RESEARCH DEPARTMENT MEMORANDUM

To:	RD Scientific Staff and Consultants	
Copy:	HR, HO, HMD, HMAS, HMOS, John Hodkinson, François Bouttier, Claude Fischer, Ryad El Khatib, Karim Yessad, John Hague	
From:	Deborah Salmond et al.	
Date:	June 1, 2011	File: R48.3/DS/1163
Subject:	**IFS Memorandum Cycle CY37R3**	

Cycle 37r3 was created in April-May 2011. In addition to the scientific changes this new release contains preparation work for OOPS and much cleaning of IFS and ODB. Active contributions have been marked **ACTIVE**.

Contributors:

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NUMERICAL ASPECTS

Sylvie Malardel - nas_CY37R2_for37R3

New Option for Linear Advection of GFL (and consequences for the advection of the cloud variables - ql, qi, qr, qs)

These modifications are one single step in a more complete cleaning of the phys/dyn interface. The main purpose of the modification is to get rid of a "trick" used to have SL linear interpolations (instead of cubic) for the cloud variables. Until now, the GFL could not be interpolated in the SL with linear interpolations (a lot of different options already existed for the choice of interpolations but not this one). But the physics tendencies of the previous time step are linearly interpolated in the SL if the semi-Lagrangian physics is used (default). The buffer which contains the physics tendencies was then also used to store the cloud variables (which were then stored twice). The cloud variables were interpolated twice in the SL, once with the monotonous cubic interpolations (GFL interpolations) and then with linear interpolations (special buffer for phys. tend. if LSLTEND=T). Later, at the beginning of the physics, the results of the cubic interpolations stored in the GFL were overwritten by the result of the linear interpolation (in GPMKTEND, but only if LSLPHYS=T).

This initial cleaning was needed to start a more complete cleaning of the "Semi-Lagrangian Physics".

Solution : a new attribute LINTLIN has been created for the GFL. The default of this attribute is .FALSE. except, if LECMWF, for the cloud variables. IF LINTLIN=T, the GFL is interpolated with linear interpolations in the SL.

Files modified(IFS):

```
adiab/cpqtuv.F90 gpaddslphy.F90 gpmktend.F90 larcinb.F90
dia/preset_grib_template.F90
module/type_gfls.F90 yomvareps.F90
phys_ec/callpar.F90 ec_phys_drv.F90 ec_phys_tl.F90 sltend.F90
setup/suarg.F90 sucslint.F90 sudefo_gflattr.F90 sudyn_setgflattr.F90
suvareps.F90 suvert.F90
utility/reset_accfie_vareps.F90
```

PHYSICS

Merged branch - pae_CY37R2_phys_for37r3_tplumb

Peter Bechtold - pae_CY37R2_convfor37r3 - ACTIVE

Modifications for convection and code cleaning

- making deep entrainment in first guess updraught=triger (cubasen.F90) consistent with full updraught (cuascn.F90)
- relative humidity dependent detrainment for deep convection (Nota for shallow detrainment=entrainment)

These 2 modifications improve tropical winds below 200hPa, but deteriorate tropical winds at 100 hPa as cold bias increases. This should be recovered with the coming higher vertical resolution.

- use proper units (1/m) for entrainment rate ENTRORG in sucumf.F90 and do no longer rescale later by gravity g in cuascn.F90

  /item code cleaning in cubasen.F90 callpar.F90 (remove single column model related code, remove unused comment lines/code in cubasen*.F90 cuentr*.F90 cosmetics CA related code in callpar.F90, comments in gwdrag_wms.F90, changed wrong definition but not value of RHOH2O)

- adding of units in yoegwwms.F90

Files modified(IFS):
`phys_ec/cuascn.F90 cuascntl.F90 cuascnad.F90 cubasen.F90 cubasentl.F90 cubasenad.F90 cuentr.F90 cuentrtl.F90 cuentrad.F90 cumastrn.F90 cumastrntl.F90 cumastrnad.F90 gwdrag_wms.F90 sucumf.F90 suphec.F90 module/yoegwwms.F90`

Files modified(SCRIPTS):
`metview/climplot_batch plot_amp_phase_clim.met`

Souhail Boussetta and Gianpaolo Balsamo - pa1_CY37R1_CTESSEL

CTESSEL: fully introduced but still passive

A carbon flux parametrization module based on the A-gs model (Jacobs 1994 and Calvet 1998) was introduced to the actual HTESSEL subsequently the canopy resistance scheme is not based any more on the Jarvis type model).

Files modified(IFS):
`adiab/cpedia.F90 postphy.F90 fullpos/hpos.F90 wrmlfpl.F90 module/parfpos.F90 yom_grib_codes.F90 yomafn.F90 namelist/namafn.h phys_ec/callpar.F90 ec_phys.F90 vdfmain.F90 vdfouter.F90 su0phy.F90 setup/su_surf_flds.F90 suafn1.F90 suafn2.F90 suafn3.F90`

Files modified(SURF):
`external/surfexcdriver.F90 interface/surfexcdriver.h module/srfcotwo_mod.F90 sucotwo_mod.F90 surfexcdriver_ctl_mod.F90 vsurf_mod.F90 offline/driver/callpar1s.F90 cpg1s.F90 offline/phys_ec/vdfmain1s.F90`

Richard Forbes - pas_CY37R1_for37R3_mixedphase_v5 - ACTIVE

Active updates to the cloud scheme

- Supersaturation term in temperature range 0 to -40degC changed to source of liquid phase and passed to ice deposition term.
- Reduction of deposition rate at cloud top and dependence on diagnosed ice nuclei concentration to improve representation of super-cooled liquid water layers in mixed-phase cloud.

These changes significantly improve the winter-time cold temperature bias over Europe and North America in regions where super-cooled liquid water is often present.

Passive updates to the cloud scheme

- Tidy up specification of rain autoconversion and cloud budget parameters.
- Removal of **LL3DPRECIPDIAG** related diagnostics in callpar.F90 and tidy up of comments in cloudsc.F90

Files modified(IFS):
`phys_ec/callpar.F90 cloudsc.F90 sltend.F90 sucldp.F90 yoecldp.F90`

Marta Janiskova - pan_CY37R2_vdif_cloudst_TLAD_v2 - ACTIVE

Modifications for the linearized physics

Vertical Diffusion (active):

- new transition from Louis et al.to Monin-Obuchov diffusion coefficients in the stable boundary layer near the surface has been introduced to make the linearized vertical diffusion scheme more consistent with the non-linear scheme
- regularization to computation of the Richardson number has been applied to avoid occasional spurious noise indicated by singular vector computations

Cloud Scheme (cleaning - bit-identical results):

- some cleaning and simplification of the previous modification introduced for creating output of 2D precipitation fraction have been done

Call routine for TL/AD physics (no impact on performance):

- additional condition introduced for writing/reading of the trajectory for fields of the non-orographic gravity wave scheme

Files modified(IFS):
`phys_ec/callpartl.F90 callparad.F90 cloudst.F90 cloudsttl.F90 cloudstad.F90 vdfexcus.F90 vdfexcustl.F90 vdfexcusad.F90`
`setup/susc2b.F90`

Irina Sandu and Anton Beljaars - pa3_CY37R2_ALL_Z0_CROPS_NOSNOW - ACTIVE

Modifications for the surface (roughness)

A new table for the momentum roughness length has been derived based on the 10m wind biases (compared to synop observations). The heat roughness length has been adjusted in order to account for heterogeneity issues.

The changes have a positive impact on 10m winds and generally on 2m night time temperatures, but lead to a slight deterioration of the geopotential scores in the short range for the north hemisphere for summer months considered for testing (august and july 2010). For winter the changes have a neutral/slightly positive impact on scores (february 2010).

Files modified(SURF):
`module/surfexcdriver_ctl_mod.F90 susveg_mod.F90`

Philippe Lopez - pah_CY37R2_assim_NEXRAD_revised_VarBC_v5 - ACTIVE

Direct 4D-Var assimilation of NCEP Stage IV precipitation data over the USA

The following changes have been made in the assimilation of NCEP Stage IV combined ground-based radar (NEXRAD) and rain-gauge 6-hourly accumulated precipitation observations over the continental USA.

Six predictors (instead of three) are now used in VarBC for the new observations to separate lower and higher rain rates (threshold value for ln(RR[mm/h]+1) set at 0.8). Few corrections have been made in the pre-screening of the new observations (bufr_screen_nexrad.F90).

To activate (resp. deactivate) the assimilation of the new observations, switches **LGBRAD** and **LNEXRAD** should be set to "on" (resp. "off") in prepIFS menu "Satellites".

Expt

```
1) fhn3: T1279 L91 4D-Var with NCEP Stage IV observations (ctrl = fhfu),
1 Apr - 21 Jun 2010, CYCLE 37R1 (finished).

2) fi00: T511 L91 4D-Var with NCEP Stage IV observations (ctrl = fhrd),
1 Jul - 12 Oct 2010, CYCLE 37R2 (still running).

3) fhzz: T511 L91 4D-Var with NCEP Stage IV observations (ctrl = fhsd),
 1 Jan - 17 Mar 2011, CYCLE 37R2 (still running).
```

Files modified(IFS):
`module/varbc_gbrad.F90 varbc_pred.F90 obs_preproc/black.F90 setup/cmoctmap.F90 gbrad/gbrad_put.F90 gbrad_put_tl.F90`

Files modified(SATRAD):
`programs/bufr_screen_nexrad.F90`

DATA ASSIMILATION

Gianpaolo Balsamo and Patricia De Rosnay - dap_CY37R2_tessel_switch_passif

Namelist control on the choice TESSEL/HTESSEL in IFS

Modification of Fortran to enable the choice between HTESSEL and TESSEL to be controlled entirely by the namelist (naephy). So libraries do not need to be modified to use TESSEL. This change is passive since by

default HTESSEL is used. It makes it possible to use TESSEL in 37r3, which is useful to initialise old cycles using TESSEL (e.g. for System 3 initialisation).

Expt T159: test=fiji, control=fijh - bit reproducible

Files modified(IFS):
`climate/updclie.F90`
`fullpos/specfitg.F90`
`setup/su_surf_flds.F90 sumcc.F90`

Patricia De Rosnay - dap_CY37R1_nesdis_00utc - ACTIVE

Early use of NOAA/NESDIS snow cover data at 00UTC

The NOAA NESDIS snow cover data is a daily composite product. The data is dated at 2200UTC and the product is available from NOAA in NRT at 2300UTC. Since the use of NESDIS data was implemented, NESDIS data has been used daily in both DA and DCDA at 1200UTC, ie with a significant delay of almost one day. In temporary snow cover conditions, this happened to cause important inconsistencies between the analysis and the real snow cover conditions on large areas. This happened several times this winter, as reported by the state members (e.g. Hungary on 5 March 2011 reported unrealistic snow cover). Using the data at 00UTC in both DA and DCDA enables to use the snow cover information at a time closer to observation time. Over Europe, the use of NESDIS data at 00UTC is followed by the use of SYNOP data which is mainly available at 0600 UTC. This allows to better combine the use the NESDIS and SYNOP data.

Expt T511: test=fieq, control=fiep

Files modified(SCRIPTS):
`scripts/gen/ssaana scripts/gen/fetchobs`

Patricia De Rosnay and Anne Fouilloux - dap_CY37R3_snow_data_clean

New report and code type for additional snow data

On 29 March 2011 the use of new data (subtype 28) from Sweden was implemented in operations in 36r4 and in the esuite 37r2. The new snow data was used like a SYNOP data in the BUFR to ODB conversion, using SYNOP snow depth data code and report types. From May 2011 a new report type was defined for "Additional Land Report" data, and it includes the new snow data. IFS cycle 37r3 is updated in order to use the new "Additional Land Report" codes in BUFR to ODB and in the surface analysis. The new report type is included in map_reportype.F90 and used in the BUFR to ODB conversion of the new snow data (bufr2odb_snow.F90). The BUFR code type and is converted to CMA code type in buf2cmat_new.F90, using codes declared in odb/module/yomboctp.F90 and ifs/module/yomcoctp.F90, respectively.

Expt: test=fixb

Files modified(ODB):
`ddl/obstype.h ssa_robody_snow.sql ssa_robhdr_snow.sql cma2odb/buf2cmat_new.F90 subuoctp.F90 buoctmap.F90 map_reportype.F90 module/yomboctp.F90 bufr2odb/bufr2odb_snow.F90`

Files modified(SSA):

sub/scan_cma_odb.F90

Files modified(IFS):
setup/cmoctmap.F90 cmoctmap_inv.F90 module/yomcoctp.F90

Gabor Radnoti - dag_CY37R2_obstatfc

Fix forecast obstat computation for all-sky micro-wave imager data

Files modified(IFS):
mwave/mwave_put.F90

Joaquin Munoz Sabater - daq_CY37R2_SMOS_MONITOR

SMOS improvements

The main change is an increase in the flexibility of the thinning approach applied to the SMOS data. Other changes correct some bugs and make our code consistent with the last version of the L1C ESA processor.

Expt T511: test=fiap, control=fiao - bit reproducible

Files modified(IFS):
smos/smos_obsop.F90

Files modified(ODB):
cma2odb/ctxinitdb.F90
tools/Load_balancing.F90

Files modified(SATRAD):
cmem/rdcmemifs.F90
programs/bufr_screen_smos.F90

Files modified(SCRIPTS):
gen/presmos

Files created(SCRIPTS):
sms_era/obtime_smos.sms

Massimo Bonavita - dav_CY37R2_REPRODUCIBLE

Bit-reproducible version of EDA post-processing

Scripts and routines have been modified to make the EDA sample statistics computation, the EDA filtering and the EDA re-scaling independent of MARS interpolation and post-processing facilities. This ensures bit-reproducibility.

Files added(IFS):
prepdata/programs/vod2uv.F90

Files modified(IFS):

prepdata/programs/Fieldset_Diff.F90 prepdata/programs/GH_RH.F90
prepdata/programs/Spread_Skill_Time_Avg.F90 prepdata/programs/sptogp.F90

Files modified(SCRIPTS):
scripts/def/an.def scripts/gen/ens_stats scripts/gen/ens_cal

Massimo Bonavita - dav_CY37R1_SCRIPTS_REPRODUCIBLE

Technical improvements to EDA

- extend the EDA background storage to +15h and make mars cope with large ensembles;
- clean up the EDA background forecasts. This is not done at the moment, causing the EDA to require an increasingly large amount of space on /fdb

Files modified(SCRIPTS):
scripts/gen/anml scripts/sms_an/clean_an.sms

Elias Holm and Agathe Untch - dae_CY37R2_READFILE_DIMENSIONING

Reading of higher vertical resolution background error and ozone chemistry files The dimensioning of arrays used to read in background error related files need maximum default dimensions set by local parameters JPMAXLAT and JPMAXLEV which were used inconsistently as local or global parameters with different values in different places. These parameters are replaced with the global parameters JPMXGL and JPMXLE. The parameter JPMAXVAR is changed from 20 to 200 to remove inconsistent use where it is increased locally to accommodate additional trace gas fields etc.

The code for reading the ozone chemistry files has been modified to allow for 100 or more vertical levels.

Expt T42: test=fik1, control=fik0 - bit reproducible

Files modified(IFS):
climate/updo3ch.F90
module/yomfger.F90
obs_preproc/inifger.F90
setup/suhdf.F90 suspecb.F90
var/estsig.F90 suinfce.F90 sujb.F90

Drasko Vasiljevic - dad_CY37R2_AIREP_BIAS - ACTIVE

Introduction of VARBC for AIREP

Files created(IFS):
obs_preproc/airep_flight_phase.F90

Files created(ODB):
ddl.ECMA/airep_flight_phase_robhdr.sql airep_flight_phase_robody.sql

ddl/airep_flight_phase_robhdr.sql airep_flight_phase_robody.sql

Files modified(IFS):

common/yomdb_defs.h yomdb_vars.h
module/varbc_airep.F90 varbc_pred.F90 yomancs.F90 yomobs.F90
namelist/namobs.h
obs_preproc/defrun.F90 obadat.F90 suobs.F90
op_obs/hop.F90 hopad.F90 hoptl.F90 hretr.F90

Files modified(ODB):

bufr2odb/bufr2odb_aircraft.F90 get_varindex.F90
cma2odb/ctxinitdb.F90 initmdb.F90
ddl/getairepid.sql hdr.h robhdr.sql varbc_airep_robody.sql
module/varindex_module.F90

Files modified(SCRIPTS):

gen/ifsmin ifstraj obstat

Yannick Tremolet - day_CY37R1_moderr_for37r3 - ACTIVE

Activation of model error cycling

The 4D-Var model error term in the stratosphere is now cycled from one assimilation cycle to the next, with the model error term penalizing the change in model error from one cycle to the next instead of the total model error. In prepIFS, **LBGMODERR** should be set to **"On"**.

Expt T511: test=fhye, control=fhrd

Files modified(SCRIPTS):

gen/model varconsts vardata anml ifsmin ifstraj

SATELLITE

Niels Bormann Milan Dragosavac and Tomas Wilhelmsson - str_CY37R2_for_CY37R3 - ACTIVE

RTTOV-10, preparations for NPP/ATMS, geostationary satellite image simulations for forecast experiments

The radiative transfer model has been upgraded to RTTOV-10, provided by the NWP SAF. RTTOV-10 includes the option to use FASTEM-4 as the microwave ocean surface emissivity model and the explicit treatment of the top-most RTTOV level. Code for the efficient radiative transfer modelling of principal component scores for AIRS and IASI is also included, as is a parametrisation of Zeeman effects for AMSU-A and SSMIS, though both options are not yet supported by the current IFS-implementation. Note that RTTOV-10 requires new coefficient files due to a format change.

As part of the implementation, the RTTOV-code in the satrad-library has been reorganised, reflecting the di-

rectory structure provided in the RTTOV release. The new directory satrad/rttov/ifs contains all IFS-specific routines that are not part of the RTTOV release, but used at the interface between RTTOV and the IFS.

Prompted by the RTTOV modifications to explicitly include the RTTOV top-most level at 0.005 hPa, an option has been included to extend the RTTOV input profiles at the top if required. This option is set-up in RTTVI (search for ntoplevels), and it extends the input profile with data from the reference profiles given in the RTTOV coefficient files for the RTTOV levels that lie above the forecast model top. The extension is done in RTTOV_-EC. The option is currently disabled, until we upgrade to RTTOV coefficient files that include reasonable values for the RTTOV top-most level in the reference profiles.

