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Investigating the primacy of B-matrix EDA flow dependence within the Copernicus Regional Re-Analysis (CERRA)

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The new Copernicus European Regional Re-Analysis (CERRA) is a 5.5km reanalysis, starting in 1984 and ending “near-real-time”, 2021. The reanalysis was delivered using the ALADIN model under the HARMONIE scripting garb. The upper-air is analysed using a 3DVAR technique cycled 3-hourly, while the surface analysis is achieved through a conventional OI technique (MESCAN). Analyses produced by CERRA at 5.5km are assisted through an accompanying 10-member Ensemble Data Assimilation (EDA) system with 11km horizontal resolution cycled 6-hourly. The EDA system is used mainly for serially updated background error covariance estimation (B-matrix) used in the deterministic upper-air 3DVAR minimisation to produce the upper-air analysis.

The B-matrix comprises 2 principal EDA-derived components. The first component is estimated from same-resolution (5.5km) forecast differences, run in the winter and the summer periods, to represent seasonal climatology. This component also varies in time, such that a linearly appropriated proportion of summer or winter differences is taken, based on the current time of year of the reanalysis. The second component comes from the lower-resolution (11km) set of forecast differences, which represents ‘errors of the day’. This second component is a 2.5 day moving average ingested into a new B-matrix every 2 days. The B-matrix is thus comprised of 80% forecast differences coming from the first component and 20% coming from the second component.

We show results from our study on the primacy of varying the weighting on the 2 components of forecast differences mentioned above, and how it has the potential, given a suitable observation network, to provide better B-matrix statistics.