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:	December 16, 2010	File: R48.3/DS/10126
Subject:	**IFS Memorandum Cycle CY37R1**	

Cycle 37r1 was created in November-December 2010. This was created on top of CY37 which came from CY36R4 from ECMWF merged with CY36T2 from Meteo France.

Modified libraries: aeolus ifs ifsaux obstat odb prepdata satrad scmec scripts surf trans wam

Contributors:

Gianpaolo Balsamo, Peter Bechtold, William Bell, Jean Bidlot, Niels Bormann, Souhail Boussetta, Roger Brugge, Mohamed Dahoui, Richard Englein, Reima Eresmaa, Richard Forbes, Anne Fouilloux, Alan Geer, Mats Hamrud, Jan Haseler, Sean Healy, Antje Inness, Dingmin Li, Philippe Lopez, Qifeng Lu, Sylvie Malardel, Jean-Jacques Morcrette, George Mozdzynski, Gabor Radnoti, Patricia De Rosnay, Joaquin Munoz Sabater, Deborah Salmond, Glenn Shutts, Martin Steinheimer, Tim Stockdale, David Tan, Yannick Tremolet, Frederic Vitart

PHYSICS

Peter Bechtold - pae_CY36R4_conv_callpar_cleanfor36r5

Technical changes to Physics

- Code cleaning (optimisation) in cumastrn*.F90 vdfmain.F90
- Correct merge bug in callpar.F90 concerning wind gusts (already in 36r4 esuite branch)
- Correct diagnostic of zero degree level (already included in 36r4 esuite branch)
- Revision of climplot package including revision and activation of diurnal cycle statistics, and updates for GRIB_API (all code should be GRIB edition independent now)

Files modified(IFS)

`phys_ec/callpar.F90 cumastrn.F90 cumastrnad.F90 cumastrntl.F90 diag_clouds.F90 diag_dcycle.F90 vdfmain.F90`

Files modified(SCRIPTS)

`def/climplot.def fc.def metview/avgtime.f90 climate_obs.met climplot_batch cossinlon1.f90 monmeans_clim.met monmeans_clim_batch plot_amp_phase_clim.met save_mean_diurnal_flux.met zondia_seas_icon_batch.met`

Richard Forbes - pas_CY36R4_cloudfor36R5_withnovesuite - ACTIVE

Improvements to cloud scheme formulation of precipitation evaporation and condensation.

1. The condensation limiter for new cloud is reinstated and the formulation of the decrease in precipitation fraction due to evaporation of rain and snow is modified. These changes lead to a very significant improvement in the mid/upper tropospheric humidity r.m.s. in the first few days of the forecast (as seen in relative humidity scores and obstats). There are also signs of small improvements to the wind and geopotential scores.
2. Set up constants for 550nm optical depth diagnostic

   The constants used in the cloud optical depth calculation at 550nm (routine cod_op) were not being set up correctly. This change sets the constants in suphec.F90. This will not affect operations, only research users who are using this cod_op to diagnose optical depth.
3. Improve contour levels for ”climplot” zonal cross section cloud fields

Files modified(IFS):

`phys_ec/cloudsc.F90 phys_ec/suphec.F90`

Files modified(SCRIPTS):

`metview/zondia_seas_icon_batch.met`

Philippe Lopez - pah_CY36R4_assim_NEXRAD_v3

Direct 4D-Var assimilation of time-accumulated precipitation observations from the national network of ground-based radars (NEXRAD) over the USA (NCEP Stage IV dataset)

Changes for the assimilation of NCEP Stage IV combined ground-based radar (NEXRAD) and rain-gauge 6-hourly accumulated precipitation observations over the continental USA, including proper BUFR and ODB handling, first-guess check, VarQC and VarBC for the new data.

To activate the assimilation of the new observations, prepIFS switches LGBRAD and LNEXRAD should be set to "on" (default will be "off", for the time being). New parameter (NPRACCL) in namelist (NAEPHY) sets the length of the time accumulation applied to the original hourly precipitation observations, prior to the assimilation. The default value for NPRACCL is 21600 seconds, i.e. 6 hours.

Files created(IFS):

```
gbrad/gbrad_get.F90 gbrad_get_ad.F90 gbrad_get_tl.F90 gbrad_obsop.F90
gbrad_obsop_ad.F90 gbrad_obsop_tl.F90 gbrad_put.F90 gbrad_put_tl.F90
gbrad_refrac.F90 gbrad_screen.F90 gbrad_setup.F90
module/varbc_gbrad.F90 yomgbrad.F90
```

Files created(ODB):

```
bufr2odb/bufr2odb_rain_rates.F90
ddl.CCMA/ecmwf_matchup_gbrad.sql gbrad.h gbrad_body_rr.sql gbrad_rr.sql
getgbradid.sql obsdist_gbrad.sql obsdist_gbrad_body.sql
obsdist_hdr2gbrad_body.sql obsort_hdr2gbrad_body.sql robhdr_gbrad_get_rr.sql
robhdr_gbrad_put_rr.sql robody_gbrad_get_rr.sql robody_gbrad_put_rr.sql
varbc_gbrad_robhdr.sql varbc_gbrad_robody.sql
ddl.ECMA/ecmwf_matchup_gbrad.sql gbrad.h gbrad_body_rr.sql gbrad_rr.sql
getgbradid.sql links_gbrad.sql matchup_gbrad.sql obsdist_gbrad.sql
obsdist_gbrad_body.sql obsdist_hdr2gbrad_body.sql obsort_gbrad.sql
obsort_gbrad_body.sql obsort_hdr2gbrad_body.sql robhdr_gbrad_get_rr.sql
robhdr_gbrad_put_rr.sql robody_gbrad_get_rr.sql robody_gbrad_put_rr.sql
update_links_gbrad.sql varbc_gbrad_robhdr.sql varbc_gbrad_robody.sql
ddl/ecmwf_matchup_gbrad.sql gbrad.h gbrad_body_rr.sql gbrad_rr.sql getgbradid.sql
links_gbrad.sql matchup_gbrad.sql obsdist_gbrad.sql obsdist_gbrad_body.sql obsdist_-
hdr2gbrad_body.sql obsort_gbrad.sql obsort_gbrad_body.sql obsort_hdr2gbrad_body.sql
robhdr_gbrad_get_rr.sql robhdr_gbrad_put_rr.sql robody_gbrad_get_rr.sql robody_gbrad_-
put_rr.sql update_links_gbrad.sql varbc_gbrad_robhdr.sql varbc_gbrad_robody.sql
```

Files created(SATRAD):

```
interface/bsslzr.h
programs/bsslzr.F90 bufr_screen_nexrad.F90 gaulat.F90 nxlonlat.F90
```

