

Training Workshop 3 Brief Description

Title: C-CASCADES Training Workshop 3 - Greenhouse gas (CO₂, CH₄) measurements

Date(s): 17th – 21st October 2016

Location: EPFL, Lausanne, Switzerland

Lead institution: EPFL

Type: Training Workshop

Contact name: Leo Rodrigues

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Local Contact: Tom Battin

Local contact email: tom.battin@epfl.ch

Description:

The main objective of this C-CASCADES Training Workshop is to achieve a better quantitative understanding of CO₂ and CH₄ evasion fluxes from inland waters and the ocean. It will also provide participants with an understanding of the physical basis of the gas exchange coefficient at the water-atmosphere interface, and of ecosystem metabolism as a critical driver of the aquatic carbon cycle.

Training will be embedded to make a breakthrough in understanding gas exchange at the local, regional and global scale. A field excursion will provide wider context on monitoring gas exchange and contextual parameters in Alpine streams.

This training workshop will have morning lectures, delivered by carbon cycle experts from inside and outside the C-CASCADES network, followed by discussions led by network senior scientists. Participants will develop their own questions on caveats and pitfalls related to gas exchange and its scaling, which they will discuss with experts and the network senior scientists. The afternoons will be dedicated to computer practical training where participants will model and compute gas exchange.

Participants will write a critical synthesis report after this workshop which will reflect the discussions, including the roundtable, the expert lectures and the papers to be read prior to the workshop.

Outcome for all participants: ECTS credit certificate

The participants are expected to acquire the following skills and knowledge during this workshop:

- 1 - Understanding the basics of the measurement of CO₂ and CH₄ partial pressure and fluxes in inland waters and the ocean;
- 2 - An overview on computational approaches for the determination of gas exchange at the water - atmosphere interface;
- 3 - General understanding on the modelling of CH₄ ebullition in lakes and reservoirs.

Assessment criteria:

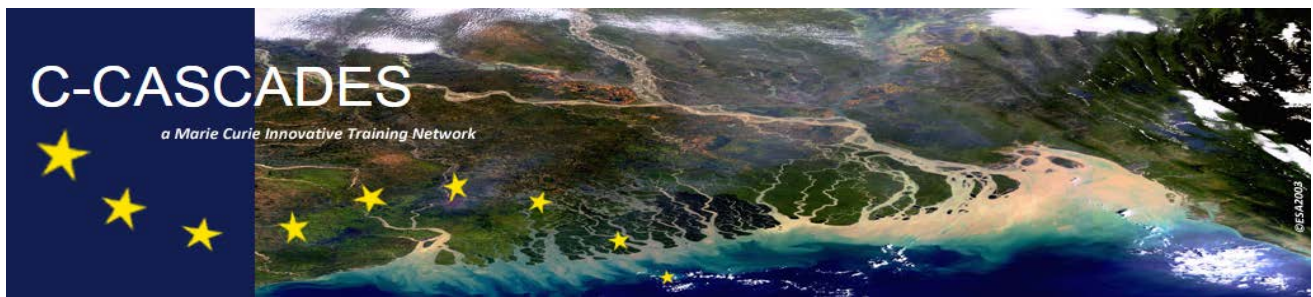
- 1 – Review on CO₂ and CH₄ fluxes (2 x A4) based on the reading of recommended papers; to be submitted electronically by 14 October 2016 and to be presented (max. 5 mins) on 18 October 2016;
- 2 – Overall engagement in the workshop, such as training, expert lectures and roundtable;
- 3 – Individual synthesis report (2 x A4) based on paper reading, expert lectures, discussions and roundtable; to be submitted electronically by 20 November 2016.

