

ECO1280:

The New ECMWF Cubic Octahedral (O1280) Nature Run

Ross N Hoffman¹, Sylvie Malardel², Pedro Maciel³, Tanya R. Peevey⁴, Philip Partain⁵, Steve Finley⁵, Robert Atlas¹, Lars Isaksen³, Nils Wedi³, Lidia Cucurull¹
and Christian D Kummerow⁶

08 January 2019

(1) NOAA Atlantic Oceanographic and Meteorological Laboratory, Miami, FL, United States

(2) Meteo-France, Sainte-Clotilde, Reunion

(3) European Center for Medium-Range Weather Forecasts, Reading, United Kingdom

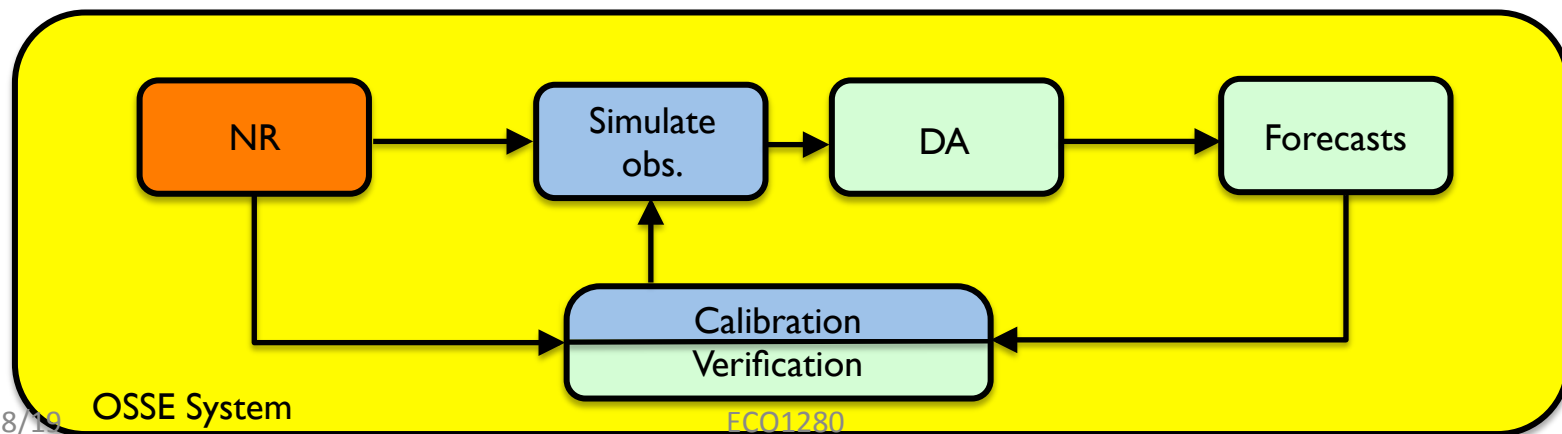
(4) Cooperative Institute for Research in Environmental Sciences, Boulder, United States

(5) Cooperative Institute for Research in the Atmosphere, Fort Collins, CO, United States

(6) Colorado State University, Fort Collins, CO, United States

A new nature run (NR)