Files modified(IFS):

```
common/yomdb_defs.h yomdb_vars.h
control/gp_model.F90 gp_model_ad.F90 gp_model_tl.F90
module/pardimo.F90 surface_fields_mix.F90 traj_physics_mod.F90 varbc_pred.F90
varbc_setup.F90 yoephy.F90 yomcoctp.F90 yomcosjo.F90 yomspsdt.F90 yomvnmb.F90
namelist/naephy.h
obs_preproc/blackhat.F90 defrun.F90 fgchk.F90 first.F90 suobs.F90
op_obs/hdepart.F90 hop.F90 hopad.F90 hoptl.F90 hvnmtlt.F90 mpobseqad_unpck.F90
```

phys_ec/callpar.F90 callparad.F90 callpartl.F90 ec_phys.F90 ec_phys_ad.F90 ec_phys_drv.F90 ec_phys_tl.F90 ec_physg.F90

setup/cmoctmap.F90 su0phy.F90 su_surf_flds.F90 sucmoctp.F90 suvnmb.F90

var/ecset.F90 ecset_thsafe.F90

Files modified(ODB):

bufr2odb/get_varindex.F90

cma2odb/buf2cmat_new.F90 ctxinitdb.F90 distributedb.F90 getatdb.F90 getdb.F90 init_odb_tables.F90 initmdb.F90 matchupdb.F90 putatdb.F90 shuffledb.F90 subuoctp.F90 xchangedatadb.F90 xchangedatadistdb.F90

ddl/black_robhdr_1.sql black_robody_1.sql cma.h hdr.h obsdist_auxiliary.sql obsdist_hdr2allsky_body.sql obsdist_hdr2surfemiss_body.sql obsdist_modsurf.sql obstype.h varno.h

module/getval_module.F90 varindex_module.F90 yomboctp.F90

tools/Bufr2odb.F90

Gianpaolo Balsamo and Souhail Boussetta

Carbon-based land surface model extension (CTESSEL)

1. Vegetation photosynthesis with associated stress-function for transpiration (based on Jacobs/Calvet approach)
2. Natural land surface carbon dioxide emission from soil and vegetation
3. Interactive vegetation (greening/senescence of plants, with prognostic Leaf Area Index)"

Files modified(IFS):

module/yoephy.F90 namelist/naephy.h phys_ec/callpar.F90 callparad.F90 callpartl.F90 radpar.F90 suphec.F90 vdfmain.F90 vdfouter.F90 setup/su0phy.F90

Files modified(SURF):

external/surf_inq.F90 surfbc.F90 surfexcdriver.F90 surftstp.F90 susurf.F90 interface/surf_inq.h surfbc.h surfexcdriver.h surftstp.h susurf.h module/ccetr_mod.F90 cotwo_mod.F90 cotworestress_mod.F90 flakeene_mod.F90 flakerad_mod.F90 nitro_decline_mod.F90 srfcotwo_mod.F90 srfvegevol_mod.F90 sucotwo_mod.F90 surfbc_ctl_mod.F90 surfexcdriver_ctl_mod.F90 surftstp_ctl_mod.F90 susurf_ctl_mod.F90 susveg_mod.F90 vevap_mod.F90 vsurf_mod.F90 yos_ags.F90 yos_veg.F90 offline/driver/callpar1s.F90 cntend.F90 cpedia1s.F90 cpg1s.F90 minmax.F90 rdclim.F90 rdcoor.F90 rdcoorgrb.F90 rdres.F90 rdsupr.F90 rdsuprgrb.F90 stepo1s.F90 su0phy1s.F90 su1s.F90 sucdfres.F90 sucdh1s.F90 sudcdf.F90 sudim1s.F90 suflake.F90 sufloobos.F90 sugc1s.F90 sugdi1s.F90 sugp1s.F90 sugpd1s.F90 suinif1s.F90 sulun1s.F90 suphec.F90 upddiag.F90 updtim1s.F90 wrtd1s.F90 wrtdcdf.F90 wrtres.F90 offline/module/ptrgp1s.F90 ptrgpd1s.F90 yoephy.F90 yomcc1s.F90 yomcdh1s.F90 yomdphy.F90 yomgdi1s.F90 yomgp1s0.F90 yomgp1s1.F90 yomgp1sa.F90 yomgpd1s.F90 yomlog1s.F90 yomlun1s.F90 offline/namelist/nam1s.h namforc1s.h namgp1s.h namgpd1s.h namphy1s.h offline/phys_ec/vdfmain1s.F90 offline/setup/su0phy.F90

DATA ASSIMILATION

Yannick Tremolet - day_CY36R4_for_36r5

Model error cycling This set of modification contains code and script changes for the cycling of model error. This is achieved by modifiying the model error term in the cost function to penalize the change in model error from cycle to cycle rather than the model error itself. The change is activated by the switch LBGMODERR. The branch also removes some unused options in the model error code and some preparatory work for overlapping assimilation windows.

Files created(ODB):

```
ddl.CCMA/obsdist_windows.sql
ddl.ECMA/obsdist_windows.sql
ddl/obsdist_windows.sql
```

Files modified(IFS):

```
common/yomdb_defs.h yomdb_vars.h
control/cdsta.F90 cnt4.F90 cnt4ad.F90 cnt4tl.F90 sim4d.F90
module/yomjq.F90 yommodel_error.F90
namelist/nammoderr.h
obs_preproc/comtc.F90 prlmchk.F90 timdif.F90
op_obs/hop.F90 hoptl.F90
parallel/bcastcov.F90
setup/sudim1.F90 suinimoderr.F90
utility/dealctv.F90 prtjo.F90 savmoderr.F90
var/add_moderr_ad.F90 add_moderr_tl.F90 bgvecs.F90 cvar2.F90 cvar2ad.F90 cvar2in.F90
cvar2inad.F90 cvar3.F90 cvar3ad.F90 cvar3in.F90 cvar3inad.F90 evjq.F90 sujq.F90 sujqdata.F90
sujqstd.F90 sumoderr.F90 suvazx.F90 upspec.F90 weak_constraint.F90
```

Files modified(ODB):

```
cma2odb/ctxinitdb.F90 distribute_odb.F90 distributedb.F90 getdb.F90 initmdb.F90
map_reportype.F90 update_obsdb.F90 xchangedatadistdb.F90
ddl/cma.h hdr.h obsdist_allsky.sql obsdist_allsky_body.sql obsdist_atovs.sql
obsdist_atovs_pred.sql obsdist_auxiliary.sql obsdist_auxiliary_body.sql
obsdist_body.sql obsdist_errstat.sql obsdist_hdr.sql obsdist_hdr2allsky_body.sql
obsdist_hdr2auxiliary_body.sql obsdist_hdr2body.sql obsdist_hdr2radar_body.sql
obsdist_hdr2reo3_body.sql obsdist_hdr2surfemiss_body.sql obsdist_index.sql
obsdist_index2hdr.sql obsdist_limb.sql obsdist_modsurf.sql obsdist_poolno.sql
obsdist_radar.sql obsdist_radar_body.sql obsdist_radar_station.sql
obsdist_radiance.sql obsdist_reo3.sql obsdist_reo3_body.sql obsdist_sat.sql
obsdist_satob.sql obsdist_scatt.sql obsdist_scatt_body.sql obsdist_ssmi.sql
obsdist_ssmi_body.sql obsdist_surfemiss.sql obsdist_surfemiss_body.sql
obsdist_update_1.sql obsdist_update_10.sql obsdist_update_2.sql
obsdist_update_3.sql obsdist_update_4.sql obsdist_update_5.sql
obsdist_update_6.sql obsdist_update_7.sql obsdist_update_8.sql
obsdist_update_9.sql update_hdr_3.sql
interface/distributedb.h xchangedatadistdb.h
```

Files modified(SCRIPTS):

```
def/an.def
```

gen/anml ansfc anwave getgrbme getini ifsmin ifstraj ifsvar mergeodb mkidta mklinks model soilana ssaana sstana var_include varconsts vardata

sms/getfcdata.sms

sms_an/mergeodb.sms

wav/wave_getalt wave_getsar wave_setup_an

Files deleted(IFS):

utility/save4next.F90

Gabor Radnoti - dag_CY36R4_obstatfc_para

Modifications for new forecast obstat suite

This new suite computes forecast departures for a set of forecast ranges and stores it in some newly introduced odb tables in the ECMA files. The suite is integrated in the analysis suite definition. My contribution contains a lot of script modifications and a number of ifs stuff. The odb extension was done by Anne F on the full analogy of what has earlier been done for ENKF. Mohamed's branch has the corresponding changes in the obstat software.