ECTS awarded: 3

Awarding institution: EPFL

Registration:

If you wish to register for this event, please send an email (including a CV and a motivation letter for non-C-CASCADES students), before 10 September 2016 to the "Contact email" above and add to the subject line "C-CASCADES Training Workshop 3 external application". *Maximum participants: 20.*



Indicative Timetable

Monday, October 17th, 2016

- 10:00-10:30 Welcome and Introduction (**Tom Battin**), brief presentation of participants
- 10:30-12:00 **Peer Fietzek** (KM Contros GmbH, GER): *Technologies and applications for dissolved CO₂ and CH₄ measurements with a focus on absorption spectroscopy and sensor platform integration*
- 12:00-13:00 Lunch
- 13:00-18:00 Visit of field sites, Vallon de Nant
- 18:00 Dinner – ‘Fondue and Fendant’, Vallon de Nant

Tuesday, October 18th, 2016

- 09:00-10:30 Participant working groups on GHG measurements and upscaling: caveats and pitfalls
- 10:30-11:00 Coffee break
- 11:00-13:00 Participant working groups on GHG measurements and upscaling: Review on CO₂ and CH₄ fluxes presentations
- 13:00-14:00 Lunch
- 14:00-15:30 **Bernard Wehrli** (ETHZ, Eawag, CH): *Calculating pCO₂ and fluxes from standard monitoring data (pH, temperature and conductivity)*
- 15:30-16:00 Coffee break
- 16:00-18:00 **Bernard Wehrli** (ETHZ, Eawag, CH): Computer exercises - Determine aquatic pCO₂ from chemistry data (*assisted by Marie-Sophie Maier and Rohini Athavale*)
- 18:00-18:30 Wrap-up
- 19:00 Dinner

Wednesday, October 19th, 2016

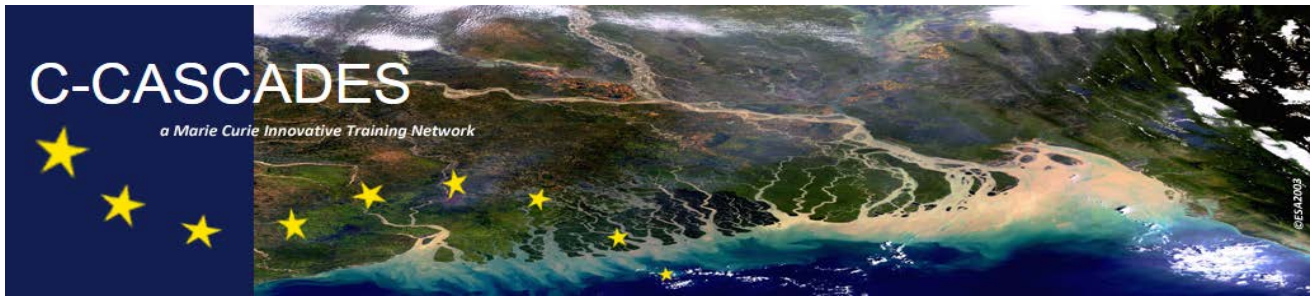
- 09:00-10:30 **Robert Odgen Hall** (University of Wyoming, USA): *Ecosystem metabolism: the driver of the carbon cycle in fluvial ecosystems*
- 10:30-11:00 Coffee break
- 11:00-12:30 **Robert Odgen Hall** (University of Wyoming, USA): *The physical basis of “k”*
- 12:30-14:00 Lunch
- 14:00-18:00 **Robert Odgen Hall** (University of Wyoming, USA): Computer exercises - Computing “k” - from SF₆ and propane releases and from diel O₂ curves (R code)
- 18:00-18:30 Wrap-up
- 19:00 Dinner

Thursday, October 20th, 2016

- 09:00-10:30 **Daniel McGinnis** (University of Geneva, CH): *CH₄ emissions from lakes and reservoirs*
- 10:30-11:00 Coffee break
- 11:00-12:30 **Natacha Pasche** (EPFL, CH): *Impact of river water inflow on under ice spatial distribution of carbon dioxide in Petrozavodsk Bay, Lake Onego in Russia*
- 12:30-14:00 Lunch
- 14:00-18:00 **Daniel McGinnis** (University of Geneva, CH): Computer exercises - Modelling CH₄ ebullition in lakes and reservoirs
- 18:00-18:30 Wrap-up
- 20:00 Dinner

Friday, October 21st, 2016

- 09:00-11:00 Roundtable: Can we scale CH₄ and CO₂ fluxes from the local to the regional scale and beyond?
- 11:00-11:30 Wrap-up and closure



Logistics brief

Important note: Although the training event itself is free to attend for external participants, any other costs, such as accommodation, travel and subsistence, are to be covered by them. Further information will be provided once an offer to attend is firmly accepted.