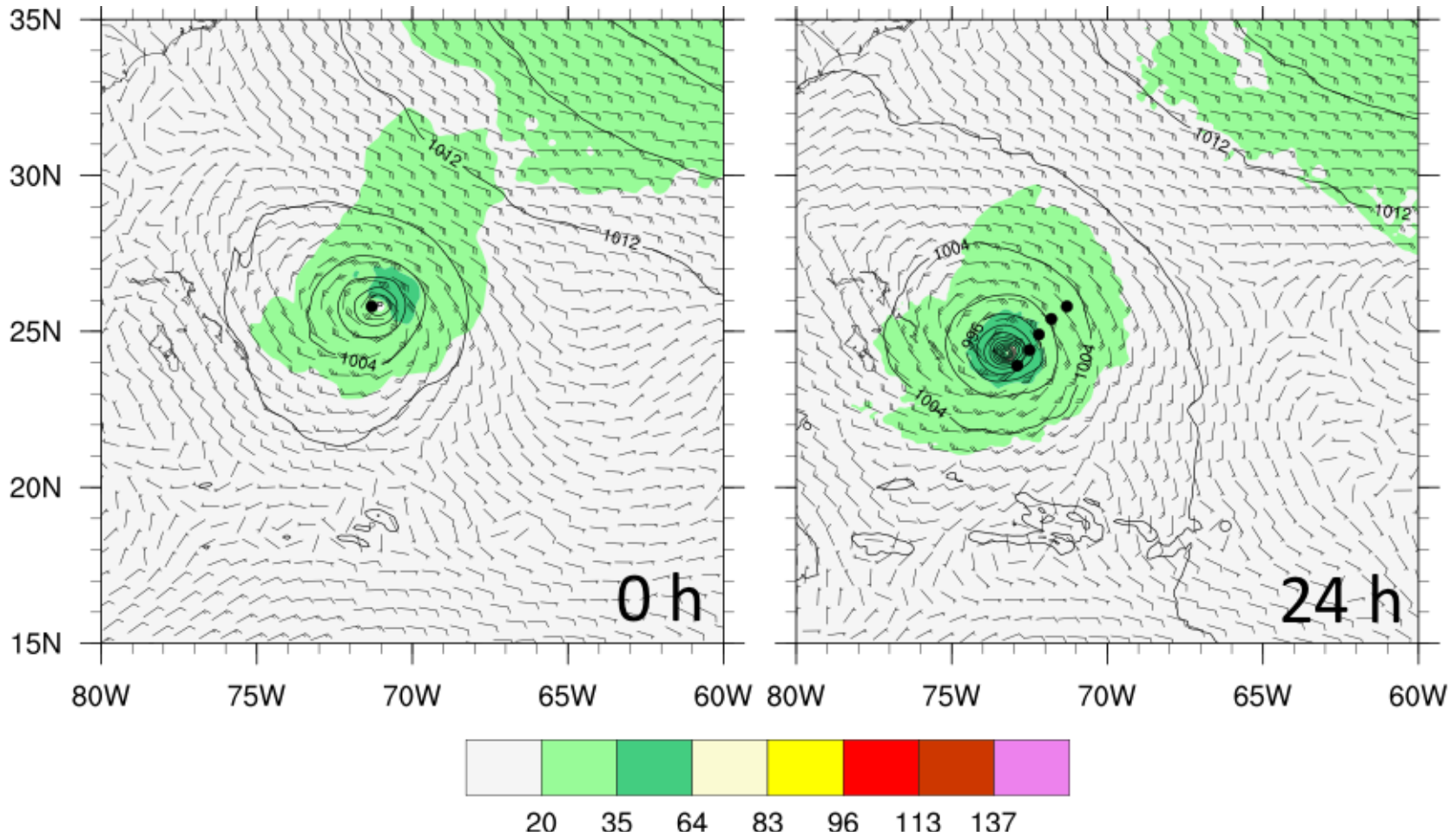
- OSSEs are used to evaluate the impact of proposed observing systems
- A NR is the basis for an OSSE; it must be realistic and realistically different than the forecast model used in the OSSE.
- The ECO1280 is a new NR based on the ECMWF operational NWP model of March 2016 (IFS cycle 43r1).



Description

- The new ECMWF cubic octohedral NR (ECO1280) has 9 km resolution
 - TCo1279L137 configuration
 - 137 layers, using T1279 spectral truncation, and an octahedral reduced Gaussian grid (resolution O1280).
 - Became operational March 2016 (IFS cycle 43r1).
- Everything available from an operational run is saved.
- The new NR starts with the rapid intensification of Hurricane Joaquin (0000 UTC 30 Sep 2015) and runs for 14 months (10248 hours, end of Nov 2016).

Hurricane Joaquin rapid intensification from 985 to 951 in 24 h



Advantages of ECO1280

- Operational, proven, forecast model.
 - Routinely used to produce 13-month forecasts.
- Different dynamics compared to fvGFS, G5NR.
- 2015 start allows comparisons to modern observing systems.
- But...
 - No aerosols, chemistry other than ozone.

Differences from operations

- Boundary conditions: time-varying SST and sea ice are prescribed from reality.
- Fields saved include
 - Geopotential height on the model full layers
 - Convective rain and snow flux for all-sky DA
 - Natural log of pressure on the model full layers

Production (at ECMWF)

- Month 1 (Oct), archived hourly.
- Month 2-14 (Nov-Nov), archived 3-hourly.
- TBD: 1 month (or maybe 2 months) will be restarted and run with hourly archiving.