Files created(ODB):

ddl.CCMA/forecast_diagnostic.h

ddl.ECMA/forecast_diagnostic.h obstatfc_1.sql obstatfc_10.sql obstatfc_11.sql obstatfc_12.sql obstatfc_13.sql obstatfc_14.sql obstatfc_15.sql obstatfc_16.sql obstatfc_17.sql obstatfc_18.sql obstatfc_19.sql obstatfc_2.sql obstatfc_20.sql obstatfc_3.sql obstatfc_4.sql obstatfc_5.sql obstatfc_6.sql obstatfc_7.sql obstatfc_8.sql obstatfc_9.sql update_fcdiag_links.sql

ddl/forecast_diagnostic.h obstatfc_1.sql obstatfc_10.sql obstatfc_11.sql obstatfc_12.sql obstatfc_13.sql obstatfc_14.sql obstatfc_15.sql obstatfc_16.sql obstatfc_17.sql obstatfc_18.sql obstatfc_19.sql obstatfc_2.sql obstatfc_20.sql obstatfc_3.sql obstatfc_4.sql obstatfc_5.sql obstatfc_6.sql obstatfc_7.sql obstatfc_8.sql obstatfc_9.sql update_fcdiag_links.sql

tools/Create_fcdiag.F90

Files created(SCRIPTS):

sms_an/ec2o_aeolus.sms ec2o_airs.sms ec2o_amsre.sms ec2o_amsua.sms ec2o_amsub.sms ec2o_bufr.sms ec2o_conv.sms ec2o_geos.sms ec2o_gpsro.sms ec2o_hirs.sms ec2o_iasi.sms ec2o_iras.sms ec2o_merge.sms ec2o_meris.sms ec2o_mhs.sms ec2o_msu.sms ec2o_mwhs.sms ec2o_mwri.sms ec2o_mwts.sms ec2o_reo3.sms ec2o_reo3ak.sms ec2o_satob.sms ec2o_scatt.sms ec2o_smos.sms ec2o_ssmi.sms ec2o_ssmis.sms ec2o_ssu.sms ec2o_surf_conv.sms ec2o_-tmi.sms ec2o_vtpr1.sms ec2o_vtpr2.sms ec2o_windsat.sms ecfs2odb.sms ecfs2odb_lag.sms

Files modified(IFS):

common/yomdb_defs.h yomdb_vars.h

module/parcma.F90 yomdb.F90 yomvar.F90

mwave/mwave_put.F90

namelist/namvar.h

obs_preproc/defrun.F90 obadat.F90 readoba.F90 scaqc.F90 shipin.F90 tempin.F90

op_obs/hdepart.F90 hop.F90 hretr.F90 rad1cobe.F90

setup/su0yomb.F90

var/suvar.F90 writeoba.F90

Files modified(ODB):

cma2odb/ctxinitdb.F90 distribute_odb.F90 getdb.F90 initmdb.F90 opendb.F90 shuffle_odb.F90 xchangedatadb.F90 xchangedatadistdb.F90

ddl/cma.h

interface/ctxinitdb.h initmdb.h

Files modified(SCRIPTS):

def/an.def

gen/create_ioassign fdbksave getgrb getini getmars getpersSST ifstraj ifsvar mergeodb mkabs_odbtools mkidta model preCleanFDB var_include vardata

sms/getfcdata.sms getini.sms inidata.sms logfiles.sms model.sms sfc.sms wavini.sms

sms_an/4dvar.sms fdbksave.sms preCleanFDB.sms vardata.sms

wav/archive_wave prep_wave wave_getgrb wave_getrst wave_setup_an

Patricia De Rosnay - dap_CY36R4_snow_update - ACTIVE

Separate use of SYNOP and NESDIS data in the OI

Use of satellite snow cover data in mountains negatively affects the performances of the snow analysis. To avoid using NESDIS snow cover data in mountainous areas, snow analysis has been switched off in mountainous areas in 36r4. In 35r5/37r1, we separate the use of NESDIS and SYNOP data in the OI, so that in moutainous areas the use of SYNOP snow depth data is re-activated while keeping out NESDIS snow cover data. In other areas there is no modification, both NESDIS data and SYNOP data are used.

Files modified(SSA):

interface/calc_distance.h sub/oiinc.F90 oiupd.F90 sucsnw.F90 util/calc_distance.F90

Patricia De Rosnay - dap_CY36R4_ascat_monitoring

ASCAT soil moisture monitoring

Re-introduce ASCAT soil moisture monitoring at high incidence angles

Files modified(IFS):

obs_preproc/ascatsm_cdfmatch.F90

David Tan - dat_CY36R4_for_CY36R5

ADM-Aeolus doppler wind lidar assimilation

Further technical development (no meteorological impact) for ADM-Aeolus processing tasks. IFS: initial extraction of aeolus-related code from hretr.F90 to hretr_aeolus.F90 (OOPS-related, bigger tidy-up to follow). ODB: introduce new view hretr_aeolus and simplify associated sqls, upgrade bufr2odb_aeolus for new prototype template. SCRIPTS: upgrade generation/dissemination of Aeolus L2B/L2C products, activate new ESA

Ground Track Tool (BK). AEOLUS: upgrade to "pre-Release 1.50 v2", which includes further interfacing to the Version 5.05 Level-1B data format, new prototype Bufr template, additional L2B processing parameters, L2C product generation code, general tidying and bugfixes.

Files created(IFS):

`op_obs/hretr_aeolus.F90`

Files created(ODB):

`ddl.ECMA/sathdr_screen_aeolus_2b_part2.sql`

`ddl/sathdr_screen_aeolus_2b_part2.sql`

Files created(SCRIPTS):

`gen/aeolus_l2c_getodb`

Files modified(IFS):

`op_obs/hretr.F90`

`var/taskob.F90`

Files modified(ODB):

`bufr2odb/bufr2odb_aeolus.F90`

`cma2odb/ctxinitdb.F90 getdb.F90`

`ddl/sathdr_screen_aeolus_2b.sql sathdr_screen_aeolus_auxmet.sql`

`tools/Load_balancing.F90`

Files modified(SCRIPTS):

`build/Makefile.root.aeolus`

`def/an.def`

`gen/aeolus_l2b fetchorbpre gtt gtt2simulobs gtt2simulobs_preproc mkabs_aeolus mklinks odbmerge`

`sms_an/aeolus_l2b.sms orbpre2simulobs.sms`

Files deleted(SCRIPTS):

`gen/aeolus_geodetic2simulobs aeolus_orbpre`

`sms_an/aeolus_orbpre.sms`

Files created/modified/deleted(AEOLUS):

`Almost the entire project.`

Joaquin Munoz Sabater - daq_CY36R4_SMOS_monitor_to_CY36R5

SMOS monitoring over land and oceans

1. A substantial re-structuration of the routines handling SMOS data has been carried out, which resolves most of the memory issues experienced until the previous cycle.
2. The monitoring of SMOS data over oceans is now possible too.
3. Now pre-screening of SMOS data is more flexible and run in parallel processors. On top of that, more SMOS data is monitored as one observation per angular bin and grid point is selected instead of only one observation per grid point.

4. Other minor changes include the control of the CMEM configuration options by means of namelists, the Faraday effect correction over the brightness temperatures and the elimination of old hard-coded switches.

