Ocean Data Assimilation Towards Submesoscales

Historically, ocean data assimilation systems have focused on fitting only larger, mesoscale features because of the relatively coarse nature of the observing networks. Recent, novel observing systems, such as the Surface Water Ocean Topography (SWOT) satellite, have created the opportunity to extend data assimilation skill towards smaller scales. However, assumptions embedded in long-standing assimilation systems, valid for larger scales, create a hard boundary for the types of features that can be corrected in the model background. Ocean assimilation systems must be adapted for these new observations that provide small-scale information. Three 'multi-scale' approaches are detailed and demonstrated, each with the intent of extending ocean assimilation skill to smaller scales without sacrificing skill at larger scales. The first technique continuously adapts the horizontal scales corrected by observations: large-scale corrections around relatively coarse observations and small-scale corrections around relativ

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