



## **Acoustic-gravity waves, theory and application**

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Acoustic-gravity waves (AGW) propagate in the ocean under the influence of both the compressibility of sea water and the restoring force of gravity. The gravity dependence vanishes if the wave vector is normal to the ocean surface, but becomes increasingly important as the wave vector acquires a horizontal tilt. They are excited by many sources, including non-linear surface wave interactions, disturbances of the ocean bottom (submarine earthquakes and landslides) and underwater explosions. In this introductory lecture on acoustic-gravity waves, we describe their properties, and their relation to organ pipe modes, to microseisms, and to deep ocean signatures by short surface waves. We discuss the generation of AGW by underwater earthquakes; knowledge of their behaviour with water depth can be applied for the early detection of tsunamis. We also discuss their generation by the non-linear interaction of surface gravity waves, which explains the major role they play in transforming energy from the ocean surface to the crust, as part of the microseisms phenomenon. Finally, they contribute to horizontal water transport at depth, which might affect benthic life.