Files created(IFS):
`namelist/namoptcmem.h namradcmem.h`
`smos/smos_obsop_setup.F90`

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

Files modified(IFS):
`common/yomdb_defs.h yomdb_vars.h`
`control/gp_model.F90`
`module/parsmos.F90 yomsmos.F90`
`namelist/naephy.h`
`op_obs/hdepart.F90 hop.F90`
`phys_ec/ec_phys.F90 ec_phys_drv.F90 ec_physg.F90`
`setup/su0phy.F90`
`smos/smos_obsop.F90 smos_process.F90 smos_screen.F90 smos_update.F90`
`var/surad.F90`

Files modified(ODB):
`bufr2odb/bufr2odb_smos.F90 get_varindex.F90`
`cma2odb/ctxinitdb.F90 distributedb.F90 getatdb.F90 initmdb.F90 putatdb.F90`
`ddl/robhdr_mwave_process_smos.sql robhdr_mwave_update_smos.sql robody_mwave_process_-smos.sql robody_mwave_update_smos.sql sat_smos.sql`

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

Files modified(SCRIPTS):
`build/Makefile.root.obstat`
`def/an.def`
`gen/fetchobs ifstraj mkabs_satrad presmos`
`sms_an/presmos.sms`

Files deleted(IFS):
`smos/smos_gp2obs.F90 smos_igp2obs.F90 smos_iobs2gp.F90 smos_nearest.F90 smos_obs2gp.F90`

SATELLITE

Alan Geer - stg_CY36R4_amsua_7 - ACTIVE

All-sky changes + ”NOAA-20”/EOS-Aqua + VarBC changes

This branch introduces the capability to assimilate AMSU-A observations through the all-sky system. This is passive, but bundled in the branch are a number of minor active or purely technical changes that affect the microwave imager assimilation and/or the IFS more generally:

1. The AMSU-A instrument on EOS-Aqua is currently given a satellite ID of 222, corresponding to the non-existent "NOAA-20" satellite. This will change to the correct ID for EOS-Aqua, which is 784. When initialising from an old experiment, VarBC will have to spin up a new bias correction. There is an easy fix to this, which involves hand-editing "222" to "784" in the VarBC.cycle file.
2. Bugfix for hsatang.F90 to allow scan-bias correction for AMSR-E. AMSR-E does not suffer much scan bias, so the impact is minor, except for the first day of a new run. Here, an experiment may pick up inappropriate scan bias coefficients if initialised from an old experiment. A few cycles are required to derive more appropriate coefficients.
3. All-sky observations in the last timestep are now flagged as "rejected", since the observation operator does not get called.
4. VarBC can now be called outside of hop.F90. This leads to minor changes to some VarBC function calls.
5. hsatang.F90 has been rewritten to make it shorter and more comprehensible. This change was tested independently as bit-reproducible.
6. The diagnostic LWP retrieval for SSMIS and TMI has been updated.

The all-sky observation operator has been extensively rewritten to allow assimilation of AMSU-A. The operator remains in callpar.F90 but the code is now more self-contained, in preparation for OOPS. The operator now works in observation space, rather than model space. Imager observations also use the new framework, but the processing is nearly identical, though not bit-reproducible.

Files created(IFS):

`module/get_lwpcoeff_mix.F90`

`mwave/mwave_cloud.F90 mwave_lwp.F90 mwave_obsop_traj.F90`

Files created(ODB):

`ddl.ECMA/black_allsky.sql`

`ddl/black_allsky.sql`

Files created(SATRAD):

`programs/bufr_screen_1c_allsky.F90`

Files created(SCRIPTS):

`sms_an/b2o_amsua_allsky.sms`

Files modified(IFS):

`control/gp_model.F90 gp_model_ad.F90 gp_model_tl.F90`

`module/parmwave.F90 varbc_allsky.F90 varbc_eval.F90 varbc_pred.F90 varbc_rad.F90 yoephy.F90 yommwave.F90`

`mwave/mwave_emis.F90 mwave_get.F90 mwave_get_ad.F90 mwave_get_tl.F90 mwave_obsop.F90 mwave_obsop_ad.F90 mwave_obsop_test.F90 mwave_obsop_tl.F90 mwave_put.F90 mwave_put_tl.F90 mwave_read_sat_error.F90 mwave_screen.F90 mwave_setup.F90`

`namelist/naephy.h nammwave.h`

obs_preproc/black.F90 gefger.F90 mkglobstab.F90
onedvar/onedvar_fstscrn.F90
op_obs/hop.F90 hopad.F90 hoptl.F90 hsatang.F90 rad1cemis.F90
phys_ec/callparad.F90 callpartl.F90 ec_phys.F90 ec_phys_ad.F90 ec_phys_drv.F90 ec_phys_tl.F90 ec_physg.F90
setup/su0phy.F90
var/cvarbcad.F90 cvarbcinad.F90 getsatid.F90 taskob.F90 taskobad.F90

Files modified(ODB):

bufr2odb/bufr2odb_atovs.F90
cma2odb/ctxinitdb.F90 getatdb.F90 getdb.F90 grid_nearest.F90
ddl.ECMA/ECMA.dep
ddl/robhdr.sql robhdr_mwave_get_ssmi.sql robhdr_mwave_put_ssmi.sql robody_mwave_get_ssmi.sql robody_mwave_put_ssmi.sql sat_ssmi.sql satbody_allsky.sql sufger_allsky.sql varbc_allsky_robhdr.sql varbc_allsky_robody.sql
tools/Bufr2odb.F90

Files modified(SATRAD):

mwave/mwave_get_rtcoeff.F90
rttov/rttvi.F90

Files modified(SCRIPTS):

gen/ifsmin mkabs_satrad mklinks pre1crad_screen varconsts

Files deleted(IFS):

module/mwimager_mix.F90
mwave/mwave_postproc.F90
op_obs/mwimager_lwp.F90

Alan Geer - stg_CY36R4_obs_diags

New diagnostic output for screening: Observation usage summary

This is a new diagnostic table in the standard output from the screening trajectory. It's like the JO table, but summarises the screening decisions including blacklisting. Something similar already exists but only on a per-obstype basis. The new table shows what's happening for each satellite/instrument combination.

Files modified(IFS):

module/yomcosjo.F90
obs_preproc/pre_prsta.F90
op_obs/hjo.F90
parallel/gathercosto.F90
utility/prtjo.F90
var/sualcos.F90 suamv.F90 sucos.F90 sulimb.F90 surad.F90

Files modified(ODB):

ddl/screen_robhdr_3.sql

Niels Bormann - str_CY36R4_for_CY36R5 - ACTIVE

Reduction of AMSU-A observation errors and adjustments to MODIS AMVs

Observation errors for AMSU-A radiances from channels 5-10 have been reduced, from 0.35 K to 0.2 K. VarQC parameters have been adjusted.

Observation errors for MODIS winds have been increased, by resetting them to observation errors used for geostationay AMVs. Also, an additional quality control check has been introduced that rejects AMVs when the observation or FG wind speed is less than 2 m/s (performed in fgwnd.F90). These will be flagged in the ODB through event1.bad_practice@body.

Files modified(IFS):
`module/yomcosjo.F90 yomtvrad.F90`
`namelist/namjo.h`
`obs_preproc/defrun.F90 fgwnd.F90 satamin.F90`
`var/suamv.F90`

Sean Healy - sti_CY36R4_tan_point_test - ACTIVE

GPS radio occultation - Introduction of tangent point drift and duplicate observation check

We have adapted the bufr_grid_screen.F90 routine to use with GPSRO measurements. This is called in preobs, and it is used to screen out any duplicate GPSRO observations.