The branch also includes initial preparations for ATMS onboard NPP. These are activated through the prepIFS switch LATMS (default is false as long as we do not have real data). The modifications allow the monitoring and use of ATMS data; spatial averaging of ATMS fields of view (required to achieve noise levels comparable to AMSU-A) is not yet included.

Geostationary satellite images can now be simulated in forecast experiments, as for analysis experiments (see switches in the new prepIFS window "Satellite Image Simulation"). It is switched off by default. Using this option requires the archiving of various fields on model levels to be activated.

Expt T511

Control	RT-files as submitted	Updated RT-files (FASTEM-4)	Comment
fg20	fhdr	fhdq	36r4
fhj0	fhj2	fhj3	37r1
fhqv	fi51	fi52	37r2
fhsd	fi80	fi81	37r2

Files created(ODB):

`bufr2odb/bufr2odb_atms.F90`

Files created(SATRAD):

`include/throw.h`

`module/mod_mie.F90 mod_rttov_fastem3_coef.F90 mod_rttov_fastem4_coef.F90 rttov_chain.F90 rttov_coef_io_mod.F90 rttov_distribute_mod.F90 rttov_ec_traj.F90 rttov_getoptions.F90 rttov_lun.F90 rttov_test_k_mod.F90 rttov_unix_env.F90 rttov_zutility.F90`

`programs/create_tables_spectra.F90 example_fwd.F90 example_pc_fwd.F90 example_rttovscatt.F90 rttov_conv_coef.F90 rttov_scatt_make_coef.F90 rttov_test.F90 rttov_test_get_pc_predictindex.F90`

`rttov/coef_io/*.F90 rttov/ifs/*.F90 rttov/main/*.F90 rttov/mw_scatt/*.F90 rttov/mw_scatt_coef/*.F90 rttov/other/*.F90 rttov/parallel/*.F90 rttov/test/*.F90`

Files modified(IFS):

`common/yomdb_defs.h yomdb_vars.h`

`control/scan2mtl.F90`

`module/varbc_rad.F90 yomemis.F90 yomtvrad.F90`

`mwave/mwave_obsop.F90 mwave_obsop_ad.F90 mwave_obsop_tl.F90`

`obs_preproc/black.F90 defrun.F90 new_thinn.F90 new_thinner_no_sq.F90 pre_thinner.F90`

`op_obs/bgobs.F90 co2cldairs.F90 co2cldiasi.F90 emis_mw_n.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90 hsatang.F90 rad1cemis.F90 rad1cobe.F90 radtr.F90`

radtr_ml.F90 radtr_ml_ad.F90 radtr_ml_tl.F90 radtrad.F90 radtrtl.F90
phys_dmn/mts_phys.F90
setup/suemis_conf.F90
var/getsatid.F90 rtsetup.F90 surad.F90 vec2gp.F90

Files modified(IFSAUX):

module/mpl_broadcast_mod.F90 parkind1.F90

Files modified(ODB):

bufr2odb/bufr2odb_amsre_1d.F90 bufr2odb_atovs.F90 get_varindex.F90
cma2odb/buf2cmat_new.F90 initmdb.F90 subuoctp.F90
ddl/body.h robhdr.sql robody_traj.sql sensor.h
module/odb2bufr_varindex_module.F90 varindex_module.F90 yomboctp.F90
tools/Bufr2odb.F90

Files modified(SATRAD):

interface/rttov_ec.h rttov_ec_ad.h rttov_ec_alloc.h rttov_ec_tl.h
module/mod_cparam.F90 mod_rttovscatt_test.F90 mwave_const.F90
onedvar_variables.F90 rttov_const.F90 rttov_global.F90 rttov_types.F90
mwave/mwave_emis_rttov.F90 mwave_get_rtcoeff.F90 mwave_obsop_rttov.F90
mwave_obsop_rttov_ad.F90 mwave_obsop_rttov_adtest.F90 mwave_obsop_rttov_tl.F90
onedvar/onedvar_get_rtcoeff.F90 onedvar_obsop_grad_rttov.F90
onedvar_obsop_rttov.F90 onedvar_obsop_tl_rttov.F90
programs/aer_clim_prof.F90 gensatim.F90 reo3_prescreen.F90 rttov_ascii2bin_scattcoef.F90
rttovscatt_test.F90 screen_1c.F90

Files deleted(IFS):

op_obs/radtrk.F90

Files deleted(SATRAD):

interface/*.h
module/rttov_ec_temp.F90
programs/rttov_ascii2bin_coef.F90 test_2_coef.F90 test_coef.F90
test_errorhandling.F90 test_q2v.F90
rttov/*.F90

Kirsti Salonen and Niels Bormann - sts_CY37R2_AMV_situation_dependent_obs_errors

Calculation of situation dependent observation errors for AMVs

The branch calculates situation-dependent observation errors for AMVs, and stores these in the ODB for diagnostic purposes. For now, the assimilation still uses the old observation errors.

The AMV observation error can be divided into two parts: error due to error in the height assignment and error due to tracking error. The errors in height assignment have been estimated separately for different satellites, channels, height assignment methods and heights. The observation error contribution due to the error in height assignment is then calculated in the new routine AMV_OBERR, called from HRETR. Tracking errors have been estimated for different satellites, channels, height assignment methods and heights as well. Both estimates are provided in an auxiliary file, amv_p_and_tracking_error, read in the routine SUAMV.

Expts

```
fg2s, fh04: 02-03/2010 and 05-06/2010
to estimate errors in height assignment and tracking errors.
CY36R4, T511.

fhrk: 02-03/2010
to test that the defined height assignment errors and tracking errors
are realistic.
CY36R4, T511.

fiab, fiac: single cycle test to check the bit-reproducibility.
CY37R2, T255.
```

Files created(IFS):
`module/yom_amv_oberror.F90`
`op_obs/amv_oberr.F90`
`var/amv_read_oberror.F90`

Files modified(IFS):
`common/yomdb_defs.h yomdb_vars.h`
`op_obs/amv_get_preds.F90 hretr.F90`
`var/suamv.F90`

Files modified(ODB):
`cma2odb/initmdb.F90`
`ddl/sathdr_screen_satob.sql satob.h`

Rossana Dragani - st3_CY37R2_varbco3_var_pres

O3 VarBC upgrade

With this upgrade, it will be also possible to perform bias correction of retrieved profiles with variable number of layers and defined on variable pressure levels.

Expt T255: test=fiax, control=fhwl

Files modified(IFS):
`module/varbc_to3.F90`

Files modified(ODB):
`ddl/varbc_to3_robody.sql`

Blazej Krzeminski - st1_CY37R1_emiskf_io

Optimisation: Unformatted I/O code for the emissivity

Files created(SATRAD):
`programs/kfgrid_converter.F90`

Files modified(SATRAD):

`emiss/emiskf_init_sensor.F90 kfgrid_init_from_file.F90 kfgrid_write.F90`

Files modified(SCRIPTS):

`gen/emiskf ifstraj mkabs_satrad vardata`

Tony McNally - dam_CY37R2_ir_ozone - ACTIVE

Active assimilation of infrared ozone channels from HIRS/AIRS and IASI

Active use is now made of ozone sensitive channels from HIRS, AIRS and IASI. The assimilation is anchored to a single channel from AIRS (1088) and IASI (1585) - with the bias correction for these channels fixed at zero. All other ozone channels have adaptive bias corrections estimated by VARBC. The previous assimilation anchor that used SBUV has been removed, and these data are now adaptively bias corrected by VARBC.

Expt T511: test=fi6w, control fibh

Files modified(IFS):

`module/varbc_rad.F90 varbc_to3.F90 obs_preproc/cloud_detect_setup.F90 defrun.F90`

Sean Healy - sti_CY37R2_for_37r3

Minor GPS-RO updates (Passive)

The BUFR2ODB has been updated the enable processing of ROSA measurements. The instruments lists have been updated to enable easier identification of new measurements in the JO tables.

Expt T159: test=fikp, control=fikr - bit reproducible

Files modified(IFS):

`module/yomlimb.F90`

`var/sulimb.F90`

Files modified(ODB):

`bufr2odb/bufr2odb_radio.F90 bufr2odb_radio_lat_long.F90`

Reima Eresmaa - ste_CY37R1_airs_iasi_to_37r3

Minor modifications to usage of AIRS and IASI data

These include a bug correction and some modifications to tuning parameter values of cloud detection, as well as an extension of the warmest FOV -based pre-screening of IASI data to account for three pixels (instead of two that are currently used). Additionally, the warmest FOV is now chosen on the basis of mean brightness temperature on 100 window channels, instead of using one channel only.

Expts : T511

```
Branch ste_CY37R1_cd_modifications_trial2:
-fhue, run for July 2010, and verified against the control run fhrd
```

Branch ste_CY37R1_wfov3_for_iasi:
-fhul, run for July 2010, and verified against the control run fhrd
-fhj1, run for December 2010, and verified against the control run fhiw.

Files modified(IFS):

op_obs/cf_digital.F90

Files modified(SATRAD):

programs/bufr_screen_iasi.F90

Reima Eresmaa - ste_CY37R1_clean_ECMA_airs_iasi

ODB cleaning for AIRS and IASI

This branch contains modifications applied for cleaning of ODB files from badly-used variables in relation to the usage of AIRS and IASI data. Results from running this branch are bit-identical with Cy37R2 (at least as far as this is the case with Anne's branch stf_CY37R1_BUFR2ODB that was used as a basis for the cleaning).

Expt T159: test=fhwk, control=fhor - bit reproducible

Files modified(IFS):

module/parcma.F90 yomnmev.F90

op_obs/hretr.F90

setup/su_events.F90

Files modified(ODB):

bufr2odb/bufr2odb_205.F90 bufr2odb_aeolus.F90 bufr2odb_aircraft.F90
bufr2odb_airs.F90 bufr2odb_amsre_1d.F90 bufr2odb_ascat.F90 bufr2odb_atovs.F90
bufr2odb_fy3.F90 bufr2odb_gch1.F90 bufr2odb_gch2.F90 bufr2odb_gch3.F90
bufr2odb_gch4.F90 bufr2odb_gch5.F90 bufr2odb_grad.F90 bufr2odb_iasi.F90
bufr2odb_iscat.F90 bufr2odb_meris.F90 bufr2odb_metar.F90 bufr2odb_modisaer.F90
bufr2odb_msg.F90 bufr2odb_mwri_1d.F90 bufr2odb_oscat.F90 bufr2odb_paob.F90
bufr2odb_pgps.F90 bufr2odb_qscat.F90 bufr2odb_radio.F90
bufr2odb_radio_lat_long.F90 bufr2odb_rain_rates.F90 bufr2odb_reo3.F90
bufr2odb_satem.F90 bufr2odb_satob.F90 bufr2odb_scat.F90 bufr2odb_smos.F90
bufr2odb_ssmi.F90 bufr2odb_ssmis_1d.F90 bufr2odb_synop.F90 bufr2odb_temp.F90
bufr2odb_tmi_1d.F90 bufr2odb_windprofiler.F90 bufr2odb_windsat.F90
get_varindex.F90

cma2odb/makedesc.F90 map_reportype.F90

ddl.MTOCOMP/MTOCOMP.ddl

ddl/PSBIAS.ddl aeolus.h body.h cma.h enkf.h forecast_diagnostic.h hdr.h
obsdist_gbrad.sql obsdist_gbrad_body.sql obsdist_hdr2allsky_body.sql
obsdist_hdr2auxiliary_body.sql obsdist_hdr2gbrad_body.sql
obsdist_hdr2radar_body.sql obsdist_hdr2reo3_body.sql
obsdist_hdr2surfemiss_body.sql obsdist_smos.sql radiance.h sat.h scatt.h smos.h
ssmi1d.h type_definitions.h

module/varindex_module.F90

Cristina Lupu - from dah_CY37R2_esuite

GRIB-2 for gensatsim

Satellite image simulation part (gensatim) was updated to produce GRIB-1 images. The list of geostationary satellites was updated to simulate the images for the actual configuration of satellites used in the assimilation (including GOES-13 and MTSAT-2 instead of GOES-12 and MTSAT-1).

Files modified(SATRAD):
`satsim/satproj2geo.F90`
`programs/gensatsim.F90`

Files modified(SCRIPTS):
`def/an.def gen/archive_satim satimsim mkabs_satim`

Enza Di Tomaso and Niels Bormann - stt_CY37R2_varbcFix

Bug-fix in VarBC

The fix allows one to change VarBC predictors also when the number of predictors is not changed

Expt T511: test=fias, control=fhrd - bit reproducible

Files modified(IFS):
`module/varbc_setup.F90`

OBSTAT

Mohamed Dahoui - mo3_CY37R1_obstat37r3_v1

Updates for OBSTAT

- Full support to ODB2. Obstat can now optionally retrieve and use ODBs from MARS.
- Allow the optional production of ”targeted points/areas” statistics. This is a generic procedure that can be used for all data types and it’s very useful for CAL/VAL activities.
- Allow RD users to produce gridded statistics by activating a variable LGRIDSTAT (prepIFS can be updated to set this variable). A generic stat.ref.grid.rdx has been created for that purpose. The automatic plotting is not yet in prepIFS but this will be easily added in the next cycle. For now users can rely on the off-line tools to plot their pre-computed gridded statistics
- I extended the stat.ref (temporarily) to produce statistics systematically for 2 flags (”used” and ”active+passive”) for all satellite data. The old stat.ref block are still there to allow experiments comparison with the previous cycles. The new stat blocks will be for 37r3 invisible for users (I added a change for that). From the next cycle, the old stat block will be removed and the new onces will be visible and usable. By doing this we ensure a smooth transition between the current and the new and clean stat.ref. The computation cost will be higher than usual but it’s only for 37r3 (as we keep duplicate stat blocks).

- Upgraded the odb sql according to the ODB cleaning. The obstat code has been reviewed to be backward compatible with the previous ODB versions.
- Added a tool to merge obstat output gribs according to different dimensions (datastreams, scan angles, surface types, channels, time)
- Bug fixes.

Files created(OBSTAT):
`module/odb_c_binding.F90`
`src/obstat_grib_merge.F90 odb2read.F90`

Files created(ODB):
`ddl.ECMA/obstat_resat.sql obstat_smos_land.sql`
`ddl/obstat_resat.sql obstat_smos_land.sql`

Files modified(OBSTAT):
`module/dataqc.F90 globvar.F90 mod_obstat_plot.F90 obsdata.F90 statsoft.F90`
`src/addstat.F90 allocsoft.F90 calcairspop.F90 enlstatarray.F90 genopt.F90 gridpos.F90 inibufr.F90 iniglob.F90 iniitemloc.F90 inisoft.F90 inisoftdef.F90 inisoftflag.F90 inisoftinstr.F90 inisoftstat.F90 inisoftstream.F90 mergesoft.F90 mpsoft.F90 obstat.F90 obstat_add_grib.F90 obstat_geo_plot.F90 obstat_hist_plot.F90 obstat_hov_plot.F90 obstat_-normalize_scat.F90 obstat_overview_hist_plot.F90 obstat_scat_plot.F90 odbread.F90 odbscaling.F90 plothis.F90 plotime.F90 plotrms.F90 plotrmsbias.F90 plotsoft.F90 plotusage.F90 sucalcgauw.F90 updsoft.F90 user_data_read.F90 writealarm.F90 writegribs.F90 writesoft.F90 wrsoftdef.F90`

Files modified(ODB):
`ddl/obstat.sql obstat_fcdep.sql obstat_fcdep_gpsro.sql obstat_geos.sql obstat_gpsro.sql obstat_mwimg.sql obstat_radhure.sql obstat_radrefl.sql obstat_radwd.sql obstat_satob.sql obstat_scatt.sql obstat_smos.sql obstat_tovs.sql`

Files modified(SCRIPTS):
`gen/obstat obstat_init mkabs_obstat sms_an/obstat_archive.sms def/an.def`

AEOLUS

Michael Rennie and Daivd Tan - da7_CY37R2_Mar25

Doppler wind lidar assimilation

Further technical development (no meteorological impact) for Aeolus processing and assimilation tasks.

IFS: Changed sonde_type@hdr to retrtype@hdr wherever it is referred to (part of an ODB tidy). Uncomment "hretr_aeolus" call from taskob.F90. Tidy of hretr.F90 to remove unnecessary Aeolus code. Start using azimuth@sat in hop.F90, hoptl.F90 and hopad.F90

ODB: Start using retrtype@hdr instead of sonde_type@hdr, with consequent changes to aeolus SQL files, robhdr_screen.sql and bufr2odb_aeolus. Start using azimuth@sat instead of aux_1@body for aeolus azimuth angle variable - this requires a new file sat_aeolus.sql and changes to getdb.F90 and ctxinitdb.F90.

SCRIPTS: minor changes to accommodate retrtype@hdr default value for aeolus predicted-orbit cases. Updated aeolus test files for Ground Segment Overall Validation Phase 1 (Interface Test 06, GSOV-1/IT-06).

AEOLUS: Many changes. Upgrade to "pre-Release 1.50 version 3", which includes interfacing to the Version 5.07 Level-1B data format.

