The ERA5 Reanalysis: Toward 70 years of global high-resolution hourly data for weather and climate applications

ERA5 is the latest global atmospheric reanalysis produced by the European Centre for Medium-Range Weather Forecasts (ECMWF). The project is being carried out as part of the Copernicus Climate Service (C3S) implemented by ECMWF on behalf of the European Commission. ERA5 supersedes the widely-used ERA-Interim reanalysis, whose production will end in August 2019. In early 2019, ERA5 data for the 1979-1999 period were released to the public through the C3S Climate Data Store, extending the 2000-onward segment already available and allowing ERA5 to be used for climate change assessments spanning the past 40 years (and counting).

Relative to its predecessor, ERA5 has benefitted from a decade of development in numerical weather prediction at ECMWF and features a number of improvements. These include higher horizontal and vertical resolutions, hourly output, use of more consistent sea-surface temperature and sea-ice data sets, use of CMIP5-recommended greenhouse gas and aerosol forcings, assimilation of additional and reprocessed observations, and uncertainty estimates provided by a lower-resolution 10-member 4D-Var ensemble. These changes have led to significant enhancements to the quality and level of detail of the reanalysis output.

The presentation will provide an overview of the performance of ERA5 during the 1979-2019 period for several surface and upper-level fields. A preview of ERA5 output during the 1950-1978 period (currently in production and scheduled for release in 2020) will also be given. The presentation will conclude with updates on other C3S reanalysis activities such as ERA5-Land and regional reanalysis projects.