2021-04-13

Application

Bishop, Kevin

Information about applicant

Project leader: Kevin Bishop
Doctoral degree: 1993-07-17
Birthdate: 19600422
Academic title: Professor
Gender: Male
Employer: Sveriges lantbruksuniversitet
Administrating organisation: Sveriges lantbruksuniversitet
Project site: Aquatic Sciences and Assessment

Information about application

Call name: Research Grants Open call 2021 (Natural and Engineering Sciences)
Type of grant: Research Project Grant
Focus: Natural and engineering sciences
Call for proposals subject area: NE

Project title: Kasta ljus på den mörka reduktion som mobiliserar kvicksilver i torv
Project start: 2022-01-01
Project end: 2025-12-31
Review panel applied for: NT-A
Classification code: 10506. Geochemistry
Keywords: mercury reduction, dissovled gaseous mercury, peat acrotelm, chronosequence, mercuric reductase genes

Funds applied for

Year:	2022	2023	2024	2025	Total amount applied
Amount:	990,821	1,424,569	1,147,632	434,145	3,997,167

Participants

Participating researchers: Stefan Bertilsson
Doctoral degree: 1999-05-21
Birthdate: 19690619
Academic title: Professor
Gender: Male
Employer: Sveriges lantbruksuniversitet
Country: Sweden

Participating researchers: Erik Björn
Doctoral degree: 2003-10-10
Birthdate: 19740228
Academic title: Professor
Gender: Male
Employer: Umeå universitet
Country: Sweden

Participating researchers: Mats Nilsson
Doctoral degree: 1992-06-10
Birthdate: 19560229
Academic title: Professor
Gender: Male
Employer: Sveriges lantbruksuniversitet
Country: Sweden

Participating researchers: Stefan Osterwalder
Doctoral degree: 2016-05-17
Birthdate: 19850129
Academic title: Doctor
Gender: Male
Employer: Universität Basel
Country: Switzerland

Participating researchers: Ulf Skyllberg
Doctoral degree: 1993-10-15
Birthdate: 19610907
Academic title: Professor
Gender: Male
Employer: Sveriges lantbruksuniversitet
Country: Sweden

Participating researchers: Wei Zhu
Birthdate: 19860320
Gender: Male
Country: Sweden
Doctoral degree: 2015-01-17
Academic title: Doctor
Employer: Sveriges lantbruksuniversitet

Descriptive information

Project title (Swedish)

Shedding light on the dark reduction mobilizing mercury in peat acrotelm

Project title (English)

Kasta ljus på den mörka reduktion som mobiliserar kvicksilver i torv

Abstract and popular scientific description

Please note that the abstract may be used when distributing the application to the reviewers taht will make the scientific assessment of it.

Abstract (English)

Anthropogenic Hg emissions to the atmosphere have increased this potent neurotoxin in ecosystems. Efforts to control Hg pollution has halved atmospheric Hg over Sweden since 1980. The first annual Hg mass-balance for a boreal peatland that measured peat-atmosphere exchange revealed so much Hg evasion that the mire will have recovered in decades, rather than in centuries as previously believed. Producing this mass balance was a methodological challenge, but explaining it presents new scientific challenges. The time Hg spends in the uppermost decimeters of peat between atmospheric deposition on the surface and long-term immobilization deeper in the peat is a period when remobilization is possible, provided the pollution legacy Hg can be reduced to dissolved gaseous Hg (DGM) in the absence of light. Dark Hg reduction can do this. Despite the potentially critical role of such processes though, they remain poorly characterized. We will test the hypothesis that dark Hg reduction controls the rate at which legacy Hg evades from peatlands and explore how both biotic and abiotic processes associated with specific microbial metabolic pathways interact to control dark Hg reduction. Hg evasion and porewater DGM measurements will test that this product of dark Hg reduction is driving the evasion. Reduction assays on microcosms will investigate the roles of specific processes associated with different microbial metabolic pathways in controlling the dark Hg reduction creating DGM.

Popular scientific description (Swedish)

Förekomsten av förhöjda halter av kvicksilver i miljön utgör fortfarande ett omfattande miljöproblem. Olika mänskliga aktiviteter såsom gruvnäring och förbränning av fossila bränslen, har ökat förekomsten av kvicksilver i atmosfär, mark, sötvatten och hav med en faktor 3 till 5. En stor del av världens länder har därför enats om att minska utsläppen av kvicksilver genom Minamata Konventionen. De kraftigt förhöjda halterna av kvicksilver i atmosfären och olika ekosystem har lett till att de flesta av Sveriges 100 000 sjöar innehåller fisk med Hg-halter som inte är säkert att äta för varken människor eller vilt enligt WHO:s gränsvärden.

En viktig del av internationella åtgärder för att minska problemet med kvicksilver i miljön är att minska utsläpp och därmed nedfallet av kvicksilver från atmosfären. Till följd av kraftiga utsläppsminskningar i Europa sedan 1970-talet, har gasformigt elementärt kvicksilver (GEM) i atmosfären över Fennoscandien minskat med 50%. Trots det kraftigt minskade nedfallet av atmosfäriskt kvicksilver så minskar halterna av kvicksilver i fisk ytterst långsamt i Fennoscandien. Detta beror på att kvicksilver, under många århundraden har ackumulerats i marken och utgör en källa för förhöjda halter kvicksilver i fisk.

Det behövs därför kunskap om hur fort ekosystemen i Fennoskandien kan återhämta sig från förhöjd kvicksilverbelastning. Dessa bedömningar kräver dock kunskap kring en nyckel-process: utbytet av GEM mellan mark och atmosfär, särskilt för torvmarker. Torvmarken har en central roll i överföringen av kvicksilver från marken till ekosystemen i sjöar och vattendrag. Dels finns stora mängder kvicksilver lagrat i torv, dels utgör torv bästa möjliga förutsättning för omvandling av oorganiskt kvicksilver till biotillgängliga former som transporteras ut och anrikas i näringskedjan i sjöar och vattendrag.

Vår forskningsgrupp har utvecklat mikro-meteorologisk tekniker för att mäta utbytet av GEM mellan mark och atmosfär. Med hjälp av denna teknik beräknade vi, för första gången, en årlig massbalans av kvicksilver för en boreal torvmark. Denna massbalans visade på en snabb avgasning av kvicksilver som över lång tid ackumulerats i torven. Med den takt som kvicksilver avgick skulle mycket av arvet från industrialiseringens ökade kvicksilver deposition vara borta på årtionden, snarare än århundraden, som man tidigare antagit. Vi antar att förklaringen till en nettoavgivning av kvicksilver från torvjord till atmosfären är en effekt av minskade GEM koncentrationer i atmosfären. Detta innebär att en minskning av kvicksilverutsläpp till atmosfären kan vara effektivare än man tidigare trott i att minska kvicksilver i insjöfisk, då torvmarker är en dominerande källa till antropogent kvicksilver i akvatiska ekosystem.

Bildningen av gasformigt kvicksilver, som avgör hur fort mängden i kvicksilver i torven kommer att minska, sker i de övre 20-40 cm innan torven kommer i den permanent vattenmättade zonen. Grundläggande hypotes för projektet är att omvandlingen till gasformigt kvicksilver och avgivning till atmosfären sker via mörker-reduktion. Trots betydelsen av den här processen är kunskapen dålig om vad som kontrollerar transformationen. Vi kommer också att bestämma vilka biologiska och fysikaliskt-kemiska faktorer som reglerar mörker-reduktion av Hg. Vi kommer att kombinera direkta mätningar i fält av avgivning av gasformigt kvicksilver och halterna av gasformigt Hg i vattnet med laboratorieexperiment och detaljerade mikrobiologiska studier. Tillsammans kommer de här resultaten att göra det möjligt att avgöra hur betydelsefull mörker-reduktion är för att minska mängden Hg i torven och därmed också bestämma hur fort kvicksilverhalterna i fisk också bör minska.

Resultaten från projektet kommer också att vara viktiga för att värdera hur betydelsefulla olika internationella initiativ, såväl inom ramen för UNEP som inom ramen för EU, varit för att minska belastningen av kvicksilver i miljön.

Planned use of research infrastructure

Specify national/international infrastructures funded by the Swedish Research Council, not local core facilities.

Planned use of research infrastructure

Yes

Research infrastructure/s

SITES – Swedish Infrastructure for Ecosystem Science

ICOS och ICOS-ERIC – Integrated Carbon Observation System

Other research infrastructure

Research description

Reporting of ethical considerations

This research is not expected to involve ethical approval since it does not involve collecting personal data or
experiments on either humans or animals.

The project includes handling of personal data

No

The project includes animal experiments

No

The project includes experiments involving human subjects

No

Sex and gender perspectives

Sex and gender perspectives in the proposed research

No

Motivate your answer

We do not anticipate sex and gender perspectives in the proposed research. This is a project in natural sciences
with a basic research orientation, aiming to collect new data, explore important processes occurring in natural systems and obtain fundamental knowledge about the functioning of our environment. We do not see gender perspectives in teh research questions.

This project will be conducted in accordance with the European Code of Conduct for Research Integrity. This includes working conscientiously to avoid discrimination on the basis of gender or other criteria.

Research description

Attach your research plan in the field below in accordance with the instructions in the call text.

Click the folder-button to locate the PDF-file on your computer and upload it to the application form.

Research plan

See following page for attachment

Purpose and aims: The threat from mercury pollution has united 120 nations in the UNEP Minamata Convention. This work is particularly important for Sweden where the majority of over 100,000 lakes fail EU standards and have fish that are unsafe to eat.[1] Despite a halving of gaseous elemental mercury (GEM) in the atmosphere over Fennoscandia relative to peak pollution levels in the 1980s, the prospects for fresh water recovery have appeared bleak due to the legacy of mercury (Hg) pollution accumulated in the terrestrial environment.[2, 3] This legacy is especially problematic in peatlands that supply so much of both the total Hg and the highly toxic methylmercury (MeHg) to downstream aquatic ecosystems.[4] Thus diminished atmospheric GEM offered little hope of reducing mercury (Hg) levels in Fennoscandia's freshwater fish to safe levels for generations to come.[5] However that viewpoint was challenged by our team's discovery that a peatland was evading legacy Hg pollution back to the atmosphere, driven by supersaturation of dissolved gaseous mercury (DGM) in peat porewater relative to the atmosphere.[6] Subsequent research found widespread DGM supersaturation in peatland porewaters across Alaska, supporting the regional generality of this phenomenon.[7]

Finding evasion was a technical challenge – explaining and quantifying it presents new scientific challenges. What mechanisms make evasion of legacy Hg from peat possible at all when the strong binding of Hg to peat makes it a long term archive of past Hg deposition? And what controls rates of evasion across a landscape?

The time that Hg (i.e., inorganic Hg(II)) spends in the uppermost decimeters of peat between atmospheric deposition on the surface and long-term immobilization deeper in the peat catotelm is a period when remobilization and equilibration with changing atmospheric Hg concentrations is possible, provided that legacy Hg(II) can be reduced to DGM. Since DGM supersaturation occurs below the peat surface, this DGM is produced in the absence of light, ruling out photoreduction. "Dark Hg reduction" can do this. Despite its potentially critical role though, dark reduction remains poorly characterized in anoxic environments like peat, especially the role of biotic processes.[8]

We propose to distinguish the interplay of biotic and abiotic processes on dark Hg(II) reduction to form the supersaturated DGM that subsequently evades to the atmosphere. A factor of two difference in the amount of pollution legacy Hg remaining in the peat along a chronosequence of open, sphagnum-dominated mires with similar historic Hg deposition along the coast of the Bothnian Sea could be explained by plausible differences in recent Hg evasion rates.[9] This chronosequence, with well characterized biogeochemistry and microbiology, provides an excellent setting to resolve the influences on dark reduction and evasion of legacy Hg. We capitalize on this opportunity with a PhD student project combining state-of-the-art genomic, geochemical and micrometeorological methodologies.

Purpose: Test the hypothesis that dark Hg reduction controls the rate at which legacy Hg evades from peatlands, and decipher how both biotic and abiotic processes associated with specific microbial metabolic pathways interactively control dark Hg reduction.

A novel eddy covariance Hg flux measurement technique [10] will be utilized to measure Hg land-atmosphere exchange at two biogeochemical settings along the mire chronosequence where we deduced a significant difference in Hg evasion. The dynamic flux chamber technique (DFC) will establish the spatial variability of evasion within each of those settings, and porewater DGM measurements will test that this product of dark Hg(II) reduction is driving the evasion. Reduction assays on microcosms from these two settings will investigate the roles of specific abiotic processes and microbial metabolic pathways on the variation in dark Hg reduction creating the DGM supersaturation in porewater.

State-of-the-art

Peatland Hg mobility: For thousands of years, peatlands accumulated Hg from atmospheric deposition. Northern hemisphere peat Hg accumulation rates increased sharply at the onset of

the industrial period in the mid-1800s.[11] Each year, a small fraction of previously deposited legacy Hg pollution is exported from peatlands to fresh waters, some of it as methylmercury (MeHg).[5] This suffices to make peatlands important sources of the Hg that biomagnifies in downstream aquatic ecosystems. It was long thought that this lateral export was the main factor moving legacy Hg out of peatlands. A review of recent Hg research, however, emphasized new discoveries about Hg mobility in landscapes, often as a result of climate change, but also due to recent reductions in atmospheric Hg concentrations.[12, 13]

While Hg fixed in the peat catotelm is an archive of past deposition, recent findings indicate that Hg in the overlying peat acrotelm (down to ca 50cm depth, just below the lowest water table) can be remobilized after deposition.[14-17] The remobilization of pollution legacy Hg from soils/peat back to the atmosphere is consistent with the existence of a balance between atmospheric GEM and terrestrial surfaces. This means that a surface, such as a peatland, can switch from being a net sink to a net source depending on the Hg concentration in the atmosphere relative to that in the terrestrial source.[3, 14] Some of the initial evidence that evasion was occurring from wetlands came from short term chamber studies.[15, 16] It was, however, our quantification of annual atmospheric Hg exchange on a peatland using relaxed eddy accumulation (Hg-REA) which indicated that evasion might halve the pool of legacy Hg in the acrotelm within decades.[6] The driver of this loss was identified as supersaturation of dissolved gaseous mercury (DGM) in the peat acrotelm. More recently, the presence of DGM supersaturation in acrotelm porewaters across Alaska confirmed this potential driver of Hg evasion from peatlands over large areas.[7] Dark Hg reduction processes were suggested by that study as the source of this DGM since it is generated below the peat surface in the absence of light for photoreduction.

Dark Hg reduction in peat acrotelm: The dark anoxic reduction of Hg(II) to Hg(0) has been identified below the photic zone of lakes, rice paddy soils (H. Hu, pers. comm.), in contaminated sites, and peat soils.[18-20] This can occur abiotically via redox reactions with electrons donated by dissolved organic matter (DOM).[21] DOM, however, can also inhibit reduction by binding Hg(II).[21, 22] Negative relationships between DOM and the ratio of DGM to Hg(II) were interpreted as a dominantly abiotic control on differences in dark Hg reduction rates.[7] Mercury isotope signatures in forest histosols from Sweden have also suggested a predominance of abiotic reduction.[23]

Biotic, microbially mediated dark reduction of Hg also occurs. The best known example is the Hg resistance (*mer*) system found in a number of bacterial and archaeal linages, most of them being aerobic. The expression of *merA* which regulates production of the mercuric reductase enzyme is triggered by µM concentrations of Hg in bacterial growth media.[24] The *mer* system is generally regarded as a means for cells to detoxify and excrete Hg(II). This has been studied extensively in contaminated sites under oxic conditions, however expression of *merA* was also observed at low Hg concentrations in Arctic lakes and coastal water.[19, 25, 26] The bioavailable Hg(II) levels that caused expression of *merA* in those waters are similar to Hg(II) levels observed in peatlands.

Another form of biotic Hg reduction, distinct from the *mer* operon, has been identified in Hg sensitive, metal reducing bacteria (e.g. *Shewanella oneidensis* MR-1, *Geobacter metallireducens* GS-15, and *Geobacter sulfurreducens* PCA).[27-29] A central role of suitable electron donors and acceptors (such as ferric oxyhydroxide, oxygen, or fumarate) are some of the few things elucidated so far about this relatively unrecognized and poorly studied type of dark and anoxic Hg reduction.

Land Atmosphere Exchange: Dark reduction creates DGM supersaturation in peat porewater, but it is evasion of this DGM that can accelerate depletion of legacy Hg in peatlands. The lack of accurate techniques for determining GEM exchange between the atmosphere and terrestrial surfaces at relevant spatial and temporal scales has contributed to great uncertainty in annual global land-atmosphere exchange. Current estimates lie somewhere between - 500 Mg a^{-1} and

+1500 Mg a^{-1}, with the uncertainty range similar in size to annual anthropogenic emissions.[3, 30]

Flux chambers measure surface exchange, but are generally difficult to interpret quantitatively. Dynamic flux chambers better quantify short term land-atmosphere exchange rates as verified against micrometeorological techniques.[31, 32] Even many micrometeorological methods, however, are compromised by difficulties and assumptions in measuring ambient Hg fluxes. Development of Hg-REA a decade ago improved the possibilities for accurate, long-term flux determination.[33] The first year-round Hg-REA deployment on a peatland indicated that Hg evasion rates correlated to seasonal variation in DGM concentration (Fig. 1). Given the complex mixture of solid, liquid and gas in the unsaturated acrotelm that lies between the atmosphere and pore water DGM below the water table, more simultaneous measurements of Hg evasion and DGM are needed to generalize that relationship.[18]

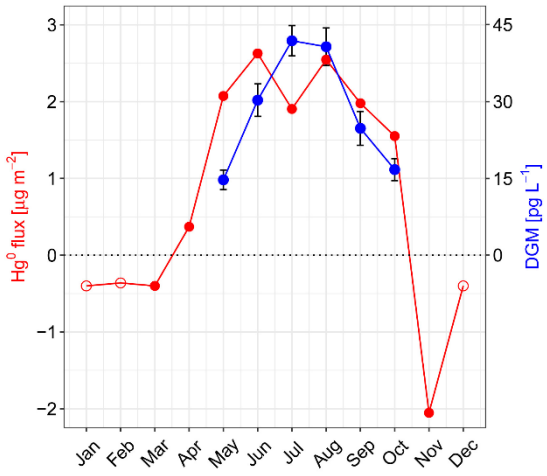

Fig. 1. Monthly sum of net REA Hg(0) flux (red), and average dissolved gaseous mercury (DGM) concentration (blue) (5)

Hg-REA was also able to measure sea-atmosphere exchange, despite the generally smaller Hg gradients above the sea.[34] Useful as REA can be though, it is technically challenging. This prompted Co-PI Osterwalder, who led the development of Hg-REA, to make a major breakthrough in Hg eddy covariance (Hg-EC), enabling Hg flux quantification over natural surfaces.[10] The EC technique is the only direct flux measurement method that avoids assumptions that compromise other methods (e.g. aerodynamic gradient or modified Bowen ratio). Thus CO_2-EC and CH_4-EC are the foundation for global research on land-atmosphere exchange of greenhouse gases. The breakthrough in Hg-EC was achieved by measuring Hg in ambient air at 1 Hz with a Lumex RA-915 AM mercury monitor (Lumex Ltd.). Since the 2020 proof of concept article,[10] the Hg-EC system has been improved to measure Hg at higher frequencies (16 Hz) and flow rates. We expect Hg-EC to provide more accurate peatland-atmosphere exchange measurements than were possible with Hg-REA, while at the same time being simpler and more reliable.

