

3.11 JMA Climate Data Assimilation System (JCDAS)

JMA Climate Data Assimilation System (JCDAS) is an atmospheric global analysis for operational climate use and has been operational since March 2006. It was transitioned from Japanese 25-year Reanalysis (JRA-25) which covered 26 years from 1979 to 2004 and was produced by JMA and the Central Research Institute of Electric Power Industry (CRIEPI) (Onogi et al. 2007). JCDAS is using the same data assimilation system as that of JRA-25. It has a spectral resolution of T106, equivalent to a horizontal grid size around 120km, and 40 vertical layers with the top level at 0.4hPa. The data assimilation method of JCDAS is the three dimensional variational (3D-VAR) which had been used in JMA operations until February 2005. The background error statistics were taken from 2003 operational analyses which were the latest statistics available at the time JRA-25 production started. For surface variables, surface pressure is assimilated simultaneously with upper air variables in the 3D-VAR; other surface variables of temperature, wind and relative humidity are assimilated separately with a uni-variate 2-dimensional optimal interpolation (2D-OI).

Many advantages have been found in the JRA-25 and JCDAS. Firstly, predicted 6-hour global total precipitation distribution and amount are well reproduced both in space and time. The performance is the best among vis-a-vis reanalyses, such as NCEP/NCAR Reanalysis 1 and NCEP/DOE Reanalysis 2 (both continuously operated as CDAS), 15-year and 40-year reanalyses of European Centre for Medium-Range Weather Forecasts (ERA-15 and ERA-40). Especially after July 1987, assimilating retrieved precipitable water from SSM/I radiance data contributed to the good performance. Furthermore, tropical cyclones (TC) are properly analyzed owing to the assimilation of reconstructed wind profile around tropical cyclones.

JRA-25 and JCDAS jointly provide long term consistent and high quality global analysis fields since 1979. For the operational use of the JRA-25 at JMA, a new climate normal value was created and is being used as a basic reference data for climate monitoring services. Reanalysis data, produced by the model whose characteristics are the same as the seasonal forecast model, can provide consistent initial field and verification data for the seasonal forecast and hindcast. Consequently the JRA-25 and JCDAS data greatly contributes to the development of the seasonal forecast model.

Reference

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