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Geometrid vs Classical breeding of vectors: Application to hazardous weather in the Western Mediterranean

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The initialization of mesoscale Short Range Ensemble Prediction Systems is a subject of active research and debate in the weather prediction community. The generation of mesoscale short-range ensembles using bred vectors emerges as a promising technique provided the fully nonlinear character and the low cost of the method when compared to the singular vector approach. Previous works using simplified models show that the classical (arithmetic rescaling) breeding technique leads to fully correlated vectors with a characteristic spread growth related to the amplitude of initial perturbations. Geometric bred vectors allow controlling the spatial correlation and, hence, the spread of the EPS model with a constant initial dispersion. This new method has great potential in limited area mesoscale prediction framework in which the spread is highly limited by the boundary and the relatively unknown initial condition errors.

An operational mesoscale model with full-physics is used to test the geometric bred vector technique within the Western Mediterranean region for the last quarter of 2001. From the hypothesis that the ensemble spread is better controlled by using geometric bred vectors than the arithmetic vectors, we compare the performance of both breeding methods in real operations-like frameworks, with special attention to extreme (rare) events. Preliminary results show that for similar initial perturbation amplitudes, the geometric breeding technique produces a better spread-skill relationship than the arithmetic one. Standard statistical verification scores are also computed to confirm the improved skill of the ensemble hazardous weather forecasts based on geometric

breeding with respect to the classical technique.