EUFAR Webinars
thematic group: Water
11 April 2025, 13:00-15:00 (CET; Warsaw-Paris time zone)

Registration to the EASW #10 webinar: https://www.eufar.net/event/registration/10th-eufar-airborne-science-webinar-water-106034

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During the Webinar, various case studies of the use of aerial and satellite data, hydrodynamic modelling and ongoing projects in this field will be presented. This Zegrze Reservoir local case study focuses on the use of airborne hyperspectral images for analysis of the water quality of two different reivers (Bug and Narew), which come together in an artificial reservoir, and each of them maintains its own water regime. Based on the corrected images remote sensing indices of water quality were calculated and compared to the hydrodynamic model results and field measurements. The analysis shows the spatial distribution of the water's physico-chemical properties in the reservoir, and poor mixing of the two rivers at their confluence.

Sentinel-1 images can be used for detection of ice cover and ice jams on the lowland rivers. Example from Zegrze Reservoir and Bug River are showing that the most useful are Ground Range Detected Geo-referenced Products (GRD) with two polarization channels of VV and VH. Using SNAP program geometric correction and color composite was created for selected

images at the beginning and end of ice cover at Dębe reservoir on Narew river, covering period January 5-March 6, 2017. It has been found that interpretation of the Sentinel-1 images is most problematic if we want to detect boundary between open calm water and new fast ice. The flow of pancake ice on January 5, 2017 had been recorded and the pattern of ice distribution compared to flow lines calculated by the hydrodynamic CCHE2D model. Result of the hydrodynamic modeling shows circulation pattern in the widest part of the reservoir where are also the most favorable conditions for lake type of ice cover formation. End of ice cover is represented by the image of February 26, 2017 which shows the Narew river free from ice due to higher temperature of the water. Detection of ice jam formation and development on Bug river .help to determine the river hydraulic conveyance blocking and stage-discharge relationship disturbance at hydrological gauging stations.

The Sulejów Reservoir in Central Poland was the subject of the research focused on gaining a better understanding of the balance of nutrients and the use of Sentinel-2 remote sensing data to detect phytoplankton blooms, and on finding the pattern of wind-driven surface currents using the CCHE2D – a depth-averaged hydrodynamic model. The calculation of the total phosphorus load has shown that the reservoir mainly acts as a place for nutrient storage. Still, during low flow and intensive phytoplankton blooms, it can be a source of nutrients. The distribution of phytoplankton blooms on the Sulejów Reservoir was documented using eight Sentinel-2 satellite images from the vegetation season of 2020 and the Normalized Difference Chlorophyll Index (NDCl). Coupling remote sensing data and 2D numerical modelling helps to interpret the hydrodynamic model results and understand nutrients and sediment dynamics within the reservoir.

While drones are highly beneficial for local monitoring studies, they also hold promise in the context of satellite Calibration and Validation (Cal/Val). In contrast to traditional in-situ calibration and validation data collected from fixed stations like AERONET or HYPERNETS, drones can be used to assess the spatial variability surrounding these fixed stations. This assessment helps to determine the representativeness of point measurements with respect to the satellite pixel resolution and coverage, making drones a valuable complementary tool to the existing fixed platform sites. However, obtaining quantitative estimates of aquatic reflectance using Unmanned Aerial Vehicles (UAVs) poses challenges, especially in the presence of glint conditions. Furthermore, water exhibits in general a much higher spatial and temporal variability compared to land, presenting a significant challenge as well.

The AQUARIUS project (https://aquarius-ri.eu/) coordinated by the Marine Institute (Ireland) brings together a portfolio of 57 diverse research infrastructures ranging from satellites to research vessels, and from drones to laboratory facilities from the participating partner institutes and Research Infrastructures EMBRC, EMSO ERIC, SeaDataNet, DANUBIUS-RI, JERICO RI, EUROFLEETS+ and EUFAR. VITO (Belgium) (in collaboration with the University of Zurich Switzerland), CzechGlobe (Czech Republic) and OGS (Italy) are offering aerial research infrastructures within AQUARIUS. The second AQUARIUS Transnational Access Call will open 2 September 2025 and aims to support research and innovation projects that demonstrate integration of different research infrastructures and contribute to the objectives of the EU Mission 'Restore our Ocean and Waters'.

Moderators: Artur Magnuszewski, Bogdan Zagajewski

Program:

13:00 – 13:20 *Sentinel-1 radar images and detection of ice jams on the lowland rivers;* **Artur Magnuszewski** (University of Warsaw, Poland).

13:20 – 13:40 *Hydrodynamic modeling and Sentinel-2 images new source of information for phytoplankton bloom detection on artificial reservoir;* **Artur Magnuszewski** (University of Warsaw, Poland).

13:40 – 14:00 *Monitoring of water quality with the use of airborne hyperspectral data: case study of Zegrzynskie Lake*; **Anna Jarocińska**, Sabat-Tomala A., Magnuszewski A., Zagajewski B. (University of Warsaw, Poland), Sławik Ł. (MGGP Aero, Poland).

14:00 – 14:20 *Towards drone-based aquatic reflectance fiducial reference measurements to validate aquatic (reflectance) satellite products*; **Liesbeth De Keukelaere**, Sterckx S. (VITO, Belgium), Bialek A., Origo N. (NPL, UK).

14:20 – 14:40 *AQUARIUS, an opportunity for transnational access to EUFAR and other Research Infrastructures for healthy and sustainable marine and freshwater ecosystems*; **Ils Reusen** (VITO, Belgium), Hanuš J. (CzechGlobe, Czech Republic), Ferraccioli F., Paganini P., Pavan A. (OGS, Italy).

Zoom: https://uw-edu-pl.zoom.us/j/98899624657?pwd=dyEibHmuZqzG42BrBeSsBZf2vCCWJz.1
Meeting's ID: 988 9962 4657
Access code: 212665

During the meeting, images of people participating in the EUFAR Webinar will be recorded, and the obtained print screens will be published on the EUFAR's web sites and the EUFAR' social media to promote the event.