Significance and scientific novelty

The growing evidence of Hg mobility in the acrotelm challenges current paradigms of Hg cycling in peatlands.[13] The insights we expect from this project will build a process level understanding for quantifying dark reduction and atmospheric evasion of pollution legacy Hg from peat acrotelm. This has implications for how aquatic ecosystems may recover from Hg contamination. This directly answers to the UNEP Minamata Convention call (Article 19) for research on the effectiveness of Hg emissions control for reducing exposure of people and wildlife to Hg.

The approaches taken in this proposal are founded on a decade of successful research on Hg mobilization in peatlands and deepening insights on the research potential of mire chronosequences. The proposal's novelty lies partly in the techniques to be applied. This will be only the second operational deployment of Hg-EC, and will operate two systems simultaneously on mires predicted to evade Hg at significantly different rates. The cultivation-independent molecular methods to describe microbial communities mediating Hg reduction are also at the cutting edge of a rapidly developing field. The alteration of key biogeochemical properties and microbial metabolic pathways in reduction assays will distinguish the relative importance of abiotic and biotic processes, as well as their interrelationships. New insights will be made about

dark Hg reduction which is a key nexus of the Hg cycle in peatlands. The most novel feature of the project, though, is selection of study sites and methodologies that enable powerful tests of our hypotheses about the influences on dark Hg reduction, and how differences in that reduction determine the rate at which evasion removes legacy Hg from the peat acrotelm. That power derives from recently acquired knowledge about the shifts in geochemistry and microbial ecology along a mire chronosequence which spans much of the range in mire biogeochemistry found across Sweden.[9, 35-37]

Preliminary and previous results

Isostatic uplift along the Baltic coast north of Umeå created a mire chronosequence with ages now varying from a century to several millennia within a distance of less than 10 km (Fig. 2). Increasing separation of the acrotelm from the underlying minerogenic soils due to increasing total peat depth results in a geochemical gradient in the acrotelm along the chronosequence.[9, 38, 39] The atmospheric Hg deposition is expected to be the same on these mires that have been open and sphagnum dominated throughout their existence. Indeed the amount of Hg in the uppermost 2 cm of 60 peat cores from across the chronosequence were almost identical, with changes appearing first deeper in the cores (Table 1).[9, 36, 40] Investigation of Hg methylation in the 10 cm peat layer immediately below the water table revealed that at the younger end of the chronosequence (centennial ages) there was significantly more MeHg but less total Hg than at the geochemically less diverse, older end of the chronosequence (millennial ages). If this difference was caused entirely by more evasion of legacy Hg from the younger mires, that corresponds to 5 μg m^{-2} more evasion in the 30 years since atmospheric Hg declined sharply over Sweden.[9] If evasion from the older mires was similar to that observed from an older mire during 2013-2014,[6] then the average evasion from the younger mires would have been 14 μg m^{-2}. Subsequent to these findings based on a 10 cm peat layer, the Hg content in the entire peat acrotelm to 50 cm was determined in chronosequence mires. The mean Hg pool of older lawn peats was 50% more than under the lawn peats of younger mires (Table 1).[40] Preliminary ^{210}Pb ages show similar dates at 50 cm across the chronosequence (C. Olid, pers. comm.) meaning that if Hg deposition was the same on the open mires along the chronosequence, post-depositional remobilization created the acrotelm Hg pool differences.

Another key finding from the chronosequence was that while some geochemical features varied, others did not. The pore water MeHg, as well as some potential electron acceptors (e.g. Fe) were higher at the younger end of the chronosequence while the porewater inorganic Hg, bioavailable Hg(II), DOM and its specific ultraviolet absorbance did not differ significantly (Table 1).[35, 36] These observations call into question the prevailing view that abiotic factors (in particular DOM) regulate dark Hg reduction in wetlands.[7] What did differ along the chronosequence, besides certain electron acceptors, were the microbial communities as determined both by 16sRNA and experimental microcosm manipulations.[38] Hg methylation in the younger mires was dominated by dissimilatory metal reducers, whereas methanogens and syntrophic microbial partnerships were more important in the older mires.

Table 1. Chronosequence mires: young vs. Old

	Young	Old
Differences		
Hg in 10 cm layer below water table	37 ng g^{-1}	73 ng g^{-1}
Hg in upper 50 cm (peat lawns)	1.2 mg m^{-2}	1.8 mg m-2
porewater MeHg	3.2 ng L^{-1}	2.3 ng L^{-1}
porewater total Fe	43 ng L^{-1}	19 ng L^{-1}
Microbial communities	metal reducing	syntrophy & methanogens
Similarities		
Surface Hg (2cm)	19 hg g^{-1}	20 ng g^{-1}
Porewater DOC	56 mg L^{-1}	56 mg L^{-1}
Porewater Hg(II)	2.6 ng L^{-1}	2.9 ng L^{-1}

VR contribution to the previous research and preliminary results: VR initially funded research on how atmospheric deposition of sulfur influenced the cycling of Hg in peatlands (Dnr 2001-1543). The realization that Hg could be lost from the acrotelm led to a new VR project to quantify Hg evasion by developing Hg-REA (Dnr 2009-3914). This was also the basis for Osterwalder's PhD at the University of Basel, where Bishop and Nilsson were co-supervisors. The VR funded China cooperation in the Sino-Swedish Mercury Management Research Framework 2014-2018 (Dnr 2013-6978) contributed to investigations of Hg microbiology and geochemistry along the mire chronosequence. An ongoing project (Dnr 2018-04695) is creating a conceptual model of the influence of atmospheric Hg on peat as an archive of Hg where measurements of the isotope signature in solid peat and the pore atmosphere are central features. The current proposal has a different focus than the ongoing project, even though the isotope signatures will provide a useful clue about the relative roles of abiotic and biotic dark reduction since biotic processes do not generate mass independent fraction, while abiotic reduction does.[41-43] Interpretation of such processes from Hg isotope signatures, however, is fraught with uncertainties. The microcosm reduction assays in our new proposal are a more precise way to identify the role of specific abiotic and biotic mechanisms.[44] The ongoing VR project also has no measurement of Hg reduction or current peat-atmosphere exchanges, making our new proposal complementary to that ongoing VR project which concludes in 2021.

Project description

Theory and method: We will test whether differences in rates of dark Hg reduction are responsible for differences in the rate at which legacy Hg leaves peatlands. We will also determine whether these differences relate to the roles of biotic and/or abiotic dark reduction associated with syntrophic microbial metabolic pathways as well as peat with a greater prevalence of metal reducers.

This study is based on the situation along a chronosequence of open, sphagnum-dominated mires where the amount of legacy Hg in the acrotelm differs despite similar levels of historical Hg deposition. Several key geochemical properties are similar along the chrono-sequence, including DOC, its quality and modelled Hg(II) speciation. Differences in dark reduction when these factors are similar is at odds with the conclusions of the most comprehensive study to date on dark reduction in peat porewaters which suggested that abiotic processes related to DOM and Hg(II) were responsible for differences in DGM and dark Hg reduction.[7]

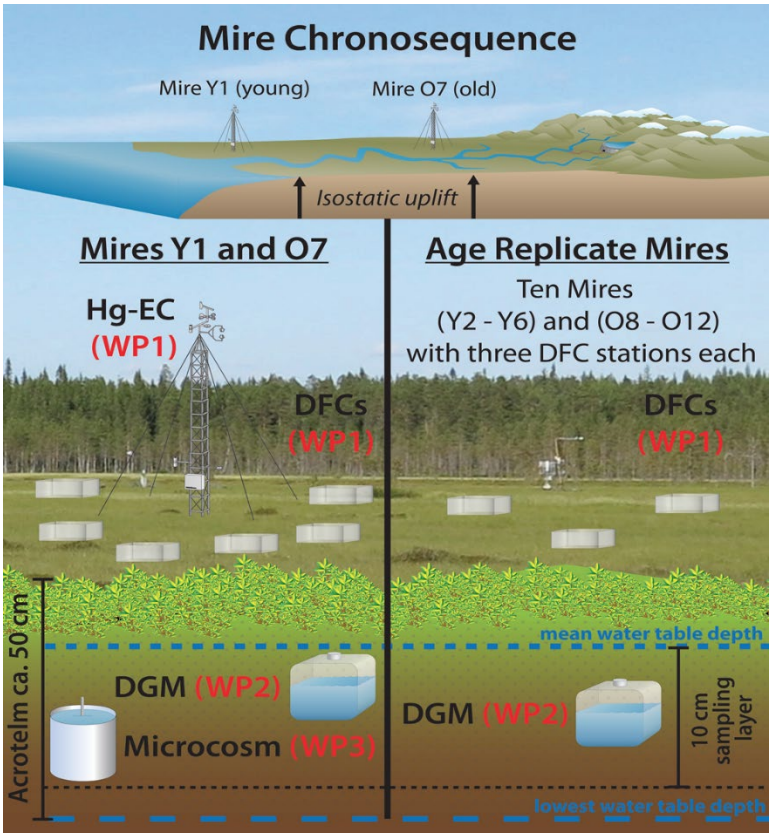

Fig. 2. Observations at each end of the chronosequence.

What does differ along the chronosequence are the electron acceptors and the microbiology. Metal reducing microbial communities are more predominant in younger mires, while methanogenic and syntrophic communities characterize older mires. Higher concentrations of some electron acceptors at the younger end of the chronosequence may also enhance the activity of Hg(II)-sensitive metal reducing bacteria, and thus that type of biotic Hg(II) dark reduction. Methylation assays of peat also responded differently to inhibition of specific microbial metabolisms depending on location along the chronosequence.[38] This motivates our interest in improving the understanding of controls on dark Hg reduction by resolving the relative roles of biotic and abiotic processes.

Mercury peat-atmosphere exchange will be measured with the first ever year-round deployment of a revolutionary new Hg-EC on two peatlands, supported by shorter-term chamber measurements on another five young and five old mires. This will assess differences in Hg fluxes above two distinctive biogeochemical settings (WP1, Fig. 2). The DGM supersaturation below the peat surface presumed to drive differences in these fluxes between sites, and seasonally within the sites, will be measured along with genomic markers and geochemical parameters (WP2, Fig. 2). Mercury reduction assays in microcosm incubations will use amendments to experimentally explore the factors influencing dark reduction and DGM production in these peatlands (WP3, Table 2).

Time plan and Implementation: A PhD student will be recruited for the project.

Time Plan	2022				2023				2024				2025			
WP1: Peatland-atmosphere exchange																
WP2: Dark Hg reduction as DGM driver																
WP3: Microcosm reduction assays																
WP4: Synthesis																

WP 1: Peatland-atmosphere exchange

Objective: *Determine the difference in peatland-atmosphere Hg exchange from two mire types with contrasting geochemical settings and microbial communities*

Research Questions:

- *Do differences in Hg fluxes explain differences in pollution legacy Hg stored in the acrotelm along the chronosequence?*
- *Are Hg fluxes from the Hg-EC footprint representative of the fluxes in the geochemical settings at each end of the mire chronosequence?*

Two Hg Eddy Covariance Systems (Hg-EC) will be deployed for two years, one at each end of the mire chronosequence (Fig. 2). The high resolution Hg concentration (16 Hz) is measured with improved Lumex RA-915 AM mercury monitors (Lumex Ltd.) using atomic absorption spectroscopy.[10] The Hg-EC measurements will be complemented by hour long deployments of Dynamic Flux Chambers (DFCs) to measure spatial variability in fluxes (Fig. 2). The Hg flux is measured by drawing air through the DFC and over a pair of gold cartridges.[45] From May to September DFCs will measure flux fortnightly at six locations in the footprint of each Hg-EC (Mires Y1 and O7, 60 observations per year). Five young and five old “age replicate” mires (mires Y2-Y6, and O8-012) will also have DFC deployed monthly at three locations on each mire. (120 measurements from the 30 DFC stations annually)

WP 2: Dark Hg reduction as the driver of evasion via DGM supersaturation

Objective: Relate the concentration of Hg(0) in peat porewater (DGM) with measured peat-atmosphere Hg exchange fluxes and biogeochemical parameters in the acrotelm.

Research Questions:

- *Which geochemical parameters associated with dark Hg(II) reduction co-vary with DGM supersaturation between sites, and over time at a given site?*
- *Do microbial community composition or the abundance and expression of marker genes for biotic dark Hg reduction covary with DGM and/or geochemical parameters?*
- *Can Hg peat-atmosphere exchange be predicted from porewater concentrations of DGM?*

Porewater DGM concentrations will be measured under each DFC deployment from WP1. The solid peat will be characterized geochemically and for the composition of the total and Hg reducing microbial communities by parallelized Illumina sequence analysis of 16sRNA and *merA* gene amplicons. Additionally, the expression of *merA* genes will be quantified by RT-QPCR targeting the same genes.[46] This will be done in May, July and Sept. in porewater samples taken in the 10 cm peat layer just below the annual average water table. Chemical parameters include concentrations of S(-II) [$=H_2S+HS^-$],[47] Fe(II) and Fe(III) by the Ferrozine method,[48] total Fe, pH, DOC, $SUVA_{254}$, low molecular weight organic acids (LMW), and concentrations of total Hg and MeHg. The electron donating capacity of the peat will be determined by Fe(II) titration.[49] The speciation of bioavailable Hg(II) will be modeled. The redox status of the peat samples will be indirectly determined by S K-edge XANES.[50] That method provides a distribution of sulfur oxidation states that serves as a long-term (months-years) redox-proxy. The concentration of organic matter associated thiol groups will be determined with Hg L_{III}-edge EXAFS spectroscopy, following the method of Skyllberg et al.[51]

WP 3: Microcosm reduction assays

Objective: Determine the sensitivity of DGM production by dark Hg(II) reduction to amendments enhancing or inhibiting specific abiotic processes and metabolic groups of microorganisms

Research Questions:

- *Do dark Hg(II) reduction rates in porewater and peat differ along the chronosequence?*
- *Does suppression of specific metabolic processes influence Hg(II) reduction and DGM production and what are the important microbial groups?*
- *How important is the abiotic dark Hg(II) reduction mediated by DOM for DGM formation?*
- *How is the expression of merA influenced by altering environmental factors?*

We will measure the DGM formation potential to decipher the response of dark Hg(II) reduction to amendments/treatments that regulate the specific processes explained below.

Porewater microcosms: Porewater will be collected from the 42 DGM sampling locations without exposure to air and purged of DGM with N_2. Half of the water will be filter-sterilized (0.2 µm) to separate effects of biotic and abiotic Hg(II) reduction in porewater. Four vials will be prepared in the glove box (two filter-sterilized, two unfiltered). A spike of Hg(II) (e.g., ($Hg(NO_3)_2$) will be added to one of the filtered and unfiltered vials. After 6, 12 and 24 hours, DGM in each vial will be measured by purge and trap using a CVAFS analyzer (Tekran 2537). Afterwards, remaining Hg(II) will be analyzed to close the mass balance.

Solid peat microcosms: An anoxic slurry of peat will be prepared in a glove box. Some samples will be sterilized with formaldehyde to stop enzymatic processes. The slurry will be purged with N_2 to remove existing DGM and then distributed into microcosms. A set of seven amendments (plus a control and a sterile sample) will either inhibit or stimulate certain processes according to

the table below adapted from our previous methylation and reduction assays.[38, 44] A spike of Hg(II) will be added to the microcosms. The DGM in the supernatants will be analyzed after purge and trap on a Tekran CVAFS analyzer at 6, 12 and 24 hours. The CH_4 and CO_2 in the supernatant will be measured as an indicator of microbial activity. In the reacted peat quantitative RT-PCR will assess expression of *merA*.

Table 2 Microcosm amendments and their intended effects

Manipulations	Substance	Target
Mo	Na_2MoO_4	Inhibit sulfate-reduction and syntrophic fermentation
BES	2-bromoethanesulphonate	Inhibit methanogensis and methanogenic part of syntroph
MoBES	Na_2MoO_4+BES	Inhibit sulfate-reduction, methanogensis and syntrophy
SO_4^{2-}	Na_2SO_4	Stimulate sulfate-reduction
Fe	FeOOH	Stimulate iron-reduction
LBP	lac+ but+ pro	Stimulate syntrophy
Azide poisining	Azide	No Respiration left, only methnogenesis and fermentation
Sterile	Formaldehyde	Denature proteins, only abiotic processes left
Control	No addition, no treatment	Original states

WP 4: Synthesis

***Objective**: Develop a conceptual model of how environmental influences on dark Hg reduction control DGM supersaturation and the fate of legacy Hg pollution in peatlands.*

Research Questions:

- *Does dark Hg reduction determine the rate at which pollution legacy Hg in peat acrotelm will respond to changes in atmospheric Hg concentrations?*
- *What are the relative roles of biotic and abiotic processes in dark Hg reduction?*
- *How do season and microbial metabolisms influence DGM production by dark Hg reduction?*

This synthesis will seek to go from answering specific questions about differences in legacy Hg and dark Hg reduction along the chronosequence to a better understanding of Hg cycling in mires.

Basic equipment available and infrastructure needs: All the required infrastructure, biological and geochemical techniques are available through integration of the cross-disciplinary expertise of the project team. The DNA and RNA-based methodologies are established within Bertilsson's research group. The geochemical methods are from Prof. Björn's group and the Umeå Trace Analytical Platform, while the speciation models and synchrotron measurements are provided by Prof. Skyllberg. Dr. Zhu provides the DFCs as well as the lab for microcosm reduction assays. The ICOS research infrastructure station Degerö (Led by Prof. Nilsson, funded by VR) provides access to one of the well-characterized chronosequence sites, and will support deployment of one Hg-EC flux system (co-deployed with ongoing long-term CO_2, and CH_4 eddy covariance systems). For WP1, an SLU infrastructure grant provides the two Hg-EC systems, a Tekran 2537 and salary for Dr. Osterwalder to deploy and operate them. An ongoing Formas project led by Nilsson on the mire chronosequence provides background geochemistry and vegetation data.