Location

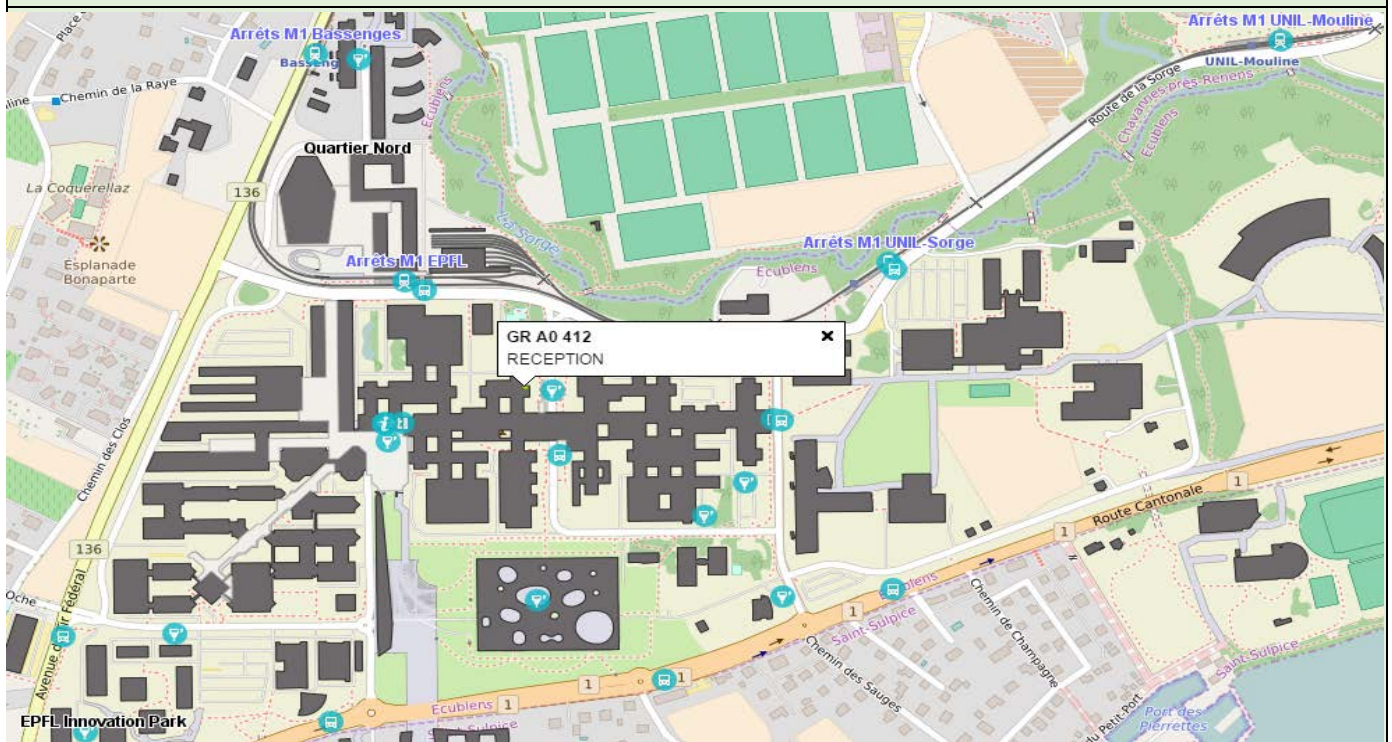
Station 2 – GR A0 412

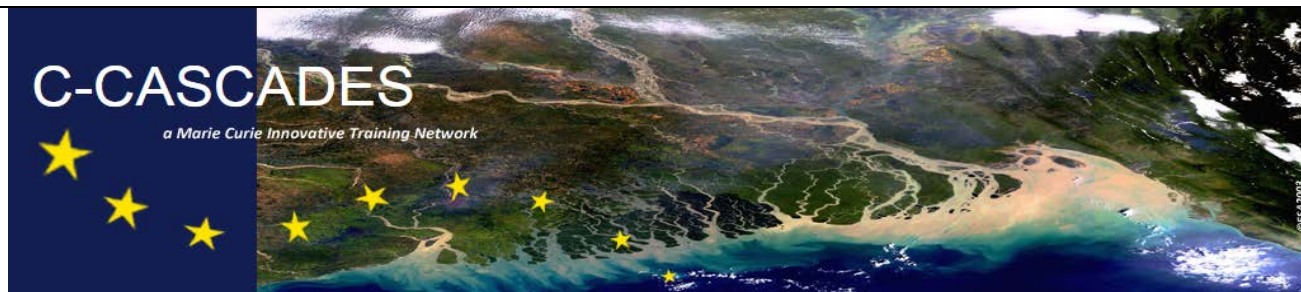
Institute of Environmental Engineering, School of Architecture, Environmental and Civil Engineering (ENAC)
Ecole Polytechnique Fédérale de Lausanne (EPFL)
CH-1015 Lausanne
Switzerland

Access by public transport

- 1 - From Geneva airport: Take the next train to 'Lausanne, gare' and from "Lausanne-Gare" Take the metro (M2) direction 'Croisettes', step down at 'Lausanne-Flon' and then take the metro (M1) direction "Renens-gare" and stop at "EPFL".
- 2 - From Lausanne train station: Take the metro (M2) direction 'Croisettes', step down at 'Lausanne-Flon' and then take the metro (M1) direction "Renens-gare" and stop at "EPFL";
- 3 - Enclosed a metro map and a map from the metro station at EPFL to SBER secretariat – just in case a link to find public transport map of Lausanne and area.

Map





Indicative Syllabus

Block 1: Literature review and presentation	
Length: 5 hrs reading time + 10 hrs preparation time (15 hrs)	Time slot: various
Trainer: various	Requirement: key articles
<p>Description: This block provides the theoretical framework to the Workshop. Participants are required to read 10 peer-reviewed key papers on the overarching workshop theme in advance – these will be provided by 16 September 2016.</p> <p>This associated reading and further reading provide initial theoretical opportunities towards the active participation on the workshop.</p> <p>Participants will write a short individual review (2 x A4) based on these key articles to be submitted electronically by 14 October 2016 and to be presented (max. 5 mins) on 18 October 2016.</p>	
