Implementation of IFS cycle 43r3

Description of upgrade

The CAMS IFS cycle 43R3 is based on ECMWF's IFS cycle 43R3. IFS Cycle 43r3 is an upgrade with many scientific contributions, including changes in the use of observations and in modelling. The new cycle only includes scientific changes; there are no technical changes, e.g. new resolutions.

The page will be updated as required. It was last changed on 28.09.2017.

For a record of changes made to this page please refer to Document versions.

Further information and advice regarding the upgrade can be obtained from User Support.

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Timetable for implementation

The planned timetable for the implementation of the cycle 43r3 is as follows:

Date	Event
26.07.2017	Announcement of expected implementation date
26.09.2017	Implementation

The timetable represents current expectations and may change in light of actual progress made.

Current Status

IFS cycle 43r3 has been implemented in operations on Tuesday 26 September 2017. We have discontinued the dissemination of the release candidate data.

Meteorological content of the new cycle

The meteorological changes can be found on the ECMWF IFS CY43R3 page.

Atmospheric composition content of the new cycle

Assimilation

- No changes

Observations

- **Assimilation of PMAp aerosol optical depth (AOD) from METOP-A and METOP-B over land and ocean**. The Polar Multi-Sensor Aerosol Product (PMAp) is a combined aerosol product based on measurements by the GOME-2, AVHRR and IASI instruments. PMAp data over land and PMAp data from METOP-B are introduced in this cycle. The impact of PMAp on the analysis and subsequent forecast is low, but at the same time important to increase resilience against potential failures of the two MODIS instruments.

Model

- **Updated optical properties for aerosol.** This has a small impact on the optical depth of organic matter and of sea-salt: both are less extinctive per unit mass.
- **Bug fix for sedimentation speed for sea-salt.** Impact on sea salt burden and AOD.

- **Improved parameterisations for SO2 and SO4 dry deposition and SO2 to SO4 conversion**. These changes have an impact on the sulphate aerosol burden and AOD.
- **Improved use of ozone information in UV processor**. The use of ozone information from the IFS model has been improved in the UV processor resulting in changes to both the spectrally resolved UV radiation and the UV-Index for all-sky and clear-sky conditions.
- **Update of solar radiation input for UV processor.** The spectrally resolved solar radiation climatology has been updated to ATLAS3. This results in generally lower UV values that better match surface observations.
  Introduction of interaction between chemistry and aerosol scheme. Prognostic aerosol is used for (i) the attenuation of photolysis rates because of aerosols; (ii) the calculation of heterogeneous uptake coefficient for N2O5 and HO2 on aerosol
- **Application of proportional mass fixer for chemistry and aerosol.** The mass fixer has been changed back to the proportional mass fixer for chemistry and aerosols. The proportional mass fixer used to be the default option for most of the time in the CAMS global forecast system. A change to the Bermejo-Conde mass fixer (BC-MF) was implemted in the last operational system upgrade, because extensive experimentation with mass fixers for CH4 and CO2 had shown best results for this particualr scheme. However, furterh testing showed that the BC-MF scheme was less suited for the simulation of reactive gases than the proportional mass fixer.

Impact of the new cycle

The new cycle has been validated by the CAMS Validation team and the results are presented in a validation report. The main conclusions are: the new model configuration is an improvement as far as aerosols are concerned. Tropospheric ozone results for the o-suite and e-suite generally are very comparable, apart from a wintertime negative high-latitude bias (about 2-5 ppb) compared to the current operational version. This bias is largely related to changes (positive jump) in o-suite ozone that occurred on 24 January, the implementation day of the last upgrade. In spring, ozone values in the o-suite and e-suite are very similar. The other trace gas concentrations (CO, NO2, HCHO) show minor differences. Methane is improved.

Technical details of the new cycle

Changes to GRIB encoding

Model identifiers

The GRIB model identifiers (generating process identification number) for cycle 43R3 will be changed as follows:

GRIB 1 Section 1 Octets	GRIB 2 Section 4 Octets	grib_api key	Component	Model ID	
				Old	New
6	14	generatingProcessIdentifier	Atmospheric model	147	**148**
			Ocean wave model	112	**113**
			HRES stand-alone ocean wave model	212	**213**

⚠ The generatingProcessIdentifier for the Atmospheric Model for the initial dates (until 05 June 2017) is 147.

New model output parameters

There are no new parameters introduced with cycle 43r3.

Impact on users

Software

The versions of EMOSLIB and GRIB API used to decode the existing operational cycle 43r1 data are suitable to handle the cycle 43r3 data as well.

⚠ Note that ecCodes has now replaced GRIB API on the ECMWF platforms.

Availability of test data from the cycle 43r3 test suites

Test data is available from MARS, either through direct access or through WebAPI. The CAMS operational FTP server (ECPDS) also serves daily test data in the directory "/DATA/CAMS_GLOBAL_TEST" and "/DATA/CAMS_EUROPE_BC_TEST" for global and regional boundary condition data, respectively. More details can be found here.

Document versions

Date	Reason for update
10.02.2017	• Initial version
11.04.2017	• Update of content description
11.072017	• Update to change list
17.07.2017	• Link to validation report
27.07.2017	• Announcement of implementation date
29.09.2017	• Cycle has been implemented