International and national collaboration: Cooperation with research groups in Switzerland and China have been critical to establishing the hypotheses and methodologies in this proposal. The cooperation will be continuing through collaboration with Dr. Hu who left SLU in 2021 to take a position at the Chinese Academy of Sciences.

Other applications or grants: The main applicant is leading a three year VR project that seeks to establish a conceptual model for atmospheric control of Hg deposition/evasion in the peat archive that is based on Hg isotopes. That project is complementary, with no shared measurements.

Project Organization and collaboration. The role of project participants/partners.

Prof. Kevin Bishop researches the factors which make peatlands hot spots of mercury to downstream surface waters. He will be the principal supervisor of the PhD student.

Doktorand N.N. The PhD student to be recruited will have responsibility for implementing the project plan with mentorship from the co-applicants.

Prof. Stefan Bertilsson is an authority on microbial ecology who uses innovative genomic methods to understand environmental processes, including those related to Hg cycling.

Prof. Erik Björn leads the Umeå Trace Analysis Platform. He uses his skills as an analytical chemist in Hg speciation and transformation studies, including microcosm experiments.

Dr. Haiyan Hu is biogeochemist who has pioneered advances in Hg reduction and Hg-related genomics. She led key work on the chronosequence and will collaborate in this project.

Prof. Mats Nilsson is biogeochemist at the forefront of boreal peatlands research for decades. He recognized and promoted the scientific potential in the mire chronosequence.

Dr. Stefan Osterwalder is an atmospheric scientist investigating Hg cycling at terrestrial, marine and contaminated sites. He has pioneered novel Hg flux methods such as Hg-EC.

Prof. Ulf Skyllberg is a world leader in Hg soil chemistry who has advanced the understanding of Hg cycling with synchrotron based measurements and speciation modeling.

Dr. Wei Zhu is an early career scientist with major accomplishments in measuring Hg land-atmosphere fluxes as well as dark Hg reduction processes.

References

1. Åkerblom, S.; Bignert, A.; Meili, M.; Sonesten, L.; Sundbom, M., *AMBIO* **2014,** *43*, (1), 91-103.
2. Meili, M.; Bishop, K.; *et al*, *Sci. Total Environ* **2003,** *304*, (1–3), 83-106.
3. Agnan, Y.; Le Dantec, T.; *et al*, *Environ. Sci. Technol.* **2016,** *50*, (2), 507-524.
4. Branfireun, B.; Cosio, C.; Poulain, A.; Riise, G.; Bravo, A., *Sci. Total Environ* **2020,** *745*, 140906.
5. Munthe, J.; Bodaly, R. A.; *et al*, *AMBIO* **2007,** *36*, (1), 33-44.
6. Osterwalder, S.; Bishop, *et al*, *Scientific Reports* **2017,** *7*, (1), 16022.
7. Poulin, B. A.; Ryan, J. N.; Tate, M. T.; Krabbenhoft, D. P.; Hines, M. E.; Barkay, T.; Schaefer, J.; Aiken, G. R., *Environ. Sci. Technol.* **2019,** *53*, (11), 6203-6213.
8. Grégoire, D. S.; Lavoie, N. C.; Poulain, A. J., *Environ. Sci. Technol.* **2018,** *52*, (7), 4145-4153.
9. Wang, B.; Nilsson, M. B.; *et al*, *Science of The Total Environment* **2020,** *718*, 137306.
10. Osterwalder, S.; Eugster, W.; *et al*., *Atmos. Meas. Tech.* **2020,** *13*, (4), 2057-2074.
11. Enrico, M.; Le Roux, G.; *et al*., *Environ. Sci. Technol.* **2017,** *51*, (11), 5899-5906.
12. Obrist, D.; Kirk, J. L.; *et al*, *Ambio* **2018,** *47*, (2), 116-140.
13. Bishop, K.; Shanley, J. B.; *et al*, *Science of The Total Environment* **2020,** *721*, 137647.
14. Biester, H.; Bindler, R.; *et al*, *Environ. Sci. Technol.* **2007,** *41*, (14), 4851.
15. Haynes, K. M.; Kane, E. S.; et al., *Atmospheric Environment* **2017,** *154*, 247-259.
16. Lindberg, S. E.; Dong, W.; *et al*, *Atmospheric Environment* **2005,** *39*, (7).
17. Rydberg, J.; Karlsson, J.; *et al*, *Geochimica Et Cosmochimica Acta* **2010,** *74*, (24), 7116-7126.
18. Zhou, J.; Wang, Z.; Zhang, X.; Driscoll, C. T., *Environ. Sci. Technol.* **2021,** *55*, (3), 2132-2142.
19. Peretyazhko, T.; Charlet, L.; *et al*, *Science of The Total Environment* **2006,** *364*, (1–3), 260-271.

20. Poulain, A. J.; Amyot, M.; Findlay, D.; Telor, S.; Barkay, T.; Hintelmann, H., *Limnology and Oceanography* **2004,** *49*, (6), 2265-2275.
21. Gu, B. H.; Bian, Y. R.; *et al*, *P Natl Acad Sci USA* **2011,** *108*, (4).
22. Zheng, W.; Liang, L. Y.; Gu, B. H., *Environ. Sci. Technol.* **2012,** *46*, (1), 292-299.
23. Jiskra, M.; Wiederhold, J. G.; Skyllberg, U.; Kronberg, R.-M.; Hajdas, I.; Kretzschmar, R., *Environ. Sci. Technol.* **2015,** *49*, (12), 7188-7196.
24. Barkay, T.; Miller, S. M.; Summers, A. O., *FEMS Microbiology Reviews* **2003,** *27*, (2-3), 355-384.
25. Brazeau, M. L.; Blais, *et al*, *Appl Geochem* **2013,** *37*, 142-148.
26. Poulain, A. J.; Chadhain, S. M. N.; et al, *Appl Environ Microb* **2007,** *73*, (7), 2230-2238.
27. Wiatrowski, H. A.; Ward, P. M.; Barkay, T., *Environ. Sci. Technol.* **2006,** *40*, (21), 6690-6696.
28. Lovley, D. R.; Giovannoni, et al., *Archives of microbiology* **1993,** *159*, (4), 336-344.
29. Hu, H.; Lin, H.; Zheng, W.; Rao, B.; Feng, X.; Liang, L.; Elias, D.; Gu, B., *Environ. Sci. Technol.* **2013,** *47*.
30. Horowitz, H. M.; Jacob, D. J.; Zhang, Y.; Dibble, T. S.; Slemr, F.; Amos, H. M.; Schmidt, J. A.; Corbitt, E. S.; Marais, E. A.; Sunderland, E. M., *Atmos. Chem. Phys.* **2017,** *17*, (10), 6353-6371.
31. Sommar, J.; Osterwalder, S.; Zhu, W., *Science of The Total Environment* **2020,** *721*, 137648.
32. Zhu, W.; Lin, C. J.; Wang, X.; Sommar, J.; Fu, X.; Feng, X., *Atmos. Chem. Phys.* **2016,** *16*, (7), 4451-4480.
33. Osterwalder, S.; Fritsche, J.; Alewell, C.; Schmutz, M.; Nilsson, M. B.; Jocher, G.; Sommar, J.; Rinne, J.; Bishop, K., *Atmos. Meas. Tech.* **2016,** *9*, (2), 509-524.
34. Osterwalder, S.; Nerentorp Mastromonaco, M.; Zhu, W.; Jiskra, M.; Nilsson, E.; Nilsson, M.; Rutgersson, A.; Soerensen, A. L.; Sommar, J.; Wallin, M. B.; Wängberg, I.; Bishop, K., *Global Biogeochem Cycles* **2021**.
35. Wang, B. Mercury methylation in boreal peatlands: Influence of geochemistry and biology. PhD Theis. Swedish University of Agricultural Sciences, 2020.
36. Wang, B.; Zhong, S.; Bishop, K.; Nilsson, M.; Hu, H.; Eklöf, K.; Bravo, A. G.; Skyllberg, U., *Geochim. Cosmochim. Acta* **2021**.
37. Wang, B.; Hu, H.; Bravo, A.; Buck, M.; Bjorn, E.; Skyllberg, U.; Nilsson, M.; Bertilsson, S., Manuscript.
38. Hu, H.; Wang, B.; Bravo, et al., *Journal of Hazardous Materials* **2020,** *387*, 121967.
39. Laine, A.; Lindholm, T.; Nilsson, M.; Kutznetsov, O.; Jassey, V. E.; Tuittila, E. S., *Journal of Ecology* **2021**.
40. Smeds, J. Dependence of Total Mercury in Superficial Peat With Nutrient Status: Implications for Stability of Peat as an Archive of Hg Deposition. MSc. Thesis. Uppsala University, 2020.
41. Kritee, K.; Blum, J. D.; Barkay, T., *Environ. Sci. Technol.* **2008,** *42*, (24), 9171-9177.
42. Kritee, K.; Blum, J.; Johnson, M.; Bergquist, B.; Barkay, T., *Environ. Sci. Technol.* **2007,** *41*, (6), 1889-1895.
43. Zheng, W.; Hintelmann, H., *Journal of Physical Chemistry A* **2010,** *114*, (12), 4238-4245.
44. Zhu, W.; Song, Y.; Adediran, G. A.; Jiang, T.; Reis, A. T.; Pereira, E.; Skyllberg, U.; Björn, E., *Geochimica et Cosmochimica Acta* **2018,** *220*, 158-179.
45. Fritsche, J.; Osterwalder, S.; et al.., *Environ. Sci. Technol. Lett.* **2014,** *1*, (10), 421-425.
46. Poulain, A. J.; Aris-Brosou, S.; Blais, J. M.; Brazeau, M.; Keller, W.; Paterson, A. M., *ISME J* **2015,** *9*, (12).
47. Cline, J. D., *Limnology and Oceanography* **1969,** *14*, (3), 454-458.
48. Viollier, E.; Inglett, P..; et al, *Appl Geochem* **2000,** *15*, (6).
49. Peretyazhko, T.; Sposito, G., *Geoderma* **2006,** *137*, (1–2), 140-146.
50. Shakeri Yekta, S.; Gustavsson, J.; Svensson, B. H.; Skyllberg, U., *Talanta* **2012,** *89*, 470-477.
51. Skyllberg, U.; Bloom, P.; Qian, J.; Lin, C.; Bleam, W. F., *Environ. Sci. Technol.* **2006,** *40*, (13), 4174-4180

Budget and research resources

Activity level in the project

Role in the project	Name	Percent of full time
1 Applicant	Kevin Bishop	25%
2 Participating researcher	Stefan Bertilsson	8%
3 Participating researcher	Wei Zhu	8%
4 Participating researcher	Mats Nilsson	6%
5 Participating researcher	Ulf Skyllberg	6%
6 Participating researcher	Stefan Osterwalder	25%
7 PhD Student	n.n.	100%
8 Other personnel with doctoral degree	Haiyan Hu	6%
9 Other personnel with doctoral degree	Prune Leroy	4%

Salaries including social fees

Role in the project	Name	Percent of salary
1 PhD Student	n.n.	75%
2 Participating researcher	Mats B. Nilsson	3%
3 Participating researcher	Ulf Skyllberg	3%
4 Participating researcher	Wei Zhu	4%
5 Participating researcher	Erik Björn	2%
6 Other personnel with doctoral degree	P. Leroy	4%

Total

	2022	2023	2024	2025	Total
1	520,000	531,000	542,000	0	1,593,000
2	51,000	52,000	27,000	27,000	157,000
3	51,000	52,000	27,000	27,000	157,000
4	31,000	31,000	32,000	33,000	127,000
5	24,000	24,000	25,000	25,000	98,000
6	29,000	30,000	30,000	31,000	120,000
Total	706,000	720,000	683,000	143,000	2,252,000

Other costs

Premises

Type of premises	2022	2023	2024	2025
No information added				

Running Costs

Running Cost	Description	2022	2023	2024	2025	Total
1 Porewater analysis	Sulfide, Fe speciation, LMW done by PhD student (126 samples @50kr)	0	6,300	0	0	6,300
2 Porewater analysis	DOC & SUVA254 (126 samples @150 kr)	0	18,900	0	0	18,900
3 Porewater analysis	Cations, metals, incl. Fe, 126 samples @ 800 kr	0	88,200	0	0	88,200
4 Porewater analysis	Total Hg and MeHg (126 samples at 1500 kr)	0	176,400	0	0	176,400
5 Genomic analysis	16S rRNA (42 samples)	0	30,000	0	0	30,000
6 Genomic analysis	RT-qPCR merA (126 samples)	0	10,000	0	0	10,000
7 Genomic analysis	Sequencing of merA (42 samples),Hg and other elements (S, C, N)	0	10,000	0	0	10,000
8 Soild peat analysis	Hg and other elements 42 samples (S, C, N)	0	42,000	0	0	42,000
9 electron donation capacity done by PhD student @100 kr	electron donation capacity done by PhD student 42 samples @100 kr	0	4,200	0	0	4,200
10 Genomic analysis	Metagenome (2)	0	25,000	0	0	25,000
11 Microcosm	Porewater - 168 assays - filters and consumaples	0	0	50,000	0	50,000
12 Microcosm	Peat - 210 assays - consumables	0	0	50,000	0	50,000
13 Microcosm	270 supernatant CO2 & CH4 gas chromatograph measurements @ 100kr	0	0	27,000	0	27,000
14 Microcosm	RT-qPCR merA on 270 samples	0	0	50,000	0	50,000
15 Travel	-Field Site	7,000	10,000	7,000	0	24,000
16 Conferences	ICMGP and EGU	0	0	10,000	10,000	20,000
17 Publication	Open Access	0	0	5,000	10,000	15,000
Total		7,000	421,000	199,000	20,000	647,000

Depreciation costs

Depreciation cost	Description	2022	2023	2024	2025
No information added					

Total cost

Total Budget

	Specified costs	2022	2023	2024	2025	Total, applied
1	Salaries including social fees	706,000	720,000	683,000	143,000	2,252,000
2	Running costs	7,000	421,000	199,000	20,000	647,000
3	Depreciation costs					0
4	Premises					0
5	Subtotal	713,000	1,141,000	882,000	163,000	2,899,000
6	Indirect costs	277,821	283,569	265,632	271,145	1,098,167
7	Total project cost	990,821	1,424,569	1,147,632	434,145	3,997,167

	Other costs	Total cost
1	0	2,252,000
2	0	647,000
3	0	0
4	0	0
5	0	2,899,000
6	0	1,098,167
7	0	3,997,167

Justification of the budget applied for

Prof. Kevin Bishop is the project leader with overall responsibility for the project and supervision of the PhD stduent. As a faculty professor, his salary is covered by his department.

The PhD student will be recruited to work 100% on the project for four years. The host department covers the salary for the fourth year of PhD projects funded by research councils. The PhD student will be involved in all the work packages, including the execution of the reduction assays in WP3, and some of the analytical work in WP2 (e.g. determination of sulfide and LMW in peat porewaters).

Prof. Stefan Bertilsson is leading the genomic aspects of the project. As a faculty professor, his salary is covered by his department.

Prof. Erik Björn is responsible for several of the geochemical approaches employed in WP2 and WP3. Half of his salary is covered by ongoing, closely related projects that have synergies with this project.

Prof. Mats Nilsson will be responsible for the integration of mire ecology and geochemistry. Half of his salary will be provided by faculty funds.

Dr. Stefan Osterwalder is responsible for the Hg-EC and DFC methodologies. Half of his funding is provided by the SLU Infrastructure grant, and the other half by his home university.

Prof. Ulf Skyllberg is responsible for the synchrotron based measurements and speciation modeling. Half of his salary will be provided by faculty funds.

Dr. Wei Zhu is responsible for the reduction assays. Half of his funding is covered by ongoing, closely related projects that have synergies with this project

Instrumentation: The instrumentation for measuring land-atmosphere Hg exchanges with mercury eddy covariance, dynamic flux chambers, and the determination of dissolved gaseous mercury is provided by an SLU research infrastructure grant. This has financed two Lumex RA-915 AM mercury monitors (Lumex Ltd.), two Tekran 2537 mercury analyzers (Tekran Inc.) associated equipment, consumables and technical support for use of this instrumentation. One deployment will be at Degerö where extensive ICOS and SITES field infrastructure exists.

Analyses: Within the two study peatlands, there will be 42 DFC stations, below which porewater and peat will be measured. 12 of these stations are in the footprint of the two Hg-EC systems ("young" Y1 and "old" O7 mires, Fig 2.) The remaining 30 stations are in the 10 "age replicate mire, Y2-Y6, O8-O12, Fig. 2)". The Hg-EC will be operated for two years (June 2022-May 2024), and the DFCs will be measured biweekly on mires Y1 and O8 as well as monthly on the other ten mires, May-September. That will be 270 DFC measurements annually, for each of two years (540 total.) DGM under each DFC measurement will be measured during both years. The porewater will be sampled and analyzed for geochemical parameters during May, July and September 2023 (126 analyses as specified in WP2). One set of solid peat will be sampled and analysed as specified in WP2 (42 samples). Reduction assays will be done on the porewater from all 42 DGM sites as specified in WP3 (168 microcosms). The reductions assays on peat will be done once on peat from the ten DGM sites in the Hg-EC footprints (270 different mesocosms)

Publication Costs: Funds are needed to publish in open access journals.

Travel: Funds are needed to visit the field sites during the field season.

Conference: We expect the PhD student will present project results at the 2024 International Conference on Mercury as a Global Pollutant and the 2025 EGU.

Other funding for this project

Funder	Applicant/project leader	Type of grant	Status	Reg no or equiv.	
2022		2023	2024		2025
No information added					

Publications

Publications

Applicant's publication list

See following page for attachment

PUBLICATIONS – Kevin Bishop

Total peer reviewed publications: 267
Total citations. 9,907
i10-index: 197
H-index: 57
Bibliometry Clarivate Analytics, Web of Science (2021-04-10)

Selected Peer Reviewed Articles "*"denotes student/post-doc lead author

Bishop K., Shanley J.B., Riscassi A., de Wit H.A., Eklof K., et al. 2020. Recent advances in understanding and measurement of mercury in the environment: Terrestrial hg cycling. *Science of the Total Environment*. 721, doi.org./10.1016/j.scitotenv.2020.137647

*Wang, B., Nilsson, M.B., Eklof, K., Hu, H., Ehnvall, B., Bravo, A.G., Zhong, S., Akeblom, S., Bjorn, E., Bertilsson, S., Skyllberg, U. and **Bishop, K.** 2020. Opposing spatial trends in methylmercury and total mercury along a peatland chronosequence trophic gradient. Science of the Total Environment 718.

I designed project that led to this publication and assisted the PhD student in the writing and analysis of his first scientific publication. This paper is a key basis for the application which found the large difference in legacy Hg along the chronosequence.

