



Estimates of ocean wave heights and attenuation in sea ice using the SAR wave mode on Sentinel-1A

Fabrice Ardhuin (1), Fabrice Collard (2), Bertrand Chapron (3), Fanny Girard-Ardhuin (3), Gilles Guitton (2), Alexis Mouche (3), and Justin Stopa (3)

(1) Laboratoire de Physique des Océans , UMR 6523 CNRS-IFREMER-IRD-UBO, France (ardhuin@ifremer.fr), (2) OceanDataLab, (3) IFREMER, Laboratoire d'Océanographie Spatiale, Plouzané, France

Swell evolution from the open ocean into sea ice is poorly understood, in particular the amplitude attenuation expected from scattering and dissipation. New synthetic aperture radar (SAR) data from Sentinel-1 wave mode reveal intriguing patterns of bright oscillating lines shaped like instant noodles. We investigate cases in which the oscillations are in the azimuth direction, around a straight line in the range direction. This observation is interpreted as the distortion by the SAR processing of crests from a first swell, due to the presence of a second swell. As deviations from a straight line should be proportional to the orbital velocity towards the satellite, swell height can be estimated, from 1.5 to 5 m in the present case. This evolution of this 13 s period swell across the ice pack is consistent with an exponential attenuation on a length scale of 200 km.