Expt : test=fi89, control=fi87 - bit reproducible

Files created(AEOLUS):

```
Test/BUFR_file_handling/testoutput_A.L1B_bufr2ee.expected
BUFR_file_handling/testoutput_A.L1B_ee2bufr.expected
BUFR_file_handling/testoutput_A.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput_B.L1B_bufr2ee.expected
BUFR_file_handling/testoutput_B.L1B_ee2bufr.expected
BUFR_file_handling/testoutput_B.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput_C.L1B_bufr2ee.expected
BUFR_file_handling/testoutput_C.L1B_ee2bufr.expected
BUFR_file_handling/testoutput_C.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput_nf.L1B_bufr2ee.expected
BUFR_file_handling/testoutput_nf.L1B_ee2bufr.expected
BUFR_file_handling/testoutput_nf.TestL1B_ee2bufr.expected
L1B_file_handling/testoutput_A.TestReadL1Bdata.expected
L1B_file_handling/testoutput_B.TestReadL1Bdata.expected
L1B_file_handling/testoutput_C.TestReadL1Bdata.expected
L1B_file_handling/testoutput_nf.TestReadL1Bdata.expected
support/compiler_features_pgf90.F90
```

Files created(ODB):

```
ddl.CCMA/sat_aeolus.sql
ddl.ECMA/sat_aeolus.sql
ddl/sat_aeolus.sql
```

Files modified(AEOLUS):

```
BUFR_file_handling/L1B_BufrUtil.F90 Makefile.aeolus
DataStructures/Test_L1B_DataStructure.F90 Test_L1B_PCD_ADS.F90 Test_L1B_SPH.F90
Test_L1B_WV_MDS.F90 Test_L2BC_SPH.F90 Test_L2B_PCD_ADS.F90 datasetdescriptor.F90
ee_cfi_datatypes.F90 fixedheader.F90 joborder_datastructure.F90 l1b_cal_ads.F90
l1b_geoloc_ads.F90 l1b_gwd_ads.F90 l1b_meas_ads.F90 l1b_miecorepars_ads.F90
l1b_pcd_ads.F90 l1b_sph.F90 l1b_us_mds.F90 l1b_wv_mds.F90
l2b_auxpar_datastructure.F90 l2b_geoloc_ads.F90 l2b_mie_mds.F90 l2b_pcd_ads.F90
l2b_rayleigh_mds.F90 l2bc_sph.F90 l2c_assimpcd_ads.F90 l2c_mievec_mds.F90
l2c_rayleighvec_mds.F90 mainproductheader.F90
L1B_file_handling/TestReadL1Bdata.F90 readl1bdata.F90
L2C_construction/append_l2c.F90 create_testinput
Match_AMD/match_amd_module.F90
Scripts/CheckVersionNumbers.py binary_datapack_listing.txt.expected
build_L2BP.EXAMPLE.sc build_L2BP.KNMI.sc build_L2BP.sc
generate_makefiles_for_local_use install.txt
Set_Makeoptions
Test/AMD_file_handling/testoutput2.TestReadAMDdata.expected Application_Client_-
Example/AE_TEST_AUX_PAR_2B_20050118T000000_20110118T000000_0018.EEF
Application_Client_Example/JobOrder.AeolusL2BP.xml
Application_Client_Example/Makefile.aeolus
```

Application_Client_Example/testoutput.L2B_processor.test1.expected
Application_Client_Example/testoutput.application_client_example.test2.expected
AuxClim_file_handling/AE_TEST_AUX_CLM_L2_20010312T123456_20110312T123456_-
0001.TXT.expected AuxClim_file_handling/testoutput.TestWriteAuxClimData.expected
AuxClim_file_handling/testoutput.Write_AuxClim_Text_Product.expected
BUFR_file_handling/Makefile.aeolus
DataStructures/testoutput.Test_DataSetDescriptor.expected
DataStructures/testoutput.Test_L1B_DataStructure.expected
DataStructures/testoutput.Test_L1B_PCD_ADS.expected
DataStructures/testoutput.Test_L1B_SPH.expected
DataStructures/testoutput.Test_L2B_AMD_SPH.expected
DataStructures/testoutput.Test_L2B_Geoloc_ADS.expected
DataStructures/testoutput.Test_L2B_Mie_MDS.expected
DataStructures/testoutput.Test_L2B_PCD_ADS.expected
DataStructures/testoutput.Test_L2B_SPH.expected
DataStructures/testoutput.Test_L2C_AssimPCD_ADS.expected
DataStructures/testoutput.Test_L2C_SPH.expected
DataStructures/testoutput.Test_MainProductHeader.expected
InputScreening/AE_TEST_AUX_PAR_2B_20060707T000000_20111231T000000_0000.EEF
InputScreening/Makefile.aeolus InputScreening/testinput.Test_Screening_L1B_Data
InputScreening/testoutput.Test_Screening_L1B_Data.expected
L1B_file_handling/Makefile.aeolus L2BC_file_handling/AE_TEST_ALD_U_N_2B_-
20010312T123456_20010312T123700_0002.TXT.expected
L2BC_file_handling/AE_TEST_ALD_U_N_2B_20010312T123456_20010312T123700_-
0003.TXT.expected
L2BC_file_handling/AE_TEST_ALD_U_N_2B_20010312T123456_20010312T123700_-
0004.TXT.expected
L2BC_file_handling/AE_TEST_ALD_U_N_2C_20010312T123456_20010312T123700_-
0002.TXT.expected
L2BC_file_handling/AE_TEST_ALD_U_N_2C_20010312T123456_20010312T123700_-
0003.TXT.expected
L2BC_file_handling/AE_TEST_ALD_U_N_2C_20010312T123456_20010312T123700_-
0004.TXT.expected
L2B_AuxPar_file_handling/testoutput1.Test_Read_L2B_AuxPar_file.expected
L2C_construction/AE_TEST_ALD_U_N_2C_20160307T061458_20160307T074732_-
0001.TXT.expected
Match_AMD/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0101.EEF
Match_AMD/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0102.EEF
Match_AMD/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0103.EEF
Match_AMD/testoutput1.Test_Match_AMD_Module.expected
Match_AMD/testoutput2.Test_Match_AMD_Module.expected
Match_AMD/testoutput3.Test_Match_AMD_Module.expected
RBC_FileHandling/testoutput2.TestReadRBCdata.expected Tools/Makefile.aeolus
Tools/testoutput10.difftool.expected Tools/testoutput11.difftool.expected
Tools/testoutput9.Test_difftool.expected main/AE_TEST_ALD_U_N_2B_-
20071002T001842_20071002T002236_0001.TXT.test106.expected
main/AE_TEST_ALD_U_N_2B_20101002T000002_20101002T000040_-
0001.TXT.test104.expected
main/AE_TEST_ALD_U_N_2B_20101002T000002_20101002T000136_-
0001.TXT.test101.expected
main/AE_TEST_ALD_U_N_2B_20101002T000002_20101002T000136_-
0001.TXT.test102.expected
main/AE_TEST_ALD_U_N_2B_20101002T000002_20101002T000136_-
0001.TXT.test103.expected

main/AE_TEST_ALD_U_N_2B_20101002T000002_20101002T000136_-
0001.TXT.test105.expected
main/AE_TEST_ALD_U_N_2C_20071002T001842_20071002T002236_-
0001.TXT.test106.expected
main/AE_TEST_ALD_U_N_2C_20101002T000002_20101002T000040_-
0001.TXT.test104.expected
main/AE_TEST_ALD_U_N_2C_20101002T000002_20101002T000136_-
0001.TXT.test101.expected
main/AE_TEST_ALD_U_N_2C_20101002T000002_20101002T000136_-
0001.TXT.test102.expected
main/AE_TEST_ALD_U_N_2C_20101002T000002_20101002T000136_-
0001.TXT.test103.expected
main/AE_TEST_ALD_U_N_2C_20101002T000002_20101002T000136_-
0001.TXT.test105.expected
main/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0101.EEF
main/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0102.EEF
main/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0103.EEF
main/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0104.EEF
main/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0105.EEF
main/AE_TEST_AUX_PAR_2B_20050101T000000_20110101T000000_0106.EEF
main/JobOrder.test301.xml main/JobOrder.test401.xml main/Makefile.aeolus
main/NWPmetaData.hdr.expected main/run_one_main_test.sc
main/testoutput.L2B_processor.test101.TEST_TN3_1_0105_LITE_scene_S.L2C.expected
main/testoutput.L2B_processor.test101.TEST_TN3_1_0105_LITE_scene_S.expected
main/testoutput.L2B_processor.test102.TEST_TN3_1_0106_LITE_scene_C.L2C.expected
main/testoutput.L2B_processor.test102.TEST_TN3_1_0106_LITE_scene_C.expected
main/testoutput.L2B_processor.test103.TEST_TN3_1_0110_LITE_scene_D.L2C.expected
main/testoutput.L2B_processor.test103.TEST_TN3_1_0110_LITE_scene_D.expected
main/testoutput.L2B_processor.test104.TEST_TN3_1_0113_LITE_scene_H.L2C.expected
main/testoutput.L2B_processor.test104.TEST_TN3_1_0113_LITE_scene_H.expected
main/testoutput.L2B_processor.test105.TEST_TN3_1_0027.L2C.expected
main/testoutput.L2B_processor.test105.TEST_TN3_1_0027.expected
main/testoutput.L2B_processor.test106.L1bP_InstallTest.expected
main/testoutput.L2B_processor.test301.preprocess_test.expected
main/testoutput.L2B_processor.test401.Empty_L2B_product.expected
run_feedback_agent.py support/Makefile.aeolus
support/testoutput.TestLogging.expected
ThinLayer/AE_TEST_AUX_PAR_2B_20050331T000000_20111231T000000_0000.EEF
TaskTable.AE_L1B_L2B_WIND.xml WorkstationConfigurationFile.xml order.5.xml
Tools/Test_difftool.F90 diff_module.F90
auxiliary/auxiliarymodule.F90
ee_cfi_wrapper_module/xml_module.F90
external/aeolus_l2bp_odb_transfers.F90 compute_groundtrack.c
odb2ascii_aeolus_auxmet.F90
install_binary_datapack
main/l2bp_module.F90
schemas/AUX_CLM_HDR.xml AUX_CLM_SpecificProductHeader.xml AUX_MET_HDR.xml
AUX_MET_SpecificProductHeader.xml AUX_RBC_HDR.xml
AUX_RBC_SpecificProductHeader.xml DataSetDescriptor.xml DataSetDescriptor.xsd
DataSetDescriptor_invalid.xml EE_DataTypes.xsd L2B_AUX_PAR.xml
L2B_AUX_PAR_invalid.xml L2B_HDR.xml L2B_SpecificProductHeader.xml L2C_HDR.xml
L2C_SpecificProductHeader.xml MainProductHeader.xml MainProductHeader.xsd
Test_EE_DataTypes.xml Test_EE_DataTypes.xsd Validate_whole_L2BP_tree.py

simple_xml/xml_module.F90

support/Makefile.aeolus TestLogging.F90 aeolusconstants.F90 compiler_features_aix.F90 compiler_features_f95.F90 compiler_features_generic.F90 compiler_features_gfortran.F90 compiler_features_hpux.F90 compiler_features_ifort.F90 compiler_features_necsx.F90 compiler_features_sgi_irix.F90 compiler_features_sunforte.F90 errorhandler.F90 lexer.F90 logging.F90 lunmanager.F90

Files modified(IFS):

module/aeolus_getamd_mod.F90 aeolus_l2bp_wrapper_mod.F90

op_obs/aeolus_l2b_to_body.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90

var/taskob.F90

Files modified(ODB):

bufr2odb/bufr2odb_aeolus.F90

cma2odb/ctxinitdb.F90 getdb.F90

ddl/aeolus.h aeolus_auxmet_update_hdrflag.sql odb2ee_aeolus_auxmet.sql robhdr_screen.sql sathdr_screen_aeolus_1b.sql sathdr_screen_aeolus_2b.sql sathdr_screen_aeolus_2b_part2.sql sathdr_screen_aeolus_auxmet.sql sathdr_screen_aeolus_hdr.sql sathdr_screen_aeolus_sat.sql

Files deleted(AEOLUS):

Test/BUFR_file_handling/testoutput1.L1B_ee2bufr.expected
BUFR_file_handling/testoutput11.L1B_ee2bufr.expected
BUFR_file_handling/testoutput13.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput2.L1B_ee2bufr.expected
BUFR_file_handling/testoutput3.L1B_ee2bufr.expected
BUFR_file_handling/testoutput4.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput5.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput51.L1B_bufr2ee.expected
BUFR_file_handling/testoutput6.L1B_ee2bufr.expected
BUFR_file_handling/testoutput7.L1B_ee2bufr.expected
BUFR_file_handling/testoutput8.TestL1B_ee2bufr.expected
BUFR_file_handling/testoutput9.TestL1B_ee2bufr.expected
L1B_file_handling/testoutput1.TestReadL1Bdata.expected
L1B_file_handling/testoutput2.TestReadL1Bdata.expected
L1B_file_handling/testoutput3.TestReadL1Bdata.expected
L1B_file_handling/testoutput4.TestReadL1Bdata.expected
L1B_file_handling/testoutput5.TestReadL1Bdata.expected
L1B_file_handling/testoutput7.TestReadL1Bdata.expected

schemas/AUX_MET_HDR_v01.32.xsd AUX_PAR.xml

Files modifed(SCRIPTS):

def/an.def gen/aeolus_l2b aeolus_l2c_getodb gtt2simulobs mklinks odbmerge

RE-ANALYSIS

Paul Poli - eras_CY37R1_varbc_sfcobs

VARBC for surface observations: Ps and GPS ZTD

This branch includes a new module for calculating and using variational bias corrections for surface observations.

For now the observables accounted for are: - surface pressures, controlled by logical switch LBC_PS, and - GPS Zenith Total Delays (called Atmospheric Path Delays in IFS), controlled by logical switch LBC_APD.

Both logical switches are inside a new namelist NAMVARBC_SFCOBS.

The defaults for LBC_PS and LBC_APD are FALSE (i.e., the module is inactive).

There is one predictor per station identifier/BUFR sub-type; consequently the size of the VARBC table was increased to potentially store VARBC information for each surface station. For fixed platforms, the VARBC key also includes lat/lon (integers, in degrees – this gives an accuracy of about 100 km. This is only used for identification purposes). This is nedeed because, there were, in the past, times when two stations had the same names, although they were not at all in the same regions of the globe. The pressure reporting practice (at station height, or at sea-level – column "ppcode" in ODB), is also part of the VARBC key, as stations changed practices over time and usually moved from sea-level to station height.

The branch also includes new switches to allow triggering cold-starts for individual classes of VARBC observations. These switches, inside the relevant VARBC namelists (reminder: there is one VARBC namelist per VARBC class), are called: lcoldstart_rad, lcoldstart_to3, lcoldstart_tcwv, lcoldstart_allsky, lcoldstart_airep, lcoldstart_gbrad, lcoldstart_sfcobs. They are all FALSE by default to reproduce current behavior, but can be turned ON at script level (by modifying the relevant namelist sent to the screening job).

There is no built-in mechanism to automatically turn OFF the PSBIAS scheme when the VARBC for Ps is ON. So, if one turns ON the switch LBC_PS, one may also wish to turn OFF the switch LUSE_PSBIAS.

Although the switch LBC_APD was not tested, as we do not extract GPS ZTD/APD data routinely, it could be tested by (and of use to) Meteo-France where these data are assimilated routinely since 2006.

If LVARBC_PS and/or LVARBC_APD are turned ON, depending on how many stations are used in the assimilation, the screening may return an error message 'Insufficient allocation - increase jpmxngroup'. The variable jpmxngroup is defined in ifs/module/varbc_table.F90

Expt T511: test=1541, control=fhqv - bit reproducible

Files created(IFS):

`module/varbc_sfcobs.F90`

Files created(ODB):

`ddl.CCMA/getsfcobsid.sql varbc_sfcobs_robhdr.sql varbc_sfcobs_robody.sql`
`ddl.ECMA/getsfcobsid.sql varbc_sfcobs_robhdr.sql varbc_sfcobs_robody.sql`
`ddl/getsfcobsid.sql varbc_sfcobs_robhdr.sql varbc_sfcobs_robody.sql`

Files modified(IFS):

`module/varbc_airep.F90 varbc_allsky.F90 varbc_gbrad.F90 varbc_pred.F90`
`varbc_rad.F90 varbc_setup.F90 varbc_table.F90 varbc_tcwv.F90 varbc_to3.F90`
`op_obs/hdepart.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90`

Files modified(ODB):

`cma2odb/ctxinitdb.F90`
`ddl/body.h`

Hans Hersbach - er9_CY37R2_longrange_forcing

Enable the usage of CMIP5 recommended longrange forcing in the radiation code

Besides boundary conditions at the ocean surface, i.e., SST and sea ice cover, an atmosphere model relies on a number of input fields that are related to radiation. Conditions have evolved over the 20th century. Although IFS already contains historical evolutions for some quantities, the code has been adapted to allow for forcing as recommended by the CMIP5. Several of the contributions to this branch originate from the EC-EARTH v2.2 branch.

The different components are controlled by the script: gen/longrange_forcing

It is only invoked when a new prepIFS variable: **LONGRANGE_FORCING** is set to true. By default this switch is false, in which case results are bit-identical to CY37R2. The script contains a number of switches as specified in the list below, which in turn set the proper namelist variables in IFS.

Historical data (and future projections) are provided for:

- Solar forcing; this was already provided by Tim Stockdale in CY36R4 (lsolarforcing=true)
- Greenhouse gases: use RCP data sets for CO2, CH4, N2O, CFC-11 and CFC-12 **lghgcmip5=true**
- Ozone from a SPARC data set **leo3var=true**
- Tropospheric sulphate aerosol data set from a CAM3.5 simulation (leso4his=true)
- Stratospheric volcanic sulphate from GISS (lvolcdata=true). This allows for the replacement of an older, less complete GISS data set already available in IFS.
- Most of these data sets are represented at a coarse resolution and are not 3-dimensional.

A switch has been introduced **ldiagforcing=true** that allows for the output of the full 3-d fields as used in the radiation code (radintg). By default this switch is off, and should only be used in test mode, since it requires a significant amount of extra memory.

This branch is to be actively used in the ERA-CLIM pilot re-analyses.