Hu, H., Wang, B., Bravo, A.G., Bjorn, E., Skyllberg, U., Amouroux, D., Tessier, E., Zopfi, J., Feng, X., **Bishop, K.**, Nilsson, M.B. and Bertilsson, S. 2020. Shifts in mercury methylation across a peatland chronosequence: From sulfate reduction to methanogenesis and syntrophy. Journal of Hazardous Materials 387.

I was involved in the interpretation of the results and writing of the paper. This paper defines the differences in microbial metabolism and Hg processing along the chronosequence. .

*Akerblom, S., Nilsson, M.B., Skyllberg, U., Bjorn, E., Jonsson, S., Ranneby, B. and **Bishop, K**. 2020. Formation and mobilization of methylmercury across natural and experimental sulfur deposition gradients. Environmental Pollution 263.

I designed this project, contributed to the interpretation and writing. I mentored the post-doc who is the first author. This is a combination of manipulation studies and landscape gradients that are a background for this project.

*Wu, P., Kainz, M., Akerblom, S., Garcia Bravo, A., Sonesten, L., Branfireun, B., Deininger, A., Bergstrom, A.-K. and **Bishop, K**. 2019. Terrestrial diet influences mercury bioaccumulation in zooplankton and macroinvertebrates in lakes with differing dissolved organic carbon concentrations. Science of the Total Environment 669, 821-832.

I helped designed this project, and contributed to the interpretation and writing.
*

Wu, P., Kainz, M.J., Bravo, A.G., Akerblom, S., Sonesten, L. and **Bishop, K.** 2019. The importance of bioconcentration into the pelagic food web base for methylmercury biomagnification: A meta-analysis. Science of the Total Environment 646, 357-367.
*

Eklof, K., **Bishop, K.**, Bertilsson, S., Bjorn, E., Buck, M., Skyllberg, U., Osman, O.A., Kronberg, R.-M. and Bravo, A.G. 2018. Formation of mercury methylation hotspots as a consequence of forestry operations. Science of the Total Environment 613, 1069-1078.

I helped designed this project, and contributed to the interpretation and writing. The genomics in this project contributed to the new project.

*

*Osterwalder, S., Sommar, J., Akerblom, S., Jocher, G., Fritsche, J., Nilsson, M.B., **Bishop, K.** and Alewell, C. 2018. Comparative study of elemental mercury flux measurement techniques over a Fennoscandian boreal peatland. Atmospheric Environment 172, 16-25.

*

I mentored the PhD student who is the first author. This was a step on the way to imporving Hg flux measurements

*Osterwalder, S., Fritsche, J., Alewell, C., Schmutz, M., Nilsson, M.B., Jocher, G., Sommar, J., Rinne, J. and **Bishop, K**. 2016. A dual-inlet, single detector relaxed eddy accumulation system for long-term measurement of mercury flux. Atmospheric Measurement Techniques 9(2), 509-524.

*

I mentored the PhD student who is the first author. This was a step on the way to imporving Hg flux measurements

*Osterwalder, S., **Bishop, K**., Alewell, C., Fritsche, J., Laudon, H., Akerblom, S. et al. (2017) Mercury evasion from a boreal peatland shortens the timeline for recovery from legacy pollution. *Scientific Reports* 7.

I mentored the PhD student who is the first author. This was a step on the way to imporving Hg flux measurements

Relevant Publications 2013-2021

Laudon, H., Sponseller, R.A. and Bishop, K. 2021. From legacy effects of acid deposition in boreal streams to future environmental threats. Environmental Research Letters 16(1).

Bishop, K., Shanley, J.B., Riscassi, A., de Wit, H.A., Eklof, K., Meng, B., Mitchell, C., Osterwalder, S., Schuster, P.F., Webster, J. and Zhu, W. 2020. Recent advances in understanding and measurement of mercury in the environment: Terrestrial Hg cycling. Science of the Total Environment 721.

Finlay, R.D., Mahmood, S., Rosenstock, N., Bolou-Bi, E.B., Kohler, S.J., Fahad, Z., Rosling, A., Wallander, H., Belyazid, S., Bishop, K. and Lian, B. 2020. Reviews and syntheses: Biological weathering and its consequences at different spatial levels - from nanoscale to global scale. Biogeosciences 17(6), 1507-1533.

Gustin, M.S., Bank, M.S., Bishop, K., Bowman, K., Branfireun, B., Chetelat, J., Eckley, C.S., Hammerschmidt, C.R., Lamborg, C., Lyman, S., Martinez-Cortizas, A., Sommar, J., Tsui, M.T.-K. and Zhang, T. 2020. Mercury biogeochemical cycling: A synthesis of recent scientific advances. Science of the Total Environment 737.

Hu, H., Wang, B., Bravo, A.G., Bjorn, E., Skyllberg, U., Amouroux, D., Tessier, E., Zopfi, J., Feng, X., Bishop, K., Nilsson, M.B. and Bertilsson, S. 2020. Shifts in mercury methylation across a peatland chronosequence: From sulfate reduction to methanogenesis and syntrophy. Journal of Hazardous Materials 387.

Jing, M., Lin, D., Wu, P., Kainz, M.J., Bishop, K., Yan, H., Wang, R., Wang, Q. and Li, Q. 2020. Effect of aquaculture on mercury and polyunsaturated fatty acids in fishes from reservoirs in Southwest China. Environmental Pollution 257.

Kolbe, T., Marcais, J., de Dreuzy, J.-R., Labasque, T. and Bishop, K. 2020. Lagged rejuvenation of groundwater indicates internal flow structures and hydrological connectivity. Hydrological Processes 34(10), 2176-2189.
van Meerveld, H.J.I., Sauquet, E., Gallart, F., Sefton, C., Seibert, J. and Bishop, K. 2020. Aqua temporaria incognita. Hydrological Processes 34(26), 5704-5711.
Wang, B., Nilsson, M.B., Eklof, K., Hu, H., Ehnvall, B., Bravo, A.G., Zhong, S., Akeblom, S., Bjorn, E., Bertilsson, S., Skyllberg, U. and Bishop, K. 2020. Opposing spatial trends in methylmercury and total mercury along a peatland chronosequence trophic gradient. Science of the Total Environment 718.
Wu, Q.Q., Hu, H.Y., Meng, B., Wang, B.L., Poulain, A.J., Zhang, H., Liu, J.L., Bravo, A.G., Bishop, K., Bertilsson, S. and Feng, X.B. 2020. Methanogenesis Is an Important Process in Controlling MeHg Concentration in Rice Paddy Soils Affected by Mining Activities. Environmental Science & Technology 54(21), 13517-13526.
Akerblom, S., Nilsson, M.B., Skyllberg, U., Bjorn, E., Jonsson, S., Ranneby, B. and Bishop, K. 2020. Formation and mobilization of methylmercury across natural and experimental sulfur deposition gradients. Environmental Pollution 263.
Abbott, B.W., Bishop, K., Zarnetske, J.P., Minaudo, C., Chapin, F.S., III, Krause, S., Hannah, D.M., Conner, L., Ellison, D., Godsey, S.E., Plont, S., Marcais, J., Kolbe, T., Huebner, A., Frei, R.J., Hampton, T., Gu, S., Buhman, M., Sayedi, S.S., Ursache, O., Chapin, M., Henderson, K.D. and Pinay, G. 2019. Human domination of the global water cycle absent from depictions and perceptions. Nature Geoscience 12(7), 533-+.
Campeau, A., Bishop, K., Amvrosiadi, N., Billett, M.F., Garnett, M.N., Laudon, H., Oquist, M.G. and Wallin, M.B. 2019. Current forest carbon fixation fuels stream CO2 emissions. Nature Communications 10.
Gebrehiwot, S.G., Ellison, D., Bewket, W., Seleshi, Y., Inogwabini, B.-I. and Bishop, K. 2019. The Nile Basin waters and the West African rainforest: Rethinking the boundaries. Wiley Interdisciplinary Reviews-Water 6(1).
Riml, J., Campeau, A., Bishop, K. and Wallin, M.B. 2019. Spectral Decomposition Reveals New Perspectives on CO2 Concentration Patterns and Soil-Stream Linkages. Journal of Geophysical Research-Biogeosciences 124(10), 3039-3056.
Wu, P., Kainz, M., Akerblom, S., Garcia Bravo, A., Sonesten, L., Branfireun, B., Deininger, A., Bergstrom, A.-K. and Bishop, K. 2019. Terrestrial diet influences mercury bioaccumulation in zooplankton and macroinvertebrates in lakes with differing dissolved organic carbon concentrations. Science of the Total Environment 669, 821-832.
Wu, P., Kainz, M.J., Bravo, A.G., Akerblom, S., Sonesten, L. and Bishop, K. 2019. The importance of bioconcentration into the pelagic food web base for methylmercury biomagnification: A meta-analysis. Science of the Total Environment 646, 357-367.
Xu, J., Buck, M., Eklof, K., Ahmed, O.O., Schaefer, J.K., Bishop, K., Skyllberg, U., Bjorn, E., Bertilsson, S. and Bravo, A.G. 2019. Mercury methylating microbial communities of boreal forest soils. Scientific Reports 9.
Campeau, A., Bishop, K., Nilsson, M.B., Klemedtsson, L., Laudon, H., Leith, F.I., Oquist, M. and Wallin, M.B. 2018. Stable Carbon Isotopes Reveal Soil-Stream DIC Linkages in Contrasting Headwater Catchments. Journal of Geophysical Research-Biogeosciences 123(1), 149-167.
Eklof, K., Bishop, K., Bertilsson, S., Bjorn, E., Buck, M., Skyllberg, U., Osman, O.A., Kronberg, R.-M. and Bravo, A.G. 2018. Formation of mercury methylation hotspots as a consequence of forestry operations. Science of the Total Environment 613, 1069-1078.
Ledesma, J.L.J., Futter, M.N., Blackburn, M., Lidman, F., Grabs, T., Sponseller, R.A., Laudon, H., Bishop, K.H. and Kohler, S.J. 2018. Towards an Improved Conceptualization of Riparian Zones in Boreal Forest Headwaters. Ecosystems 21(2), 297-315.
Lidskog, R., Bishop, K., Eklof, K., Ring, E., Akerblom, S. and Sandstrom, C. 2018. From wicked problem to governable entity? The effects of forestry on mercury in aquatic ecosystems. Forest Policy and Economics 90, 90-96.
Ortega, S.H., Catalan, N., Bjorn, E., Grontoft, H., Hilmarsson, T.G., Bertilsson, S., Wu, P., Bishop, K., Levanoni, O. and Bravo, A.G. 2018. High methylmercury formation in ponds

fueled by fresh humic and algal derived organic matter. Limnology and Oceanography 63, S44-S53.
Osterwalder, S., Sommar, J., Akerblom, S., Jocher, G., Fritsche, J., Nilsson, M.B., Bishop, K. and Alewell, C. 2018. Comparative study of elemental mercury flux measurement techniques over a Fennoscandian boreal peatland. Atmospheric Environment 172, 16-25.
Wallin, M.B., Campeau, A., Audet, J., Bastviken, D., Bishop, K., Kokic, J., Laudon, H., Lundin, E., Lofgren, S., Natchimuthu, S., Sobek, S., Teutschbein, C., Weyhenmeyer, G.A. and Grabs, T. 2018. Carbon dioxide and methane emissions of Swedish low-order streams-a national estimate and lessons learnt from more than a decade of observations. Limnology and Oceanography Letters 3(3), 156-167.
Wu, P., Bishop, K., von Bromssen, C., Eklof, K., Futter, M., Hultberg, H., Martin, J. and Akerblom, S. 2018. Does forest harvest increase the mercury concentrations in fish? Evidence from Swedish lakes. Science of the Total Environment 622, 1353-1362.
Zhong, S., Qiu, G., Feng, X., Lin, C. and Bishop, K. 2018. Sulfur and iron influence the transformation and accumulation of mercury and methylmercury in the soil-rice system. Journal of Soils and Sediments 18(2), 578-585.
Abeysinghe, K.S., Qiu, G., Goodale, E., Anderson, C.W.N., Bishop, K., Evers, D.C., Goodale, M.W., Hintelmann, H., Liu, S., Mammides, C., Quan, R.-C., Wang, J., Wu, P., Xu, X.-H., Yang, X.-D. and Feng, X. 2017. Mercury flow through an Asian rice-based food web. Environmental Pollution 229, 219-228.
Ameli, A.A., Beven, K., Erlandsson, M., Creed, I.F., McDonnell, J.J. and Bishop, K. 2017. Primary weathering rates, water transit times, and concentration-discharge relations: A theoretical analysis for the critical zone. Water Resources Research 53(1), 942-960.
Campeau, A., Bishop, K.H., Billett, M.F., Garnett, M.H., Laudon, H., Leach, J.A., Nilsson, M.B., Oquist, M.G. and Wallin, M.B. 2017. Aquatic export of young dissolved and gaseous carbon from a pristine boreal fen: Implications for peat carbon stock stability. Global Change Biology 23(12), 5523-5536.
Campeau, A., Wallin, M.B., Giesler, R., Lofgren, S., Morth, C.-M., Schiff, S., Venkiteswaran, J.J. and Bishop, K. 2017. Multiple sources and sinks of dissolved inorganic carbon across Swedish streams, refocusing the lens of stable C isotopes. Scientific Reports 7.
Habiba, G., Abebe, G., Bravo, A.G., Ermias, D., Staffan, A. and Bishop, K. 2017. Mercury Human Exposure in Populations Living Around Lake Tana (Ethiopia). Biological Trace Element Research 175(2), 237-243.
Olsson, B.A., Akerblom, S., Bishop, K., Eklof, K. and Ring, E. 2017. Does the harvest of logging residues and wood ash application affect the mobilization and bioavailability of trace metals? Forest Ecology and Management 383, 61-72.
Osterwalder, S., Bishop, K., Alewell, C., Fritsche, J., Laudon, H., Akerblom, S. and Nilsson, M.B. 2017. Mercury evasion from a boreal peatland shortens the timeline for recovery from legacy pollution. Scientific Reports 7.
Teutschbein, C., Sponseller, R.A., Grabs, T., Blackburn, M., Boyer, E.W., Hytteborn, J.K. and Bishop, K. 2017. Future Riverine Inorganic Nitrogen Load to the Baltic Sea From Sweden: An Ensemble Approach to Assessing Climate Change Effects. Global Biogeochemical Cycles 31(11), 1674-1701.
Xu, X., Meng, B., Zhang, C., Feng, X., Gu, C., Guo, J., Bishop, K., Xu, Z., Zhang, S. and Qiu, G. 2017. The local impact of a coal-fired power plant on inorganic mercury and methyl-mercury distribution in rice (Oryza sativa L.). Environmental Pollution 223, 11-18.
Ameli, A.A., Amvrosiadi, N., Grabs, T., Laudon, H., Creed, I.F., McDonnell, J.J. and Bishop, K. 2016. Hillslope permeability architecture controls on subsurface transit time distribution and flow paths. Journal of Hydrology 543, 17-30.
Eklof, K., Lidskog, R. and Bishop, K. 2016. Managing Swedish forestry's impact on mercury in fish: Defining the impact and mitigation measures. Ambio 45, S163-S174.
Osterwalder, S., Fritsche, J., Alewell, C., Schmutz, M., Nilsson, M.B., Jocher, G., Sommar, J., Rinne, J. and Bishop, K. 2016. A dual-inlet, single detector relaxed eddy accumulation system for long-term measurement of mercury flux. Atmospheric Measurement Techniques 9(2), 509-524.

Winterdahl, M., Laudon, H., Lyon, S.W., Pers, C. and Bishop, K. 2016. Sensitivity of stream dissolved organic carbon to temperature and discharge: Implications of future climates. Journal of Geophysical Research-Biogeosciences 121(1), 126-144.

Akerblom, S., Meili, M. and Bishop, K. 2015. Organic Matter in Rain: An Overlooked Influence on Mercury Deposition. Environmental Science & Technology Letters 2(4), 128-132.

Bishop, K. and Seibert, J. 2015. A primer for hydrology: the beguiling simplicity of Water's journey from rain to stream at 30 Preface. Hydrological Processes 29(16), 3443-3446.

Eklof, K., Kraus, A., Futter, M., Schelker, J., Meili, M., Boyer, E.W. and Bishop, K. 2015. Parsimonious Model for Simulating Total Mercury and Methylmercury in Boreal Streams Based on Riparian Flow Paths and Seasonality. Environmental Science & Technology 49(13), 7851-7859.

Hytteborn, J.K., Temnerud, J., Alexander, R.B., Boyer, E.W., Futter, M.N., Froberg, M., Dahne, J. and Bishop, K.H. 2015. Patterns and predictability in the intra-annual organic carbon variability across the boreal and hemiboreal landscape. Science of the Total Environment 520, 260-269.

Ledesma, J.L.J., Grabs, T., Bishop, K.H., Schiff, S.L. and Kohler, S.J. 2015. Potential for long-term transfer of dissolved organic carbon from riparian zones to streams in boreal catchments. Global Change Biology 21(8), 2963-2979.

Levanoni, O., Bishop, K., McKie, B.G., Hartman, G., Eklof, K. and Ecke, F. 2015. Impact of Beaver Pond Colonization History on Methylmercury Concentrations in Surface Water. Environmental Science & Technology 49(21), 12679-12687.

Teutschbein, C., Grabs, T., Karlsen, R.H., Laudon, H. and Bishop, K. 2015. Hydrological response to changing climate conditions: Spatial streamflow variability in the boreal region. Water Resources Research 51(12), 9425-9446.

Eklof, K., Schelker, J., Sorensen, R., Meili, M., Laudon, H., von Bromssen, C. and Bishop, K. 2014. Impact of Forestry on Total and Methyl-Mercury in Surface Waters: Distinguishing Effects of Logging and Site Preparation. Environmental Science & Technology 48(9), 4690-4698.

Fritsche, J., Osterwader, S., Nilsson, M.B., Sagerfors, J., Akerblom, S., Bishop, K. and Alewell, C. 2014. Evasion of Elemental Mercury from a Boreal Peat land Suppressed by Long-Term Sulfate Addition. Environmental Science & Technology Letters 1(10), 421-425.

Oquist, M.G., Bishop, K., Grelle, A., Klemedtsson, L., Kohler, S.J., Laudon, H., Lindroth, A., Lofvenius, M.O., Wallin, M.B. and Nilsson, M.B. 2014. The Full Annual Carbon Balance of Boreal Forests Is Highly Sensitive to Precipitation. Environmental Science & Technology Letters 1(7), 315-319.

Valinia, S., Englund, G., Moldan, F., Futter, M.N., Kohler, S.J., Bishop, K. and Folster, J. 2014. Assessing anthropogenic impact on boreal lakes with historical fish species distribution data and hydrogeochemical modeling. Global Change Biology 20(9), 2752-2764.

