Title of the tutorial:

Mapping Arctic lakes from space: a tutorial on Copernicus data access and processing

Description/Abstract:

Lakes and ponds are a prominent feature shaping the Arctic landscapes, representing about 30 % of land surface. The vast majority of arctic lakes (depending on the region) falls into the category of small thermokarst lakes, which are particularly susceptible to change (drainage). Therefore, up-to-date and accurate lake dataset is a vital input for many applications and studies focusing on lake dynamics and climate change. Remote sensing provides a very effective and low cost tool for mapping lakes and monitoring their evolution over large areas, with high temporal and spatial resolution. A wide range of different and complementary data (SAR, optical, IR) from Sentinel-1, -2, -3 and recently also from Sentinel-5P are nowadays available with an open and free policy. Sentinel-2 optical data, providing high accuracy through few simple processing steps, are an invaluable resource for regional water body mapping in cloud free conditions. Sentinel-1 SAR data are also frequently used for open water and flooded areas due to their independence on solar illumination and ability to see through cloud cover. A joint use of both types of data can further increase the accuracy and coverage.

This training session will demonstrate the usage of the Open Tools (ESA SNAP; Orfeo Toolbox; QGIS; etc.) available within the RUS environment for mapping water bodies using satellite data, focusing specifically on Arctic landscapes. During a theoretical lecture provided by an expert speaker from Academia, concepts of water surface detection will be introduced. The theory part will also cover the introduction to the Copernicus missions with a focus on Sentinel-1 and Sentinel-2. A hands-on session consisting of SAR and optical data processing exercises will follow; they will be based on Open tools developed within the ESA SEOM Programme (with a focus on the ESA SNAP Toolbox, STEP platform) in the RUS environment.

The RUS - Research and User support for Sentinel core products - is an initiative funded by the European Commission and managed by ESA with the objective to promote the uptake of Copernicus Sentinel data and support R&D activities. It is a free and open service offering not only powerful computational environment - in the form of customized Virtual Machines (VMs) preinstalled with wide variety of open source toolboxes - but also EO expertise and support for application-specific data selection, data processing and visualization as well as algorithm development and scaling-up to large amount of Sentinel products.

Each registered participant will be provided with a preinstalled RUS VM, accessible through an internet browser on his or her personal laptop. The VM will contain all the software and data necessary to follow the practical exercise during the course. It will remain accessible for several weeks for participants to repeat the exercises at their leisure.

Learning objectives: Participants will have a good overview and hands-on experience with selected methods for water body mapping in the Arctic using SAR as well as optical data. Participants will be

familiar with the RUS environment and will be informed on how to request RUS VM for other EO projects and activities exploiting the Copernicus Sentinel data.

Prerequisites of the participants: None

List of material to be distributed: Each participant registered to the hands-on part will be provided with a virtual machine preinstalled with all the necessary software and data. Note that in order to provide a personal VM to each participant, preregistration is required, although a small number of VMs will be accessible to walk-in participants.

Schedule:
10.30 – 12:00 Theory
12:00 – 13:30 Lunch
13:30 – 15:00 Practical part 1
15:00 – 15.30 Coffee Break
15:30 – 17:00 Practical Part 2

Number of participants: For practical reasons, the number of participants to the hands-on session is limited to 25, whereas the number of participants to the theory session is constrained only by the room capacity.

Registration:
Morning Theory Session: 90 - Seats for the morning theory lecture will be available on a first-come first-served basis, no registration is needed

Afternoon Practical Session: 25 - Seats for the afternoon session are subject to a pre-registration, also on first-come first-served basis. Registration available here: https://rus-training.eu/training/mapping-arctic-lakes-from-space