GEUS & CENPERM: Molecular Microbial Ecology

Research area of interest

Systems: Agricultural soil, Permafrost soil, Glaciers and Icecap, Seawater, Groundwater; Rivers; Waterworks filters; Manure; Bioash

Processes: N-cycle (nitrification, denitrification), C-cycle (methane, CO_2), Pesticide degradation (2,4-D, MCPA, BAM etc); Reductive dechlorination (dehalococcoides, *vcrA*, *bvcA*); Oil degradation (*alkB*, *nah*); Transport of pathogens (*invA*, *tetM*);

Organisms: Bacteria, Fungi, Protozoa

Members of research group


Morten S. Nielsen


Pernille Stockmarr


Anders Priemé


Nikoline S. Olsen


Toke Andreasen


Pia B. Jacobsen


Marek Stibal


Carsten S. Jacobsen


Mathis H. Hjelmsø


Louise Feld


Tina B. Bech


Tue K. Nielsen

Methods

- DNA extraction; Quantitative PCR
- RNA extraction; Quantitative RT-PCR
- Analysis of 454 and Illumina 16S Sequences
- High Resolution Melt PCR for diversity profiling of bacterial communities
- ^{14}C-labelled degradation studies of pesticides

Resources

Fieldsites:

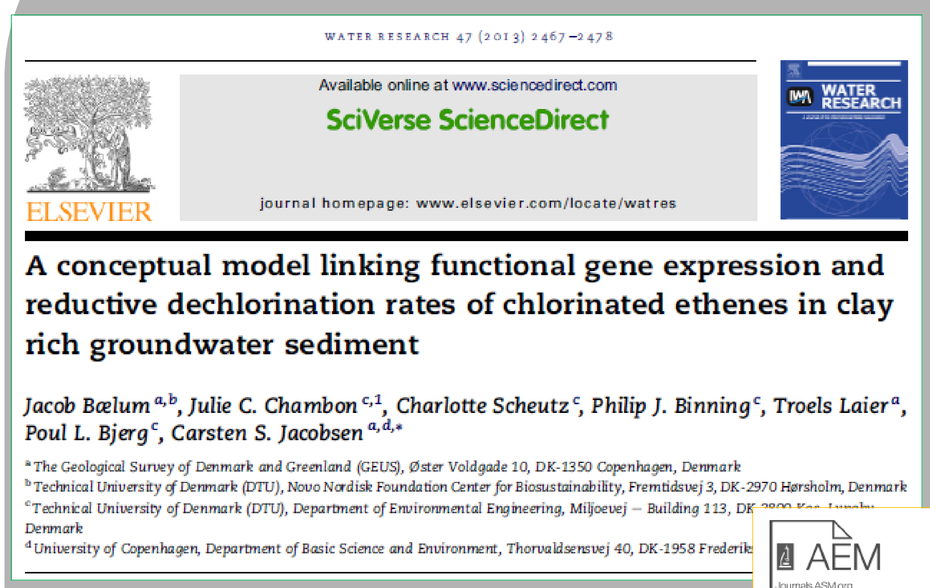
- Greenland (Zakenberg, Station Nord and Disko)
- VAP (large scale field leaching facilities)

PCR workflow in three separated localities:

- DNA/RNA extraction
- PCR set up
- PCR run and post-process analysis.

High Resolution Melt PCR

Key publications


WATER RESEARCH 47 (2013) 2467–2478

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/watres

ELSEVIER

WATER RESEARCH

A conceptual model linking functional gene expression and reductive dechlorination rates of chlorinated ethenes in clay rich groundwater sediment

Jacob Bælum [a,b], Julie C. Chambon [c,1], Charlotte Scheutz [c], Philip J. Binning [c], Troels Laier [a], Poul L. Bjerg [c], Carsten S. Jacobsen [a,d,]*

