Open Forum

News from the field and updates by research groups



Samuel Jaccard University of Lausanne

Vendée Globe Project (2022-2025)



Oliver Heer racing team, SPI, Prof. N. Gruber (ETHZ), Prof. T. Frölicher (UNIBE), Prof. S. Jaccard (UNIL)

Rationale -

Equip Olivier Heer's IMOCA sailing yacht with sensors allowing for continuous, highly resolved measurements of temperature, salinity, pH and pCO_2

* constrain air-sea partitioning of CO_2 , with a particular focus on the yet largely unexplored Southern Ocean

"The extreme environment of the Southern Ocean still holds many mysteries – especially with regard to its role as a sink for atmospheric CO_2 . With these novel measurements, we will be able to unlock some of these"

* unravel the mechanisms leading to marine extreme events, in particular to compound events, combining multiple stressors (T, pH)

"The new high frequency measurements provide us the unique opportunity to study compound marine heatwaves and ocean acidity extremes events in almost real time"

Marine heatwaves



Frölicher & Laufkötter, 2018



data collected by Boris Herrmann in 2020



2.2 OceanPack-RACE[®] basic system

Modifications to the 5th gen instrument are highlighted.



Martin Schneebeli SLF



Understanding thermal conductivity of snow on sea ice

Amy Macfarlane, Lucille Gimenes, David Wagner, Stephan Hämmerle, Martin Schneebeli

• Thermal conductivity and thermal resistance key factors in freezing of sea ic

MOSAIC

- Dozens of samples for X-ray tomography during entire winter
- Direct numerical simulation of thermal conductivity
- Very complex stratigraphy, stochastic interpretation necessary
- Depending on snow microstructure, thermal conductivity at same density varies by a factor 3







Iron and carbon dynamics in Iceland soils under changing environmental conditions

O, high

 CO_2

org

https://soilchem.ethz.ch
laurel.thomas@usys.ethz.ch
@LThomasArrigo

What do we study?

Fe and C cycling in redox active

environments

org

org

Fe^{III}

 O_2 low

How do we study this?

Characterization of field samples

Lab-based soil incubations

In-situ mineral transformation



What do we find?

Fe and C cycles are coupled

Changing redox conditions destabilizes C_{org} storage



Anne-Marie Wefing ETHZ



Tracing Arctic Ocean circulation with ¹²⁹I and ²³⁶U

A.-M. Wefing, N. Casacuberta, A. Payne & TITANICA team Motivation: Arctic Ocean is changing - role of Atlantic Water?

⇒ track Atlantic Water pathways, mixing, timescales

Tool: ¹²⁹I & ²³⁶U

- long-lived radionuclides
- anthropogenic origin
- label Atlantic Waters
- time-dependent source functions

Results: Circulation times

Surface layer (0-30m)

ETH zürich







Atlantic layer ($\sigma_{\Theta} = 27.91$) Mean Age (yrs)





communications earth & environment

N. Casacuberta, A. Payne & TITANICAteam

Núria Casacuberta ETHZ





MODULAR OCEAN RESEARCH INFRASTRUCTURE (MORI)

Flexible infrastructure to maximize ocean-going research capacity and access.

Presented by: Núria Casacuberta Arola



MODULAR OCEAN RESEARCH INFRASTRUCTURE (MORI)

Flexible infrastructure to maximize ocean-going research capacity and access.

In Switzerland (future?):

- Technological development of MORI
 - Customize containers (SBB?)
 - New complementary and compatible labs.
- Ability to use specialized infrastructure worldwide.
- Make use of modern, low-carbon-emitting vessels.
- Possibility to share vessel infrastructure internationally.



- In Canada (now):
- No need to purchase, maintain specialized vessels.
- Provides flexibility to use diverse vessels all along Canadian coast.
- Democratizes access to the sea.
- Cheaper than scientific research vessels.
- Create synergies with private sector.
- New possibilities for international collaboration, beyond Canada.







Heavy Metals in rivers of South Greenland

Dr. David Janssen, Eawag, Department Surface Waters

Key Questions

- Do geologic enrichments lead to high metal fluxes in rivers?
- How are fluxes related to anthropogenic pressures?
 - Direct mining/development
 - Indirect climate, retreating glaciers
- Sampled 45 sites covering varied environmental conditions









SPI projects from ETHZ's

GPS & RTK

Event Camera

Radar Ranger

mmWave 2.5D Rad



ample or deplo

Collect data

3D Lidar (Ouster OS1)

Time-of-Flight Camera



Neural Network for landing prediction

Michael Pantic, Thomas Stastny, Marco Job, Christian Lanegger, David Rohr, Tim Kazik, Guillaume Jouvet, Roland Siegwart

rair

Lisa Bröder ETHZ







Mackenzie Delta Lake sediments – Records of recent permafrost thaw?

Lisa Bröder, Julie Lattaud, Marco Bolandini, Maarten Lupker and Thomas Bossé-Demers

Aerial view of the Mackenzie River and lakes



Coring the ice before coring the sediment

Home-built sediment corer

40 cm long lake sediment core



Diversity and Activity of Methanotrophs in Shallow Ponds of the Arctic Tundra

@alizee_lm

Dr. Alizée Le Moigne



Anna Carratalà EPFL



Microbiome, conservation and citizen science in high mountain lakes

Microbiome research

- To date, 50 lakes >2000 m
- 16 rRNA, metagenome
- Functional predictions
- Environmental context



- 224 bacteria isolates from alpine lakes and polar environments
- The collection Microbialps will be available for research and education





- Network database for citizen science
- Public surveys
- Sampling campaigns open for public Coming: 2000lakes sampling ultramarathon 26/09 – 02/10







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GLISN stations E ST CPI

Google

Proposed Early Warning Network for landslide tsunamis in Ummannaq Basin

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NUUG_M4.2 Landslide 2017				
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