Block 2: Field excursion	
Length: 6 hrs contact time (6 hrs)	Time slot: various
Trainer: various	Requirement: none
<p>Description: The excursion to the Vallon de Nant provides insights into sensor platforms and other monitoring systems to quantify carbon fluxes in Alpine streams.</p>	
Block 3: Practical training	
Length: 12 hrs contact time (12 hrs)	Time slot: various
Trainer: various	Requirement: laptop / TOTEM
<p>Description: Practical computer exercises will be performed to understand and compute/model the:</p> <ul style="list-style-type: none"> (i) gas exchange coefficient (k); (ii) derive $p\text{CO}_2$ from chemistry data (e.g. conductivity, pH, DIC); and (iii) CH_4 ebullition in lakes and reservoirs. 	
Block 4: Expert lectures and roundtable	
Length: 12 hrs contact time (12 hrs)	Time slot: various
Trainer: various	Requirement: key articles
<p>Description: Expert lectures will provide the theoretical framework to this workshop. Participants are required to actively engage with the discussion after each lecture. The <i>a priori</i> reading of key papers will stimulate these discussions.</p>	
Block 5: Synthesis	
Length: 20 hrs preparation time (20 hrs)	Time slot: various
Trainer: various	Requirement: key articles
<p>Description: Participants will write individual synthesis reports (2 x A4) critically reviewing the determination of CO_2 and CH_4 concentration and fluxes in inland waters and the ocean, and the gas exchange coefficient in these ecosystems, to be submitted electronically by 20 November 2016.</p>	