

# ECMWF Reanalysis ERA-40

45-year reanalysis of the  
global atmosphere and  
surface conditions

1957–2002

## Project partners

European Centre for  
Medium-Range Weather Forecasts  
Koninklijk Nederlands  
Meteorologisch Instituut  
Max-Planck-Institut für Meteorologie  
Météo-France  
Met Office  
National Center for  
Atmospheric Research  
University of Reading

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Co-operating States of ECMWF  
EC Fifth Framework Programme

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**Institute of Atmospheric Physics, China**

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**WCRP and GCOS**

Many institutions provided observational datasets, NCAR being the main supplier. The NCAR multi-source conventional observations were processed by NCEP for use in ERA-40

## Observational sources and product definitions

<http://www.ecmwf.int/research/era/Products>

## Access to the products

A full set of six-hourly and monthly-mean pressure level and surface fields at 2.5° resolution can be downloaded from:

<http://data.ecmwf.int/data>

## For full-resolution data and further enquiries

**e-mail** [data.services@ecmwf.int](mailto:data.services@ecmwf.int)

**Address** The Director  
ECMWF  
Shinfield Park  
Reading, RG2 9AX  
United Kingdom

## Quality of the ERA-40 products

The quality of the ERA-40 products depends both on the quality of the observing system and on the quality of the assimilating numerical model and analysis system. Some assessments as of November 2003 are summarized below. More information on these and other aspects of product quality is provided in project reports and on the project website.

- ◆ The general quality of the analyses improves over time.
- ◆ Quality is most uniform in time for the Northern Hemisphere troposphere and lower stratosphere. Quality for the Southern Hemisphere is substantially better after 1978 and approaches that of the Northern Hemisphere later in the period.
- ◆ Trends and interannual variability in global-mean temperature from the surface to the lower stratosphere are in reasonable agreement with a number of specialised data studies.
- ◆ Long-term temperature time series for particular regions, and for the upper stratosphere in general, require careful interpretation due to model biases and variations in observational coverage.
- ◆ Stratospheric sudden warmings and the quasi-biennial oscillation of stratospheric winds are well captured. The Brewer Dobson circulation is too strong.
- ◆ Total-column water vapour validates quite well against independent data for the satellite era. Tropical analyses are much drier in the pre-satellite period.
- ◆ Precipitation in short-range forecasts for the satellite era is too high over tropical oceans, but in much more reasonable agreement with verifying data elsewhere.
- ◆ The clear-sky outgoing long-wave radiation is of quite high quality, but there are some evident deficiencies in the all-sky radiation budget.
- ◆ Total-column ozone agrees well with independent data for most regions and much of the period. There are some problems with vertical structures, particularly at higher latitudes.
- ◆ Ocean-wave products are of generally good quality. High peaks of significant wave height are underestimated, but can be corrected statistically.

