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Sujet/Subject: Spatial Verification Methods

Langue/language : Anglais/English

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Résumé/Abstract:

Forecasts defined over spatial domains are often characterized by a coherent spatial structure and the presence of features. Traditional point-by-point verification approaches do not account for this complex spatial structure and the intrinsic spatial correlation existing between nearby grid-points. This leads to issues (such as double penalties), and an overall limited diagnostic power (e.g. traditional scores are insensitive to distance errors or to the multi-scale structure of weather phenomena). In order to addess this issues, several novel spatial verification techniques have been developed in the past decade. Spatial verification methods aim to: i) account for the coherent spatial structure and the presence of features characterizing weather fields; ii) provide more informative and meaningful verification, e.g. assess location and timing errors (separately from intensity errors) in physical terms (e.g. in km); iii) account for small time-space uncertainties, in order to avoid double penalties. Spatial verification methods have been classified in five classes: scale-separation, neighbourhood, field-deformation, feature-based and distance metrics.

In this presentation, the application of two spatial verification methods are illustrated. First we illustrate the use of binary image distance metrics of the Hausdorff and Baddeley family for the verification of sea-ice extent and sea-ice edge. The metrics are illustrated for the Canadian Regional Ice Ocean Prediction System evaluated against the Ice Mapping System analysis. The distance metrics are sensitive to the distances and similarities in shape of observed and predicted sea-ice features: they reveal to be a robust and suitable set of verification measures, complementary to the traditional categorical scores. Second, we illustrate a wavelet-based scale-separation verification approach for the verification of spatial precipitation forecasts. The method enables to analyse the scale-dependence of the bias and the capability of the forecast to reproduce the observed scale structure; the forecast error and skill are also evaluated for each scale component, separately. Both methods are suitable for comparing models with different resolutions.