Arctic circulation from a Lagrangian perspective

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In the context of rapid increase of temperature in the polar regions, inducing a dramatic ice melting, Lagrangian transport in the Arctic Ocean becomes an area of key interest. The aim of this work is to show the phase portrait of the sea currents throughout the Arctic Ocean, which allows us to study aspects of their dynamics. This is done by means of the numerical method known as Lagrangian descriptors, which computes and graphically displays flow structures over a given domain of the ocean, highlighting coherent jet circulation patterns, eddy-like structures and distinguished trajectories. This method was originally based on the computation of the Euclidean arc length of trajectories of a dynamical system. In this work the considered dynamical system is a velocity field given by data sets from COPERNICUS which assimilate observations. The images provide us both a validation of already known and well reported flow structures, and also the discovery of singular features in the ocean which correspond to extreme weather events. ACNOWLEDGEMENTS: We acknowledge L. Bertino and Jiping Xie from NERSC for providing us with the dataset used in this study.