Expt

```
T511 early-delivery suite for 20110101 00UTC - 12UTC:
- control   : fiby
- experiment: fic0, using both script, ifs branch, LONGRANGE_FORCING=false
  Gives bit-identical results

T159 forecast experiment:
- fiag, and others
- Test that all options work (i.e. when LONGRANGE_FORCING=true)

T42 debug
- several
- test that ifs-branch-only works and that it is bit identical to CY37R2
```

Files created(IFS):
`climate/read_cmip5ghg.F90`
`module/reglatlon_field_mix.F90 yoecmip5.F90`
`phys_ec/radozv.F90 suecozv.F90`

Files modified(IFS):
`climate/updrgas.F90`
`fullpos/vpos.F90`
`module/surface_fields_mix.F90 yoeaerc.F90 yoerad.F90 yomdphy.F90 yomlun.F90 yomphyds.F90`
`namelist/naerad.h namdphy.h namphyds.h`
`phys_dmn/surdi15.F90`
`phys_ec/radact.F90 raddrv.F90 radintg.F90 su_aerw.F90 su_ghgclim.F90 suecaec.F90`
`phys_radi/suecrad.F90 suecso4.F90`
`pp_obs/pos.F90`
`setup/su_surf_flds.F90 sudim1.F90`
`utility/updtim.F90`

Files deleted(IFS):
`phys_radi/su_so4_A1B2000.F90 su_so4_A1B2010.F90 su_so4_A1B2020.F90 su_so4_A1B2030.F90 su_so4_A1B2040.F90 su_so4_A1B2050.F90 su_so4_A1B2060.F90 su_so4_A1B2070.F90 su_so4_A1B2080.F90 su_so4_A1B2090.F90 su_so4_A1B2100.F90 su_so4_obs1920.F90 su_so4_obs1930.F90 su_so4_obs1940.F90 su_so4_obs1950.F90 su_so4_obs1960.F90 su_so4_obs1970.F90 su_so4_obs1980.F90 su_so4_obs1990.F90 suecso4his.F90`

SEASONAL

Frederic Vitart - nec_CY37R2_wmem

Fix for creation post-processed products for the monthly forecasts

Files modified(PREPDATA):
`programs/wm.F90 wmem.F90`

WAVES

Jean Bidlot - wab_CY37R2_for_CY37R3

External currents in IFS and minor fixes in WAM

Adapt code and scripts to latest grib_api changes to run IFS with external surface currents.

Bug fixes:

- wavemdl to allow 1-way coupling,

- bsdcol to read first record,
- removal of potential division by 0 in sinput,
- resolve memory problem when mpdecomp is run on 1PE,

changes to non MPI version for mubuf, readwind and spec2fdb.

Files modified(WAM):

`Wam_oper/bsdcol.F decode_integrated_parameter.F decode_point_spectra.F mpdecomp.F mubuf.F readwind.F sinput.F spec2fdb.F userin.F wavemdl.F`

Saleh Abdalla - waa_CY37R2_cryosat

Changes for preprocessing of wave data

- Changes are needed to adjust the quality check of SAR data following the change of ENVISAT and ERS-2 orbits.
- Changes needed to make use of CryoSat-2 data when available.

Expt

```
- Wave model stand-alone runs (0.25 degrees).
  Exp. fik7   (Control: fin0)
  Exp. fioa   (Control: fio8, fio9)

- Coupled runs with T159 Exp. fiq2
```

Files created(WAM):

`Alt/uracry.F`

Files modified(SCRIPTS):

`gen/fetchobs preobs`

`wav/wam_input wave_data_dates wave_getalt wave_getobs wave_getsar wave_save`

Files modified(WAM):

`Alt/Include/parameters.h debac.F esf_preprocessor.F uragat.F urapre.F uraqcm.F uraqes.F uraqrd.F uraqwf.F urascor.F urasor.F`

`Sar/debnv.F eninv.F sarinv.F subs_check.F uwaror.F`

`module/yowaltas.F`

Giovanna De Chiara - dig_CY37R2_oscat_l2b_integtest

Changes to the Oceansat-2 Scatterometer data processing

In CY36R4 the assimilation system was already prepared to process Oceansat-2 scatterometer data. The code was based on the L2A products and included the in-house wind inversion. The code has been now modified in

order to extract wind speed and direction from the L2B products delivered by the OSI-SAF. No in-house wind inversion is performed for OSCAT data. The quality control is based on the OSI-SAF quality flags. Oceansat-2 data is now being received in NRT. Data will be initially passively monitored.

Files modified(ODB):

`bufr2odb/bufr2odb_oscat.F90`

Files modified(SCAT):

`module/oscat_bufr.F oscat_flag.F oscat_wind.F`

`oretrieve/invert_owind.F obeam_check.F oscat_invert50.F oscat_read_bufr.F oscat_write_bufr.F`

`programs/bufr_qscat.F oscat_filter.F`

Files modified(SCRIPTS):

`gen/fetchobs prescat`

EPS

Martin Leutbecher - nel_CY37R2_varEPS

Conserving interpolation of accumulated fields at resolution changes in EPS and bugfixes

In the variable resolution EPS, the accumulated fields are reset to interpolated higher resolution fields from the previous leg at the end of the overlap period. This interpolation is changed from a mars interpolation in script getgrb_vareps to a conserving interpolation in the model.

A couple of minor corrections and additions were required in module iostream_mix.F90 to enable the interpolation from high to low resolution in subroutine grid_in. Bugs in VAREPS for truncation times not equal to multiples of 24 hour have been fixed.

Expt T255/159: test=fia4, control=fia5 - bit reproducible
Expt T639/319: test=fid3, control=fhz9 - bit reproducible

Files modified(SCRIPTS):

`gen/getgrb_vareps modeleps modeleps_nemo`

Files modified(IFS):

`dia/prepfdb.F90 preset_grib_template.F90`

`module/iostream_mix.F90`

`setup/sugrib.F90 sugridg.F90`

`utility/reset_accfie_vareps.F90`

Martin Leutbecher - nel_CY37R2_for37r3prepdata

Enable use of grib1 initial condition perturbations in experiments that use grib2 for model levels

The check of the a-s and b-s defining the vertical levels in program add_pert has been relaxed in order to account for the different packing in grib1 and grib2.

Files modified(PREPDATA):
`mc_tools/add_pert.F90`

CLEANING and pre-OOPS

George Mozdzynski - mpm_CY37R1_all_cleaning

New derived types

Cleaning of the semi-Lagrangian interface

Major cleaning of the semi-Lagrangian interface by application of the extended derived type SL_STRUCT. The main features of this branch are, - Initialisation of SL halo data structures now completely dynamic and allocated within SLCSET/SLRSET - Reduced argument lists for calling SLCOMM routines - On-demand masks included in SL_STRUCT derived type - Improved halo volume calculation - New module EINT_MOD (Externalisable part of horizonal interpolators and halo management used in the semi-Lagrangian scheme) - RDCSET merged into SLCSET (and RDCSET deleted) - Removed use of on-demand comms in SCAN2MAD/COBSLAGAD/OBSHORA call tree

The motivation for this work comes from a document prepared by Karim Yessad, titled 'New Presentation For Obshor Observation Interpolator', Sept 2010, version 3.

New derived types for modules YOMGEM, YOMGC and YOMWFPB

The following new derived types are provided by this branch.

Reference: 'Proposal of Cleanings in ARPEGE/IFS in 2011-2012' Karim Yessad, Jan 26, 2011, version 6e, Appendix J.

Geometry arrays of module YOMGC (type TGSGEOM): RCORI, RCORIC, GEMU, GSQM2, GELAM, GELAT, GECLO, GESLO, GM, GOMVRL, GOMVRM, GNORDL, GNORDM, GNORDLCL, GNORDMCL, GNORDMCM, GAW, NGPLAT, NUNIQUEGP Orography arrays of module YOMGC (type TOROG): OROG, OROGL, OROGM, OROGLL, OROGMM, OROGLM Computational sphere or plane projection geometry arrays of module YOMGEM (new type TCSGEOM): RCOLON, RSILON, RINDX, RINDY, RATATX, RATATH Eta-vertical coordinate arrays of module YOMGEM (type TVAB): VALH, VBH, VAH, VC, VAF, VBF, VDELA, VDELB, VP00 and TOPPRES Eta-vertical coordinate arrays of module YOMGEM (type TVETA): VETAH, VFE_ETAH, VETAF, VFE_ETAF, VFE_RDETAH Intermediate quantities of YOMGEM used in the semi-Lagrangian interpolator (type TVSLETA): VCUICO, VCUICOH, VSLD, VSLDH, VSLDW, VSLDWH, VRLEVX, NVAUTF, NVAUTH, and also VRDETAR (VRDETAR was in YOMCVER) Computational sphere geometry arrays of module YOMLEG (type TCSGLEG): RW, RMU, R1MU2, R1MUI, R1MUA, RSQM2, R1QM2, RACTHE, RLATIG, RLATI Indexes of module YOMWFPB (type TMWFPB): MLAT, MLON, MLOS, MLONN, MLOSS

Why are we creating new derived types? One reason for using derived types is that they can be used to reduce the length of argument lists for subroutine calls, by passing a derived type instead of some of the arguments. This has been done within this branch, for example, throughout the semi-Lagrangian call trees CALL_SL[TL,AD], and will be extended to more areas of code in the future. Another use is to group sets of variables, e.g. see use of derived type SL_STRUCT for describing the different halos used within IFS (SL,FULLPOS,OBS,etc.). Another reason for creating new derived types is that this is needed for the OOPS project, for improving the scalability and performance of IFS.

For types TGSGEOM, TOROG and TCSGEOM (the NGPTOT sized quantities), the components of these types are used in both an NPROMA blocked form or a non-blocked form (_NB), reflecting how they are typically initialised and used in IFS. It should be noted that while there are two structures (blocked and non-blocked) there is only one instance of the data, as the blocked structure points into the non-blocked structure. See code for details, for example, use of YRGSGEOM and YRGSGEOM_NB.

Files created(IFS):

`module/eint_mod.F90`

Files modified(IFS):

`adiab/call_sl.F90 call_sl_ad.F90 call_sl_tl.F90 cpeuldyn.F90 cpg.F90 cpg2.F90 cpg25.F90 cpg2ad.F90 cpg2lag.F90 cpg2lagad.F90 cpg2lagtl.F90 cpg2tl.F90 cpg5_gp.F90 cpg_gp.F90 cpg_gp_ad.F90 cpg_gp_tl.F90 cpg_gpb_nhgeogw.F90 cpgad.F90 cpglag.F90 cpglagad.F90 cpglagtl.F90 cpgtl.F90 cpmvvps.F90 fspglh.F90 gnh_conv_nhvar.F90 gnh_conv_nhvar_geogw.F90 gnh_conv_prhs.F90 gnh_tndlagadiab_gw.F90 gnh_tndlagadiab_spd.F90 gnh_tndlagadiab_svd.F90 gnhdlr.F90 gnhdlra.F90 gnhdlrb.F90 gnhgrdlr.F90 gnhgrgw.F90 gnhgrpre.F90 gnhgw2svd.F90 gnhgw2svdarome.F90 gnhpre.F90 gnhpreh.F90 gnhsvd2gw.F90 gnhx.F90 gp_kappa.F90 gpcty.F90 gpctyad.F90 gpctytl.F90 gpgeo.F90 gpgeoad.F90 gpgeotl.F90 gpgrgeo.F90 gpgrgeoad.F90 gpgrgeotl.F90 gpgrp.F90 gpgrxyb.F90 gpgrxybad.F90 gpgrxybtl.F90 gpgw.F90 gppre.F90 gppref.F90 gpprefad.F90 gppreftl.F90 gppvo.F90 gpxx.F90 gpxyb.F90 gpxybad.F90 gpxybtl.F90 lacdynshw.F90 lacdynshwad.F90 lacdynshwtl.F90 ladad.F90 ladine.F90 ladinead.F90 ladinetl.F90 laiddi_init.F90 laidli_init.F90 lainor2.F90 lainor2ad.F90 lainor2tl.F90 laitli_init.F90 laitri_init.F90 laitvspcqm.F90 lapinea.F90 lapinea5.F90 lapineaad.F90 lapineatl.F90 lapineb.F90 lapinebad.F90 lapinebtl.F90 larche.F90 larche5.F90 larchead.F90 larchetl.F90 larcin2.F90 larcin2ad.F90 larcin2tl.F90 larcina.F90 larcinaad.F90 larcinatl.F90 larcinb.F90 larcinb5.F90 larcinbad.F90 larcinbtl.F90 larcinha.F90 larcinhb.F90 larmes.F90 larmes2.F90 larmes25.F90 larmes2ad.F90 larmes2tl.F90 larmes5.F90 larmesad.F90 larmestl.F90 lascaw.F90 lascawad.F90 lascawtl.F90 lattes.F90 lattesad.F90 lattestl.F90 lattex.F90 lavent.F90 laventad.F90 laventtl.F90 pre_sladrep.F90 rdscaw.F90 sigam.F90 sigamad.F90 siseve.F90 sitnu.F90 sitnuad.F90 sivderi.F90`

`ald_inc/interface/elarche.intfb.h interface/elarchead.intfb.h interface/elarchetl.intfb.h interface/elarmes.intfb.h interface/elarmes5.intfb.h interface/elarmesad.intfb.h interface/elarmestl.intfb.h interface/elascaw.intfb.h interface/elascawad.intfb.h interface/elascawtl.intfb.h interface/eslextpol.intfb.h`

`c9xx/chk923.F90 cseaice.F90 ganiso.F90 geo923.F90 incli0.F90 incli1.F90 incli10.F90 incli2.F90 incli3.F90 incli4.F90 incli5.F90 incli6.F90 incli7.F90 incli8.F90 incli9.F90 inclib.F90 inclir.F90 inipz.F90 intice.F90 ppv923.F90 relnew.F90 simrel.F90`

`canari/cabane.F90 caclsi.F90 caclsst.F90 cahuax.F90 caissedm.F90 calincw.F90 canari.F90 caohis.F90 capdgu.F90 capotx.F90 casmswi.F90`

`climate/cormass2.F90 cormass3a.F90 cormass3b.F90 cormassdry.F90 updcli.F90 updclie.F90 updcpl.F90 updnud.F90`

`control/cnt3.F90 gp_model.F90 gp_model_ad.F90 gp_model_tl.F90 scan2m.F90 scan2mad.F90 scan2mtl.F90`

`dia/chkevo.F90 cpdyddh.F90 cpdysldia.F90 preset_grib_template.F90 sumddh.F90 wmovieh.F90 wrfu.F90 wrgrida.F90 wrmlppg.F90 wrspeca.F90 wrxfu.F90`

`fullpos/cpclimi.F90 endpos.F90 fpint12.F90 fpint4.F90 fpintdyn.F90 fpintphy.F90 fpmodprec.F90 fposhor.F90 fpsampl.F90 fpscaw.F90 hpos.F90 openfpfa.F90 phymfpos.F90 pregpfpos.F90 specfita.F90 specfitg.F90 subfpos.F90 sufpcip.F90`

sufpg1.F90 sufpg2.F90 sufpoph.F90 sufpsuw.F90 sufpwfpbuf.F90 sufpwfpds.F90 sufpwide.F90 suprocfp_dep.F90 vpos.F90

module/sats_mix.F90 yoe_cuconvca.F90 yom_phys_grid.F90 yomcver.F90 yomdim.F90 yomgc.F90 yomgem.F90 yomleg.F90 yommask.F90 yommp.F90 yomprad.F90 yomsc2.F90 yomslrep.F90 yomtvrad.F90 yomwfpb.F90 yomwfpds.F90

namelist/naerad.h

obs_preproc/gefger.F90 mkglobstab.F90 sekf_prep_ascat.F90 suobs.F90

onedvar/onedvar_diagnostics.F90 onedvar_get_bgsig.F90 onedvar_obsop.F90 onedvar_obsop_gr.F90 onedvar_obsop_tl.F90 onedvar_screen.F90

op_obs/cobs.F90 cobsad.F90 cobslag.F90 cobslagad.F90 cobslagtl.F90 cobstl.F90 mpobseq_pack.F90 mpobseqad_unpck.F90 mpobseqtl_pack.F90 obshor.F90 obshorad.F90 obshortl.F90 preint.F90 preint2d.F90 preint2dad.F90 preint2dtl.F90 preintad.F90 preinttl.F90 slint.F90 slintad.F90 slinttl.F90

parallel/slcomm.F90 slcomm2.F90 slcomm2a.F90 slcset.F90 slextpol.F90 slextpolad.F90 slrset.F90

phys_dmn/aclsps.F90 aclspsad.F90 aclspstl.F90 acrads.F90 acradsad.F90 acradstl.F90 aplpar.F90 hl_aplpar.F90 suphmse.F90 suphy2.F90 surdi15.F90 writeprofile.F90

phys_ec/aer_clim.F90 aer_climg.F90 aer_climz.F90 aer_clist.F90 aer_stratcl.F90 callparad.F90 callpartl.F90 ec_phys.F90 ec_phys_ad.F90 ec_phys_drv.F90 ec_phys_tl.F90 ec_physg.F90 heldsuarez.F90 radcfg.F90 raddiag.F90 raddrv.F90 radintg.F90 sltend2.F90 su_aerw.F90 suphec.F90 wvwg2rg.F90

phys_radi/suecrad.F90

pp_obs/apache.F90 pos.F90 ppobsap.F90 ppsta.F90 ppstaad.F90 ppstatl.F90 ppvvel.F90

prism/couplo4_definitions.F90 couplo4_exchange.F90 couplo4_grg_input.F90 couplo4_grg_stats.F90

setup/suallo.F90 sucoaphy.F90 sucuconv_ca.F90 sudyn.F90 suecphypo.F90 sugem.F90 sugem1b.F90 sugem2.F90 sugpqlim.F90 sugrcfu.F90 sugrib.F90 sugridf.F90 sugrxfu.F90 suhdf.F90 sulega.F90 sump0.F90 sunh_vertfe1d.F90 sunh_vertfe1dd.F90 sunh_vertfe3d.F90 sunh_vertfe3dbc.F90 sunh_vertfe3dd.F90 sunhbmat.F90 sunhsi.F90 suoph.F90 suorog.F90 supong.F90 surand1.F90 surand2.F90 surayfric.F90 surcordi.F90 susc2b.F90 susi.F90 susimpr.F90 suslad1.F90 suslad2.F90 suslad3.F90 suslb.F90 suspecb.F90 suspecg2.F90 suspectcfou.F90 suspqlim.F90 susta.F90 sustadlr.F90 suvert.F90 suvertfe1.F90 suvertfe3.F90 suvertfe3d.F90 suvsplip.F90

sinvect/vdiflcz.F90 vdiflczad.F90 vdiflcztl.F90

utility/dealfpos.F90 deallo.F90 dealsc2.F90 grid_biconserv.F90 gstats_label_ifs.F90 openfa.F90 pre_grid_biconserv.F90 write_grid_grib.F90

var/add_modbias_ad.F90 add_modbias_tl.F90 balnonlin.F90 balnonlinad.F90 balnonlintl.F90 balomega.F90 balomegaad.F90 balomegatl.F90 cosjl.F90 cossmq.F90 estsig.F90 estsiga.F90 gp_nearest.F90 nmicost.F90 pregprh.F90 rdfpinc.F90 suinfce.F90 sujbchvar.F90 sujbcor.F90 sujbcosu.F90 sujbcovnoise.F90 sujbstd.F90 sujbvarens.F90 sujbvcoord.F90 sujbwavelet.F90 sujqstd.F90 sumdfce.F90 suprecov.F90 suprffce.F90 suqnorm.F90 suscal.F90 sushfce.F90

Files modified(IFSAUX):

module/local_trafos.F90

Files modified(OASIS3):

src/setoasis3.F90

Files modified(ODB):

cma2odb/grid_nearest.F90

Files modified(SATRAD):

module/cparam.F90 rttov_types.F90

Files modified(SCMEC):

source/cpg1c.F90 lacdyn1c.F90 lainor1c.F90 larmes1c.F90 lascaw1c.F90 suallo1c.F90 suecrad1c.F90 suphec1c.F90 suvert1c.F90 wrtd1c_nc.F90 wrtp1c.F90 wrtp1c_nc.F90

Files modified(SURF):

external/surfbc.F90

Files modified(WAM):

Wam_oper/outwspec.F wgribout.F

Files deleted(IFS):

parallel/rdcset.F90

George Mozdzynski - mpm_CY37R1_gstats

Fixes for GSTATS

This branch fixes a number of gstats related problems,

- fixed some overlapping counters (1709,1704,1433) causing 4D-Var ifstraj (traj2) to exceed 100 percent in (gstats) detailed stats summary statistic, 'FRACTION OF TOTAL TIME ACCOUNTED FOR INCLUDING SUMB'
- split counter 1001 (OMP Physics) into two counters (1001 and 1002) to separate out timesteps when cloud cover diagnostics are calculated on radiation (NRADFR) timesteps
- by separating these counters we resolve the problem of counter 1001 (OMP Physics) appearing in the 'unexpected delays' detailed stats output
- split counter 1209 (OMP Radiation input) into separate counters, same issue as above

Files modified(IFS):

control/gp_model.F90 obs_preproc/suobs.F90 phys_ec/ec_phys_drv.F90 ec_physg.F90 radintg.F90 utility/gstats_label_ifs.F90

Files modified(WAM): Wam_oper/outwspec.F wgribout.F

George Mozdzynski - mpm_CY37R1_data_new

Replace assignment statements by files

About 600K source lines (assignment statements) in IFS have been replaced by reading files (unformatted reads). This branch produces bit identical results to 37R1 controls and has been tested with the following experiments.

