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Simulated temporal Evolution of the Climatological Winter mean state: A Diagnosis

T. Spengler (1), C. Schwierz (2) and H.C. Davies (1)

(1) Institute for Atmospheric and Climate Science, ETH Zürich, Switzerland, (2) Institute for Atmospheric Science, School of Earth and Environment, University of Leeds, United Kingdom

A 45 year climatological winter mean (December/January/February) state was derived from the ECMWF ERA40 dataset for the pertinent atmospheric variables. Although a time-mean state it can nevertheless spawn a flow evolution, since for example the baroclinicity in the climatological fields will allow for a corresponding measure of large-scale wave development.

Here the approach is to study the space-time-evolution of this mean state using the dynamical core of the ECMWF CY29R3 IFS (Integrated Forecasting System) model, and to undertake a detailed dynamical diagnosis of the results so as to shed light on the nature of the intrinsic transient and longer-term flow features.

This approach is complementary to, but differs fundamentally from, earlier studies of the instabilities of the time-mean state that include analysis of highly transient synoptic-scale baroclinic modal and singular-vector wave growth, and the longer-term planetary-scale quasi-barotropic modes. Here the focus is on identifying the nature and structure of the dynamical development (as opposed to growth) induced by the time-mean flow state.