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[b] Technical University of Denmark (DTU), Novo Nordisk Foundation Center for Biosustainability, Fremtidsvej 3, DK-2970 Hørsholm, Denmark
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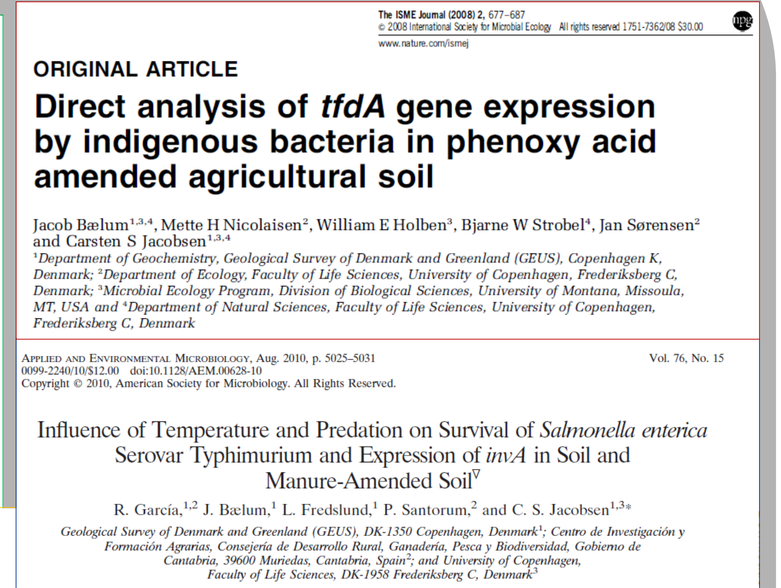
[d] University of Copenhagen, Department of Basic Science and Environment, Thorvaldsensvej 40, DK-1958 Frederik


The ISME Journal (2008) 2, 677–687
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www.nature.com/ismej

ORIGINAL ARTICLE

Direct analysis of *tfdA* gene expression by indigenous bacteria in phenoxy acid amended agricultural soil

Jacob Bælum[1,3,4], Mette H Nicolaisen[2], William E Holben[3], Bjarne W Strobel[4], Jan Sørensen[2] and Carsten S Jacobsen[1,3,4]

[1]*Department of Geochemistry, Geological Survey of Denmark and Greenland (GEUS), Copenhagen K, Denmark;* [2]*Department of Ecology, Faculty of Life Sciences, University of Copenhagen, Frederiksberg C, Denmark;* [3]*Microbial Ecology Program, Division of Biological Sciences, University of Montana, Missoula, MT, USA and* [4]*Department of Natural Sciences, Faculty of Life Sciences, University of Copenhagen, Frederiksberg C, Denmark*

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Aug. 2010, p. 5025–5031 Vol. 76, No. 15
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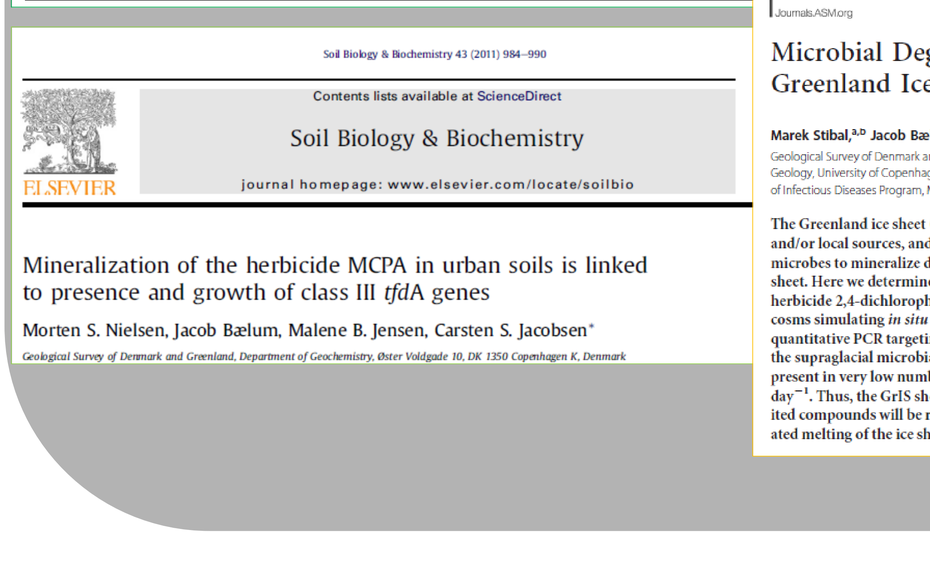
Influence of Temperature and Predation on Survival of *Salmonella enterica* Serovar Typhimurium and Expression of *invA* in Soil and Manure-Amended Soil[▽]

R. García,[1,2] J. Bælum,[1] L. Fredslund,[1] P. Santorum,[2] and C. S. Jacobsen[1,3]*

Geological Survey of Denmark and Greenland (GEUS), DK-1350 Copenhagen, Denmark[1]; Centro de Investigación y Formación Agrarias, Consejería de Desarrollo Rural, Ganadería, Pesca y Biodiversidad, Gobierno de Cantabria, 39600 Muriedas, Cantabria, Spain[2]; and University of Copenhagen, Faculty of Life Sciences, DK-1958 Frederiksberg C, Denmark[3]