Expt T159: test=fhyh, control=fhgv - bit reproducible

Files modified(IFS):

module/sats_mix.F90 yomtvrad.F90

op_obs/mpobseq_pack.F90 mpobseqad_unpck.F90 mpobseqtl_pack.F90

phys_radi/rrtm_kgb1.F90 rrtm_kgb10.F90 rrtm_kgb11.F90 rrtm_kgb12.F90 rrtm_kgb13.F90 rrtm_kgb14.F90 rrtm_kgb15.F90 rrtm_kgb16.F90 rrtm_kgb2.F90 rrtm_kgb3.F90 rrtm_kgb4.F90 rrtm_kgb5.F90 rrtm_kgb6.F90 rrtm_kgb7.F90 rrtm_kgb8.F90 rrtm_kgb9.F90 srtm_kgb16.F90 srtm_kgb17.F90 srtm_kgb18.F90 srtm_kgb19.F90 srtm_kgb20.F90 srtm_kgb21.F90 srtm_kgb22.F90 srtm_kgb23.F90 srtm_kgb24.F90 srtm_kgb25.F90 srtm_kgb26.F90 srtm_kgb27.F90 srtm_kgb28.F90 srtm_kgb29.F90 su_c11clim.F90 su_c12clim.F90 su_c22clim.F90 su_ccl4clim.F90 su_ch4clim.F90 su_co2clim.F90 su_gch4clim.F90 su_gco2clim.F90 su_gozoclim.F90 su_mcica.F90 su_n2oclim.F90 su_no2clim.F90 su_ozoclim.F90 su_so4_A1B2000.F90 su_so4_A1B2010.F90 su_so4_A1B2020.F90 su_so4_A1B2030.F90 su_so4_A1B2040.F90 su_so4_A1B2050.F90 su_so4_A1B2060.F90 su_so4_A1B2070.F90 su_so4_A1B2080.F90 su_so4_A1B2090.F90 su_so4_A1B2100.F90 su_so4_obs1920.F90 su_so4_obs1930.F90 su_so4_obs1940.F90 su_so4_obs1950.F90 su_so4_obs1960.F90 su_so4_obs1970.F90 su_so4_obs1980.F90 su_so4_obs1990.F90 suecozc.F90

Files modified(IFSAUX):

module/local_trafos.F90

Files modified(SATRAD): cparam.F90 rttov_types.F90

Files modified(SCRIPTS):

gen/lowres_fp mkidta mkidta_eps mkidta_ocean mkidta_sens mklinks model modeleps modeleps_nemo modelsv sekf_sm varconsts

oce/model_nemoIFS model_oceatm

sens/J1.sms J7.sms J9.sms

Mike Fisher - dai_CY37R2_cleanup_for_oops

Removal of YOMDIM from pp_obs routines

Routines in pp_obs pass most array dimensions via the argument list. However, many routines also dimensioned some arrays using NFLEVG and NPPM (from YOMDIM). These variables are now passed via the argument list. As a consequence, nearly half of the routines in pp_obs now depend only on YOMHOOK and PARKIND1.

Files modified(IFS):

adiab/cpeuldyn.F90 cpeuldynad.F90 cpeuldyntl.F90 lassie.F90 lassiead.F90 lassietl.F90 si_cccor.F90 sidd.F90 siddad.F90 sigam.F90 sigamad.F90 spcsi.F90 spcsiad.F90 spnhsi.F90

fullpos/endpos.F90 vpos.F90

nmi/vtran.F90 vtranad.F90

op_obs/amv_get_preds.F90 bgobs.F90 ghg_ak_ad.F90 ghg_ak_op.F90 ghg_ak_tl.F90 grg_ak_ad.F90 grg_ak_op.F90 grg_ak_tl.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90 hretr_aeolus.F90 mopitt_ak_ad.F90 mopitt_ak_op.F90 mopitt_ak_tl.F90 nox2no2.F90 nox2no2ad.F90 nox2no2tl.F90 preint.F90 preint2d.F90 preint2dad.F90 preint2dtl.F90 preintad.F90 preinttl.F90 rtl_hop_1d.F90 rtl_hop_1d_ad.F90 rtl_hop_1d_tl.F90 rtl_hop_2d.F90 rtl_hop_2d_ad.F90 rtl_hop_2d_tl.F90

phys_dmn/mts_phys.F90

phys_ec/grg_nox2no2.F90

pp_obs/aerod_ad.F90 aerod_op.F90 aerod_tl.F90 apache.F90 expbesu.F90
expbesuad.F90 expbesutl.F90 pos.F90 pp2dint.F90 ppak.F90 ppakad.F90 ppaktl.F90
ppcc.F90 ppccad.F90 ppcctl.F90 ppch4.F90 ppclw.F90 ppclwad.F90 ppclwtl.F90
ppflev.F90 ppgeop.F90 ppgeopad.F90 ppgeoptl.F90 ppinit.F90 ppinitad.F90
ppinittl.F90 ppinitz.F90 ppinitza.F90 ppinitztl.F90 ppintp.F90 ppintpad.F90
ppintptl.F90 ppintz.F90 ppintzad.F90 ppintztl.F90 ppitpq.F90 ppitpqad.F90
ppitpqtl.F90 ppnox.F90 ppnoxad.F90 ppnoxtl.F90 ppobsa.F90 ppobsaad.F90
ppobsac.F90 ppobsacad.F90 ppobsactl.F90 ppobsap.F90 ppobsas.F90 ppobsasad.F90
ppobsastl.F90 ppobsatl.F90 ppobsaz.F90 ppobsaza.F90 ppobsaztl.F90 ppobsn.F90
ppps.F90 pppsad.F90 pppstl.F90 pppwc.F90 pppwcad.F90 pppwctl.F90 ppq.F90
ppqad.F90 ppqtl.F90 pprh.F90 pprhad.F90 pprhtl.F90 ppt.F90 ppt_old.F90 pptad.F90
pptad_old.F90 ppttl.F90 ppttl_old.F90 ppuv.F90 ppuvad.F90 ppuvtl.F90 ppvvel.F90
ppzhlev.F90

setup/submat.F90

var/cvaru2ad.F90 suprecov.F90 suvifce.F90 vec2gp.F90

Mike Fisher - dai_CY37R3_yomtag

Convert YOMTAG and YOMMPI variables to parameters

The message passing tags in YOMTAG and the message type identifiers in YOMMPI have been converted to PARAMETERS. SUTAG has been removed.

Expt T159: test=fi8w, control=fi9z - bit reproducible

Files modified(IFS):

module/yomtag.F90

setup/sumpini.F90

Files modified(IFSAUX):

module/yommpi.F90

Files deleted(IFS):

parallel/sutag.F90

Mike Fisher - dai_CY37R3_yomlun

Cleaning of YOMLUN

YOMLUN holds the Fortran unit numbers for files read and written by IFS.

This change removes several duplicate unit numbers (i.e. cases in which the same unit number was assigned to more than one varaible in YOMLUN). One duplicate remains: NULTRAJBG==NFGISH.

The variables in YOMLUN have been given the PARAMETER attribute. They should never be changed by the user. The GRIB codes in YOM_GRIB_CODES have also been declared as parameters.

We are running out of available unit numbers. Most numbers in the range 0–99 are named in yomlun and are thus effectively reserved for all configurations of IFS, whether they are used or not. To avoid this situation getting any worse, a ”unit-number pool” has been implemented. A unit number from the pool can be requested by a function call:

IUNIT=RESERVE_LUN()

and returned to the pool using:

CALL FREE_LUN(IUNIT).

This mechanism replaces NULTMP, which has been removed. NULUSR1–5 have been retained for now, but should probably be phased out in favour of the RESERVE_LUN/FREE_LUN mechanism.

Files modified(IFS):

```
climate/updo3ch.F90
dia/spnorm.F90
module/pardim.F90 varbc_setup.F90 yom_grib_codes.F90 yomlun.F90
obs_preproc/suobscor.F90 suobscor_resol.F90
ocean/wrcoe.F90 wrcpl.F90
phys_ec/radintg.F90
programs/merge_varbc.F90
setup/su0yoma.F90 sulun.F90 sumpini.F90 sumpout.F90 surand1.F90
var/rdvarbc.F90 sujbbal.F90 sujbcor.F90 sujbdat.F90 sujbwavtrans.F90 sujqdata.F90
wrvarbc.F90
```

Files modified(ODB):

```
pandor/module/bator_init_mod.F90
```

Files modified(SATRAD):

```
cmem/cmem_main.F90 cmem_setup.F90 rdcmemifs.F90
interface/rdcmemifs.h
```

Mike Fisher - dai_CY37R3_oopsJb

Encapsulation of JB

This branch implements a large fraction of the code changes required to allow Jb to be treated as an ”object”. It will allow the Jb code to be used in the OOPS system, and also opens the possibility to have multiple instances of Jb (for example, it could allow different Jb statistics to be used for rainy or dry conditions).

The code replaces the static module variables used by Jb with derived types, which are organised into a heirarchy. A single global variable remains, consisting of a pointer to the top level of the heirarchy: JB_STRUCT (in YOMJG).

Files modified(IFS):

```
adiab/spchor.F90 control/adjotest.F90 cfcsens2obs.F90 cnt4ad.F90 cnt4tl.F90
cva1.F90 cva2.F90 forecast_error.F90 sim4d.F90 dia/grib_code_message.F90
pregrbenc.F90 wrmlppg.F90 wroutspgb.F90 fullpos/wrmlfp.F90 function/fjbchvar.h
module/control_vectors_comm_mod.F90 yomjbchvar.F90 yomjg.F90 yomskf.F90
yomspjb.F90 yomwavelet.F90 namelist/namvar.h obs_preproc/inifger.F90
op_obs/bgobs.F90 parallel/commjbbal.F90 commjbdat.F90 dot_product_ctlvec.F90
gathereigmd.F90 gathergpf.F90 gathergpf_wavelet.F90 setup/su0yoma.F90
su0yomb.F90 sualdyn.F90 sudyn.F90 sulap.F90 sunhsi.F90 susc2b.F90 susi.F90
sutrans.F90 sinvect/chsymeig.F90 cun3.F90 nalan1.F90 nalan2.F90 opk.F90 opm.F90
suforce.F90 transform/transdir_wavelet.F90 transdir_waveletad.F90
transinv_wavelet.F90 transinv_waveletad.F90 utility/addbgs.F90 dealges.F90
```

deallo.F90 dealspa.F90 modeltojb.F90 modeltojbad.F90 prt_ctlvec_max.F90
random_ctlvec.F90 sbsbgs.F90 sualspa1.F90 sualspajb.F90
write_wavelet_initcv_grib.F90 var/adtest.F90 balvert.F90 balvertad.F90
balverti.F90 balvertiad.F90 bgevecs.F90 bgvecs.F90 cain.F90 cainad.F90
cainin.F90 caininad.F90 chavarin.F90 chavarinad.F90 cvar2.F90 cvar2ad.F90
cvar2in.F90 cvar2inad.F90 cvar3.F90 cvar3ad.F90 cvar3in.F90 cvar3inad.F90
cvarbc.F90 cvarbcad.F90 cvarbcin.F90 cvargpad.F90 cvargptl.F90 cvaru2ad.F90
cvaru2i.F90 cvaru2iad.F90 cvtest.F90 djbdy.F90 djcdy.F90 estsig.F90 estsiga.F90
evjq.F90 fltbgcalc.F90 fltbgvarens.F90 getmini.F90 getmini2.F90 jbchvar.F90
jbchvarad.F90 jbchvari.F90 jbchvariad.F90 jbtomodel.F90 jbtomodelad.F90
jbvcor_wavelet.F90 jbvcor_waveletad.F90 jbvcor_waveletin.F90
jbvcor_waveletinad.F90 jbvcorg.F90 jgcor.F90 jgcorad.F90 jgcori.F90 jgcoriad.F90
jghcor.F90 jghcori.F90 jgnr.F90 jgnrad.F90 jgnri.F90 jgnriad.F90 jgnrs.F90
jgnrsi.F90 jgvcor.F90 litest.F90 objtrunc.F90 pregprh.F90 preppcm.F90
rdfpinc.F90 readvec.F90 rokfcovar.F90 scalefe.F90 scaljgg.F90 scaljgs.F90
sqrtb.F90 sqrtbad.F90 sqrtbin.F90 sqrtbinad.F90 sqrtfe.F90 sualctv.F90
sualges.F90 suallr.F90 suecges.F90 suinfce.F90 sujb.F90 sujbbal.F90
sujbchvar.F90 sujbcor.F90 sujbcosu.F90 sujbcov.F90 sujbcovnoise.F90
sujbcovsignal.F90 sujbdat.F90 sujbgptomat.F90 sujbstd.F90 sujbtest.F90
sujbvarens.F90 sujbwavallo.F90 sujbwavalls.F90 sujbwavelet.F90 sujbwavelet0.F90
sujbwavgen.F90 sujbwavstats.F90 sujbwavtrans.F90 sujbwavvc.F90 sujbwavwri.F90
sumdfce.F90 suprffce.F90 suscal.F90 susepfce.F90 sushfce.F90 suskf.F90 suvar.F90
suvazx.F90 symtransin.F90 tlprop.F90 tltest.F90 troplev.F90 vec2gp.F90
vec2gpfe.F90 wavxform.F90 writesd.F90 writestd.F90 xformev.F90

Files deleted(IFS):

namelist/namjbcodes.h namjg.h module/yomfceb.F90

Deborah Salmond - das_CY37R2_cleaning

Remove coding norm violations

Files created(IFS):

climate/read_cmip5ghg.F90

module/reglatlon_field_mix.F90 yoecmip5.F90

phys_ec/radozv.F90 suecozv.F90

Files modified(IFS):

climate/updrgas.F90

fullpos/vpos.F90

module/surface_fields_mix.F90 yoeaerc.F90 yoerad.F90 yomdphy.F90 yomlun.F90
yomphyds.F90

namelist/naerad.h namdphy.h namphyds.h

phys_dmn/surdi15.F90

phys_ec/radact.F90 raddrv.F90 radintg.F90 su_aerw.F90 su_ghgclim.F90 suecaec.F90

phys_radi/suecrad.F90 suecso4.F90

pp_obs/pos.F90

setup/su_surf_flds.F90 sudim1.F90

utility/updtim.F90

Files deleted(IFS):

phys_radi/su_so4_A1B2000.F90 su_so4_A1B2010.F90 su_so4_A1B2020.F90 su_so4_A1B2030.F90 su_so4_A1B2040.F90 su_so4_A1B2050.F90 su_so4_A1B2060.F90 su_so4_A1B2070.F90 su_so4_A1B2080.F90 su_so4_A1B2090.F90 su_so4_A1B2100.F90 su_so4_obs1920.F90 su_so4_obs1930.F90 su_so4_obs1940.F90 su_so4_obs1950.F90 su_so4_obs1960.F90 su_so4_obs1970.F90 su_so4_obs1980.F90 su_so4_obs1990.F90 suecso4his.F90