Winterdahl, M., Erlandsson, M., Futter, M.N., Weyhenmeyer, G.A. and Bishop, K. 2014. Intra-annual variability of organic carbon concentrations in running waters: Drivers along a climatic gradient. Global Biogeochemical Cycles 28(4), 451-464.

Akerblom, S., Bishop, K., Bjorn, E., Lambertsson, L., Eriksson, T. and Nilsson, M.B. 2013. Significant interaction effects from sulfate deposition and climate on sulfur concentrations constitute major controls on methylmercury production in peatlands. Geochimica Et Cosmochimica Acta 102, 1-11.

Eklof, K., Meili, M., Akerblom, S., von Bromssen, C. and Bishop, K. 2013. Impact of stump harvest on run-off concentrations of total mercury and methylmercury. Forest Ecology and Management 290, 83-94.

Laudon, H., Taberman, I., Agren, A., Futter, M., Ottosson-Lofvenius, M. and Bishop, K. 2013. The Krycklan Catchment Study-A flagship infrastructure for hydrology, biogeochemistry, and climate research in the boreal landscape. Water Resources Research 49(10), 7154-7158.

Wallin, M.B., Grabs, T., Buffam, I., Laudon, H., Agren, A., Oquist, M.G. and Bishop, K. 2013. Evasion of CO2 from streams - The dominant component of the carbon export through the aquatic conduit in a boreal landscape. Global Change Biology 19(3), 785-797.

Publications

Publications

Participating researcher's publication list

See following page for attachment

PUBLICATIONS
A total of 171 peer reviewed publications.
Total citations 14451,
h-index of 60,
i10 index of 128 (Google Scholar 06/04/2021).
https://scholar.google.se/citations?user=8I3ASaEAAAAJ&hl=en

SELECTED RELEVANT PUBLICATIONS

(1) Xu, J., Liem-Nguyen, V., Buck, M., **Bertilsson, S**., Björn, E., Bravo, A.G., 2020. Mercury methylating microbial community structure in boreal wetlands explained by local physicochemical conditions. *Frontiers in Environmental Science*. 8:e518662.

(2) Wu, Q., Hu, H., Meng, B., Wang, B., Poulain, A., Zhang, H., Liu, J., Bravo, A.G., Bishop, K., **Bertilsson, S.** Feng, X. 2020. Methanogenesis Is an Important Process in Controlling MeHg Concentration in Rice Paddy Soils Affected by Mining Activities. *Environmental Science and Technology.* 54:13517-13526.

(3) Wang, B., Nilsson, M.B., Eklöf, K., Hu, H., Ehnvall, B., Bravo, A.G., Zhong, S., Åkerblom, S., Björn, E., **Bertilsson, S.,** Skyllberg, Bishop, K. 2020. Opposing spatial trends in methylmercury and total mercury along a peatland chronosequence trophic gradient. *Science of the Total Environment*. 718:e137306.

(4) Hu, H., Wang, B., Bravo, A.G., Björn, E., Skyllberg, U, Amouroux, D., Tessier, E., Zopfi, J., Feng, X., Bishop, K., Nilsson, M.B., **Bertilsson, S.** 2020. Shifts in mercury methylation across a peatland chronosequence: From sulfate reduction to methanogenesis and syntrophy. *Journal of Hazardous Materials*. 387:e121967.

(5) Capo, E., Bravo, A.G., Söensen, A., **Bertilsson, S.,** Pinhassi, J., Feng, C., Andersson, A.F., Buck, M., Björn, E. 2020. Deltaproteobacteria and Spirochaetes-like bacteria are abundant putative mercury methylators in oxygen-deficient water and marine particles in the Baltic Sea. *Frontiers in Microbiology* 11:e574080.

(6) Xu, J., Buck, M., Eklöf, K., Ahmed, O., Shaefer, J.K., Bishop, K., Skyllberg, U., Björn, E., **Bertilsson, S.,** Bravo, A.G. 2019. Mercury methylating microbial communities of boreal forest soils. *Scientific Reports* 9:e518.

(7) Bravo, A.G., Peura, S., Buck, M., Ahmed, O., Mateos-Rivera, A., Herrero Ortega, S., Schaefer, J.K., Bouchet, S., Tolu, J., Björn, E., **Bertilsson, S.** 2018. Methanogens and iron-reducing bacteria: the overlooked members of mercury methylating microbial communities in boreal lakes. *Appl. Environ. Microbiol.* 84:e01774-18.

(8) Bravo, A.G. Zopfi, J., Buck, M., Xu, J., **Bertilsson, S.,** Schaefer, J., Poté, J., Cosio, C. 2018. Geobacteraceae are important members of mercury-methylating microbial communities of sediments impacted by waste water releases. *ISME Journal.* 12:802-812.

(9) Eklöf, K., Bishop., K., **Bertilsson, S.,** Björn, E., Buck. M., Skyllberg, U., Ahmed Osman, O., Kronberg, R.M., Bravo, A.G. 2018. Formation of mercury methylation hotspots as a consequence of forestry operations. *Science of the Total Environment.* 613:1069-1078.

(10) Bravo, A.G., Bouchet, S., Tolu, J., Björn, E, Mateos-Rivera, A., **Bertilsson, S.** 2017. Molecular composition of organic matter controls methylmercury formation in boreal lakes. *Nature Communications.* 8:e14255.

Erik Björn
Total number of peer-review original articles: 101
Totala number of citations: 3625
i10-index: 80
Database: Google Scholar

99. *Methylmercury formation in boreal wetlands in relation to chemical speciation of mercury(II) and concentration of low molecular mass thiols,* V. Liem-Nguyen, U. Skyllberg, **E. Björn**, Sci. Tot. Environ., 2021 (755) 142666

95. *Deltaproteobacteria and Spirochaetes-like bacteria are abundant putative mercury methylators in oxygen-deficient water and marine particles in the Baltic Sea,* E. Capo, A. G. Bravo, A. L. Soerensen, S. Bertilsson, J. Pinhassi, C. Feng, A. F. Andersson, M. Buck, **E. Björn,** Front. Microbiol., 2020 (11) 574080

87. *Microbial biosynthesis of thiol compounds: implications for speciation, cellular uptake and methylation of Hg(II),* G.A. Adediran, V. Liem-Nguyen, Y. Song, J.K. Schaefer, U. Skyllberg, **E. Björn,** Environ. Sci. Technol., 2019 (53) 8187-8196

83. *Deciphering the role of water column redoxclines on methylmercury cycling using speciation modeling and observations from the Baltic Sea,* A.L. Soerensen, A.T. Schartup, A. Skrobonja, S. Bouchet, D. Amouroux, V. Liem-Nguyen, **E. Björn,** Global Biogeochem. Cycles, 2018 (32) 1498-1531

76. *Mercury transformations in resuspended contaminated sediments controlled by redox conditions, chemical speciation and sources of organic matter,* W. Zhu, Y. Song, G. A. Adediran, T. Jiang, A. T. Reis, E. Pereira, U. Skyllberg, **E. Björn,** Geochim. Cosmochim. Acta, 2018 (220) 158-179

74. *Thermodynamic stability of mercury(II) complexes formed with environmentally relevant low molecular mass thiols studied by competing ligand exchange and density functional theory,* V. Liem-Nguyen, U. Skyllberg, K. Nam, **E. Björn,** Environ. Chem., 2017 (14) 243-253,

72. *Thermodynamic modelling of the solubility and chemical speciation of mercury and methylmercury driven by organic thiols and micromolar sulfide concentrations in boreal wetland soils,* V. Liem-Nguyen, U. Skyllberg, **E. Björn,** Environ. Sci. Technol., 2017 (51) 3678-3686

69. *Molecular composition of organic matter controls methylmercury formation in boreal lakes*, A. G. Bravo, S. Bouchet, J. Tolu, **E. Björn**, A. Mateos-Rivera, S. Bertilsson, Nat. Commun., 2017 (8) 14255

68. *Terrestrial discharges mediate trophic shifts and enhance methylmercury accumulation in estuarine biota,* S. Jonsson, A. Andersson, M.B. Nilsson, U. Skyllberg, E. Lundberg, J.K. Schaefer, S. Åkerblom, **E. Björn**, Sci. Adv., 2017 (3) e1601239

53. *Differentiated availability of geochemical mercury pools controls methylmercury levels in estuarine sediment and biota*, S. Jonsson, U. Skyllberg, M.B. Nilsson, E. Lundberg, A. Andersson, **E. Björn**, Nat. Commun., 2014 (5) 4624

PUBLICATIONS

A total of 163 peer reviewed publications.
Bibliometry as of Clarivate Analytics, WoS:
Total citations >5500,
h-index of 43.

SELECTED RELEVANT PUBLICATIONS

1. Laine, Anna; Lindholm, Tapio; **Nilsson, B. Mats**; Kuznetsov, Oleg; Jassey, Vincent; Tuittila, Eeva-Stiina (2021) Functional diversity and trait composition of vascular plant and *Sphagnum* moss communities during peatland succession across land uplift regions, ***Journal of Ecology, JEcol-***2020-0083.R2 https://doi.org/10.1111/1365-2745.13601
2. Helbig, M; Waddington, JM; …; **Nilsson, MB**; Ohta, T; Peichl, M; et al., 2020, Increasing contribution of peatlands to boreal evapotranspiration in a warming climate, ***Nature Climate Change***, 10:555+, 10.1038/s41558-020-0763-7
3. Akerblom, S; Nilsson, MB; Skyllberg, U; Bjorn, E; Jonsson, S; Ranneby, B; Bishop, K., 2020 Formation and mobilization of methylmercury across natural and experimental sulfur deposition gradients, ***Environmental Pollution***, 263: 114398, 10.1016/j.envpol.2020.114398
4. Wang, B., **Nilsson, M.B**., Eklöf, K., Hu, H., Ehnvall, B., Bravo, A.G., Zhong, S., Åkerblom, S., Bertilsson, S., Skyllberg, U. and K. Bishop, 2020, Opposing spatial trends in methylmercury and total mercury along a peatland chronosequence trophic gradient, ***Science of the Total Environment*****,** 718,
5. Järveoja, J., **Nilsson M.B**., Crill P. and M. Peichl, 2020, Bimodal diel pattern in peatland ecosystem respiration rebuts uniform temperature response, ***Nature Communications****,* 11:4255, 10.1038/s41467-020-18027-1
6. Rinne, J; Tuovinen, JP; Klemedtsson, L; Aurela, M; Holst, J; Lohila, A; Weslien, P; Vestin, P; Lakomiec, P; Peichl, M; Tuittila, ES; Heiskanen, L; Laurila, T; Li, X; Alekseychik, P; Mammarella, I; Strom, L; Crill, P; **Nilsson, MB** 2020, Effect of the 2018 European drought on methane and carbon dioxide exchange of northern mire ecosystems, ***Philosophical Transactions of the Royal Society B-Biological Sciences,*** 375, Article Number: 20190517 DOI: 10.1098/rstb.2019.0517
7. Hu, H., [ab1]BaolinWang[c1]Andrea, Bravo[d], ErikBjörn[e], UlfSkyllberg[f], DavidAmouroux[g], EmmanuelTessier[g], JakobZopfi[h], XinbinFeng[a]. KevinBishop[c]. **Mats B.Nilsson[f]**, StefanBertilsson[bc] 2019 Shifts in mercury methylation across a peatland chronosequence: From sulfate reduction to methanogenesis and syntrophy ***Journal of Hazardous Materials,*** 387:121967; https://doi.org/10.1016/j.jhazmat.2019.121967
8. Skov Nielsen, C., Hasselquist, N., **Nilsson, M.B**., Oquist, M., Jarveoja, J. and M. Peichl, 2019, A Novel Approach for High-Frequency *in-situ* Quantification of Methane Oxidation in Peatlands, ***Soil Syst****.* **2019**, *3*(1), doi.org/10.3390/soilsystems3010004
9. Nemitz, E., I. Mammarella, A. Ibrom, M. Aurela, G. Burba, S. Dengel, B. Gielen, A. Grelle, B. Heinesch, M. Herbst, L. Hörtnagl, L. Klemedtsson, A. Lindroth, A. Lohila, D. McDermitt, P. Meier, L. Merbold, D. Nelson, G. Nicolini, **M. Nilsson**, O. Peltola, J. Rinne, M. Zahniser, 2018, Standardisation of eddy-covariance flux measurements of methane and nitrous oxide**,** ***International Agrophysics****, 32, 4, 517-549,*
10. **Nilsson, M**., Sagerfors, J., Buffam, I., Laudon, H., Eriksson, T., Grelle, A., Klemedtsson, L., Weslien, P. and A. Lindroth, 2008, Contemporary carbon accumulation in a boreal oligotrophic minerogenic mire – a significant sink after accounting for all C-fluxes ***Global Change Biology*** 14, 1–16,

PUBLICATIONS
A total of 14 peer reviewed publications.
Bibliometry as of Clarivate Analytics, WoS:
Total citations 73,
I10 of 3.

SELECTED RELEVANT PUBLICATIONS

1. Ballabio, C., Jiskra, M., **Osterwalder, S.**, Borrelli, P., Montanarella, L., Panagos, P., 2021. A spatial assessment of mercury content in the European Union topsoil. **Science of The Total Environment** 769, 144755. https://doi.org/10.1016/j.scitotenv.2020.144755
2. **Osterwalder, S.**, Eugster, W., Feigenwinter, I., Jiskra, M., 2020. Eddy covariance flux measurements of gaseous elemental mercury over a grassland. **Atmospheric Measurement Techniques 13**, 2057–2074. https://doi.org/10.5194/amt-13-2057-2020
3. Wohlgemuth, L., **Osterwalder, S**., Joseph, C., Kahmen, A., Hoch, G., Alewell, C., Jiskra, M., 2020. A bottom-up quantification of foliar mercury uptake fluxes across Europe. **Biogeosciences** 17, 6441–6456. https://doi.org/10.5194/bg-17-6441-2020
4. Sommar, J., **Osterwalder, S.**, Zhu, W., 2020. Recent advances in understanding and measurement of Hg in the environment: Surface-atmosphere exchange of gaseous elemental mercury (Hg0). **Science of The Total Environment** 721, 137648. https://doi.org/10.1016/j.scitotenv.2020.137648
5. Bishop, K., Shanley, J.B., Riscassi, A., de Wit, H.A., Eklöf, K., Meng, B., Mitchell, C., **Osterwalder, S.**, Schuster, P.F., Webster, J., Zhu, W., 2020. Recent advances in understanding and measurement of mercury in the environment: Terrestrial Hg cycling. **Science of The Total Environment** 137647. https://doi.org/10.1016/j.scitotenv.2020.137647
6. **Osterwalder, S.**, Huang, J.-H., Shetaya, W. H., Agnan, Y., Frossard, A., Frey, B., Alewell, C., Kretzschmar, R., Biester, H., Obrist, D., 2019. Mercury emission from industrially contaminated soils in relation to chemical, microbial, and meteorological factors. **Environmental Pollution** 250, 944–952. https://doi.org/10.1016/j.envpol.2019.03.093
7. **Osterwalder, S.**, Sommar, J., Åkerblom, S., Jocher, G., Fritsche, J., Nilsson, M. B., Bishop, K., Alewell, C., 2018. Comparative study of elemental mercury flux measurement techniques over a Fennoscandian boreal peatland. **Atmospheric Environment** 172, 16–25. https://doi.org/10.1016/j.atmosenv.2017.10.025
8. **Osterwalder, S.**, Bishop, K., Alewell, C., Fritsche, J., Laudon, H., Åkerblom, S., Nilsson, M.B., 2017. Mercury evasion from a boreal peatland shortens the timeline for recovery from legacy pollution. **Scientific Reports** 7, 1–9. https://doi.org/10.1038/s41598-017-16141-7
9. **Osterwalder, S.**, Fritsche, J., Alewell, C., Schmutz, M., Nilsson, M. B., Jocher, G., Sommar, J., Rinne, J., Bishop, K., 2016. A dual-inlet, single detector relaxed eddy accumulation system for long-term measurement of mercury flux. **Atmospheric Measurement Techniques** 9, 509–524. https://doi.org/10.5194/amt-9-509-2016
10. Fritsche, J., **Osterwalder, S.**, Nilsson, M. B., Sagerfors, J., Åkerblom, S., Bishop, K., Alewell, C., 2014. Evasion of Elemental Mercury from a Boreal Peatland Suppressed by Long-Term Sulfate Addition. **Environmental Science & Technology Letters** 1, 421–425. https://doi.org/10.1021/ez500223a

PUBLICATIONS
A total of 97 peer reviewed publications and 4 book chapters.
Bibliometry from Google Scholar April, 11, 2021:
Total citations: 6393,
h-index 42.

SELECTED RELEVANT PUBLICATIONS

1. Song, Y., Adediran, A.G., Jiang, T., Hayama, S., Björn, E., and **Skyllberg, U.** 2020. Toward an internally consistent model for Hg(II) chemical speciation calculations in bacterium – natural organic matter – low molecular mass thiol systems. ***Environ. Sci. Technol.*** 54, 8094-8103.
2. Song, Y., Jiang, T., Liem-Nguyen, V. Sparrman, T., Björn, E., and **Skyllberg, U.** 2018. Thermodynamics of Hg(II) bonding to thiol groups in Suwannee River natural organic matter resolved by competitive ligand exchange, Hg L_{III}-edge EXAFS and ^{1}H NMR spectroscopy. ***Environ. Sci. Technol.*** 52, 8292-8301.
3. Zhu, W., Song, Y., Adediran, G.A., Jiang, T., Reis, T., Pereira, E., **Skyllberg, U**., and Björn, E. 2018. Mercury transformations in resuspended contaminated sediments controlled by redox conditions, chemical speciation and sources of organic matter. ***Geochim. Cosmochim. Acta*** 220, 158-179.
4. Liem-Nguyen, V., **Skyllberg, U.,** and Björn, E. 2017. Thermodynamic modelling of the solubility and chemical speciation of mercury and methylmercury driven by organic thiols and micromolar sulfide concentrations in boreal wetlands. ***Environ. Sci. Technol***. 51, 3678-3686.
5. Kronberg, R-.M., Drott, A., Jiskra, M., Wiederhold, J.G., Björn, E., and **Skyllberg, U.** 2016. Forest harvest contribution to Boreal freshwater methyl mercury load. ***Global Biogeochem. Cycles.*** 30, 825-843.
6. Jiskra, M., Wiederhold, J.G. **Skyllberg, U.,** Kronberg, R-M., Hajdas, I., and Kretzschmar, R. 2015. Mercury deposition and re-emission pathways in boreal forest soils investigated with Hg isotope signatures. ***Environ. Sci. Technol***. 49, 7188-7196.
7. Jiang, T., **Skyllberg, U.**, Wei, S., Wang, D., Lu, S., Jiang, Z., and Flanagan, D.C. 2015. Modeling of the structure-specific kinetics of abiotic, dark reduction of Hg(II) complexed by O/N and S functional groups in humic acids while accounting for time-dependent structural rearrangement. ***Geochim. Cosmochim. Acta*** 154, 151-167.
8. **Skyllberg, U**., and Drott, A. 2010. Competition between Disordered Iron Sulfide and Natural Organic Matter Associated Thiols for Mercury (II) – an EXAFS study. ***Environ. Sci. Technol.*** 44, 1254-1259.
9. **Skyllberg, U.,** 2008. Competition among thiols, inorganic sulfides and polysulfides for Hg and MeHg in wetland soils and sediments under suboxic conditions – illumination of controversies and implications for MeHg net production. ***J. Geophys. Res.*** 113, G00C03.
10. **Skyllberg, U.,** Lin, C-M., Bloom, P.R., Qian, J., and Bleam, W.F. 2006. Complexation of mercury (II) in soil organic matter: EXAFS evidence for linear two-coordination with reduced sulphur groups. ***Environ. Sci. Technol.*** 40, 4147-4180.

