Cross-Validation of polynya characterization methods from multisensor satellite and airborne data. Case study for a polynya event in the Laptev Sea on 29 April, 2008.

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Polynyas in the polar coastal seas are recognized as areas where huge amounts of new ice are formed in the cold season. Hence, they might play an increasing role in the uncertain future of the sea ice volume in the Arctic Ocean. A long-term monitoring and characterization of polynyas requires stable methods to detect the area of open water as well as growth, thickness and evolution of thin ice. We present different conventional parameters to describe these features, derived from optical and microwave satellite data for one pronounced polynya event in the Laptev Sea in April 2008. This includes the classification of open water and thin ice from passive microwave data, radar backscatter from Quikscat and Envisat SAR data, the estimation of thin ice thickness from MODIS/AVHRR surface temperatures and several other parameters. Across-polynja electromagnetic ice thickness measurements (EM-Bird) and aerial photography from helicopter are used to assess the applicability of these data to establish a combinatory approach for polynya monitoring methods on different time scales.