Files modified(IFS):

adiab/cpg_end_ad.F90 cpg_end_tl.F90 gptf1.F90 gptf1ad.F90 gptf1pc.F90 gptf2.F90 gptf2ad.F90 gptf2pc.F90 spcimpfinit.F90 spcimpfinitad.F90 spcimpfpost.F90 spcimpfpostad.F90 spcimpfsolve.F90 spcimpfsolvead.F90 spnhsi.F90 spnhsi_geogw.F90

c9xx/relnew.F90

control/cfcsens2obs.F90 cgr1.F90 cnt4.F90 cnt4ad.F90 cnt4tl.F90 cprep1.F90 sim4d.F90 stepo.F90

dia/preset_grib_template.F90 sualtdh.F90 sumddh.F90 wrmlpp.F90 wrmlppg.F90 wrmlppl.F90 wrmlpplg.F90 wrmoderr.F90

fullpos/rdecclimo.F90 sufpd.F90 wrmlfp.F90

module/aeolus_l2bp_wrapper_mod.F90 control_vectors_comm_mod.F90 disgrid_mod.F90 diwrgrid_mod.F90 parfpos.F90 qadock.F90 qadore.F90 qaeteo.F90 traj_main_mod.F90 varbc_airep.F90 varbc_allsky.F90 varbc_eval.F90 varbc_gbrad.F90 varbc_pred.F90 varbc_rad.F90 varbc_setup.F90 varbc_table.F90 varbc_tcwv.F90 varbc_to3.F90 yemwavelet.F90 yoelw.F90 yoesw.F90 yomcmemtypes.F90 yomcoctp.F90 yomectab.F90 yomjq.F90 yommodel_error.F90 yomnud.F90 yomrstbias.F90 yomrstrhbias.F90 yomspjb.F90 yomtraj.F90 yomvareps.F90

obs_preproc/limb_plane.F90 new_thinn_rad_reflec.F90 new_thinn_radar.F90 ngenada.F90 pre_thinn_rad_reflec.F90 pre_thinn_radar.F90 sufger.F90 suobscor.F90 tempinmf.F90

onedvar/onedvar_obsop_gr.F90 onedvar_obsop_tl.F90

op_obs/amv_get_preds.F90 gpscalc_alpharkm2.F90 gpscalc_alpharkm2tl.F90 hoptl.F90 inv_refl1dstat.F90 reflsim.F90 reflsim_2dop.F90

parallel/diwrgrid.F90 diwrgrid_surf_ext.F90 read_spec_grib.F90 trmtos_spec.F90 trstom_spec.F90 write_spec_grib.F90

phys_ec/callpar.F90 cuascn2tl.F90 cuascntl.F90 cucallnad.F90 cucallntl.F90 cumastrnad.F90 cumastrntl.F90 phys_ad.F90 phys_tl.F90 restore_surftstp.F90 restore_vdfout.F90 store_surftstp.F90 store_vdfout.F90 suclopn.F90 suphec.F90 vdfdifh.F90 vdfdifm.F90 vdfincr.F90 wvcouple.F90 wvxf2gb.F90

phys_radi/rrtm_rtrn1a_140gp.F90 sulw.F90 sulwn.F90 suswn.F90 uvflxa.F90

pp_obs/ppobsn.F90

setup/suarg.F90 suinimoderr.F90 sump.F90 suvareps.F90 suvert.F90 suvsplip.F90

sinvect/lcztoald.F90 lcztoifs.F90 sptrlcz.F90

transform/grid2spec.F90 grid2specad.F90 spec2grid.F90 spec2gridad.F90

utility/add5to3.F90 copy_spa2spec.F90 copy_spec2spa.F90 dealctv.F90 dealspa.F90 model2moderr.F90 modeltojb.F90 modeltojbad.F90 prt_ctlvec_max.F90 prt_ctlvec_norms.F90 prtjo.F90 random_ctlvec.F90 rdmoderr.F90 read_grid_grib.F90 reset_accfie_vareps.F90 save_merr_tend.F90 save_test4dinc.F90 savmoderr.F90 sbs5to3.F90 setimzero.F90 spec2state.F90 spec_concat.F90 spec_imzero.F90 spec_split.F90 state2spec.F90 state2specad.F90 sualspajb.F90 write_grid_grib.F90

var/add_modbias_ad.F90 add_modbias_tl.F90 add_moderr_ad.F90 add_moderr_tl.F90 adtest.F90 balvert.F90 balvertad.F90 balverti.F90 balvertiad.F90 bgvecs.F90 cain.F90 cainad.F90 cainin.F90 caininad.F90 cosjr.F90 cvar2.F90 cvar2ad.F90 cvar2in.F90 cvar2inad.F90 cvar3.F90 cvar3ad.F90 cvar3in.F90 cvar3inad.F90 cvtest.F90 djbdy.F90 evjq.F90 fltbgcalc.F90

getmini2.F90 jbtomodel.F90 jbtomodelad.F90 jgcor.F90 jgcorad.F90 jgcori.F90 jgcoriad.F90 jghcos.F90 jghcosad.F90 jghcosi.F90 jghcosiad.F90 jgnrs.F90 jgnrsi.F90 jqhcor.F90 jqhcorin.F90 jqvcor.F90 litest.F90 objtrunc.F90 rdfpinc.F90 savmini2.F90 sqrtb.F90 sqrtbad.F90 sqrtbin.F90 sqrtbinad.F90 sqrtq.F90 sqrtqad.F90 sqrtqin.F90 sqrtqinad.F90 sujbcovsignal.F90 sujbtest.F90 sujbvarens.F90 sujbwavgen.F90 sujq.F90 sumoderr.F90 suscalmerr.F90 symtransin.F90 tlprop.F90 tltest.F90 upspec.F90 weak_constraint.F90 weak_constraint_ad.F90 weak_constraint_tl.F90 writestd.F90

Files modified(IFSAUX):

module/local_trafos.F90

Files modified(SATRAD):

cmem/cmem_main.F90 cmem_setup.F90 rdcmemifs.F90
interface/rdcmemifs.h
programs/reo3_prescreen.F90

Files deleted(IFS):

module/yoeclop.F90
phys_ec/suclop.F90

Files deleted(SATRAD):

programs/bufr_resat_thin.F90

Deborah Salmond - das_CY37R2_yomcoctp

Make constants in YOMCOCTP PARAMETERS

Files created(IFS):

setup/cmoctmap_inv.F90

Files modified(IFS):

module/yomcoctp.F90
obs_preproc/defrun.F90 sudimo.F90
setup/cmoctmap.F90 su_events.F90 suoaf.F90
var/sualcos.F90

Files modified(ODB):

cma2odb/init_common.F90 obsproc_init.F90
pandor/extrtovs/extr_init_1c.F90

Files modified(SSA):

util/setcomssa.F90

Files deleted(IFS):

setup/sucmoctp.F90

Tomas Wilhelmsson - nat_CY37R2_oops and nat_CY37R3_oops

Preparation for OOPS

Files modified(IFS):

adiab/call_sl.F90 call_sl_tl.F90 cpg.F90 cpg5_gp.F90 cpg_end.F90 cpg_gp.F90 cpg_gp_ad.F90 cpg_gp_tl.F90 cpgad.F90 cpgtl.F90 lapinea.F90 lapineb.F90 lapinebad.F90 lapinebtl.F90 larcinb.F90 larcinbad.F90 larcinbtl.F90 specrt.F90 control/cdsta.F90 cnt0.F90 gp_model.F90 gp_model_ad.F90 gp_model_tl.F90 reresf.F90 restart_cnt3.F90 scan2m.F90 scan2mad.F90 scan2mtl.F90 dia/cpdysldia.F90 fullpos/hpos.F90 specfita.F90 vpos.F90 module/gmv_subs_mod.F90 surface_fields_mix.F90 traj_physics_mod.F90 yom_ygfl.F90 yomdim.F90 yomgfl.F90 yomgmv.F90 op_obs/ghg_ak_ad.F90 ghg_ak_op.F90 grg_ak_ad.F90 grg_ak_op.F90 grg_ak_tl.F90 hop.F90 hopad.F90 hoptl.F90 mopitt_ak_ad.F90 mopitt_ak_op.F90 mopitt_ak_tl.F90 nox2no2.F90 nox2no2ad.F90 nox2no2tl.F90 phys_dmn/accvud.F90 acdifus.F90 acmixelen.F90 mf_physad.F90 mf_phystl.F90 phys_ec/ec_phys_drv.F90 gems_init.F90 raddrv.F90 pp_obs/ppobsa.F90 ppobsaad.F90 ppobsatl.F90 prism/couplo4_definitions.F90 couplo4_grg_input.F90 couplo4_grg_stats.F90 setup/sudim2.F90 sump.F90 susc2b.F90 utility/dealxmo.F90 prtgom.F90 wrresf.F90 var/deallt.F90 suallt.F90 symtransin.F90

Files deleted(IFS):

module/yomgmv_ptrs.F90 yomdimt.F90

Files modified(IFS):

control/cnt4.F90 cprep4.F90 cva2.F90 forecast_error.F90 dia/wrspec.F90 fullpos/prespfpos.F90 module/yomsp.F90 setup/su0yomb.F90 sudim2.F90 sugem1a.F90 sump.F90 sutrans.F90 utility/dealmod.F90 dealspa.F90 rdspec.F90 sbsfgs.F90 sualspa.F90 var/deallt.F90 suallt.F90

Tomas Wilhelmsson and Karim Yessad - nat_CY37R3_clean

Removal of unnecessary routines

Files modified(IFS):

control/cnt1.F90 module/yoeaersrc.F90 yommwave.F90 yomsekf.F90 yomtraj.F90 mwave/mwave_setup.F90 namelist/nammwave.h obs_preproc/airepin.F90 ascatin.F90 decis.F90 dribuin.F90 dwlin.F90 errstat.F90 ersin.F90 ewprfin.F90 lndsyin.F90 metarin.F90 nscatin.F90 oscatin.F90 paobin.F90 pgpsin.F90 pilotin.F90 qscatin.F90 reo3sin.F90 satamin.F90 satobin.F90 shipin.F90 suobs.F90 tempin.F90 sekf/susekf.F90 setup/suoaf.F90 utility/dealsc2.F90

Files deleted(IFS):

module/yomssmi.F90 module/yomfltxt.F90 namelist/namssmi.h obs_error/finoerr.F90 obs_preproc/inissmip.F90 misce.F90 ssmimas.F90 suobsc1.F90 obs_error/obsperr.F90 setup/sufltxt.F90

John Hague - ibj_CY37R1_cobsall and ibj_CY37R1_cobsallxx

Observation Interpolation Encapsulation

COBSALL/TL/AD replaces calls to several within SCAN2M/TL/AD and enables a single routine to be called for Observation Interpolation in an OOPS environment.

Files modified(IFS):

control/scan2m.F90 scan2mad.F90 scan2mtl.F90

Files created(IFS):
`op_obs/cobsall.F90 cobsallad.F90 cobsalltl.F90`

John Hague - ibj_CY37R1_mpiprof

MPI tracing

This Branch enables mpi tracing if the LMPIPROF option is set to ON in the "ccmpile options" screen of prepIFS.

ifsvar is modified to save the 4dvar mpi profiles in **$WDIR/MPIPROF_mode_uptraj**.

In addition, gstats_barrier is inserted into ODBMP_global (GEN_GLOPER in fodbmp.h) to produce more accurate communication times.

Also, mpl_alltoallv_mod is modified so that if LUSEHLMPI set to FALSE, the MPI SEND/RECV/WAIT sequence will be used, rather than MPI_ALLTOALLV call. This makes the mpi profiling statistics easier to understand and does not affect performance. Currently LUSEHLMPI is "hardwired" to TRUE in mpl_init_mod.

Files modified(IFS):
`utility/gstats_label_ifs.F90`

Files modified(IFSAUX):
`module/mpl_alltoallv_mod.F90`

Files modified(ODB):
`include/fodbmp.h`

Files modified(SCRIPTS):
`gen/ifsvar mkabs_an mkabs_fc run_parallel`

John Hague - ibj_CY37R3_globs

YOMGLOBS into a derived type

YOMGLOBS is changed into a derived type which is passed to Observation Interpolation (COBSALL), and then passed down as in the arguement lists to routines requiring to use it (rather than using a module).

Files modified(IFS):
`control/cnt4.F90 cnt4ad.F90 cnt4tl.F90 scan2m.F90 scan2mad.F90 scan2mtl.F90`
`module/yomglobs.F90 obs_preproc/mkglobstab.F90 rd_obs_boxes.F90`
`op_obs/cobsall.F90 cobsallad.F90 cobsalltl.F90 cobslag.F90 cobslagad.F90`
`cobslagtl.F90 mpobseq.F90 mpobseq_pack.F90 mpobseqad.F90 mpobseqad_unpck.F90`
`mpobseqtl.F90 mpobseqtl_pack.F90 obshor.F90 obshorad.F90 obshortl.F90`
`post_obshor.F90 post_obshortl.F90 pre_obshorad.F90 phys_ec/callpar.F90`
`callparad.F90 callpartl.F90 utility/deallo.F90 var/sualctv.F90`

John Hague - ibj_CY37R3_gom5

Encapsulation of GOM arrays - for OOPS

All GOM arrays are encapsulated in the derived type TYPE_GOMALL defined in the module GOMS_MIX. All data in this module is held in the Derived Type instance YGOM.

Routines downstream of Observation Interpolation (SCAN2Mxx) and the Observation Operator (TASKOBxx) have the Derived Type pointer (YDGOM) passed down through the calling chain. They USE the module GOMS_MIX only for the Derived Type definition TYPE_GOMALL.

Routines SCAN2Mxx, TASKOBxx and upstream routines access the instance of the Derived Type (YGOM) in the module GOMS_MIX.

Files modified(IFS):

```
canari/calver.F90 cancer.F90 control/scan2m.F90 scan2mad.F90 scan2mtl.F90
module/goms_mix.F90 module_obb1_mix.F90 obs_preproc/black.F90 defrun.F90
fgwnd.F90 gefger.F90 prech.F90 repra.F90 sugoms.F90 suobsaddr.F90
op_obs/amv_get_preds.F90 bgobs.F90 cobs.F90 cobsad.F90 cobsall.F90 cobsallad.F90
cobsalltl.F90 cobslag.F90 cobslagad.F90 cobslagtl.F90 cobstl.F90 hop.F90
hop_rad.F90 hop_rad_ml.F90 hopad.F90 hoptl.F90 hradp.F90 hradp_ml.F90
hradp_ml_ad.F90 hradp_ml_tl.F90 hradpad.F90 hradptl.F90 hretr.F90
hretr_aeolus.F90 mpobseq.F90 mpobseq_pack.F90 mpobseqad.F90 mpobseqad_unpck.F90
mpobseqtl.F90 mpobseqtl_pack.F90 obshor.F90 obshorad.F90 obshortl.F90
post_obshor.F90 post_obshortl.F90 pre_obshorad.F90 preint.F90 preint2d.F90
preint2dad.F90 preint2dtl.F90 preintad.F90 preintr.F90 preintrad.F90
preintrtl.F90 preints.F90 preintsad.F90 preintstl.F90 preinttl.F90
rtl_hop_1d.F90 rtl_hop_1d_ad.F90 rtl_hop_1d_tl.F90 rtl_hop_2d.F90
rtl_hop_2d_ad.F90 rtl_hop_2d_tl.F90 slintad.F90 phys_dmn/mts_phys.F90
phys_ec/callpar.F90 callparad.F90 callpartl.F90 pp_obs/ppobsa.F90 ppobsaad.F90
ppobsac.F90 ppobsacad.F90 ppobsactl.F90 ppobsas.F90 ppobsatl.F90 ppobsaz.F90
ppobsn.F90 setup/sudim1.F90 utility/prtgom.F90 var/sumoderr.F90 taskob.F90
taskobad.F90 taskobtl.F90 vec2gp.F90
```

John Hague - ibj_CY37R1_jio

JIO Monitoring

I/O tracing is enabled. run_parallel preloads /usr/local/lib/libjio.a (if it exists, and LJIO=true). master.F90 writes a timing record to enable post-run analysis to take account of timing differences on different nodes.

Files modified(IFS):

```
programs/master.F90
```

Files modified(SCRIPTS):

```
gen/run_parallel
```

John Hague and Mats Hamrud - nar_CY37R3_mats_john

Setup MKGLOBSTAB for OOPS

Split YOMECTAB and move setup of TOVS Control Variable out of MKGLOBSTAB

Richard Engelin - stj_CY37R2_MACC_clean

Cleaning of MACC

Files modified(IFS):

`module/grg_photolysis_mix.F90 yoeaeratm.F90 yoeaerop.F90 yoeaersnk.F90 yoeaersrc.F90`

`namelist/naeaer.h`

`op_obs/aer_opt_prop.F90 aer_opt_prop_ad.F90 aer_opt_prop_tl.F90 aer_refl_ad.F90 aer_refl_op.F90 aer_refl_tl.F90 aod_ad.F90 aod_op.F90 aod_tl.F90 bgobs.F90 ch4_tcmr.F90 ch4_tcmr_ad.F90 ch4_tcmr_tl.F90 co2_tcmr.F90 co2_tcmr_ad.F90 co2_tcmr_tl.F90 csalbr_gems.F90 discom_gems.F90 discom_gems_ad.F90 discom_gems_tl.F90 gauss_gems.F90 ghg_ak_ad.F90 ghg_ak_op.F90 ghg_ak_tl.F90 grg_ak_ad.F90 grg_ak_op.F90 grg_ak_tl.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90 iso_gems.F90 iso_gems_ad.F90 iso_gems_tl.F90 kernel_pbp.F90 kernel_pbp_ad.F90 kernel_pbp_tl.F90 kernel_ppsl.F90 mopitt_ak_ad.F90 mopitt_ak_op.F90 mopitt_ak_tl.F90 nox2no2.F90 nox2no2ad.F90 nox2no2tl.F90 os_gems.F90 os_gems_ad.F90 os_gems_tl.F90 pre_calc.F90 preint.F90 preintad.F90 preinttl.F90 radtr.F90 radtr_ml.F90 radtr_ml_ad.F90 radtr_ml_tl.F90 radtrad.F90 radtrk.F90 radtrtl.F90 rt6s_gems.F90 rt6s_gems_ad.F90 rt6s_gems_tl.F90 scatra_gems.F90 scatra_gems_ad.F90 scatra_gems_tl.F90 trunca_gems.F90 trunca_gems_ad.F90 trunca_gems_tl.F90 vertdisc.F90 vertdisc_ad.F90 vertdisc_tl.F90`

`phys_ec/aer_sedimnt.F90 aer_src.F90 su_aerop.F90 su_aerp.F90 su_aerw.F90`

`phys_radi/suecrad.F90`

`pp_obs/ppobsa.F90 ppobsaad.F90 ppobsatl.F90`

Jean-Jacques Morcrette - pam_CY37R2_RadComments

Comments for RRTM and SRTM modules

Files modified(IFS):

`module/parrrtm.F90 parsrtm.F90 yoe_mcica.F90 yoe_uvrad.F90`

`yoerrtaM.F90 (M = 1 to 16) yoesrtaN.F90 (N = 16 to 29)`

Anne Fouilloux - stf_CY37R1_MARS_cleaning_SATOB_ATOVS_ALLSKY

ODB cleaning for mars archiving: radiances (including allsky) and satob

Alan Geer - stg_CY37R1_BUFR2ODB_SATOB_ATOVS_ALLSKY

- The modsurf table (tsfc, windspeed10m, albedo, orography, lsm, seaice) is now filled in hretr for all non-2D operators
- ”biasctrl” (the FG bias correction) is now filled universally in hop.F90 (ideally Anne will change the name to ”biascorr_fg”)
- All-sky now uses ”tbclear” (rather than the obsolete ”obs_error”) to store FG clear-sky brightness temperatures.