Peer-reviewed original articles, conference contributions, edited volumes, research review articles.

Bishop K., Shanley J. B., Riscassi A., de Wit H., Eklöf K., Meng B., Mitchell C., Osterwalder S., Schuster P.F., Webster J. K., ***Zhu W.***, 2020. Recent advances in understanding and measurement of mercury in the environment: Terrestrial Hg cycling, **Science of The Total Environment**, 721, 137647.

Sommar J., Osterwalder S., ***Zhu W.***, 2020. Recent advances in understanding and measurement of Hg in the environment: Surface-atmosphere exchange of gaseous elemental mercury (Hg0), **Science of The Total Environment**, 721, 137648.

Zhu W., Song Y., Adediran G. A., Jiang T., Ana T. Reis, Eduarda Pereira, Skyllberg U., Björn E., 2018. Mercury transformations in resuspended contaminated sediment controlled by redox conditions, chemical speciation and sources of organic matter. **Geochimica Et Cosmchimica Acta**, 220: 158-179.

Fu X. W., ***Zhu W.***, Zhang H., Sommar J., Yu B., Yang X., Wang X., Lin C.-J., Feng X. B., 2016. Depletion of atmospheric gaseous elemental mercury by plant uptake at Mt. Changbai, Northeast China. **Atmospheric Chemistry and Physics**, 16, 12861-12873.

Zhu W., Lin C.-J., Wang X., Sommar J., Fu X. W., Feng X., 2016. Global observations and modeling of atmosphere-surface exchange of elemental mercury: a critical review. **Atmospheric Chemistry and Physics**, 16(7): 4451-4480.

Sommar J., ***Zhu W.***, Shang L., Lin C.-J., Feng, X. B., 2016. Seasonal variations in metallic mercury (Hg^0) vapor exchange over biannual wheat–corn rotation cropland in the North China Plain. **Biogeosciences**, 13: 2029-2049.

Zhu W., Sommar J., Lin C.-J., Feng X. B., 2015. Mercury vapor air–surface exchange measured by collocated micrometeorological and enclosure methods - Part I: Data comparability and method characteristics. **Atmospheric Chemistry and Physics**, 15(2): 685-702.

Zhu W., Sommar J., Lin C.-J., Feng X. B., 2015. Mercury vapor air–surface exchange measured by collocated micrometeorological and enclosure methods – Part II: Bias and uncertainty analysis. **Atmospheric Chemistry and Physics**, 15(10): 5359-5376.

Sommar J., ***Zhu W.***, Shang L. H., Feng X. B., Lin C.-J., 2013. A whole-air relaxed eddy accumulation measurement system for sampling vertical vapour exchange of elemental mercury. **Tellus B.**, 65, 19940.

Lin C.-J., ***Zhu W.***, Li X. C., Feng X. B., Sommar J., Shang L. H., 2012. Novel dynamic flux chamber for measuring air-surface exchange of Hg^0 from soils. **Environmental Science & Technology**, 46(16): 8910-8920.

CV

CV - Kevin Bishop

Project leader: Kevin Bishop
Birthdate: 19600422
Gender: Male
Country: Sweden
Doctoral degree: 1993-07-17
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Doctors degree

Examination	Organisation	Dissertation title (original language)	Supervisor
10507. Physical Geography, 1993-07-17	University of Cambridge, Department of Geography		Richard Chorley

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10507. Physical Geography, 1993-07-17	University of Cambridge, United Kingdom, Department of Geography	Episodic increases in stream acidity, catchment flow pathways and hydrograph separation	Richard Chorley

Basic education

Year	Examination
1985	10509. Oceanography, Hydrology and Water Resources, Degree of Master of Science in Engineering, The Imperial College of Science, Technology and Medicine, United Kingdom
1983	60301. Philosophy, Degree of Bachelor, Haverford College, USA

Professional history

Employments

Period	Position	Part of research in employment	Employer	Other information
mars 2016 - Present	Professor, Permanent employment	50	Swedish University of Agricultural Sciences, Sweden, Aquatic Sciences and Assessment	Vicerektor 70% t.o.m. dec 2019
oktober 2010 - oktober 2016	Professor, Permanent employment	80	Uppsala universitet, Sweden, Inst för geovetenskaper	Tjänstledig 50% to be a Guest Professor at SLU
december 1997 - december 2013	Professor, Permanent employment	80	Swedish University of Agricultural Sciences, Sweden, Vatten och miljö	

Post doctoral assignments

Period	Organisation	Subject
juli 1993 - december 1993	Massachusetts Institute of Technology, USA, Parsons Laboratory for Environmental Science and Engineering	10509. Oceanography, Hydrology and Water Resources

Research exchange assignments

Period	Type	Organisation	Subject
juli 2001 - juni 2002	Visiting professor	University of Colorado Boulder, USA, Institute of Arctic and Alpine Research	10509. Oceanography, Hydrology and Water Resources

Merits and awards

Docentur

Year	Subject	Organisation
1995	401. Agriculture, Forestry and Fisheries	Swedish University of Agricultural Sciences, Sweden, Vatten och miljö

Supervised persons

Year	Supervised persons	Role	Number
	PhD student	Secondary supervisor	14
	Postdoc	Main supervisor	12
	Student	Main supervisor	57
2020	PhD student, Baolin Wang, Swedish University of Agricultural Sciences, Sweden, Vatten och miljö	Main supervisor	
2017	PhD student, Pianpian Wu, Swedish University of Agricultural Sciences, Sweden, Vatten och miljö	Main supervisor	
2016	PhD student, Jean-Marc Mayotte, Uppsala universitet, Sweden, 161 Inst för geovetenskaper	Main supervisor	
2016	PhD student, Julia Hytteborn, Uppsala universitet, Sweden, 161 Inst för geovetenskaper	Main supervisor	
2016	PhD student, Viveca Norén, Uppsala universitet, Sweden, 161 Inst för geovetenskaper	Main supervisor	
2012	PhD student, Karin Eklöf, Swedish University of Agricultural Sciences, Sweden, Vatten och miljö	Main supervisor	
2012	PhD student, Solomon Gebreyohannis Gebrehiwot, Swedish University of Agricultural Sciences, Sweden, Vatten och miljö	Main supervisor	
2011	PhD student, Marcus Wallin	Main supervisor	
2011	PhD student, Mattias Winterdahl	Main supervisor	
2009	PhD student, Martin Erlandsson	Main supervisor	
2009	PhD student, Rasmus Sorensen	Main supervisor	
2006	PhD student, Neil Cory	Main supervisor	
2005	PhD student, Johan Temnerud	Main supervisor	
2003	PhD student, Per-Erik Mellander, Swedish University of Agricultural Sciences, Sweden, Vatten och miljö	Main supervisor	
2000	PhD student, Hjalmar Laudon	Main supervisor	
1999	PhD student, Filip Moldan	Main supervisor	
1999	PhD student, Stephan Köhler	Main supervisor	

Research grants awarded in competition

Research grants awarded in competition

Period	Funder	Project leader	Your role	Total amount (SEK)
2019 - 2021	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	2 520 000
2018 - 2019	Formas, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	200 000
2018 - 2019	Formas, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	1 994 326
2017 - 2019	Formas, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	2 968 459
2016 - 2018	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop		2 250 000
2014 - 2018	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	24 398 000
2013 - 2015	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	2 850 000
2011 - 2015	Formas, Sweden - Other financing agencies and organisations	Kevin Bishop	Applicant	24 065 000

Awards and distinctions

Year	Name of award/distinction	Issuer
2019	Fellow	Royal Society of Agriculture and Forestry
2017	The Rossby Prize in Nordic Geophysics 2017	Swedish National Committee for Geophysics
2016	MG Anderson Award Outstanding Paper of the Year	Hydrological Processes
2000	Teaching Excellence Fellowship	Swedish Foundation for International Cooperation in Research and Higher Education

Other merits

Period	Type of merit	Description
2014 - 2020	European Research Council Expert Evaluator	Since 2014 I have been an expert evaluator for the European Research Council on the Earth System Science Panel. I have evaluated proposals at the Starting Grant and Advanced Grant levels.
2000 - 2019	Opponent	Opponent for 19 PhD examinations. 16 of these examinations were at universities outside of Sweden.
2016 - 2018	Outreach: Decision Support for Sustainable Development	I served as SLU's Pro Vice-Chancellor (March 2016-August, 2020, 70%). My primary area of responsibility was for Environmental Monitoring and Assessment. In that capacity I developed SLU's quality and capacity in supplying decision support regarding sustainable development. This has involved extensive interaction with national and regional authorities to facilitate the communication between academic expertise and society. I was also responsible for research infrastructure. This included representing SLU in national infrastructures and policy consultations.

Period	Type of merit	Description
1990 - 2018	Bibliometri	H-index: 57 Refereed Articles and Book Chapters (career/2016-2020): 265/79 Total citations: 9887 Bibliometry taken from ISI Web of Science 20210407 Researcher ID C-7816-2012 Popular Science (career/2016-2020) (47/12)
2012 - 2017	Transdisciplinary Research	I have been working to increase the relevance of SLU's environmental monitoring and assessment for Agenda 2030. Two key elements of this effort emerged in a FORMAS project I led (2018-2020, Dnr 2018-02341). One is more explicit inclusion of economy and society, alongside the environment in monitoring and assessment. The second is encouraging public engagement through participation in building the social knowledge base and then applying this in governance. I am following up on this transdisciplinary approach to monitoring and assessment as a co-PI in the MISTRA Environmental Communication Program (2020-2023, www.slu.se/en/subweb/mistra-ec/).
2006 - 2016	Teaching (Course Responsiblities)	Course leadership for the basic level Environmental Analysis Course (5hp) in the Water and Environment Civil Engineering Progam at Uppsala University (2011-2016), the Master's Level course Environmental Assessment (5hp) for the MSc. in Sustainable Development run jointly by Uppsala University and SLU (2011-2020), and the PhD level literature seminar in Environmental Monitroing and Assessment at SLU (2002-2020). Co-responsibility for the MSc. Program in Integrated Water Management at SLU (2006-2010).

CV - Stefan Bertilsson

Participating researchers: Stefan Bertilsson
Birthdate: 19690619
Gender: Male
Country: Sweden
Doctoral degree: 1999-05-21
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10502. Environmental Sciences (social aspects to be 507), 1999-05-21	Linköping University, Sweden, Institutionen för tema (TEMA)	Photochemical alterations of dissolved organic matter –Impact on heterotrophic bacteria and carbon cycling in lakes	Bert Allard

Basic education

Year	Examination
1994	10611. Ecology incl. Aquatic Ecology, Terrestrial Ecology, Biodiversity Conservation, Degree of Master, Uppsala universitet, Sweden

Professional history

Employments

Period	Position	Part of research in employment	Employer	Other information

Period	Position	Part of research in employment	Employer	Other information
juli 2019 - Present	Professor, Permanent employment	100	Swedish University of Agricultural Sciences, Sweden, Aquatic Sciences and Assessment	
januari 2018 - december 2019	Förståndare "Swedish Infrastructure for Ecosystem Science", Project employment	0	Swedish University of Agricultural Sciences, Sweden, Aquatic Sciences and Assessment	Deltidsanställning (50%)
januari 2011 - juni 2019	Professor, Permanent employment	80	Uppsala universitet, Sweden, Inst för ekologi och genetik	
januari 2005 - januari 2011	Researcher, Temporary employment	100	Uppsala universitet, Sweden, Inst för ekologi och genetik	Rådsforskare-VR
januari 2002 - december 2004	Researcher, Temporary employment	100	Uppsala universitet, Sweden, Inst för ekologi och genetik	KAW repatriering

Post doctoral assignments

Period	Organisation	Subject
november 1999 - februari 2002	Massachusetts Institute of Technology, USA, Civil and Environmental Engineering	10610. Bioinformatics and Systems Biology (methods development to be 10203)

Research exchange assignments

Period	Type	Organisation	Subject
november 2009 - maj 2010	Sabbatical	University Of Georgia, USA, Marine Sciences	10610. Bioinformatics and Systems Biology (methods development to be 10203)

Merits and awards

Docentur

Year	Subject	Organisation
2005	10611. Ecology incl. Aquatic Ecology, Terrestrial Ecology, Biodiversity Conservation	Uppsala universitet, Sweden, Inst för ekologi och genetik

Supervised persons

Year	Supervised persons	Role
2019	PhD student, Leyden Fernandez Vidal, Uppsala universitet, Sweden, 146 Inst för ekologi och genetik	Main supervisor
2018	PhD student, Jingying Xu, Uppsala universitet, Sweden	Main supervisor
2016	PhD student, Monica Ricao, Uppsala universitet, Sweden	Main supervisor
2015	PhD student, Friederike Heinrich, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2015	PhD student, Torsten Jeske, Uppsala universitet, Sweden	Main supervisor

Year	Supervised persons	Role
2015	PhD student, Valerie Hubalek, Uppsala universitet, Sweden	Main supervisor
2010	PhD student, Sara Beier, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2007	PhD student, Alexander Eiler, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2019	Postdoc, Haiyan Hu, Uppsala universitet, Sweden, 146 Inst för ekologi och genetik	Main supervisor
2019	Postdoc, Sarahi Garcia, Uppsala universitet, Sweden, 146 Inst för ekologi och genetik	Main supervisor
2017	Postdoc, Andrea Garcia-Bravo, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2016	Postdoc, Omneya Ahmed, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2010	Postdoc, Laura Alonso-Saez, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2010	Postdoc, Ramiro Logares, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2010	Postdoc, Stephan Gantner, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2009	Postdoc, Anders Andersson, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2009	Postdoc, Henry Holmstrand, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2008	Postdoc, Xinmei Feng, Linköping University, Sweden, Institutionen för tema (TEMA)	Main supervisor
2005	Postdoc, Carlos Gonzalez-Rey, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor
2004	Postdoc, Mona Johansson, Uppsala universitet, Sweden, Inst för ekologi och genetik	Main supervisor

Research grants awarded in competition

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2020 - 2022	Formas, Sweden - Other financing agencies and organisations	Stefan Bertilsson	Applicant	0	3 052 149
2019 - 2022	European Union (EU),	Laura Alonso Saez	Co-applicant	2 256 719	8 800 000
2018 - 2022	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Stefan Bertilsson	Applicant	0	107 241 250
2018 - 2021	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Stefan Bertilsson	Applicant	0	3 480 000
2016 - 2019	European Union (EU),	Ramon Massana	Co-applicant	2 500 000	35 700 000
2016 - 2018	Wennergrenstiftelsen, Sweden - Other financing agencies and organisations	Stefan Bertilsson	Applicant	0	600 000

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2014 - 2018	Knut och Alice Wallenbergs Stiftelse, Sweden - Other financing agencies and organisations	Lars Tranvik	Co-applicant	2 000 000	31 000 000
2014 - 2018	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Co-applicant	3 460 000	19 500 000
2013 - 2015	Formas, Sweden - Other financing agencies and organisations	Stefan Bertilsson	Applicant	0	2 747 000
2013 - 2015	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Stefan Bertilsson	Applicant	0	3 245 000

Other merits

Period	Type of merit	Description
2020 - 2023	Board Member	Board member of steering group for the National Genomics Infrastructure
2016 - 2022	Associate Editor	Associate Editor for Freshwater Biology (Wiley).
2018 - 2022	Director, Swedish Infrastructure for Ecosystem Science (SITES)	Director for Swedish Infrastructure for Ecosystem Science (SITES). Half time position (50%)
2016 - 2021	Bibliometric summary	In total 169 peer reviewed articles in international scientific journals. Additionally 2 book chapters, 1 coauthored book and 12 popular science publications. In total 14407 citations and an h-index of 60 (Google Scholar March 31 2021). My work has been cited 8577 times during the last 5 years and my h-index considering only citations during these 5 years is 48. Twenty-one of my articles have been cited more than 200 times (excluding self citations) and highlights include a 2017 article in Nature Communications, 17 articles in ISME Journal (premier journal in environmental microbiology and microbial ecology), 2 articles in PNAS and additional articles in Molecular and Microbiology Reviews, Nature Methods.
2012 - 2020	Facility Director, Microbial Single Cell Genomics, SciLifeLab	Strategic and operational leadership of National Infrastructure in microbial genomics as part of SciLifeLab. During 2018-2019 also acting Director for the Single Cell Biology Platform.
2015 - 2016	Node Management, SciLifeLab Uppsala	Management of Uppsala Node of SciLifeLab
2015 - 2015	Chair, Second EMBO Conference on Aquatic Microbial Ecology-SAME14	Main organizer of international EMBO conference.
2014 - 2015	Scientific Director-Science for Life Laboratory	Strategic and operational leadership of the national informastructure SciLifeLab with special responsibility for Outreach (Dec 2013-2015)

Participating researchers: Erik Björn
Birthdate: 19740228
Gender: Male
Country: Sweden

Doctoral degree: 2003-10-10
Academic title: Professor
Employer: Umeå universitet

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10401. Analytical Chemistry, 2003-10-10	Umeå University, Sweden, Kemiska institutionen+	Fundamental studies of ICP-QMS with alternative sample introduction for improved reliability of measurements	Wolfgang Frech

Basic education

Year	Examination
1997	104. Chemical Sciences, Degree of Bachelor, Umeå University, Sweden

Professional history

Employments

Period	Position	Part of research in employment	Employer
november 2019 - Present	Professor, Permanent employment	75	Umeå University, Sweden, Kemiska institutionen+
september 2009 - november 2019 (Present)	Senior lecturer, Permanent employment	75	Umeå University, Sweden, Kemiska institutionen+
september 2004 - september 2009	Assistant professor, Temporary employment	80	Umeå University, Sweden, Kemiska institutionen+
januari 2003 - september 2004	Research assistant, Temporary employment	70	Umeå University, Sweden, Kemiska institutionen+

