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Oceanic eddy signature on SAR-derived sea ice drift and vorticity

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In the global ocean, mesoscale eddies are routinely observed from satellite observation. In the Arctic Ocean, however, their observation is impeded by the presence of sea ice, although there is a growing recognition that eddy may be important for the evolution of the sea ice cover. In this talk, we will present a new method of surface ocean eddy detection based on their signature in sea ice vorticity retrieved from Synthetic Aperture Radar (SAR) images. A combination of Feature Tracking and Pattern Matching algorithm is used to compute the sea ice drift from pairs of SAR images. We will mostly focus on the case of one eddy in October 2017 in the marginal ice zone of the Canadian Basin, which was sampled by mooring observations, allowing a detailed description of its characteristics. Although the eddy could not be identified by visual inspection of the SAR images, its signature is revealed as a dipole anomaly in sea ice vorticity, which suggests that the eddy is a dipole composed of a cyclone and an anticyclone, with a horizontal scale of 80-100 km and persisted over a week. We will also discuss the relative contributions of the wind and the surface current to the sea ice vorticity. We anticipate that the robustness of our method will allow us to detect more eddies as more SAR observations become available in the future.