- All-sky uses ”emis_fg” to store the emissivity
- Useless calls to varbc in hretr have been removed
- All Harris and Kelly code in rad1cobe.F90 has been removed

Cristina Lupu - stc_CY37R1_clean_ECMA_GEOS

For geostationary radiances a new column called CSR_PCLEAR was added in ODB. This column contains the percentage of clear pixels for geostationary CSR (until now stocked in PRESS_RL). In the blacklist, PRESS_RL has been replaced by CSR_PCLEAR.

Niels Bormann - str_CY37R1_BUFR2ODB_SATOB_ATOVS

SATOBS:

- QI_1 is now QI_fc
- QI_3 is now QI_nofc
- QI_2 is now RFF
- Removed the weight_* array and the corresponding code in the IFS

ATOVS:

- Totally revamped the columns in surfemiss_body. They are now called: emis_rtin pk9real, // Input surface emissivity for RTTOV (can be outside 0-1 to prompt internal calculations) emis_atlas pk9real, // Surface emissivity estimate from an atlas emis_retr pk9real, // Surface emissivity retrieved from observations and FG emis_fg pk9real, // Surface emissivity used in FG simulations (pre-set or RTTOV-internal) skintemp_retr pk9real,// Skin temperature retrieved from observations, emissivity atlas and FG (should be moved to radiance_body) These columns should all go into the new radiance_body table.
- tausfc@body (to be moved to radiance_body) is now filled during the screening in HOP for all clear-sky radiances; mwatmo_trans@surfemiss_body has been removed as it served the same purpose.
- emis_fg@surfemiss_body is now filled with the FG-emissivity used internally by RTTOV for all clear-sky radiances during the screening in HOP
- tskin@modsurf (new variable) is filled with the model skin temperature for all clear-sky radiances in HRETR (note that for the dynamic skin temperature option this may be different from what is in the other skintemp variable.)
- emis_rtin@surfemiss_body now contains the input value for the emissivity array for RTTOV (it can be 0 or larger than 1 to prompt internal RTTOV calculations) - ie it’s what used to be stored in the hijacked pers_error@errstat.

Done on top of all these changes:

- removed surfemiss and surfemiss_body tables; added radiance_body table. Moved ODB columns from surfemiss_body to radiance_body
- some more cleaning in the body/hdr tables, etc.
- in the blacklist language I added fail(USE_EMISKF_ONLY) (and changed the blacklist accordingly) and added an ODB bitfield called use_emiskf_only in status_t and removed WHITELIST from the blacklist language. whitelisting shall not be done via blacklist (it's not use and never worked properly...) We will use the known list of reportypes (http://datasvc.ecmwf.int/datasvc/t/reportype) and reject any unknown reportypes (reportype@hdr=NULL) in the bufr2odb creation.
- update archiving of ODBs in MARS: archive MONDB (ODB-2 format) and ECMA in MARS
- removed creation of MONDB in format ODB-1 (we have MONDB ODB-2 only)
- removed creation of small ODBs in format ODB-1. Done in ODB-2 only.
- removed revmatchup i.e. do not save CCMA in ecfs (even in operation); everything is in ECMA (and ODB archiving in MARS is done from ECMA only).
- removed final and initial from update tables; instead added actual_depar in body table (to store the actual departure during the minimization)

Files created(ODB):

```
ddl.CCMA/obsdist_hdr2radiance_body.sql obsdist_radiance_body.sql
satbody_atovs.sql
ddl.ECMA/obsdist_hdr2radiance_body.sql obsdist_radiance_body.sql
obsort_hdr2radiance_body.sql obsort_radiance_body.sql satbody_atovs.sql
ddl/obsdist_hdr2radiance_body.sql obsdist_radiance_body.sql obsort_hdr2radiance_-
body.sql obsort_radiance_body.sql satbody_atovs.sql
```

Files created(SCRIPTS):

```
gen/mondb_geos.sql mondb_groupid=35.sql mondb_groupid=36.sql mondb_hirs.sql ofb_-
airs.sql ofb_allsky.sql ofb_gbrad.sql ofb_generic.sql ofb_geos.sql ofb_groupid=1.sql
ofb_groupid=10.sql ofb_groupid=11.sql ofb_groupid=12.sql ofb_groupid=13.sql ofb_-
groupid=14.sql ofb_groupid=15.sql ofb_groupid=16.sql ofb_groupid=17.sql ofb_groupid=18.sql
ofb_groupid=19.sql ofb_groupid=2.sql ofb_groupid=20.sql ofb_groupid=21.sql ofb_groupid=22.sql
ofb_groupid=23.sql ofb_groupid=24.sql ofb_groupid=25.sql ofb_groupid=26.sql ofb_-
groupid=27.sql ofb_groupid=28.sql ofb_groupid=29.sql ofb_groupid=3.sql ofb_groupid=30.sql
ofb_groupid=31.sql ofb_groupid=32.sql ofb_groupid=33.sql ofb_groupid=34.sql ofb_-
groupid=35.sql ofb_groupid=36.sql ofb_groupid=4.sql ofb_groupid=5.sql ofb_groupid=6.sql
ofb_groupid=7.sql ofb_groupid=8.sql ofb_groupid=9.sql ofb_hirs.sql ofb_iasi.sql ofb_-
iras.sql ofb_meris.sql ofb_reo3.sql ofb_satob.sql ofb_smos.sql ofb_surfconv.sql ofb_-
tovs.sql
```

Files modified(BL):

```
include/defs.h fail.h
programs/bl_old2new.c
```

Files modified(IFS):

```
common/yomdb_defs.h yomdb_vars.h
function/fcobs.h
```

module/parcma.F90 yomvrtl.F90

mwave/mwave_get_ad.F90 mwave_get_tl.F90 mwave_put.F90

namelist/namvrtl.h

obs_preproc/black.F90 blinit.F90 pre_thinner.F90 prech.F90 satamin.F90 satobin.F90

op_obs/bgobs.F90 hdepart.F90 hjo.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90 hretr_aeolus.F90 meanuv_weights.F90 preintr.F90 preints.F90 rad1cemis.F90 rad1cobe.F90

var/setqccma.F90 suvar.F90

Files modified(OBSTAT):

src/iniitemloc.F90

Files modified(ODB):

bufr2odb/bufr2odb_205.F90 bufr2odb_aeolus.F90 bufr2odb_aircraft.F90 bufr2odb_airs.F90 bufr2odb_amsre_1d.F90 bufr2odb_ascat.F90 bufr2odb_atovs.F90 bufr2odb_fy3.F90 bufr2odb_gch1.F90 bufr2odb_gch2.F90 bufr2odb_gch3.F90 bufr2odb_gch4.F90 bufr2odb_gch5.F90 bufr2odb_grad.F90 bufr2odb_iasi.F90 bufr2odb_iscat.F90 bufr2odb_meris.F90 bufr2odb_metar.F90 bufr2odb_modisaer.F90 bufr2odb_msg.F90 bufr2odb_mwri_1d.F90 bufr2odb_oscat.F90 bufr2odb_paob.F90 bufr2odb_pgps.F90 bufr2odb_qscat.F90 bufr2odb_radio.F90 bufr2odb_radio_lat_long.F90 bufr2odb_rain_rates.F90 bufr2odb_reo3.F90 bufr2odb_satem.F90 bufr2odb_satob.F90 bufr2odb_scat.F90 bufr2odb_smos.F90 bufr2odb_ssmi.F90 bufr2odb_ssmis_1d.F90 bufr2odb_synop.F90 bufr2odb_temp.F90 bufr2odb_tmi_1d.F90 bufr2odb_windprofiler.F90 bufr2odb_windsat.F90 get_varindex.F90

cma2odb/ctxinitdb.F90 distributedb.F90 getatdb.F90 getdb.F90 init_odb_tables.F90 initmdb.F90 makedesc.F90 map_reportype.F90 putatdb.F90 shuffledb.F90 xchangedatadb.F90 xchangedatadistdb.F90

ddl/PSBIAS.ddl aeolus.h allsky.h amv.sql amv2.sql black_robhdr_2.sql black_robody_4.sql black_satob.sql body.h cma.h discard_dep_1.sql discard_dep_2.sql emiskf_amsua.sql emiskf_amsub.sql emiskf_mhs.sql enkf.h fcq_robody_0.sql fcq_robody_1.sql fcq_robody_2.sql forecast_diagnostic.h global_enkf_1.sql global_enkf_10.sql global_enkf_100.sql global_enkf_15.sql global_enkf_2.sql global_enkf_20.sql global_enkf_25.sql global_enkf_3.sql global_enkf_30.sql global_enkf_35.sql global_enkf_4.sql global_enkf_40.sql global_enkf_45.sql global_enkf_5.sql global_enkf_50.sql global_enkf_55.sql global_enkf_60.sql global_enkf_65.sql global_enkf_70.sql global_enkf_75.sql global_enkf_80.sql global_enkf_85.sql global_enkf_90.sql global_enkf_95.sql hdr.h links_sat.sql modsurf.h new_thinn_robhdr_5.sql obsdist_gbrad.sql obsdist_gbrad_body.sql obsdist_hdr2allsky_body.sql obsdist_hdr2auxiliary_body.sql obsdist_hdr2gbrad_body.sql obsdist_hdr2radar_body.sql obsdist_hdr2reo3_body.sql obsdist_smos.sql obstat.sql obstat_fcdep.sql obstat_fcdep_gpsro.sql obstat_geos.sql obstat_gpsro.sql obstat_mwimg.sql obstat_radhure.sql obstat_radrefl.sql obstat_radwd.sql obstat_reo3.sql obstat_satob.sql obstat_scatt.sql obstat_smos.sql obstat_tovs.sql post_thinn_robhdr_5.sql pre_thinn_robhdr_5.sql pre_thinn_robody_2.sql pre_thinn_robody_9.sql prtdpst_robody.sql radiance.h robhdr_screen.sql robody.sql robody_mwave_get_ssmi.sql robody_mwave_put_ssmi.sql robody_screen.sql robody_tc.sql robody_traj.sql sat.h sat_satob.sql satbody_screen_atovs.sql sathdr_satob.sql sathdr_screen_atovs.sql sathdr_screen_satob.sql satob.h scatt.h smos.h ssmi1d.h type_definitions.h

module/varindex_module.F90

pandor/fcq/fcqodb_dribu.F90 fcq/fcqodb_pilot.F90 fcq/fcqodb_synop.F90
fcq/fcqodb_temp.F90 module/bator_ecritures_mod.F90

scripts/create_ioassign

Files modified(SCRIPTS):

build/Makefile.root.ifs

def/an.def

gen/archive_mondb archive_obsgroup convert_mondb convert_obsgroup
create_ioassign ifstraj ifsvar mondb.sql mondb_allsky.sql mondb_gpsro.sql
mondb_meris.sql mondb_sat.sql mondb_satob.sql mondb_tovs.sql obstat p4_mklib

sms_an/archive_mondb.sms archive_obsgroup.sms convert_mondb.sms convert_obsgroup.sms

Files deleted(IFS):

op_obs/incvfilt.F90

Files deleted(ODB):

ddl.CCMA/obsdist_hdr2surfemiss_body.sql obsdist_surfemiss.sql
obsdist_surfemiss_body.sql obsort_hdr2surfemiss_body.sql surfemiss.h

ddl.COUNTRYRSTRHBIAS/surfemiss.h

ddl.ECMA/obsdist_hdr2surfemiss_body.sql obsdist_surfemiss.sql
obsdist_surfemiss_body.sql obsort_hdr2surfemiss_body.sql obsort_surfemiss.sql
obsort_surfemiss_body.sql surfemiss.h update_links_surfemiss.sql

ddl.RSTBIAS/surfemiss.h

ddl.SONDETYPERSTRHBIAS/surfemiss.h

ddl/obsdist_hdr2surfemiss_body.sql obsdist_surfemiss.sql
obsdist_surfemiss_body.sql obsort_hdr2surfemiss_body.sql obsort_surfemiss.sql
obsort_surfemiss_body.sql surfemiss.h update_links_surfemiss.sql

perl/robfilt.pl screening.pl

Files deleted(SCRIPTS):

gen/AIRS.ddl ALLSKY.ddl AMSRE.ddl AMSUA.ddl AMSUB.ddl CONV.ddl GEOS.ddl
GPSRO.ddl HIRS.ddl IASI.ddl IRAS.ddl MERIS.ddl MHS.ddl MONDB.ddl MWHS.ddl
MWRI.ddl MWTS.ddl NEXRAD.ddl ODBCMP.ddl REO3.ddl REO3AK.ddl SATOB.ddl SCATT.ddl
SMOS.ddl SSMI.ddl SSMIS.ddl SURFCONV.ddl TMI.ddl TOVS.ddl VTPR1.ddl VTPR2.ddl
WINDSAT.ddl

sms_an/mondb_ccma.sms mondb_prepare.sms odb_mondb.sms

Anne Fouilloux - stf_CY37R1_MARS_cleaning_v4

ODB cleaning (mainly for reo3, conventional and gpsro)

- added gnssro, gnssro_body tables in ODB and moved some columns from hdr/body to these new tables
- added conv and conv_body tables and moved ODB columns accordingly
- renamed reo3 and reo3ak to resak and resat_averaging_kernel ODB tables (resat stands for retrieval of satellite and ak for averaging kernels). Also renamed these groups reo3–¿ resat and reo3ak to resat_ak (changed done in all scripts; changed to be done in prepIFS too in ODB and CMA variables).
- renamed iasi table to collocated_imager_information

- removed aux[] array in body table.
- removed ifdef CCMA/EMCA in odb/ddl/*.h. CCMA and ECMA have now the same schema file.
- removed revmatchup
- added two new columns datum_tbflag_hires and datum_status_hires: they are not used yet but the idea is to use these columns to avoid to copy the whole CCMA (we currently create a tarball and save it) between an ifstraj and ifsmin. These would allow to restart a task without saving CCMAs. TO BE DONE IN A NEXT CYCLE.
- update scripts to archive ODB in MARS (no MONDB or CCMA saved in ECFS). ODB-2 are created from ECMAs for both stream MFB and OFB.

For Meteo-France: csr_pclear, csr_pcloudy, surfemiss@body used by GPS relay in hop.F90 ; commented all this part as it was anyway wrong(csr_pclear and csr_pcloudy were removed from CY36R4 as part of the ODB cleaning... surfemiss is used by radiance only and is in radiance_body (was wrongly use to save other information; see hop.F90 for more info).

Files created(ODB):

```
ddl.CCMA/ak_resat_averaging_kernel.sql collocated_imager_information.h conv.h
conv_hdr.sql errstat.h fixresatlen.sql get_soe_resat.sql getsatid_resat.sql
hretr_canari_satbody.sql limb.h mkglobstab_gpsro.sql
obsdist_hdr2resat_averaging_kernel.sql obsdist_resat.sql
obsdist_resat_averaging_kernel.sql radar_station.h sat_gpsro.sql
satbody_gpsro.sql update.h
ddl.COUNTRYRSTRHBIAS/collocated_imager_information.h conv.h errstat.h limb.h
radar_station.h update.h
ddl.ECMA/ak_resat_averaging_kernel.sql black_gpsro.sql black_robhdr_10.sql
black_robody_10.sql collocated_imager_information.h conv.h conv_hdr.sql
decis_convbody_1.sql decis_convbody_2.sql errstat.h fb_getresat.sql
fixresatlen.sql get_soe_resat.sql getsatid_resat.sql hretr_canari_satbody.sql
limb.h mkglobstab_gpsro.sql nak_resat_averaging_kernel.sql
obsdist_hdr2resat_averaging_kernel.sql obsdist_resat.sql
obsdist_resat_averaging_kernel.sql obsort_collocated_imager_information.sql
obsort_conv.sql obsort_conv_body.sql obsort_gnssro.sql obsort_gnssro_body.sql
obsort_hdr2conv_body.sql obsort_hdr2gnssro_body.sql obsort_resat.sql
obsort_resat_averaging_kernel.sql obstat_conv.sql obstat_resat.sql
radar_station.h robhdr_screen_conv.sql sat_gpsro.sql satbody_gpsro.sql
sathdr_screen_gpsro.sql sathdr_screen_resat.sql update.h
ddl.MTOCOMP/errstat.h limb.h radar_station.h update.h
ddl.RSTBIAS/collocated_imager_information.h conv.h errstat.h limb.h
radar_station.h update.h
ddl.SONDETYPERSTRHBIAS/collocated_imager_information.h conv.h errstat.h limb.h
radar_station.h update.h
ddl/ak_resat_averaging_kernel.sql black_gpsro.sql black_robhdr_10.sql black_robody_-
10.sql collocated_imager_information.h conv.h conv_hdr.sql decis_convbody_1.sql decis_-
convbody_2.sql errstat.h fb_getresat.sql fb_gettypes_sat.sql fixresatlen.sql get_-
soe_resat.sql getsatid_resat.sql hop_canari_conv.sql hretr_canari_satbody.sql limb.h
mkglobstab_gpsro.sql nak_resat_averaging_kernel.sql obsdist_hdr2resat_averaging_-
kernel.sql obsdist_resat.sql obsdist_resat_averaging_kernel.sql obsort_collocated_-
imager_information.sql obsort_conv.sql obsort_conv_body.sql obsort_gnssro.sql obsort_-
```

gnssro_body.sql obsort_hdr2conv_body.sql obsort_hdr2gnssro_body.sql obsort_hdr2resat_-
averaging_kernel.sql obsort_resat.sql obsort_resat_averaging_kernel.sql obstat_conv.sql
obstat_resat.sql radar_station.h robhdr_screen_conv.sql sat_gpsro.sql satbody_gpsro.sql
sathdr_screen_gpsro.sql sathdr_screen_resat.sql update.h