We have modified the bufr2odb for GPSRO to introduce tangent point drift when forward modelling the GPSRO observations.

Positive impact on stratospheric temps + winds, day-1 to day-4, own analysis.

Files modified(SATRAD):
`module/mod_grid_screen.F90`
`programs/bufr_grid_screen.F90`

Files created(ODB):
`bufr2odb/bufr2odb_radio_lat_long.F90 tools/Bufr2odb.F90`

Files modified(SCRIPTS):
`gen/preobs`

William Bell, Anne Fouilloux, Qifeng Lu - stw_CY36R4_FY3_for_CY36R5

Non-linearity correction of FY-3A MWTS data

This change enables the correction of FY-3A Microwave Temperature Sounder (MWTS) data for radiometer non-linearities. The correction of these effects, coupled with improved RTTOV coefficient files (already used from CY36R4 onwards), significantly improves the quality of the MWTS data and the forecast impact of the data. Corrections to the brightness temperatures are made in ***bufr2odb_fy3.F90*** using quadratic polynomial coefficients stored in a new routine, ***fy3_corrections.F90***. The value of the correction for each of the four MWTS channels is stored in the new odb variable tbcorr@body and the *version number* of the corrections in

corr_version@radiance.

The current version of *fy3_corrections.F90* deals with data from FY-3A (launched May 2008) and FY-3B, due to be launched November 2010.

Files created(ODB):

`bufr2odb/fy3_corrections.F90`

Files modified(IFS):

`common/yomdb_defs.h yomdb_vars.h obs_preproc/defrun.F90`

Files modified(ODB):

`bufr2odb/bufr2odb_fy3.F90 get_varindex.F90`
`cma2odb/initmdb.F90`
`ddl/body.h radiance.h`
`module/varindex_module.F90`

Dingmin Li - stl_CY36R4_ModeF

Mode Varbc

Implementation of mode based variational bias correction of observations from microwave sounders (AMSUA-A channel 3), modified from the last cycle and suggested for operational implementation.

The code changes involve modifying relevant code in op_obs/, control/, module/, odb/cma2odb and odb/ddl as well as activating switches in varbc code that is controlled by namelist of NAMVARBC_RAD in scripts/gen/ifstraj and ifsmin. All the code changes and the swithes needed to be switched on are in the branch: stl_CY36R4_-ModeF.

There are also changes in blacklists. The blacklist with my changes is at /stl/blacklists/black_ds2010082400_-ModeCh3

Files modified(IFS):

`op_obs/hop.F90 hoptl.F90 hopad.F90 hretr.F90 control/cnt1.F90 module/varbc_eval.F90 varbc_setup.F90`

Files modified(ODB):

`odb/cma2odb/ctxinitdb.F90 odb/ddl/varbc_mode_hist_robhdr.sql varbc_mode_hist_robody.sql`

Files modified(SCRIPTS):

`scripts/gen/ifstraj ifsmin`

Reima Eresmaa - ste_CY36R4_technical

Cleaning of AIRS and IASI files

Cross-band cloud detection will be applied in AIRS Band 5. Namelist file AIRS_CLDDET.NL_20081029 will no longer be used, and updated AIRS_CLDDET.NL is used instead. Explicit specification of observation error standard deviations (in file rmtberr_iasi) is added for IASI channels that are used for aerosol detection.

Files modified(SCRIPTS):
`gen/mklinks varconsts`

Reima Eresmaa - ste_CY36R4_wfov_xband_flatbias

Modified use of AIRS and IASI radiances

- Selection of IASI pixels to be used is modified. From each set of four IASI pixels within one collocated AMSU-A footprint, either pixel 1 or pixel 3 is chosen on the basis of which one is warmer (i.e. has larger radiance on a window channel). Previously, pixel 1 was always selected. The modification will increase the number of clear IASI channels in assimilation. Pre-screening of IASI data has been almost completely rewritten to ensure correct performance of the selection algorithm. In addition to selection of the warmest pixel, selection of either the coldest or most homogeneous pixel is supported in the new code.
- Implementation of the cross-band option of cloud detection is revised. This option forces cloud flags on water vapour channels to be consistent with those on long-wave sounding channels. In the new implementation, the height assignment of the lowest clear channel, instead of the highest cloud-contaminated one, in the long-wave band is applied for flagging water vapour channels as either clear or cloud-contaminated. The usage of water vapour channels of both AIRS and IASI becomes more conservative and the number of potentially cloud-contaminated water vapour channels in the assimilation is reduced.
- A bug affecting the bias corrections on five long-wave window channels of IASI is corrected.

Files modified(IFS):
`module/varbc_rad.F90`
`op_obs/cf_digital.F90 cloud_detect.F90`
Files modified(SATRAD):
`programs/bufr_screen_iasi.F90`
Files modified(SCRIPTS):
`gen/pre1crad_screen`

WAVE MODEL

Jean Bidlot - wab_CY36R4_next_cycle - ACTIVE

Updates to WAM

- The friction coefficient used in the parametrisation of the bottom dissipation was doubled in order to address a systematic positive wave height bias in shallow water.
- The numerical growth limiter used to insure the stability of the code was found to be inappropriate in very shallow waters, essentially preventing the depth induced wave breaking source term from removing wave energy for those very shallow points. It was replaced by its slightly more laxed deep water version.

- A small bug in the advection scheme was removed. It had to do with the actual weights used to interpolate model grid points (on the irregular grid) to the corner positions in the corner transport upstream scheme. Since CY35R3, the weights have been wrongly evaluated such that they were either 0 or 1, essentially, making use of one of 2 points from which the information should have been interpolated.
- Second order correction to the computed first order wave spectrum is applied in the post-processing of all integrated output parameters. Note that the output spectra are still the first order ones. This second correction can be switched off by setting LSECONDORDER to false in the input namelist.
- Encoding and decoding wave grib data can now done with grib_api. It requires grib_api version 1.9.4 or above. The exchange of informations between IFS and WAM no longer needs grib headers. Note that for the time being, the code contains both gribex and grib_api routines. By default both input and output are done with grib_api (see LGRIBAPI_I and LGRIBAPI_O in input namelist). Note that with gribex, we use the padding option (HOPER=M), which insure that for a given configuration the grib data files have always the same size. With grib_api, this option is not available, therefore file size will vary based on the change in sea ice cover.
- IFS can again be run with externally prescribed surface ocean currents.
- The first frequency for the spectra in the limited area wave model configuration (LAW) was changed to be the same as the global high resolution model. Since both configurations have the same number of frequencies, it will make it easier to use global model spectra to specify boundary conditions for LAW.
- More systematic use of Dr Hook directives. As a measure of precaution, all local variables in all OpenMP loops are now defined as private. A few code optimisations based on the work with the second order correction.
- Model numbers are now 108 for the global models and 208 for the limited area one.