Transfer from ECMWF

- Using LFTP from the ECMWF operational FTP server.
- 1 month of 3-hourly simulation (4 TB) can be transferred in 4 days.
 - Transfers within the US should be faster.
 - Now bzip'ing GRIB files (1.5 TB/month).
- QC
 - Compare file sizes before and after transfer.
 - Check for files missing or corrupt.
 - Checksums available.

Storage requirements

- CIRA/CSU will store full ECO1280 (70 TB/24 TB bzip'd).
- For storing 1 months of data at 3-h archiving
 - 4.06 TB for original spectral coefficients (0.77 TB) and Gaussian grids (3.26 TB) plus ½ degree pressure level data (35 GB)
 - When interpolated add:
 - 3.27 TB for spectral converted to Gaussian grids
 - 7.68 TB for Gaussian grids converted to 0.1 degree lat-lon grids
- Multiply by 3 for 1-h archiving.
- Multiply by 0.35 for bzip'd files.

Backup

- ECMWF
 - Will maintain the full ECO1280 for a limited time.
 - Will keep restart data sets at the end of each month until current computer system is retired.
- TBD: NOAA/AOML will keep a full backup on the HPSS mass storage system.

Distribution

- CIRA/CSU SFTP site.
- Requires user account and RSA public key.
- Request user account and instructions by email
 - ECO1280 < ECO1280@colostate.edu >
- You must agree to the conditions listed at the ECO1280 FAQ
 - <https://www.cira.colostate.edu/imagery-data/ecmwf-nature-run/>

Conditions

- Researchers who acquire the ECO1280 from CIRA/CSU agree to the following conditions:
 - The ECO1280 may be used for any research purpose.
 - The ECO1280 is provided on a non-exclusive basis.
 - Any publication or presentation must be accompanied with the proper acknowledgments.
 - Redistribution is permitted, but frowned upon. All researchers should acquire the ECO1280 from CIRA/CSU.
 - Any redistribution must be accompanied with the proper acknowledgments and a statement that the data was provided free of charge by ECMWF through CIRA/CSU.

User FAQ website

Cooperative Institute for Research in the Atmosphere

The ECMWF Cubic Octahedral (O1280) Nature Run User FAQ

Prepared by Ross N. Hoffman, Phil Partain, and Tanya Peevey
2018 November 3

The 9-km ECMWF Cubic Octahedral (O1280) grid Nature Run (ECO1280) created by ECMWF and hosted by CIRA/CSU is a single uninterrupted 14-month (10248-h) long forecast made with a circa 2016 version (IFS cycle 43r1) of the operational global deterministic ECMWF atmospheric forecast model.

The ECO1280 may be used for any research purpose. Interested researchers should acquire the ECO1280 by contacting CIRA/CSU to describe planned usage and to obtain data access instructions. (See the FAQ "[How do I download the ECO1280?](#)") Resulting publications or presentations must acknowledge ECMWF and CIRA/CSU. (See the FAQ "[What are proper acknowledgments to state when using the ECO1280?](#)")

This FAQ should answer your questions about OSSEs, NRs, and the ECO1280. This FAQ will explain how to get, use, and acknowledge ECMWF for their efforts in developing the ECO1280. Along the way this FAQ offer pointers to additional information about the ECMWF model, necessary software resources, and more. If you have a question not answered or inadequately answered by this FAQ, please write to ECO1280@colostate.edu so we can improve it.

Interpolation

- Install EMOSLIB, EC_Codes, FFTW.
- Scripts to convert to lat-lon make use of the “int” tool which is part of EMOSLIB.
- Installation hints and interpolation scripts available at the CIRA/CSU website.

Available to the community now

- Lots to do:
 - Validation of gross features and selection of cases of interest from pressure level data
 - Validation of details by obs simulation and comparison to reality
 - Day 1 obs to obs
 - After month 1 by statistics
 - Initial OSE/OSSEs across the start of the ECO1280
 - Calibration and tuning of the ECO1280 OSSE system
 - OSSEs !!!

more...

- email:
 - ECO1280@colostate.edu
 - FAQ:
 - <https://www.cira.colostate.edu/imagery-data/ecmwf-nature-run/>
 - Abstract for this presentation:
 - <https://ams.confex.com/ams/2019Annual/meetingapp.cgi/Paper/349186>
- Or just search for ECO1280