

## **Release Notes: GFDL v14.0.0 (Major)**

### **Summary**

This version (GFDL v14.0.0) is an upgraded version of the current operational GFDL forecast system. The new release has been fully tested and compared with the forecast results from the current operational GFDL hurricane forecast system. It has demonstrated significantly improved intensity and track skill. The scientific and technical upgrades and changes are highlighted as follows:

1. Several bug fixes in SAS (Simplified Arakawa-Schubert) convection Scheme.
2. Reduction in detrainment of cloud water and ice from SAS to Ferrier microphysics scheme.
3. 5 minute relaxation time in tendencies of temperature and moisture in SAS Convective scheme.
4. Improved representation of the initial wind profile.
5. New functionality to use GFS GRIB data in lateral boundary file generation. (Reduces model run time 12-15 minutes).
6. Increased Newtonian smoothing at lateral boundary (Addresses issue of sporadic model failures at lateral boundary).
7. RTOFS (Real-Time Ocean Forecast System) analyses are used for ocean initialization in the Eastern Pacific instead of GDEM climatology.
8. The GFDL Ocean Initialization will run independently of the HWRF ocean initialization.

### **Benefit of Change**

1. Results from extensive testing over the 2014 and 2015 hurricane seasons show significant improvements in prediction of storm intensity in the 3-5 day range in both basins. Reductions in track and intensity errors were in the range of 20% in both basins for those 3-5 day forecast time.
2. Extensive testing also showed a reduction in the negative intensity forecast bias that we had seen with model from the last couple years. This increases the reliability of the model as an intensity forecast guidance tool for NWS and NHC forecasters.

### **User Impact Statement**

There will be no change to delivery times with this year's implementation.

## Technical Impact Statement

The new system, gfdl.v14.0.0, does not require any change in cpu or disk resources as compared to the prior version, gfdl.v13.0.4.

## Developer notes

- Added the environmental variables RUN\_ENVIR throughout the J-jobs, as prescribed by NCO.
- ALL job scripts: Changed default value of FORCE\_USE\_OF\_HWRF\_OCEAN\_INIT from YES to instead be NO since GFDL is now running its own ocean initialization and is no longer just copying HWRF's:  
export  
FORCE\_USE\_OF\_HWRF\_OCEAN\_INIT=\${FORCE\_USE\_OF\_HWRF\_OCEAN\_INIT:-NO}
- Added a new script, gfdl\_grib2grd.sh that converts GRIB data onto our model grid so that we can create lateral boundary conditions from GRIB data instead of spectral data.
- Module file for GFDL compilation was updated for Cray system as well as for gfdl v14.0.

## Risk

None

## Proposed Implementation

July, 2016