TESTING GEOMETRIC BRED VECTORS WITH A MESOSCALE SHORT-RANGE ENSEMBLE PREDICTION SYSTEM OVER 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 technique when compared to the singular vector approach. Previous works show that the standard (arithmetic rescaling) breeding technique leads to fully correlated vectors with a characteristic spread growth related to the amplitude of initial perturbations. A new method (geometric bred vectors) which allows to control the spatial correlation and, hence, the spread of the EPS model with a constant initial dispersion has been theoretically presented. This 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.

In this study, an operational mesoscale model with full-physics is used to test the geometric bred vector technique within the Western Mediterranean region. Two ensemble prediction systems are generated using the arithmetic and the geometric techniques. The hypothesized control over the ensemble spread is tested and various prediction skill scores are computed to compare the performance of both breeding techniques in real operations-like frameworks, with special attention to extreme (rare) events and the derived prediction benefits from the control on the spread.