Files created(SCRIPTS):

gen/mondb_gbrad.sql ofb_airs.sql ofb_allsky.sql ofb_gbrad.sql ofb_generic.sql
ofb_groupid=1.sql ofb_groupid=10.sql ofb_groupid=11.sql ofb_groupid=12.sql
ofb_groupid=13.sql ofb_groupid=14.sql ofb_groupid=15.sql ofb_groupid=16.sql
ofb_groupid=17.sql ofb_groupid=18.sql ofb_groupid=19.sql ofb_groupid=2.sql
ofb_groupid=20.sql ofb_groupid=21.sql ofb_groupid=22.sql ofb_groupid=23.sql
ofb_groupid=24.sql ofb_groupid=25.sql ofb_groupid=26.sql ofb_groupid=27.sql
ofb_groupid=28.sql ofb_groupid=29.sql ofb_groupid=3.sql ofb_groupid=30.sql
ofb_groupid=31.sql ofb_groupid=32.sql ofb_groupid=33.sql ofb_groupid=34.sql
ofb_groupid=4.sql ofb_groupid=5.sql ofb_groupid=6.sql ofb_groupid=7.sql
ofb_groupid=8.sql ofb_groupid=9.sql ofb_hirs.sql ofb_iasi.sql ofb_iras.sql
ofb_meris.sql ofb_reo3.sql ofb_satob.sql ofb_smos.sql ofb_surfconv.sql
ofb_tovs.sql

sms_an/archive_nexrad.sms archive_resat.sms archive_resatak.sms b2o_resat.sms
b2o_resatak.sms convert_nexrad.sms convert_resat.sms convert_resatak.sms
ec2o_resat.sms ec2o_resatak.sms o2b_resat.sms o2b_resatak.sms
obstat_archive_resat.sms obstat_archive_resatak.sms obstat_resat.sms
obstat_resatak.sms

sms_era/obtime_resat.sms obtime_resatak.sms

Files modified(AEOLUS):

external/aeolus_l2bp_odb_transfers.F90

Files modified(IFS):

common/yomdb_defs.h yomdb_vars.h

module/aeolus_getamd_mod.F90 aeolus_l2bp_wrapper_mod.F90 varbc_to3.F90
yomcoctp.F90 yomdb.F90

obs_preproc/addoer.F90 ascatsm_cdfmatch.F90 awprfin.F90 black.F90 blackhat.F90
blinit.F90 conventional_ob.F90 dribuin.F90 dwlin.F90 ewprfin.F90 fgchk.F90
fgwnd.F90 flgtst.F90 lndsyin.F90 metarin.F90 mkcmarpl.F90 mkglobstab.F90
new_thinn.F90 new_thinner.F90 new_thinner_no_sq.F90 obatabs.F90 obinssp.F90
ozone_ob.F90 pilotbe.F90 pilotin.F90 post_thinner.F90 pre_thinner.F90 prech.F90
readoba.F90 reo3sin.F90 repra.F90 repsel.F90 selec.F90 shipin.F90 suobarea.F90
suobs.F90 suobscor.F90 synopbe.F90 tempbe.F90 tempin.F90 tempinmf.F90

op_obs/aeolus_l2b_to_body.F90 exheiz2p.F90 gpsro_2dad.F90 gpsro_2dop.F90
gpsro_2dtl.F90 gpsro_ad.F90 gpsro_oberror.F90 gpsro_op.F90 gpsro_tl.F90
hinth.F90 hop.F90 hopad.F90 hoptl.F90 hretr.F90 rtl_hop_1d.F90 rtl_hop_1d_ad.F90
rtl_hop_1d_tl.F90 rtl_hop_2d.F90 rtl_hop_2d_ad.F90 rtl_hop_2d_tl.F90

setup/cmoctmap.F90 sucmoctp.F90

var/surad.F90 sureo3.F90

Files modified(OBSTAT):

data/dobstat dobstat_bufr dobstat_quick general.cfg

src/buxtract.F90 iniitemloc.F90 odbread.F90 outcoverage.F90 updsoft.F90 user_data_-
read.F90

Files modified(ODB):

bufr2odb/bufr2odb_205.F90 bufr2odb_aeolus.F90 bufr2odb_aircraft.F90
bufr2odb_airs.F90 bufr2odb_amsre_1d.F90 bufr2odb_ascat.F90 bufr2odb_atovs.F90
bufr2odb_fy3.F90 bufr2odb_gch1.F90 bufr2odb_gch2.F90 bufr2odb_gch3.F90
bufr2odb_gch4.F90 bufr2odb_gch5.F90 bufr2odb_grad.F90 bufr2odb_iasi.F90
bufr2odb_iscat.F90 bufr2odb_meris.F90 bufr2odb_metar.F90 bufr2odb_modisaer.F90
bufr2odb_msg.F90 bufr2odb_mwri_1d.F90 bufr2odb_oscat.F90 bufr2odb_paob.F90
bufr2odb_pgps.F90 bufr2odb_qscat.F90 bufr2odb_radio.F90
bufr2odb_radio_lat_long.F90 bufr2odb_rain_rates.F90 bufr2odb_reo3.F90
bufr2odb_satob.F90 bufr2odb_scat.F90 bufr2odb_smos.F90 bufr2odb_ssmi.F90
bufr2odb_ssmis_1d.F90 bufr2odb_synop.F90 bufr2odb_temp.F90 bufr2odb_tmi_1d.F90
bufr2odb_windprofiler.F90 bufr2odb_windsat.F90 get_odb2bufr_varindex.F90
get_varindex.F90 odb2bufr_dep_206.F90 odb2bufr_fos_206.F90 odb2bufr_qc_206.F90
cma2odb/buf2cmat_new.F90 ctxinitdb.F90 distributedb.F90 dotransf.F90
gather4poolmask.F90 getatdb.F90 getdb.F90 initmdb.F90 makedesc.F90
map_reportype.F90 putatdb.F90 shuffledb.F90 update_obsdb.F90 xchangedatadb.F90
xchangedatadistdb.F90
ddl/aeolus.h aeolus_auxmet_update_hdrflag.sql ascatsm_robody_1.sql
black_robhdr_1.sql black_robhdr_7.sql black_robhdr_8.sql black_robody_1.sql
black_robody_2.sql black_robody_3.sql black_robody_4.sql black_robody_5.sql
black_robody_6.sql black_robody_7.sql black_robody_8.sql black_robody_9.sql
body.h cma.h conventional_robhdr_1.sql conventional_robody_1.sql
decis_robhdr_1.sql decis_robhdr_2.sql decis_robody_1.sql decis_robody_2.sql
ecma_body_4_psbias.sql ecma_hdr_4_psbias.sql ecma_hdr_4_rstrhbias.sql enkf.h
fb_getatovs_pred.sql fb_getbody.sql fb_getbufr.sql fb_geterrstat.sql
fb_gethdr.sql fb_getsatob.sql fb_getscatt.sql fb_getscatt_body.sql
fb_gettypes.sql fb_getupdate_1.sql fb_getupdate_10.sql fb_getupdate_2.sql
fb_getupdate_3.sql fb_getupdate_4.sql fb_getupdate_5.sql fb_getupdate_6.sql
fb_getupdate_7.sql fb_getupdate_8.sql fb_getupdate_9.sql forecast_diagnostic.h
gather4poolmask.sql gather4poolmask_counts.sql getairepid.sql gpsro_2.sql hdr.h
hop_canari_robhdr.sql hretr_canari_robody.sql level1cgeos_robody_1.sql
mkglobstab.sql mobhdr_obsort.sql modsurf.h new_thinn_robhdr_8.sql
new_thinn_robody_8.sql obsdist_gbrad.sql obsdist_gbrad_body.sql
obsdist_hdr2allsky_body.sql obsdist_hdr2auxiliary_body.sql
obsdist_hdr2gbrad_body.sql obsdist_hdr2radar_body.sql
obsdist_hdr2surfemiss_body.sql obsdist_smos.sql obsort_allsky.sql
obsort_allsky_body.sql obsort_auxiliary.sql obsort_body.sql
obsort_cloud_sink.sql obsort_errstat.sql obsort_gbrad.sql obsort_gbrad_body.sql
obsort_hdr.sql obsort_hdr2allsky_body.sql obsort_hdr2auxiliary_body.sql
obsort_hdr2body.sql obsort_hdr2gbrad_body.sql obsort_hdr2radar_body.sql
obsort_hdr2surfemiss_body.sql obsort_index.sql obsort_limb.sql
obsort_modsurf.sql obsort_radar.sql obsort_radar_body.sql
obsort_radar_station.sql obsort_radiance.sql obsort_sat.sql obsort_satob.sql
obsort_scatt.sql obsort_scatt_body.sql obsort_ssmi.sql obsort_ssmi_body.sql
obsort_surfemiss.sql obsort_surfemiss_body.sql obsort_update.sql
obsort_update_1.sql obsort_update_10.sql obsort_update_2.sql obsort_update_3.sql
obsort_update_4.sql obsort_update_5.sql obsort_update_6.sql obsort_update_7.sql
obsort_update_8.sql obsort_update_9.sql obstat.sql obstat_fcdep_gpsro.sql
obstat_gpsro.sql obstype.h odb2ee_aeolus_auxmet.sql odb98.flags
ozone_robhdr_1.sql ozone_robody_1.sql post_thinn_robhdr_8.sql
post_thinn_robody_8.sql pre_thinn_robhdr_8.sql pre_thinn_robody_8.sql radiance.h
redun_robody_6.sql resat.h robhdr.sql robhdr_obsort.sql robhdr_screen.sql
robody.sql robody_screen.sql robody_traj.sql sat.h sathdr_ozone.sql
sathdr_screen_aeolus_1b.sql sathdr_screen_aeolus_2b.sql
sathdr_screen_aeolus_2b_part2.sql sathdr_screen_aeolus_auxmet.sql

sathdr_screen_aeolus_hdr.sql sathdr_screen_aeolus_sat.sql satob_robody_1.sql scat_robody_1.sql scatt.h small.sql smos.h ssa_robody_2m.sql ssmi1d.h suobscor_robody.sql tovsrtovs_robody_1.sql type_definitions.h update_hdr_2.sql varbc_airep_robody.sql varbc_to3_robhdr.sql varbc_to3_robody.sql

module/init_module.F90 odbaccess_module.F90 varindex_module.F90

pandor/module/bator_ecritures_mod.F90

scripts/create_ioassign

tools/Bufr2odb.F90 Odb2bufr.F90 Ps_bias_correction.F90

Files modified(SCRIPTS):

build/Makefile.root.ifs

def/an.def enkf.def fsobs.def gen.def

gen/archive_mondb archive_obsgroup bufr2odb convert_mondb convert_obsgroup create_ioassign fdbksave ifstraj ifsvar mergebufr mondb.sql mondb_allsky.sql mondb_gpsro.sql mondb_meris.sql mondb_sat.sql mondb_satob.sql mondb_tovs.sql obstat obstat_init p4_mklib ssaana

sms_an/archive_mondb.sms archive_obsgroup.sms convert_obsgroup.sms

sms_era/obtime.sms

Files modified(SSA):

sub/scan_cma_odb.F90

Files deleted(IFS):

obs_preproc/mertsin.F90 windaux.F90

Files deleted(ODB):

bufr2odb/bufr2odb_satem.F90

ddl.CCMA/ak_reo3_body.sql fixreo3len.sql get_soe_reo3.sql getsatid_reo3.sql iasi.h obsdist_hdr2reo3_body.sql obsdist_reo3.sql obsdist_reo3_body.sql robhdr_screen.sql v_o3.sql

ddl.COUNTRYRSTRHBIAS/iasi.h

ddl.ECMA/ak_reo3_body.sql fb_getreo3.sql fixreo3len.sql get_soe_reo3.sql getsatid_reo3.sql iasi.h nak_reo3_body.sql obsdist_hdr2reo3_body.sql obsdist_reo3.sql obsdist_reo3_body.sql obsort_hdr2reo3_body.sql obsort_iasi.sql obsort_reo3.sql obsort_reo3_body.sql obstat_reo3.sql poolmask_3.sql satem_robhdr_1.sql satem_robody_1.sql sathdr_satem.sql sathdr_screen_reo3.sql v_o3.sql windaux.sql

ddl.RSTBIAS/iasi.h

ddl.SONDETYPERSTRHBIAS/iasi.h

ddl/ak_reo3_body.sql fb_getreo3.sql fixreo3len.sql get_soe_reo3.sql getsatid_reo3.sql iasi.h nak_reo3_body.sql obsdist_hdr2reo3_body.sql obsdist_reo3.sql obsdist_reo3_-body.sql obsort_hdr2reo3_body.sql obsort_iasi.sql obsort_reo3.sql obsort_reo3_body.sql obstat_reo3.sql poolmask_3.sql satem_robhdr_1.sql satem_robody_1.sql sathdr_satem.sql sathdr_screen_reo3.sql v_o3.sql windaux.sql

Files deleted(SCRIPTS):

gen/AIRS.ddl ALLSKY.ddl AMSRE.ddl AMSUA.ddl AMSUB.ddl CONV.ddl GEOS.ddl GPSRO.ddl HIRS.ddl IASI.ddl IRAS.ddl MERIS.ddl MHS.ddl MONDB.ddl MWHS.ddl MWRI.ddl MWTS.ddl NEXRAD.ddl ODBCMP.ddl REO3.ddl REO3AK.ddl SATOB.ddl SCATT.ddl SMOS.ddl SSMI.ddl SSMIS.ddl SURFCONV.ddl TMI.ddl TOVS.ddl VTPR1.ddl VTPR2.ddl WINDSAT.ddl

sms_an/archive_nexrad.sm archive_reo3.sms archive_reo3ak.sms b2o_reo3.sms
b2o_reo3ak.sms convert_reo3.sms convert_reo3ak.sms ec2o_reo3.sms ec2o_reo3ak.sms
o2b_reo3.sms o2b_reo3ak.sms obstat_archive_reo3.sms obstat_archive_reo3ak.sms
obstat_reo3.sms obstat_reo3ak.sms odb_compress.sms odbcmp_aeolus.sms
odbcmp_airs.sms odbcmp_amsre.sms odbcmp_amsua.sms odbcmp_amsub.sms
odbcmp_conv.sms odbcmp_geos.sms odbcmp_gpsro.sms odbcmp_hirs.sms odbcmp_iasi.sms
odbcmp_iras.sms odbcmp_meris.sms odbcmp_mhs.sms odbcmp_msu.sms odbcmp_mwhs.sms
odbcmp_mwri.sms odbcmp_mwts.sms odbcmp_nexrad.sms odbcmp_prepare.sms
odbcmp_reo3.sms odbcmp_reo3ak.sms odbcmp_satob.sms odbcmp_scatt.sms
odbcmp_simulobs.sms odbcmp_smos.sms odbcmp_ssmi.sms odbcmp_ssmis.sms
odbcmp_ssu.sms odbcmp_surf_conv.sms odbcmp_tmi.sms odbcmp_vtpr1.sms
odbcmp_vtpr2.sms odbcmp_windsat.sms

sms_era/obtime_reo3.sms obtime_reo3ak.sms

Alan Geer - stg_CY37R2_safer_blacklist

Safer blacklist

With 37r1, an ”elif” statement became available in the blacklist language, and the numerical satellite identifier is now available as an alternative to the tricky STATID string (e.g ” 00245”). The new blacklist takes advantage of these features and has been cleaned and re-formatted.

The main change is that the blacklist is arranged in statements like:

if ... elif .. elif ..else fail(CONSTANT) endif

There is a strict logical hierarchy for satem and satob, which goes from obstype to codetype to sensor to satellite ID. If any of these is not recognised, the data will be blacklisted automatically by the ”else fail(CONSTANT)”. This should things a little safer, e.g. helping to prevent new data going instantly into operations.

In addition, the commenting and indentation have been made consistent throughout, so that it is easier to follow the logical structure. (To get a better idea of the more significant blacklist changes when diffing, it is better to ignore these whitespace changes, e.g. use xdiff -biw)

One thing to note is that very old satellites will not be recognised, and will thus be blacklisted. NOAA-15 is the earliest valid NOAA series satellite, for example. However, the blacklist has been tested back to September 2007, where it works fine and is bit reproducible with the previous blacklist.

Expt T511: test=fhwi, control=fhsd - bit reproducible Expt T511: test=fhwe, control=fhrd - bit reproducible

Files modified(IFS):

obs_preproc/black.F90

Files modified(ODB):

ddl/black_robhdr_8.sql

Alan Geer - stg_CY37R2_varbc_tidy

VarBC controls: tidying

The PrepIFS interface to VarBC was out of date and has been fixed.

First, it is now impossible to ”turn off” VarBC, for the system will crash looking for Harris and Kelly files. This option has been removed - VarBC is now the only possible bias correction method.

Second, NCS_CONFIG, which controls cold starts, was being ignored. The problem has been fixed and NCS_-CONFIG is replaced by one control for each VarBC class: NCSTART_TO3, NCSTAT_RAD, NCSTART_-ALLSKY etc.

Expt T511: test=fhws, control=fhsd - bit reproducible

Files modified(IFS):

`module/varbc_airep.F90 varbc_allsky.F90 varbc_gbrad.F90 varbc_rad.F90 varbc_setup.F90 varbc_table.F90 varbc_tcwv.F90 varbc_to3.F90`

Alan Geer - stg_CY37R2_obs_summary_thsafe

Observation usage summary now threadsafe

A new diagnostic table was introduced in the ifs output in 37r1, entitled ”Observation usage summary”. However, there was a thread clash which meant that the statistics were occasionally slightly inaccurate. This has now been corrected.

Expt T511: test=fhx1, control=fhsd - bit reproducible

Files created(IFS):

`obs_preproc/pre_prsta_init.F90`

Files modified(IFS):

`obs_preproc/pre_prsta.F90 screen.F90`