Soil Biology & Biochemistry 43 (2011) 984–990

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Soil Biology & Biochemistry

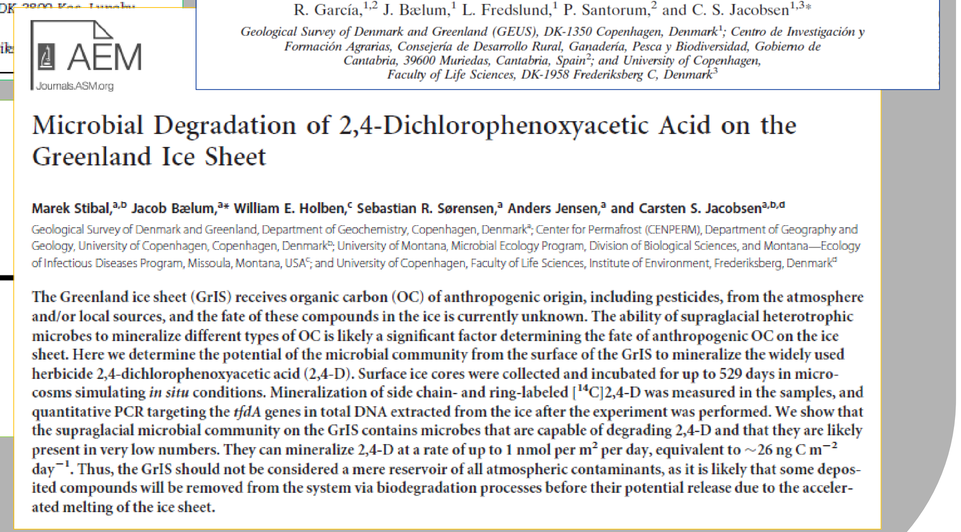
journal homepage: www.elsevier.com/locate/soilbio

ELSEVIER

Mineralization of the herbicide MCPA in urban soils is linked to presence and growth of class III *tfd*A genes

Morten S. Nielsen, Jacob Bælum, Malene B. Jensen, Carsten S. Jacobsen*

Geological Survey of Denmark and Greenland, Department of Geochemistry, Øster Voldgade 10, DK 1350 Copenhagen K, Denmark


AEM
Journals.ASM.org

Microbial Degradation of 2,4-Dichlorophenoxyacetic Acid on the Greenland Ice Sheet

Marek Stibal,[a,b] Jacob Bælum,[a*] William E. Holben,[c] Sebastian R. Sørensen,[a] Anders Jensen,[a] and Carsten S. Jacobsen[a,b,d]

Geological Survey of Denmark and Greenland, Department of Geochemistry, Copenhagen, Denmark[a]; Center for Permafrost (CENPERM), Department of Geography and Geology, University of Copenhagen, Copenhagen, Denmark[b]; University of Montana, Microbial Ecology Program, Division of Biological Sciences, and Montana—Ecology of Infectious Diseases Program, Missoula, Montana, USA[c]; and University of Copenhagen, Faculty of Life Sciences, Institute of Environment, Frederiksberg, Denmark[d]

The Greenland ice sheet (GrIS) receives organic carbon (OC) of anthropogenic origin, including pesticides, from the atmosphere and/or local sources, and the fate of these compounds in the ice is currently unknown. The ability of supraglacial heterotrophic microbes to mineralize different types of OC is likely a significant factor determining the fate of anthropogenic OC on the ice sheet. Here we determine the potential of the microbial community from the surface of the GrIS to mineralize the widely used herbicide 2,4-dichlorophenoxyacetic acid (2,4-D). Surface ice cores were collected and incubated for up to 529 days in microcosms simulating *in situ* conditions. Mineralization of side chain- and ring-labeled [^{14}C]2,4-D was measured in the samples, and quantitative PCR targeting the *tfdA* genes in total DNA extracted from the ice after the experiment was performed. We show that the supraglacial microbial community on the GrIS contains microbes that are capable of degrading 2,4-D and that they are likely present in very low numbers. They can mineralize 2,4-D at a rate of up to 1 nmol per m^2 per day, equivalent to ~26 ng C m^{-2} day^{-1}. Thus, the GrIS should not be considered a mere reservoir of all atmospheric contaminants, as it is likely that some deposited compounds will be removed from the system via biodegradation processes before their potential release due to the accelerated melting of the ice sheet.