Research exchange assignments

Period	Type	Organisation	Subject
juni 2001 - juli 2001	Guest researcher	Delft University of Technology	10401. Analytical Chemistry
juli 1997 - september 1997	Examensarbete	Institute for Spectrochemistry and Applied Spectroscopy	10401. Analytical Chemistry

Merits and awards

Docentur

Year	Subject	Organisation
2009	104. Chemical Sciences	Umeå University, Sweden, Kemiska institutionen+

Supervised persons

Year	Supervised persons	Role	Number

Year	Supervised persons	Role	Number
	PhD student	Main supervisor	7
	PhD student	Secondary supervisor	6
	Postdoc	Main supervisor	9
	Postdoc	Secondary supervisor	2
2024	PhD student, Mary Chuong, Umeå University, Sweden, TEKNAT Kemiska institutionen	Main supervisor	
2022	PhD student, Mareike Gutensohn, Umeå University, Sweden, TEKNAT Kemiska institutionen	Main supervisor	
2020	PhD student, Aleksandra Skrobonja, Umeå University, Sweden	Main supervisor	
2016	PhD student, Liem Van Nguyen, Umeå University, Sweden	Main supervisor	
2013	PhD student, Sofi Jonsson, Umeå University, Sweden	Main supervisor	
2010	PhD student, Yvonne Nygren, Umeå University, Sweden	Main supervisor	
2022	Postdoc, Elena Yunda, Umeå University, Sweden, TEKNAT Kemiska institutionen	Main supervisor	
2021	Postdoc, Caiyan Feng, Umeå University, Sweden, TEKNAT Kemiska institutionen	Main supervisor	
2021	Postdoc, Eric Capo, Umeå University, Sweden, TEKNAT Kemiska institutionen	Main supervisor	
2017	Postdoc, Gbotemi Adediran, Umeå University, Sweden	Main supervisor	
2017	Postdoc, Wei Zhu, Umeå University, Sweden	Main supervisor	
2014	Postdoc, Andreas Drott, Umeå University, Sweden	Main supervisor	
2013	Postdoc, Sylvain Bouchet, Umeå University, Sweden	Main supervisor	
2010	Postdoc, Maximilian Popp, Umeå University, Sweden	Main supervisor	

Research grants awarded in competition

Period	Funder	Project leader	Your role	Total amount (SEK)
2021 - 2024	Naturvårdsverket, Sweden - Other financing agencies and organisations	Erik Björn	Applicant	4 995 600
2020 - 2021	Kempestiftelserna, Sweden - Oterh private actors	Erik Björn	Applicant	1 000 000
2019 - 2021	Formas, Sweden - Other financing agencies and organisations	Erik Björn	Applicant	3 000 000
2019 - 2021	Carl Tryggers Stiftelse, Sweden - Oterh private actors	Erik Björn	Applicant	552 000
2018 - 2021	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Erik Björn	Applicant	3 480 000
2018 - 2018	Kempestiftelserna, Sweden - Oterh private actors	Erik Björn	Applicant	1 100 000
2016 - 2017	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Erik Björn	Applicant	166 140

Period	Funder	Project leader	Your role	Total amount (SEK)
2015 - 2017	Formas, Sweden - Other financing agencies and organisations	Erik Björn	Applicant	4 800 000
2011 - 2015	ConocoPhilips, Not Sweden - Other private actors, USA	Erik Björn	Applicant	8 750 000
2009 - 2011	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Erik Björn	Applicant	2 187 000

Awards and distinctions

Year	Name of award/distinction	Issuer
2008	Young Researcher Award	Umeå University

Other merits

Period	Type of merit	Description
2005 - 2021	Public research dissemination	In total 39 major activities, examples: TV interview, SVT Västernorrland 2019; Speaker at ECOCHANGE annual meeting 2018, 2017, 2016, 2015, 2013, 2012; Report NV ISBN 978-91-576-9454-6. 2017; Oral presentation at Kunskapsveckan, Umeå University 2017; Radio interview, P4 Västerbotten 2017; Popular science article in Havsutsikt 2017; Oral presentation at Havs- och vattenforum, Göteborg 2017; Media outreach package via AAAS (VancePak, USA) 2017; BBC world news article 2017; BBC world news radio interview 2017; SVT news report 2017: TV4 news report 2017; Oral presentation at workshop Fiberbankar, SGU/Uppsala Univ., Uppsala 2016; Newspaper article in Norrbottens kuriren 2016; Oral presentation at Umeå University's lärarfortbildning, Umeå 2015; Vetenskapslunch, Kafé Station, Umeå. Public oral presentation, 2012; Oral presentations for the public at "Forskarfredag", part of the "European Researcher's night 2011; Naturvårdsverket, Hållbar Sanering Rapport 5629. 2006;
2004 - 2021	Commission of trust	Member of the board for the Swedish Chemical Society, 2020- ; Member of the Faculty of Technology and Natural Sciences council for PhD education, 2020- ; Vice chair of the Department of Chemistry council for PhD education, 2020- ; Member of the Department of Chemistry council for undergraduate studies, 2009-2019; Arbetsmiljöombud Department of Chemistry 2007-2010; Member of the Department of Chemistry Advisory Board, 2004-2006;
2010 - 2021	Peer-review referee: grant proposals and academic positions	French National Research Agency (ANR) 2020; Deutsche Forschungsgemeinschaft (DFG) 2020; US National Science Foundation (NSF) 2013, 2018; Natural Sciences and Engineering Research Council of Canada 2018; Evaluating the promotions at Oak Ridge National Laboratory, TN, USA 2017; Portuguese Foundation for Science and Technology (FCT) 2009-2011;
2005 - 2021	Management	Project leader for implementation project 5 (Implementation of new analytical methodologies) in the North Sweden Soil Remediation Centre (MCN), 2005-2006.
1998 - 2021	Peer-review scientific publication	Bibliometric data from Google Scholar 1 Apr 2021: Totally 101 scientific papers, citations 3618, h-index 35, i10-index 80. Since 2015: citations 2253, h-index 30, i10-index 57.
2010 - 2020	Examination committee assignments	Examination committee assignments 1-3 times per year for PhD dissertation, in total 14.

Period	Type of merit	Description
2004 - 2020	Peer-review referee: scientific journals	Peer-review referee of 10 manuscripts per year for the journals: Analytical Biochemistry (Elsevier); Analytical Chemistry (ACS); Analytica Chimica Acta (Elsevier); Applied Spectroscopy (ACS); Biogeochemistry (Springer); Ecotoxicology (Springer); Environmental Pollution (Elsevier); Environmental Science and Pollution Research (Springer); Environmental Science: Processes & Impacts (RSC); Environmental Science & Technology (ACS); Environmental Toxicology and Chemistry (Wiley); Journal of Analytical Atomic Spectrometry (RSC); Journal of Pharmaceutical and Biomedical Analysis (Elsevier); Limnology and Oceanography: Methods (ASLO); Marine Chemistry (Elsevier); Nature Geoscience (Nature Publishing Group); Scientific Reports (Nature Publishing Group); Science of the Total Environment (Elsevier) Spectrochimica Acta Part B (Elsevier); Water Research (Elsevier);
1997 - 2020	Conference oral presentations and high-profile invited seminars	in total 21, selected examples: • European Symposium on Atomic Spectrometry & Colloquium Analytische Atomspektroskopie Anwendertreffen Plasmaspektrometrie (ESAS & CANAS), Berlin, Germany, 20-23 March 2018. Key Note speaker; • Oak Ridge National Laboratory, TN, USA 18/12-19/12, 2017. Invited seminar; • American Geophysical Union (AGU) 2017 Fall meeting, New Orleans, United States, 11/12-15/12, 2017. Invited speaker; • Goldschmidt 2017, Paris, France, 13/8-18/8, 2017. Invited speaker; • Goldschmidt 2016, Yokohama, Japan, 26/6-1/7, 2016. Invited speaker; • ETH, Zürich, Switzerland, Jan 2012. Invited seminar;
1998 - 2020	Teaching experience	• 5200 teaching hours of which 3000 lecturing hours, approximately 870 hours diploma work project supervising and approximately 1350 hours laboratory supervising. • Supervised 26 BSc/MSc Degree projects (as main supervisor). • One of four main responsible teachers at Umeå University for the development of the Master program in Chemistry, 2010-2011. • One of three main responsible teachers at Umeå University for the development of the Master program “Swedish School of Environmental Chemistry” in cooperation with the Department of Environmental Chemistry at Stockholm University, 2005-2006. • One of the main responsible teachers for the development of the advanced level courses Applied Atomic Spectrometry, Measurements and Modeling of Environmental Pollutants, Advanced Experimental Tools in Chemistry and Environmental Analytical Chemistry. • One of seven responsible teachers for planning and outlining the PhD education course Introduktionskurs för doktorander vid Teknisk-naturvetenskaplig fakultet, 2020.
2006 - 2020	Conference organization	• Co-organizer of the session “13h: Transformation and Transport of Environmental Contaminants across Biogeochemical Boundaries” for the Goldschmidt Virtual 2020, Hawaii, USA 21-26 June 2020. • Co-organizer of the special session “Understanding the mercury cycle in a changing world: linking terrestrial and aquatic systems” for the ASLO Summer Meeting 2018, Victoria, BC, Canada 10-15 June 2018. • Member of the local organizing committee for “Kemiportalen 2016”, Umeå 14-17/6 2016. • Member of the organizing committee for the EVISA workshop: Mercury speciation analysis-The basis for sound risk assessment, and optimized remediation strategies for contaminated soils, sediments and sludge, Umeå 17-18/3 2006.
2017 - 2020	Editor assignments	• Associate Editor Frontiers in Environmental Chemistry, 2020- • Editorial Board Member International Journal of Environmental Research and Public Health, July 2018 – • Guest editor for the special issue “Mercury Exposure and Global Change” in International Journal of Environmental Research and Public Health, July 2017 – April 2018.

Intellectual property

Intellectual property

Type	Date of approval	Status	ID	Licensed to other part	Product classification
Patentansökan	2015-08-06	Approved	20150218462	Not Sweden - Company	35. Electricity, gas, steam and air conditioning
Patent	2015-01-20	Approved	8,936,686	Not Sweden - Company	39. Remediation services and other waste management services

CV - Mats Nilsson

Participating researchers: Mats Nilsson
Birthdate: 19560229
Gender: Male
Country: Sweden
Doctoral degree: 1992-06-10
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10611. Ecology incl. Aquatic Ecology, Terrestrial Ecology, Biodiversity Conservation, 1992-06-10	Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel	Fungi and bacteria in peat and peat-forming plant communities	Anders Nordgren

Basic education

Year	Examination
1985	10611. Ecology incl. Aquatic Ecology, Terrestrial Ecology, Biodiversity Conservation, Degree of Bachelor, Umeå University, Sweden

Professional history

Employments

Period	Position	Part of research in employment	Employer
maj 2007 - Present	Professor, Permanent employment	30	Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel
juli 1998 - april 2007	Senior lecturer, Permanent employment	30	Swedish University of Agricultural Sciences
juli 1996 - juni 1998	Assistant professor, Temporary employment	100	Swedish University of Agricultural Sciences
maj 1992 - juni 1996	Researcher, Permanent employment	100	Swedish University of Agricultural Sciences
september 1984 - april 1992	Research assistant, Permanent employment	100	Swedish University of Agricultural Sciences

Merits and awards

Docentur

Year	Subject	Organisation
1998	10611. Ecology incl. Aquatic Ecology, Terrestrial Ecology, Biodiversity Conservation	Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel

Supervised persons

Year	Supervised persons	Role
2024	PhD student, Koffi Dodji Noumonvi, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2013	PhD student, Björn Erhagen, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2009	PhD student, Stina Harryson-Drotz, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2009	PhD student, Tobias Eriksson, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2007	PhD student, Jörgen Sagerfors, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2007	PhD student, Ylva Schnürer, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2001	PhD student, Malin Klarqvist, Swedish University of Agricultural Sciences, Sweden	Main supervisor
1998	PhD student, Catharina Mikkelä, Swedish University of Agricultural Sciences, Sweden	Main supervisor
1998	PhD student, Gunnar Granberg, Swedish University of Agricultural Sciences, Sweden	Main supervisor
1998	PhD student, Inger Bergman, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2021	PhD student, Betty Ehnvall, Swedish University of Agricultural Sciences, Sweden	Secondary supervisor
2019	PhD student, Baolin Wang, Swedish University of Agricultural Sciences, Sweden	Secondary supervisor
2017	PhD student, Magali Marti Genero, Linköping University, Sweden	Secondary supervisor
2021	Postdoc, Joss Ratcliff, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2020	Postdoc, Haijun Peng, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2019	Postdoc, Cecilie Skov Nielsen, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2018	Postdoc, Henrik Serk, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2018	Postdoc, Järvi Järveoja, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2016	Postdoc, Georg Jocher, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2015	Postdoc, Junbin Zhao, Swedish University of Agricultural Sciences, Sweden	Main supervisor

Research grants awarded in competition

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2019 - 2022	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	3 380 000
2017 - 2017	Kempe Foundations, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	1 500 000
2017 - 2019	Formas, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	2 996 649
2016 - 2020	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Anders Lindroth	Co-applicant	8 500 000	35 000 000
2016 - 2020	SLU - internal funding for Research Infrastructure, Sweden - Other financing agencies and organisations	Nilsson Mats	Applicant	0	3 000 000
2015 - 2017	Carl Tryggers Stiftelse för Vetenskaplig Forskning, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	600 000
2014 - 2018	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Co-applicant	2 800 000	24 400 000
2013 - 2016	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	2 800 000
2013 - 2016	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	2 400 000
2010 - 2012	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Mats Nilsson	Applicant	0	1 800 000

Awards and distinctions

Year	Name of award/distinction	Issuer
2012	WMO 2012 Norbert Gerbier-MUMM International Award	World Meteorological Organization (WMO), a specialized agency of the United Nations

Year	Name of award/distinction	Issuer
2010	Top 5% research groups at SLU based on the KON 2009 Evaluation	SLU

Other merits

Period	Type of merit	Description
1991 - 2021	Bibliometry	Total number of peer-reviewed papers since 1991 is 163 of which 59 during the last five years (2016-2020), i.e. ~12/year ; Bibliometry as of ISI WoS (20210210), H-index 43; Citations >5500. Three articles in Nature Communications (IF 12.1); one in Nature Geoscience (IF13.6), one in Nature Climate Change (IF 21.7); one in Science Advances (IF13.1); two in Scientific Reports (4.0); Two in PNAS (IF 9.4); 17 in Global Change Biology (IF >8); eight in Environmental Science & Technology (IF 7.8)
2009 - 2021	Member of ICOS Sweden Steering Committee	Steering committee member of the VR National Research Infrastructure, Swedish ICOS
2019 - 2019	Recieved research grants	I have received 45 000 000 sek as PI, mainly from VR, Formas and Kempe Foundations. I have receive an additional ~60 000 000 sek as SLU PI for the Swedish Research Infrastructure ICOS.
2000 - 2018	Evaluation of international grant proposals	Evaluation international grant applications, e.g.:Natural Environment Research Council (NERC), GB; NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL of Canada (NSERC); NSF, USA; Estonian Research Council Dept of Research Funding. ERC (European Research Council)
2005 - 2018	Services in evaluation committees for academic positions	Services in evaluation committees for academic positions - The last nine listed below: 1-Carleton University, Faculty of Arts and Social Sciences, Canada, Elyn Humphreys, promotion to Full Professor, 2018; 2-City University of New York, (CUNY), Chuixiang Yi, promotion to Professor, 2018; 3-Chinese University of Honkong, Yuk Fo Lai, promotion to Associate Professor, 2107; 4-Linköping University, Tema Vatten, Magnus Gålfalk, promotion to Senior Lecturer, 2017; 5-Montreal University, Faculty of Arts and Sciences, Julie Talbot, Tenure track promotion to Associate Professor, 2017; 6-Lund University, Faculty of Natural Sciences, Per Bengtsson, Associate Professor, (Docent), 2017; 7-University of Eastern Finland, Forest Meteorology and Hydrology, Samuli Launiaianen, Promotion to Associated Professor (Docent), 2013; 8-Lund University, Almut Arneth, promotion to Professor, 2010; 9-Lund University, Department of Physical Geography, Senior lecturer position, (oavlönad docent) Lena Ström;
2011 - 2013	Chair of Standing Committee on Peatlands and Climate Change, International Peat Society, 2011-	Chair of Standing Committee on Peatlands and Climate Change, International Peat Society,
1999 - 2012	Member of >30 PhD evaluation committees	Member of >30 PhD evaluation committees
2007 - 2012	Member of the Board of the Forestry Faculty, SLU, Umeå	Member of the Board of the Forestry Faculty, SLU, Umeå
2010 - 2010	Member of Vice chancellors committee for harmonizing criteria for promotion to associate professor or professor at SLU	Member of Vice chancellors committee for harmonizing criteria for promotion to associate professor or professor at SLU, 2010
2006 - 2008	Member of the committee on Environmental Monitoring at Forestry Faculty, SLU, Umeå	Member of the committee on Environmental Monitoring at Forestry Faculty, SLU, Umeå

Period	Type of merit	Description
2005 - 2005	member of the VR evaluation committee for grant applications on biodiversity	VR, member of the grant evaluation committee for grant applications on biodiversity,
2002 - 2004	member of the FORMAS evaluation committee for grant applications on processes in soil, air and water	Member of the FORMAS evaluation committee for grant applications on processes in soil, air and water FORMAS, member of the evaluation committee for grant applications on processes in soil, air and water.

