



Diagnosis and dynamics of the "forecast minus analysis" PV fields

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A study is undertaken of the difference between the forecast and contemporaneous analysis fields of a particular weather prediction system. The evolution of this pseudo-error field is examined and interpreted from a PV-perspective, and the underlying rationale is two fold. First this perspectives intrinsic properties imply that: (i) non-conservation of error PV signifies either isentropic advection of the error across an ambient flow's PV-gradient, the misrepresentation of diabatic or frictional processes, and/or error in the analysis field and verification time and (ii) inversion of a particular feature of the error PV field can (-via attribution) account for error of a primary flow variable in the in-situ and far-field. Second the dynamics of rapid error growth has been linked to distinctive PV-features of the error field (e.g. via vertical realignment of either initially backward slanting monochromatic columns of error PV or initially compact vertically-stacked PV error features of differing sign). Illustrations are proffered of the structure and evolution of the PV differences field derived from the ECMWF's prediction suite, and include: (a) the apparent inadequacy of the Rossby wave amplitude at the extratropical tropopause, and (b) a misforecast of a cyclone associated with deficient diabatic effects and a realignment of tropospheric PV error. The illustrations suggest that the approach provides a compact and insightful description of the difference field's dynamics.