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A vorticity transport model to restore spatial gaps in velocity data[1] SIAVASH AMELI, SHAWN SHADDEN, UC Berkeley — Often measurements of velocity data do not have full spatial coverage in the probed domain or near boundaries. These gaps can be due to missing measurements or masked regions of corrupted data. These gaps confound interpretation, and are problematic when the data is used to compute Lagrangian or trajectory-based analyses. Various techniques have been proposed to overcome coverage limitations in velocity data such as unweighted least square fitting, empirical orthogonal function analysis, variational interpolation as well as boundary modal analysis. In this talk, we present a vorticity transport PDE to reconstruct regions of missing velocity vectors. The transport model involves both nonlinear anisotropic diffusion and advection. This approach is shown to preserve the main features of the flow even in cases of large gaps, and the reconstructed regions are continuous up to second order. We illustrate results for high-frequency radar (HFR) measurements of the ocean surface currents as this is a common application of limited coverage. We demonstrate that the error of the method is on the same order of the error of the original velocity data. In addition, we have developed a web-based gateway for data restoration, and we will demonstrate a practical application using available data.

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