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Sub-millimeter scale turbulent airflow dynamics above waves

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The transfers of momentum and scalars across the air-sea interface are influenced by small-scale turbulent processes. In spite of extensive existing work on the topic, our understanding of near-surface physics remains incomplete. This is due, in part, to the technical challenges involved in the measurement and modelling of the small-scale turbulent dynamics very close to the rapidly moving ocean surface.
We present laboratory and preliminary in situ measurements of the submillimeter-scale turbulent motions in the airflow above waves. A high resolution Particle Image Velocimetry (PIV) system was specially developed for measurements at the water surface, capable of capturing 2D velocity fields in the turbulent airflow directly above the wavy surface. We will discuss the influence of waves on the structure of the wind stress within the wave boundary layer, including the influence of separated and non-separated sheltering events.