Files created(OBSTAT):

`data/stat.ref.DCDA`

Files created(SCRIPTS):

`gen/fc_sens_obs.sql`

`sms_an/obstat_archive.sms obstat_archive_airs.sms obstat_archive_amsre.sms obstat_archive_amsua.sms obstat_archive_amsub.sms obstat_archive_conv.sms obstat_archive_geos.sms obstat_archive_gpsro.sms obstat_archive_hirs.sms obstat_archive_iasi.sms obstat_archive_iras.sms obstat_archive_meris.sms obstat_archive_mhs.sms obstat_archive_msu.sms obstat_archive_mwhs.sms obstat_archive_mwri.sms obstat_archive_mwts.sms obstat_archive_reo3.sms obstat_archive_reo3ak.sms obstat_archive_satob.sms obstat_archive_scatt.sms obstat_archive_smos.sms obstat_archive_ssmi.sms obstat_archive_ssmis.sms obstat_archive_ssu.sms obstat_archive_surf_conv.sms obstat_archive_tmi.sms obstat_archive_windsat.sms premwimg_amsre.sms premwimg_mwri.sms premwimg_ssmi.sms premwimg_ssmis.sms premwimg_tmi.sms premwimg_windsat.sms`

Files created(WAM):

`Wam_oper/cal_second_order_spec.F grib2wgrid.F inwgrib.F outwspec.F preset_wgrib_template.F second_order_lib.F secondhh_gen.F secspom.F tables_2nd.F vmin_d.F vplus_d.F wgrib2fdb.F wgribout.F`

`module/yowconst_2nd.F yowgrib_handles.F`

Files modified(IFS):

control/cnt4.F90 stepo.F90

dia/grib_code_message.F90 sucddh.F90

module/iostream_mix.F90 yoewcou.F90 yomspsdt.F90

namelist/namspsdt.h

obs_preproc/ngenada.F90

op_obs/hretr.F90

phys_ec/callpar.F90 cloudvar.F90 diag_clouds.F90 suwcou.F90 wvcouple.F90 wvxf2gb.F90

setup/suspsdt.F90

Files modified(IFSAUX):

module/grib_api_interface.F90

Files modified(OBSTAT):

data/bufrodbcodes.cfg general.cfg iasi_channels stat.ref

module/dataqc.F90 mod_sat_monitor.F90

satmon/sat_add_geo.F90

src/genopt.F90 inisoftarea.F90 inisoftdef.F90 inisoftflag.F90 inisoftinstr.F90 inisoftstream.
obstat_add_grib.F90 obstat_normalize_grib.F90 updsoft.F90 writegribs.F90

Files modified(ODB):

bufr2odb/bufr2odb_fy3.F90 bufr2odb_mwri_1d.F90

cma2odb/map_reportype.F90

ddl/fc_sens_obs.sql

tools/Fc_sens_obs.F90

Files modified(PREPDATA):

programs/ensms_veps.F90 interpo.F90 reord_veps.F90 wmem.F90

Files modified(SATRAD): screen_1c.F90

Files modified(SCRIPTS):

build/Makefile.root.obstat Makefile.root.wam perl/dependanal.pl

def/an.def eps_varfc.def fsobs.def gen.def

gen/ansfc anwave archive_obs archive_obsgroup bufr2odb eda_err_save ens_cal ens_errors fast_sgint fc_sens_prepare fc_sens_save fetcherr fetchmars fetchobs getgrb getgrbe getini grib_def.h ifstraj mergeodb mkabs_obstat mkabs_wam model modeleps obstat obstat_init odb2bufr p4_mklib premwimg restart_999 satmon_getdat smrescale

oce/storm

sms/fc_sens_prepare.sms getfcdata.sms getini.sms getvarepsdata.sms libs.sms svsave.sms targets.sms verify.sms wcold.sms

sms_an/clean_an.sms fetchmars.sms premwimg.sms

wav/prep_wave preset_input wam_input wave_const wave_getcurrent wave_getrst wave_-run wave_set_config wave_set_tstep wave_setup wave_setup_3v wave_setup_4v wave_setup_-an

Files modified(WAM):

Wam_oper/altas.F bouinpt.F buildstress.F check.F chief.F closend.F ctuw.F current2wam.F decode_integrated_parameter.F decode_point_spectra.F femeanws.F fkmean.F frcutindex.F getcurr.F getspec.F getstress.F getwnd.F grb2wgrd.F

ifstowam.F implsch.F initialint.F initmdl.F intpol.F intwaminput.F kgribsize.F
meansqs.F mpbcastgrid.F mpdecomp.F mpexchng.F mpuserin.F mubuf.F newwind.F
notim.F out_onegrdpt.F outbs.F outcom.F outint.F outwnorm.F preproc.F preset.F
prewind.F propags.F propags1.F propags2.F readpre.F readwgrib.F readwind.F
savspec.F sbottom.F sdissip.F secondhh.F setice.F sinput.F snonlin.F stresso.F
timin.F topoar.F transpart.F unsetice.F updatewd.F userin.F vmin.F vplus.F
wamassi.F wamodel.F wavemdl.F write_mpdecomp.F

module/yowcout.F yowgribhd.F yowparam.F yowpcons.F yowtabl.F yowwind.F

Files deleted(ODB):

tools/Fc_sens_grid.F90

Files deleted(WAM):

Wam_oper/blsp2grs.F blspcon.F gribpacs.F inmarss.F inmarssi.F intgrs.F intmars.F intsgs.F
readgrs.F readice.F readt.F splitgrs.F

SEASONAL

Tim Stockdale - net_CY36R4_longrange2

Volcanic Aerosols

Modification to allow damped persistence of volcanic aerosol from specified initial values during a forecast. Activated by setting LVOLCDAMP to true in namelist NAERAD. Damps towards a low background value, using a timescale of 400 days.

This branch also contains a number of script changes related to S4.

Files created(SCRIPTS):

oce/intsst_update volcdat.txt

sms_oc/checkdate_sst.sms getsst_update.sms intsst_update.sms

Files modified(IFS):

module/yoerad.F90

namelist/naerad.h

phys_ec/gwdrag_wms.F90 radact.F90

phys_radi/suecrad.F90

Files modified(SCRIPTS):

def/longrange.def

gen/getini getsst mkidta mkidta_eps mkidta_ocean mkidta_sens

oce/archive_ml archive_sfc archive_ua mm_archive_sfc mm_archive_ua mm_create_ua
model_nemoIFS

sms/inidata.sms logfiles.sms

sms_oc/cpmodel_nemo.sms ocrot.sms

Martin Steinheimer and Glenn Shutts - nea_CY36R4_nextCY

Updates to spectral stochastic backscatter scheme (SPBS) and cellular automaton (CA)

Small, mainly technical, updates for the SPBS and CA implementation are included. The SPBS changes are:

- The gridpoint calculations for SPBS, which have been done in `CALLPAR` so far were moved to the new subroutine `SPBSGPUPD`. `SPBSGPUPD` is called from `CALLPAR`. This change did not effect the results (= bit-reproducible).
- Some discrepancies between the underlying theory and the code implementation have been fixed (account for the IFS normalization of the spherical harmonics; consistency between variance of complex random numbers in the AR1 process and the variances of the random numbers for real and imaginary part).

along with several minor bug fixes.

Changes to the CA code are:

- Changes to achieve bit-reproducible results when changing the number of processors and tasks. These changes are an amended use of the random numbers, an updated neigbour calculation and a revised global scaling.

