

Abstract Submitted
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Filtering on the Sphere HUSSEIN ALUIE, University of Rochester, MATTHEW HECHT, Los Alamos National Laboratory, GEOFFREY VALLIS, University of Exeter — The filtering approach is a natural and valuable framework for analyzing and modeling turbulence, especially within the subject of Large-Eddy Simulation. However, the mathematical development of the approach has been mostly limited to flows in Euclidean (flat) spaces and generalizations to non-Euclidean (curved) manifolds suffer from several shortcomings, such as dependence on the choice of coordinate system, commutation errors, or not preserving volume. Motivated by geophysical flows, we define a new generalized filtering operation on the Sphere which is free from the aforementioned problems. We prove that our filter commutes with spatial derivatives, yielding simple and exact coarse-grained equations for flow on the Sphere. We demonstrate these tools with a-priori tests on flows from high-resolution Ocean simulations.

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