

Measurements of wave height and slope statistics using the Reflective Stereo Slope Gauge

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An optical instrument for the measurement of surface ocean wave statistics has been developed. This Reflective Stereo Slope Gauge (RSSG) consists of a stereo camera setup with two LED arrays in a binocular Helmholtz stereo setup. By observing reflections on the water surface at a footprint of 1 m² from above, wave height and slope statistics can be measured both in the lab and in the field.

Due to its active illumination, the instrument can be used independent of daytime and under a wide range of environmental conditions. This is an advantage over other reflection-based techniques that use direct sunlight or diffuse sky light.

Data products include surface elevation time series and a surface roughness parameter. This parameter is proportional to the mean square slope of the surface.

Experiments with the RSSG were conducted at the Marseille wind-wave facility and during two field campaigns in the tropical Pacific (KM11-30 on R/V Kilo Moana in Dec 2011 and M91 on R/V Meteor in Dec 2012).

RSSG data products were validated by comparison to other instruments in the lab and in the field: a laser slope gauge and a capacitance-type wave wire in Marseille, a Riegl laser altimeter on R/V Kilo Moana.

During the M91 cruise off the Peruvian coast in areas of varying biological activity, very variable conditions were encountered especially due to a changing presence of surfactants.