Files modified(IFS):
`adiab/spchor.F90`
`module/stoph_mix.F90 yoe_cuconvca.F90`
`namelist/namca.h namstoph.h`
`phys_ec/callpar.F90`
`setup/sucuconv_ca.F90 surand1.F90 surand2.F90`

Files modified(SCRIPTS):
`gen/modeleps`

Frederic Vitart - nec_CY36R4_NEMO_ML

NEMO and mixed layer model

- IFS: for the ocean mixed-layer model (new variables to define the domain where the ML is applied, changes in the grib code of the outputs).
- scripts: changes to allow the coupling with mixed-layer model and coupling with the ocean model NEMO
- prepdata: a number of Fortran files have been added in prepdata (like tropical storm tracker or files for mixed-layer model)

Files created(PREPDATA):

kpp/average_fields.f90 axis.f90 cdfio.f90 cdfrestart.f90 conv2grib_geo_nemo.f90 defval.f90 eos/cp_FH.F90 eos/de_dt_FH.F90 eos/enthalpy_FH.F90 eos/entropy_FH.F90 eos/entropy_diff.F90 eos/eosall_from_eta.F90 eos/eosall_from_theta.F90 eos/eta_from_t.F90 eos/eta_from_theta.F90 eos/rho_FH.F90 eos/rho_from_eta.F90 eos/rho_from_theta.F90 eos/t_from_eta.F90 eos/theta_from_eta.F90 eos/theta_from_t.F90 nearneighbor_255l_2.f90 nearneighbor_399l_2.f90 nearneighbor_639l_2.f90 read_grb.f90 test_levels_analysis.f90 tools.f

tcyc/max.f90 storm.f90 traj_atl.f90 traj_nin.f90 traj_npac.f90 traj_shem.f90

Files created(SCRIPTS):

def/eps_nemo.def

gen/getobssst mkabs_kpptools mkabs_mofctools mkabs_tcyctools modeleps_nemo omlini_nemo

sms/getobsSST.sms kpp_tools.sms modeleps_nemo.sms oml.sms omlini_nemo.sms tcyc_tools.sms

sms_oc/mofc_tools.sms

Files modified(IFS):

climate/updclie.F90

module/yoephy.F90 yom_grib_codes.F90

namelist/naephy.h

setup/su0phy.F90

Files modified(PREPDATA):

programs/ensms_veps.F90 prob_perc.F90 reord_veps.F90

Files modified(SCRIPTS):

def/eps_varfc.def gen.def

gen/getpersSST mkidta_eps

oce/extrafields_veps_create storm wm_archive_veps_sfc wm_archive_veps_ua wm_create_veps_sfc wm_create_veps_ua

sms/getiniLeg.sms trans_an.sms

sms_oc/cleantc.sms extrafields.sms tcyc.sms wm_sfc.sms wm_ua.sms

Files modified(SURF):

module/susocean_ml_mod.F90

MACC

Richard Englein, Antje Inness and Jean-Jacques Morcrette - stj_CY36R4_MACC_for_CY36R5_-with_AER

MACC contribution

Various bug fixes; adjustments to the aerosol model; additions for future use of direct and indirect effect of aerosol on radiation; VarBC for greenhouse gases; adding MARS MC class to IFS; move various MACC input climatologies from ecfs to /home/rd/ecgems/data

Files created(IFS):

phys_ec/aer_diag1.F90 aer_lidsim.F90 aer_rrtm.F90

Files modified(IFS):

adiab/gpnoxad.F90 gpnoxtl.F90

dia/class_grib.F90

module/yoeaeratm.F90 yoeaerlid.F90 yoeaerop.F90 yoecldp.F90 yoerad.F90

namelist/naeaer.h naerad.h namcldp.h

obs_preproc/reo3sin.F90

op_obs/hdepart.F90 hopad.F90 hoptl.F90 nox2no2ad.F90 nox2no2tl.F90

phys_ec/aer_bdgtmss.F90 aer_cgrowth.F90 aer_cld.F90 aer_drydep.F90 aer_phy2.F90 aer_phy3.F90 aer_rad.F90 aer_scavbc.F90 aer_scavin.F90 aer_sedimnt.F90 aer_so2so4.F90 aer_src.F90 callpar.F90 callparad.F90 cuascn.F90 cucalln.F90 cumastrn.F90 cumastrnad.F90 radintg.F90 radlswr.F90 su_aerop.F90 su_aerw.F90 sucldp.F90

phys_radi/rrtm_ecrt_140gp_mcica.F90 rrtm_rrtm_140gp_mcica.F90 srtm_srtm_224gp_mcica.F90 suecrad.F90

var/jbtomodel.F90 sujb.F90

Files modified(SCRIPTS):

build/arch/Makefile.in.ibm_power6

def/an.def

gen/REO3AK.ddl bufr2odb fetchobs gems_setup get_gems_surface getghgsfc getgrb ifstraj mklinks model obstat obstat_init prep_couplo4 prereo3

sms_era/obtime.sms

Files modified(WAM):

Wam_oper/class_wgrib.F

ERA

Roger Brugge - eras_CY36R4_screening_only_for_lodging

Screening suite for new observations

A switch LOBS_SCREEN activates code to create a screening job for the intiial processing of new observations (particularly relevant for reanalysis to evaluate datasets before assimilation). Typically such observations will be found on ECFS - but may not be available in each 12-hour window. A pre-defined (old) IFS experiment is necessary to provide the background fields. Before family OBS, a new family (INICOND) for both 00 and 12 cycles will be run in parallel as the 'initial conditions' are acquired for each cycle to obviate the need to integrate the 'old' experiment with the current model cycle code.

Some changes are also introduced behing the logical LSIMULODB tasks archive_simulodb and odbcmp_simulobs are used if LOBS_SCREEN is set on - these tasks have yet to be finalised.

Files created(SCRIPTS):

sms_an/test_obs_exist.sms

Files modified(SCRIPTS):

def/an.def

gen/fetcherr fetchmars getini getmars ifstraj ifsvar mkabs_b2otools mkabs_reanal model restartodb vardata

sms/getfcdata.sms getini.sms model.sms wavini.sms

sms_an/4dvar.sms b2otools.sms fetcherr.sms fetchmars.sms fetchobs.sms restartodb.sms vardata.sms

sms_era/reanal.sms

wav/wave_getrst

OBSTAT

Mohamed Dahoui - mo3_CY36R4_36r5

Obstat updates

- Few improvements and bug-fixes
- Add support to OCEANSAT-2 scatterometer data
- Add support to Gabor's modifications regarding the forecast departures.
- Add an internal mapping between the new ID of AQUA for AMSUA (784) instead of 222. This change has been requested by Alan Geer
- Last version of the new obstat plotting routines of gridded statistics
- Add cellno to obstat_scatt.sql to produce scatter plots between fg departures and FOV for the soil moisture from ASCAT

Files created(ODB):

ddl.ECMA/obstat_fcdep.sql obstat_fcdep_gpsro.sql

ddl/obstat_fcdep.sql obstat_fcdep_gpsro.sql

Files created(SCRIPTS):

sms_an/obstat_archive.sms obstat_archive_airs.sms obstat_archive_amsre.sms obstat_archive_amsua.sms obstat_archive_amsub.sms obstat_archive_conv.sms obstat_archive_geos.sms obstat_archive_gpsro.sms obstat_archive_hirs.sms obstat_archive_iasi.sms obstat_archive_iras.sms obstat_archive_meris.sms obstat_archive_mhs.sms obstat_archive_msu.sms obstat_archive_mwhs.sms obstat_archive_mwri.sms obstat_archive_mwts.sms obstat_archive_reo3.sms obstat_archive_reo3ak.sms obstat_archive_satob.sms obstat_archive_scatt.sms obstat_archive_smos.sms obstat_archive_ssmi.sms obstat_archive_ssmis.sms obstat_archive_ssu.sms obstat_archive_surf_conv.sms obstat_archive_tmi.sms obstat_archive_windsat.sms

