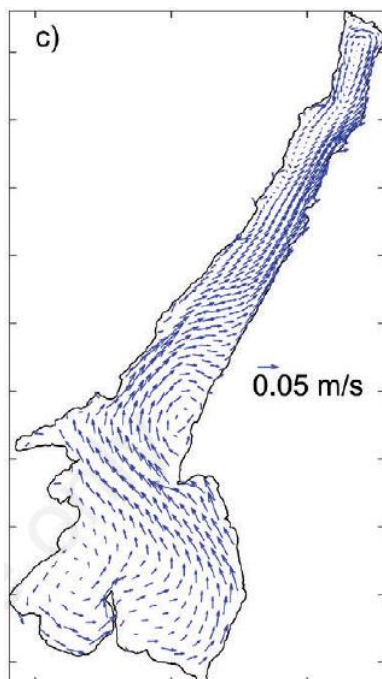
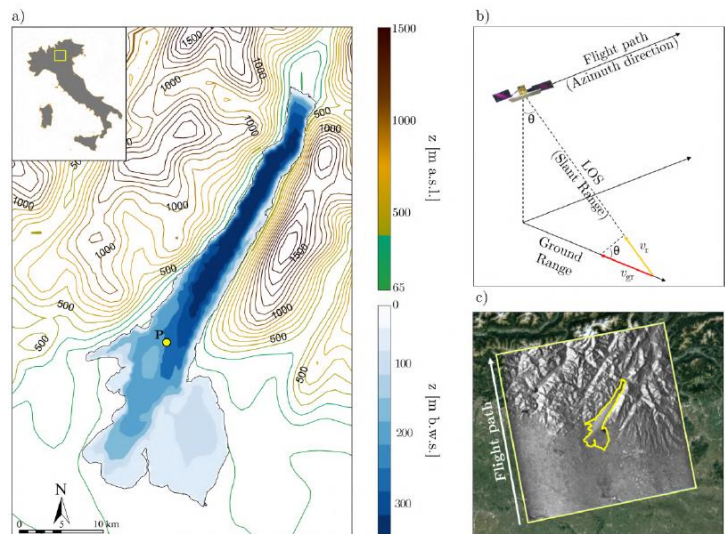


## Proposal of M.Sc. thesis

# Reconstructing the surface flow and wave fields in Lake Garda by integrating numerical modelling, in-situ measurements, and remote sensing (SAR)

### The SARLAKES project

SARLAKES, a PRIN (Progetti di Rilevante Interesse Nazionale) initiative, seeks to revolutionize lake monitoring by integrating remote and in-situ measurements with numerical models. The project utilizes spaceborne Synthetic Aperture Radar (SAR) to accurately estimate water dynamics in medium/large lakes, reducing the labour-intensive process of traditional in-situ measurements. By employing SAR for detailed spatial mapping of wind fields, surface currents, and wind waves, SARLAKES aims to enhance our understanding of lake dynamics, particularly in extreme events. The project focuses on Lake Garda, with plans to explore the applicability of the methodology in Lake Geneva. The results aim to advance standard lake monitoring and remote sensing in limnology, providing crucial tools for safeguarding freshwater resources' natural and economic value.



### The thesis

An existing numerical model of Lake Garda, based on Delft3D coupled with WRF, will be used to simulate the water flow at the surface of the lake and compare it with the maps obtained by SAR. The goal is to develop a tool to reconstruct the surface flow field without the need of in situ measurements. Additionally, the wave model SWAN will be tested to simulate the wind wave field and its interaction with surface flow.

Required competencies include a basic understanding of fluid mechanics and numerical modelling, coding skills for input/output and data analysis (implementation of numerical schemes not required), and an interest in analysing satellite imagery.

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