Measuring Wave Breaking by Radar

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The investigation of surface wave breaking remains a difficult task both theoretically and experimentally. The phenomenon is of great interest to radar remote sensing of the ocean because wave breaking produces a large signature comparable to ships or other targets of interest. These anomalous high returns from the ocean surface are broadly called sea spikes and many field studies have demonstrated their close correlation with breaking or steep waves. Also, coherence between signals from two interferometric radar channels is a descriptor of the correlation of the surface roughness that scatters back the radar signals and reflects the ocean surface turbulence condition. On the ocean surface, wave breaking is a major source of turbulence that causes surface roughness decorrelation, thus the coherence parameter serves as an independent means for detecting surface wave breaking. The results of breaking detections using the properties of surface roughness decorrelation and critical local acceleration are comparable. In this talk, we will present some results (e.g., breaking probability, fraction and length or velocity scale) of wave breaking observations based on radar measurements of land-based high-spatial-and-temporal-resolution systems as well as an airborne interferometric radar system.