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Spatial wave field characteristics in Arctic seas

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The reduction of the sea ice coverage during the boreal summer will lead to an increased importance of wind waves for the dynamic processes of the Arctic Seas. Larger ice free areas lead to longer fetch and thus longer and higher sea state. Wind waves will enhance upper-ocean mixing, may affect the breakup of ice sheets, and will likely lead to increased coastal erosion.
Our long-term goal is a better understanding of the two-way interaction of waves and sea-ice, in order to improve wave models as well as ice models applicable to a changing Arctic wave- and ice climate.
Wind, wave and ice information has been retrieved from space-borne SAR imagery (TerraSAR-X), collected during the period August-September 2014 in the Beaufort Sea. The SAR data were co-located with drifting wave-buoys and wave gliders. This information complements and validates model data (Wavewatch III) for the spatial and temporal evolution of sea state in the Arctic.
We will present examples of wind and wave fields under different wind forcing and ice conditions, and discuss the advantages of each of the three observational/modelling approaches. These examples highlight the strong spatial heterogeneity of the wave field in arctic regions, and the need for high resolution spatial wave observations.
Satellite-based wave field observations can bridge the gap between the single point buoy observation that provide high resolution time series of wave parameters, and the output of wave models which are of relatively coarse resolution and are inherently limited by the quality of the wind and ice input fields, but are unlimited in their spatial and temporal extent.