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New Perspectives on Ensemble Sensitivity Analysis with Applications to a Climatology of Severe Convection

Abstract

Ensemble sensitivity analysis (ESA) is a statistical technique applied within an ensemble to reveal the atmospheric flow features that relate to a chosen aspect of the flow. As a linear regression between forecast variables and the entire atmospheric state earlier in time, ESA has been widely used to understand the dynamics and precursors of high-impact weather, target observations, and develop forecast adjustment techniques. Despite its popularity, the technique's fundamental properties remain underutilized. This study clarifies ESA fundamentals, such as the relationship between ensemble sensitivity and pure system dynamics, to better distinguish between fluid dynamics and predictability problems. These new perspectives are applied to a climatology of severe convection forecasts, demonstrating the unique scientific knowledge gained through the broadened use of ESA.

Keywords:
Ensemble sensitivity analysis、Adjoint sensitivity

Reference:

Brian C. Ancell and Austin A. Coleman,2022: New Perspectives on Ensemble Sensitivity Analysis with Applications to a Climatology of Severe Convection , *Bull. Amer. Meteor. Soc.*,103, E511–E530.https://doi.org/10.1175/BAMS-D-20-0321.1