

Surface Waves Under the Arctic Sea Ice Observed by Drifting Wave Buoys

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Surface ocean waves are potentially one of the key physical processes to influence on the sea ice extent. To study the generation, propagation, and attenuation of surface ocean waves under the sea ice, two drifting wave buoys were deployed in the marginal ice zone in the western Arctic during R/V Mirai cruise 2019. The first buoy was deployed in the pancake-ice covered area and the second one in the open ocean. The distance between the two buoys at the deployment was approximately 40km. The comparison of the wave bulk statistic measured by the two buoys shows how the surface waves transform under the sea-ice.

During the measurements, both of the on-ice and off-ice wind conditions emerged. Under the on-ice condition, high-frequency waves attenuated significantly as the waves penetrate to the sea ice. The attenuation of the wind waves were also inferred from the SAR images. The low-frequency waves were, however, barely changed its energy level. The results indicate that the surface waves may not necessarily attenuate by the sea-ice if the wind speed is sufficiently high. On the other hand, under the off-ice conditions, the wave development was not clear, and the swells determined the significant wave direction.

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