CV - Stefan Osterwalder

Participating researchers: Stefan Osterwalder
Birthdate: 19850129
Gender: Male
Country: Switzerland
Doctoral degree: 2016-05-17
Academic title: Doctor
Employer: Universität Basel

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10503. Geosciences, Multidisciplinary, 2016-05-17	University of Basel, Switzerland	Land-atmosphere exchange of elemental mercury: New insights using a novel relaxed eddy accumulation system and enclosure techniques	Christine Alewell

Basic education

Year	Examination
2012	10503. Geosciences, Multidisciplinary, Degree of Master, University of Basel, Switzerland
2008	10503. Geosciences, Multidisciplinary, Degree of Bachelor, University of Basel, Switzerland

Professional history

Employments

Period	Position	Part of research in employment	Employer	Other information
juli 2021 - april 2022	Researcher, Project employment	100	ETH Zurich, Switzerland, Department of Environmental Systems Science	
april 2021 - juni 2021 (Present)	Researcher, Project employment	100	University of Basel	
november 2017 - december 2018 (Present)	Research assistant, Project employment	100	University of Basel	
maj 2016 - september 2016	Research assistant, Project employment	50	University of Basel	Project leader

Post doctoral assignments

Period	Organisation	Subject
januari 2019 - mars 2021	University of Grenoble Alpes, France, IGE	10508. Meteorology and Atmospheric Sciences
oktober 2016 - oktober 2017	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management	10503. Geosciences, Multidisciplinary

Interruptions in research

Period	Description
2020-11-18 - 2020-12-20	Parental leave

Merits and awards

Supervised persons

Year	Supervised persons	Role	Number
	Guest student	Main supervisor	3
2018	Student, Jacqueline Riedi, University of Basel, Switzerland	Secondary supervisor	
2017	Student, Remo Schweigler, University of Basel, Switzerland	Secondary supervisor	
2012	Guest student, Lazaro Perez, Uppsala universitet, Sweden	Main supervisor	
2011	Guest student, Maxime Florin, Paris University 1 Panthéon-Sorbonne, France	Main supervisor	

Research grants awarded in competition

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2019 - 2021	Swiss Science National Foundation (SNSF), Not Sweden - Governmental agencies, Switzerland	Stefan Osterwalder	Applicant	0	1 200 000
2018 - 2018	University of Basel, Not Sweden - Higher education institutes, Switzerland	Stefan Osterwalder	Applicant	0	500 000
2017 - 2020	Not Sweden - Governmental agencies,	Christine Alewell	Co-applicant	0	6 500 000
2013 - 2014	Not Sweden - Governmental agencies,	Stefan Osterwalder	Applicant	0	600 000

Awards and distinctions

Year	Name of award/distinction	Issuer
2017	FAG research grant	Freiwillige Akademische Gesellschaft Basel
2015	FAG research grant	Freiwillige Akademische Gesellschaft Basel

CV - Ulf Skyllberg

Participating researchers: Ulf Skyllberg
Birthdate: 19610907
Gender: Male
Country: Sweden
Doctoral degree: 1993-10-15
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10506. Geochemistry, 1993-10-15	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management	Acid-base properties of humus layers in northern coniferous forests	Nils Nykvist

Basic education

Year	Examination
1986	10506. Geochemistry, Degree of Master of Science in Forestry, Swedish University of Agricultural Sciences, Sweden

Professional history

Employments

Period	Position	Part of research in employment	Employer	Other information
juni 2005 - Present	Professor, Permanent employment	90	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management	Övrig tid undervisning (ca 10%)
juli 1998 - maj 2005	Senior lecturer, Permanent employment	85	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management	Undervisning övrig tid
december 1996 - juni 1998	Assistant professor, Project employment	85	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management	Övrig tid undervisning
augusti 1986 - oktober 1993	PhD student, Project employment	70	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management	Hade även betydande undervisningsansvar

Post doctoral assignments

Period	Organisation	Subject
oktober 1995 - november 1996	University of Minnesota Twin Cities, USA, Department of soil water and climate	10506. Geochemistry
september 1994 - september 1995	The Royal Veterinary and Agricultural University, Denmark, Department of Chemistry	10506. Geochemistry

Merits and awards

Docentur

Year	Subject	Organisation
1999	10506. Geochemistry	Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel

Supervised persons

Year	Supervised persons	Role
2014	PhD student, Rose-Marie Kronberg, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2012	PhD student, Ida Tjerngren, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2009	PhD student, Andreas Drott, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2006	PhD student, Sofia Frankki, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2005	PhD student, Torbjörn Karlsson, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2003	PhD student, Johan Eriksson, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2001	PhD student, Jin Qian, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2022	PhD student, Mareike Gutensohn, Umeå University, Sweden	Secondary supervisor
2016	PhD student, Liem Van Nguyen, Umeå University, Sweden	Secondary supervisor
2013	PhD student, Sofi Jonsson, Umeå University, Sweden	Secondary supervisor
2012	PhD student, Cristal Fernandez Gomez, Barcelona University, Spain	Secondary supervisor
2020	Postdoc, Yu Song, Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel	Main supervisor
2018	Postdoc, Tao Jiang, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2017	Postdoc, Yu Song, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2012	Postdoc, Andreas Drott, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2008	Postdoc, Magnus Bergknut, Swedish University of Agricultural Sciences, Sweden	Main supervisor
2017	Postdoc, Gbotemi Adediran, Umeå University, Sweden	Secondary supervisor
2017	Postdoc, Wei Zhu, Umeå University, Sweden	Secondary supervisor
2013	Postdoc, Sylvain Bouchet, Umeå University, Sweden	Secondary supervisor
2019	Guest postdoc, Tao Jiang, Southwest University, China	Main supervisor

Research grants awarded in competition

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2019 - 2022	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Ulf Skyllberg	Applicant	0	3 680 000
2019 - 2023	Swedish University of Agricultural Sciences, Sweden - Other governmental agencies	Ulf Skyllberg	Applicant	0	4 335 000
2018 - 2019	Sweden - Oterh private actors,	Ulf Skyllberg	Applicant	0	719 000

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2015 - 2018	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Ulf Skyllberg	Applicant	0	3 000 000
2014 - 2018	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Co-applicant	3 140 000	23 400 000
2013 - 2017	Formas, Sweden - Other financing agencies and organisations	Mats Tysklind	Co-applicant	1 000 000	7 510 000
2010 - 2014	Formas, Sweden - Other financing agencies and organisations	Ulf Skyllberg	Applicant	0	3 900 000
2007 - 2009	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Ulf Skyllberg	Applicant	0	1 644 000
2006 - 2008	Formas, Sweden - Other financing agencies and organisations	Ulf Skyllberg	Applicant	0	3 600 000
2004 - 2005	Naturvårdsverket, Sweden - Other financing agencies and organisations	Ulf Skyllberg	Applicant	0	660 000

Awards and distinctions

Year	Name of award/distinction	Issuer
2009	Top 5% research group at the KoN ("Kunskap och Nytta") evaluation of research, teaching and outreach at the Swedish University of Agricultural Sciences (SLU)	Swedish University of Agricultural Sciences
2007	Top Environmental Science Paper Award of the Scientific Journal Environmental Science and Technology	American Chemical Society
1999	Gunnar Torstenssons Forskarstipendium	Kungliga Skogs- och Lantbruksakademien (KSLA)

Other merits

Period	Type of merit	Description
1989 - 2021	Bibliometric profile	I have published in total 98 peer-reviewed original research papers and four book chapters. By Mar, 31 2021 they have been cited 3967 times with a h-index of 36 (Scopus, Elsevier, self-citations excluded). I have published 31 peer-reviewd articles the last five year period (2016-2021).
1997 - 2021	Grant evaluation committé member	External evaluator of project proposals to SIDA, MISTRA, FORMAS, NSF–USA, Czech Research Foundation, Swiss Research Foundation, Swiss-Norwegian synchrotron radiation beamline ESRF, Grenoble, SSRL Stanford, ETH-Zürich and faculty positions (including professorships) at several Universities.

Period	Type of merit	Description
1999 - 2021	External examiner and examination committé PhD students	During the period 1999-2021 I have been external examiner of PhD these twice (B. Westergaard Strobel. The Royal Veterinary and Agricultural University, Denmark, 2000. T. Lifvergren. Örebro University, 2001) and member of examination committees 20 times.
2004 - 2021	Keynote and plenary speaker at international conferences	I am regularly invited to give keynote talks on mercury biogeochemistry at international research conferences. The following list give examples on conferences to which I have been invited and accepted to give a presentation: • Soil Science Society of America Meetings, Seattle, USA Nov, 1-4, 2004. • 9th International Conference on mercury as a global pollutant (ICMGP), Madison, USA, Aug 4-8, 2006 • American Geophysical Union fall meeting, San Francisco, Dec. 10-14, 2007. • Keynote 19th World Congress of Soil Science, Brisbane, Australia, Aug. 1-6, 2010. • Keynote 7th International Symposium on Ecosystem Behavior (BIOGEOMON), Maine, USA, July 15-20, 2012 • Keynote 13th International Conference on mercury as a global pollutant (ICMGP), Jeju, June 14-19, 2015 • Invited as speaker at the Gordon Research Conference on Environmental Sciences: Water - postponed to June 19-22, 2022
2000 - 2021	Principal Investigator of beamtime applications at synchrotron radiation facilities	I have received beamtime as PI at the following synchrotron light facilities ESRF, Grenoble: Experiment no. ME-64 (2000-2001), ME-602 (2003), EC-320 (2008), EC-590 (2009). HASYLAB (GER): Experiment no. I-04-076-EC (2005). MAX-II (SWE): Experiment no. I811-009, -026, -046, -073, -105, -137, -181, -188, -240, -470 (2004-2015). MAX-IV (SWE): Commission Expert at the Balder Beamline 2019- ANKA (GER): Mar-2007 Diamond (UK): Experiment SP9157-1,2 (2014/2017), SP 14025 (2016), SP20521 (2018)
1989 - 2021	Communication of research	I regularly communicate research results at international conferences. My main research topic is mercury biogeochemistry and in that research field there is an international conference every second year. At each of the last four conferences (Edinburgh, UK, 2013, Jeju, South Korea 2015, Providence, Rhode Island, 2017, Krakow, Poland, 2019) my research group have presented about 10 contributions. My research on mercury biogeochemistry always have a clear link to stakeholders in society. I have arranged and am regularly invited to meetings and education events to communicate recent findings and discuss environmental issues linked to mercury contamination with paper- and pulp industry, forest companies, county administrations, the Swedish EPA, the Swedish Forest Agency, as well as various funding agencies.
2019 - 2019	Grant evaluation committé member	Member of the grant evaluation committé NT-B: “Processes in soil, air and water” of the Swedish Research Council (VR)
2009 - 2017	Member advisory committé	Member of advisory committee for the In Situ Hard XAS beamline BALDER at the synchrotron radiation light source MAX IV, Lund, (2009-).
2000 - 2017	External expert	Engaged by the Swedish Forestry Agency and Swedish EPA as expert related to actions to counteract anthropogenic acidification of forest soils and waters in Sweden (2000, 2005–2008, 2012-2017).
2006 - 2015	External expert	External expert to the Norwegian Coastal Administration and the consulting company Det Norske Veritas on the risk assessment of a submarine wreck containing 70 tons of mercury (2006–2010, 2012-2015).
2005 - 2010	Grant evaluation committé member	Member of the grant evaluation committé of “Centre for Environmental Research” CMF in Umeå 2005-2010. Every year 5-6 PhD student fellowships were granted.
2008 - 2008	Grant evaluation committé member	Member of the grant evaluation committé NT-B: “Processes in soil air and water” of the Swedish Research Council (VR)

Period	Type of merit	Description
2001 - 2006	Coordinator for SUAS in North Sweden Soil Remediation Centre (MCN)	North Sweden Soil Remediation Centre (MCN). The goal of MCN was to integrate academeia with society, where in-depth research results was implemented in the process of risk assessment of sediements and soils contaminated by inorganic and organic contaminants. MCN was a consortium consisting of 3 universities (Luleå, Umeå and SUAS), the Swedish Defence Research Agency (FOI), 16 private companies, 2 county administrations (Norrbotten and Västerbotten) and 5 municipal communities. Of the total budget of 12 million Euro, 1/3 was EU structural funds, 1/3 was co-funded by priate companies and 1/3 was co-funded by the public, including universities. As a coordinator for SLU, Skyllberg received 7 000 000 SEK (0.8 million Euro) covering 100% salary for 2 PhD students and 1-4 months / year for 4 researchers at the Dept. of Forest Ecology, SLU. One additional PhD student was co-funded by the Dept. of Forest Ecology. I was member of the management board and theme leader of Theme 2: Soprtion and Mobility of Contaminants.

CV - Wei Zhu

Participating researchers: Wei Zhu
Birthdate: 19860320
Gender: Male
Country: Sweden
Doctoral degree: 2015-01-17
Academic title: Doctor
Employer: Sveriges lantbruksuniversitet

Educational history

Research education

Examination	Organisation	Dissertation title	Name of supervisor
PhD degree, 10503. Geosciences, Multidisciplinary, 2015-01-17	University of Chinese Academy of Sciences, China, Institute of Geochemistry	Development and Evaluation of Enclosure and Micrometeorological Techniques for Quantifying Air-surface Exchange of Gaseous Elemental Mercury over Agricultural Lands	Xinbin Feng

Basic education

Year	Examination
2009	10503. Geosciences, Multidisciplinary, Degree of Bachelor, Southwest University, China

Professional history

Employments

Period	Position	Part of research in employment	Employer
januari 2019 - Present	Researcher, Permanent employment	100	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management
april 2017 - december 2018	Postdoctoral fellow, Temporary position	100	Swedish University of Agricultural Sciences, Sweden, Forest Ecology and Management

Post doctoral assignments

Period	Organisation	Subject
april 2015 - mars 2017	Umeå University, Sweden, TEKNAT Kemiska institutionen	10401. Analytical Chemistry

Research exchange assignments

Period	Type	Organisation	Subject
juli 2014 - november 2014	Guest researcher	Lamar University, USA, Department of Civil and Environmental Engineering	10503. Geosciences, Multidisciplinary

Interruptions in research

Period	Description
2020-09-01 - 2020-10-31	Parental leave (100%)

Merits and awards

Supervised persons

Year	Supervised persons	Role
2022	PhD student, Xiangwen Zhang, Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel	Main supervisor
2023	Postdoc, Haijun Peng, Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel	Main supervisor
2022	Postdoc, Ting Huang, Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel	Main supervisor
2022	Postdoc, Chuxian Li, Swedish University of Agricultural Sciences, Sweden, Skogens ekologi och skötsel	Secondary supervisor
2018	Student, Benjamin Brinkert, National School for Water and Environmental Engineering, France, France	Main supervisor
2018	Student, Julie Dubos, School of Industrial Biology, France, France	Main supervisor
2018	Student, Morgane Frere, National School for Water and Environmental Engineering, France, France	Main supervisor
2020	Student, Jacob Smeds, Uppsala universitet, Sweden	Secondary supervisor

Research grants awarded in competition

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2021 - 2024	Swedish Environmental Protection Agency, Sweden - Other governmental agencies	Paul Frogner-Kockum	Co-applicant	975 541	4 987 136
2021 - 2023	The Kempe Foundation, Sweden - Other financing agencies and organisations	Wei Zhu	Applicant	0	700 000
2020 - 2023	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Wei Zhu	Applicant	0	3 300 000
2019 - 2023	Swedish University of Agricultural Sciences, Sweden - Higher education institutions	Ulf Skyllberg	Co-applicant	0	4 350 000

Period	Funder	Project leader	Your role	Sub amount (SEK)	Total amount (SEK)
2019 - 2021	VR - The Swedish Research Council, Sweden - Other financing agencies and organisations	Kevin Bishop	Co-applicant	0	2 520 000
2018 - 2020	Formas, Sweden - Other financing agencies and organisations	Wei Zhu	Applicant	0	2 985 354

Awards and distinctions

Year	Name of award/distinction	Issuer
2016	Excellent Doctoral Dissertation of Chinese Academy of Sciences	Chinese Academy of Sciences
2015	Chinese Academy of Sciences Presidential Scholarship - Distinguished Special Prize	Chinese Academy of Sciences
2012	Best Presentation of 7th National Conference of Environmental Chemistry (China)	Scientific Steering committee of 7th National Conference of Environmental Chemistry (China)

Other merits

Period	Type of merit	Description
2019 - 2023	Developing of research infrastructure	Dr. Zhu, together with colleagues in SLU, have been granted an internal funding from SLU to develop a state-of-the-art research infrastructure: SLU Quicksilver Platform. Total budget 4350 kkr for instrumentation development. The project will support Dr. Zhu to develop an advanced mercury bio-geochemistry research laboratory with capability for accurate measuring Hg flux, Hg concentration and chemical preparation for Hg isotope analysis.
2012 - 2020	Bibliometric Summary	Dr. Zhu has published 23 peer-reviewed scientific papers. Total citation 649 (Apr 05, Google Scholar). Dr. Zhu has also authored 15 international conferences (e.g., ICMGP, EGU, ICHMET) abstracts (8 as a presenter), and 1 popular science presentation/exhibition to high school students. In addition, Dr. Zhu serves as 12 international journals' reviewer (Ca. 6-10 reviews per year).
2012 - 2020	Membership of Scientific Societies	Since 2020, a member of European Geosciences Union. Since 2016, a member of Swedish Chemical Society. Since 2012, a member of Chinese Society of Mineralogy,Petrology and Geochemistry.
2019 - 2020	Review for funding agencies	Invited international scientific reviewer for research proposals from Natural Science Foundation of China.

Publications

Publications - Bishop, Kevin

Project leader: Kevin Bishop
Birthdate: 19600422
Gender: Male
Country: Sweden
Doctoral degree: 1993-07-17
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Publications - Stefan Bertilsson

Participating researchers: Stefan Bertilsson
Birthdate: 19690619
Gender: Male
Country: Sweden
Doctoral degree: 1999-05-21
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Publications - Erik Björn

Participating researchers: Erik Björn
Birthdate: 19740228
Gender: Male
Country: Sweden
Doctoral degree: 2003-10-10
Academic title: Professor
Employer: Umeå universitet

Publications - Mats Nilsson

Participating researchers: Mats Nilsson
Birthdate: 19560229
Gender: Male
Country: Sweden
Doctoral degree: 1992-06-10
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Publications - Stefan Osterwalder

Participating researchers: Stefan Osterwalder
Birthdate: 19850129
Gender: Male
Country: Switzerland
Doctoral degree: 2016-05-17
Academic title: Doctor
Employer: Universität Basel

Publications - Ulf Skyllberg

Participating researchers: Ulf Skyllberg
Birthdate: 19610907
Gender: Male
Country: Sweden
Doctoral degree: 1993-10-15
Academic title: Professor
Employer: Sveriges lantbruksuniversitet

Publications - Wei Zhu

Participating researchers: Wei Zhu
Birthdate: 19860320
Gender: Male
Country: Sweden
Doctoral degree: 2015-01-17
Academic title: Doctor
Employer: Sveriges lantbruksuniversitet

Register

Terms and conditions

The application shall be signed by the applicant and also by an authorised representative of the administrating organisation. The representative is normally the head of the department where the research will be carried out, but this is dependent on the administrating organisation's structure.

The *applicant's* signature confirms that

- the information in the application is correct and complies with the Swedish Research Council's instructions
- secondary occupations and commercial ties have been reported to the administrating organisation and that nothing has emerged that breaches good research practice
- the permits and approvals required have been obtained before the research is started, such as permits from the Swedish Medical Products Agency or approval from an ethical review board or an ethical committee on animal experiments
- the applicant will comply with all other conditions applicable to the grant.

The signature of the *administrating organisation* confirms that

- the research or research-supporting activities described can be given room at the administrating organisation during the period and to the extent stated in the application
- the applicant will be employed by the administrating organisation during the period covered by the application
- the administrating organisation approves of the budget in the application
- the administrating organisation will comply with all other conditions applicable to the grant.

The above points shall have been discussed by the parties before the representative of the administrating

organisation approves and signs the application.