

Change log for GHG forecast o-suite CY42R1 (ghqy)

The MACC NRT high resolution CO₂ cyclic forecast (experiment **ghqy**) was started on 2016-03-01 to make use of the new ECMWF meteorological analysis on a octahedral grid at 9km.

IMPORTANT NOTE: Negative values associated with the mass fixer were detected for some dates in the forecast. These originated sporadically in the vicinity of very strong sources during stagnant conditions and the negative plume then propagated downstream. The problem was solved in the mass fixer by changing BETA=1.5. A more robust version of the mass fixer is available in which a QM limiter ensure no negative values can occur. This new version has been tested in experiment **gnoo** (20160308-20170131) that can be used as a replacement for this experiment.

The experiment was initialised from the CAMS GHG analysis (gg5m).

- Linear CO, CH4 and CO2 available 3-hourly throughout the forecast.
- runs in near-real-time in a cyclic mode (tracers are initialised with previous 1-day forecast while meteorology is initialised with the operational ECMWF analysis.
- 120 h long forecast from 00UTC
- IFS cycle CY42R1
- Coupled to CTESSEL Net Ecosystem Exchange surface fluxes.
- EDGARv4.2 anthropogenic emissions - scaled from 2008 with estimated and climatological trends.
- GFASv1.2 fire emissions
- Takahashi et al. (2009) CO2 air-sea CO2 flux climatology.
- IFS model resolution T1279L91
- operational meteorological analysis resolution
- time period 20160301 -
- branch: paf_CY42R1_GHG_for_43R1_with_EDA_LinCO_Broadwell
- Tracer mass fixer implemented based on Bermejo and Conde (Agusti-Panareda et al. 2017, GMD).

Changes introduced during production affecting the quality of the products

| real date | exp date | description of change |
|-----------|----------|---|
| 20160309 | 20160308 | All operational ECMWF products (EPS, high res AN/FC) change to octahedral cubic grid: BFAS is not ready to compute budgets on octahedral grid, so to compute standardised climate anomaly from EPS, both ENS hindcasts and forecasts have to be retrieved in a reduced Gaussian grid. Although the mass interpolation is not mass conserving, we are only interested in getting the amplitude and sign of NEE anomaly, so the impact of lack of mass conservation is deemed to be negligible. |
| 20160325 | 20160324 | A bug was found in the way BFAS constraints the standardised anomaly to not exceed 1. This was only done for standardised anomalies larger than +1 (but not smaller than -1). This has been sorted by modifying comp_gpp_rec_bfas |
| 20160610 | 20160609 | The experiment was stopped/removed from Xcdp and re-submitted with new branch to be able to work with the new Broadwell nodes in ccb (paf_CY42R1_GHG_for_43R1_with_EDA_LinCO_Broadwell). Note that the number of processors and thread is also different for the new nodes to work optimally. |
| 20160610 | 20160609 | A bug fix was introduced in the BFAS script comp_gpp_rec_bfas (associated with re-scaling of IAV factor to have a maximum of 1 std of OPTFLUX for both +ve and negative anomalies. Before it was only done for the positive anomalies). This bug fix will impact slightly the results as NEE re-scaling factors will be slightly different. A parallel experiment has been run under ecgems gj2r for a couple of months (from 20160501) to test this change. |
| 20161021 | 20161020 | Small bug fix in BFAS (should not affect results) but avoid division by zero in exceptional cases. |
| 20161025 | 20161024 | Change of CO2 and CH4 anthropogenic emissions from edgarv42 to edgarv42ft2010 because there were some (5) very intense point sources in CH4 APF emissions causing unrealistic CH4 values under certain conditions (low winds and low BL) leading to extremely steep gradients around the point source and eventually negative CH4 values. |
| 20161123 | 20161122 | CH4 fluxes (on 1279L2 grid) reprocessed (from netcdf APF) because they were very blocky (this could not be seen when fluxes were plotted globally). It is probably linked to interpolation or dummy grid used when processing the APF from netcdf format. |
| 20170102 | 20170101 | LinCO emissions from 2016 are used. Mark Parrington to interpolate 2017 emissions to TL1279 and Tco 1279 (mod in prep_flux script) |
| 20170121 | 20170120 | Change of mass fixer in gems_setup (BETAMFBC=1.5 instead of 2) to avoid creation of negative values of CH4 around a couple of coal power stations in China under low wind conditions. |
| | | |

Flux updates

| real date | expdate | description of change |
|-----------|---------|-----------------------|
|-----------|---------|-----------------------|

| | | |
|-----------------|-----------------|---|
| 20161025 | 20161024 | Change of CO2 and CH4 anthropogenic emissions from edgarv42 to edgarv42ft2010 |
| 20170121 | 20170120 | CO emissions updated to use dataset for 2017 |
| 20180815 | 20180815 | Bug fix in CH4 flux temporal interpolation affecting fluxes in period of last half of December. |