EARTH OBSERVATION SYMPOSIUM (B1)
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AN OCEAN WAVE SIMULATOR AS A BASIS FOR MODELLING SAR BACKSCATTERING OF OCEAN WAVE SPECTRA

Abstract

The observation of the ocean surface via spaceborne SAR systems is a difficult task, even at the early stages of both the development and testing of such systems. Indeed, the nature of the ocean dynamics —which can be considered as a chaotic and non-stationary process —prevents from studying fully-deterministic scenarios at a certain degree of accuracy. Due to it is simply impossible to get identical realisations of the ocean surface in the same geographical region but recorded at different times, a numerical ocean wave simulator is proposed here as an alternative way of working with specific scenarios. We say the simulator is able to synthetically generate a fully-deterministic realisation of an artificial ocean surface —at a particular time and space— when the underlying model is completely known. Furthermore, the idea of producing fully-deterministic realisations does not imply that the model is rigid. In a statistical sense, the model can be "harmlessly flexible", because the randomness is assumed to be entirely characterised and controlled by the use of certain probability distributions that can keep close relations to theoretical results and empirical observations of the linear wave theory and the ocean wave spectra, respectively. The numerical simulator is intended to produce realisations of the ocean surface that are close to reality, based on several well-known omnidirectional spectra and spreading functions that are proposed in the literature. Since this numerical simulator constitutes the basis for the next step of our research work —a better understanding of ocean features by means of the backscattered RCS of the ocean surface roughness using a SAR system— a special emphasis is put on the appropriate construction of the ocean waves that are visible by the radar, that is, ocean wavelengths in the same magnitude order as the radar wavelength.