

Title: Observations of breaking ocean waves using state of the art stereovision and image processing techniques.

About the Project

Breaking ocean waves play a crucial role in weather and climate by enhancing the exchange of energy, momentum and material between the atmosphere and ocean. They also pose a significant hazard to offshore platforms, ships and ocean renewable devices because of the large fluid loads they can induce on structures. Despite their importance, however, very little is known about their scale, frequency of occurrence and severity. While many studies have strived to quantify the coverage of the ocean surface in breaking waves, there is still a large degree of uncertainty related to statistical descriptions of their occurrence. One reason for this uncertainty is the lack of detailed field measurements of breaking waves.

To overcome this limitation, this project will use an existing stereovision camera system that is installed on the oceanographic platform, [Acqua Alta](#), in the Adriatic Sea east of the Venice lagoon. In collaboration with colleagues at the Italian Institute of Marine Science and the University of Venice, the 3-D water surface is reconstructed from the stereovision image pairs using the state of the art image processing software package [WASS](#) (Waves Acquisition Stereo System). The project will use an existing in-house image processing software to identify, map and track individual breaking waves as they occur in the stereo images. This allows the kinematic, geometric and energetic properties of each breaking wave to be characterised. The goal of the project is to produce state-of-the-art statistical descriptions of the measured breaking waves and to apply the results to problems in oceanography, atmospheric science, climate science and engineering. The project will be in collaboration with colleagues who have developed the WASS software.

The successful candidate should have a high level of motivation for ocean wave research, image processing and data analysis. Applicants should have a strong background in a numerate discipline such as physics, engineering, applied mathematics or physical oceanography with a 1st class honours degree at undergraduate level. The successful candidate will receive training in image processing, data analysis, wave physics and air-sea interaction.

Funding to cover tuition fees at the level of Home students, a living stipend and will be secured in open competition within Imperial College London.

Interested candidates should contact Dr. Adrian Callaghan (a.callaghan@imperial.ac.uk) for further information.

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Ocean engineering, Oceanography, Ocean Waves, Wave Breaking, Fluid Mechanics, London, Imperial College London, Air-Sea Interaction, Stereovision, Image Processing, Italy.