Files modified(OBSTAT):

bias_sat/biasprep_fbcrack_geos.F90

module/bufrcodes.F90 dataqc.F90 globvar.F90 mod_sat_monitor.F90 obsdata.F90

satmon/sat_add_geo.F90

src/addstat.F90 bucoord.F90 buxtract.F90 defsensor.F90 genopt.F90 inibufr.F90 iniglob.F90
iniitemloc.F90 inisoftarea.F90 inisoftdef.F90 inisoftflag.F90 inisoftinstr.F90 inisoftstream.
mergesoft.F90 mpsoft.F90 obstat.F90 obstat_add_grib.F90 obstat_geo_plot.F90 obstat_-
hist_plot.F90 obstat_hov_plot.F90 obstat_normalize_grib.F90 obstat_normalize_scat.F90
obstat_overview_hist_plot.F90 obstat_scat_plot.F90 odbread.F90 odbscaling.F90 odbscatamb.F90
outcoverage.F90 updhard.F90 updsoft.F90 user_data_read.F90 writegribs.F90 writescat.F90

Files modified(ODB):

ddl/obstat_scatt.sql

Files modified(SCRIPTS):

build/Makefile.root.obstat perl/dependanal.pl
gen/mkabs_obstat obstat obstat_init satmon_getdat
sms_era/obtime.sms obtime_iasi.sms obtime_meris.sms

ESUITE

Jan Haseler - dah_CY36R4_esuite

Esuite changes extra to CY36R4

TECHNICAL

George Mozdzynski - mpm_CY36R4_clean

Remove obsolete radiation variables NRINT and LRADLB

'NRINT - Interpolation Factor' from the 'Radiation calculation' options.

Files modified(SCMEC):

source/suecrad1c.F90

Files modified(SURF):

offline/module/yoerad.F90

George Mozdzynski - mpm_CY36R4_gath

Improve performance of gather operations performed by gath_grid_ctl_mod

Gather operations performed by gath_grid_ctl are done using a call to mpl_alltoallv (gstats counter 809) and have been found to be inefficient in cases where the number of fields gathered is significantly smaller than the number of tasks (NPROC). In these cases it is more efficient to use non-blocking sends and recvs as shown by the examples below. In addition subroutine assign_ioproc in iostream_mix.F90 has been modified to (where possible) distribute tasks performing I/O uniformly across the number of IO procs (numioprocs). This results

in a small reduction in memory use for both model and 4D-Var cases tested.

For T1279 384x8 4D-Var experiments performance is unchanged with this branch. Peak memory use in traj0 for this case reduces from 34014 MB to 33905 MB.

Results are bit identical with 36R4 controls.

Files modified(IFS):

`module/iostream_mix.F90`

Files modified(TRANS):

`gath_grid_ctl_mod.F90`

Anne Fouilloux - stf_CY36R4_remove_CO2_sink

Removal of CO2 sink variables

The usage of CO2 sink variables has been removed from IFS (was obsolete). The associated ODB table co2_-sink and all the corresponding ODB columns have been removed too.

Files modified(IFS):

`common/yomdb_defs.h yomdb_vars.h`
`module/yomtvrad.F90 yomvar.F90`
`namelist/namvar.h`
`obs_preproc/defrun.F90 mkglobstab.F90`
`op_obs/hoptl.F90 hradp.F90 hradp_ml.F90 hradp_ml_ad.F90 hradp_ml_tl.F90 hradpad.F90 hradptl.F90 radtr.F90 radtrad.F90 radtrk.F90 radtrtl.F90`
`var/rtsetup.F90 sualctv.F90 suvar.F90 taskob.F90 taskobtl.F90`

Files modified(ODB):

`cma2odb/ctxinitdb.F90 getatdb.F90 getdb.F90 init_odb_tables.F90 initmdb.F90 putatdb.F90 shuffledb.F90 xchangedatadb.F90`
`ddl/cma.h radiance.h`

Files modified(SCRIPTS):

`gen/ifsmin ifstraj sekf_sm`

Files deleted(IFS):

`op_obs/tropopause.F90`

Files deleted(ODB):

`ddl.CCMA/co2_sink.h mkglobstab_co2_sink.sql sathdr_co2_sink.sql`
`ddl.ECMA/co2_sink.h mkglobstab_co2_sink.sql obsort_co2_sink.sql sathdr_co2_sink.sql sathdr_screen_co2_sink.sql`
`ddl/co2_sink.h mkglobstab_co2_sink.sql obsort_co2_sink.sql sathdr_co2_sink.sql sathdr_screen_co2_sink.sql`

Anne Fouilloux - stf_CY36R4_Blacklist

Update of blacklist language

At user request, the blacklist language has been enriched with ”elif statement”:

The IF-statement syntax is now:

```
 if (condition) then
     statement_1;
     statement_2;
     etc.
[elif (condition) then
    statement_1;
    statement_2;
    etc.
]*
[else
    statement_1;
    statement_2;
    etc.]
endif;
```

Files modified(BL):

`compiler/eval.c generate.c lex.l tree.c yacc.y`

Anne Fouilloux - stf_CY36R4_MARS_cleaning

ODB cleaning

The main purpose of this branch is to clean the ODB usage in IFS (atovs and atovs_pred tables were completely removed; it means that some columns were renamed/moved to radiance table; some other were removed) in preparation of ODB archiving in MARS.

Archiving of ODBs in MARS was also improved; it now allows to create a MONDB which depends on the observation type. Archiving of MONDBs in MARS is turn on by default for all RD experiments (it still needs to be off in operation); However, the MONDB database (in old format) is still stored in ecfs for all RD experiments.

This branch also contains a few optimisations/cleaning in the ODB core (for instance msgpass_obsdata was optimized by John Hague).

Files created(ODB):

`interface/msgpass_loaddata.h msgpass_storedata.h`

`lib/msgpass_loaddata.F90 msgpass_storedata.F90`

`module/odbio_msgpass.F90`

Files created(SCRIPTS):

`gen/NEXRAD.ddl mondb.sql mondb_allsky.sql mondb_gpsro.sql mondb_groupid=1.sql mondb_groupid=10.sql mondb_groupid=11.sql mondb_groupid=12.sql mondb_groupid=13.sql mondb_groupid=14.sql mondb_groupid=15.sql mondb_groupid=16.sql mondb_groupid=17.sql mondb_groupid=18.sql`

mondb_groupid=19.sql mondb_groupid=2.sql mondb_groupid=20.sql
mondb_groupid=21.sql mondb_groupid=22.sql mondb_groupid=23.sql
mondb_groupid=24.sql mondb_groupid=25.sql mondb_groupid=26.sql
mondb_groupid=27.sql mondb_groupid=28.sql mondb_groupid=29.sql
mondb_groupid=3.sql mondb_groupid=30.sql mondb_groupid=31.sql
mondb_groupid=32.sql mondb_groupid=4.sql mondb_groupid=5.sql mondb_groupid=6.sql
mondb_groupid=7.sql mondb_groupid=8.sql mondb_groupid=9.sql mondb_meris.sql
mondb_sat.sql mondb_satob.sql mondb_tovs.sql

sms_an/archive_simulobs.sms odbcmp_simulobs.sms

Files modified(IFS):

common/yomdb_defs.h yomdb_vars.h

module/yomcmhdr.F90

obs_preproc/black.F90 mkglobstab.F90

op_obs/hop.F90 hopad.F90 hoptl.F90 hradp.F90 hradp_ml.F90 hradp_ml_tl.F90 hradptl.F90
hretr.F90 rad1cemis.F90

Files modified(OBSTAT):

src/iniitemloc.F90 odbread.F90

Files modified(ODB):

aux/cma_open.c newio.c

bufr2odb/bufr2odb_airs.F90 bufr2odb_atovs.F90 bufr2odb_fy3.F90 bufr2odb_grad.F90
bufr2odb_iasi.F90 bufr2odb_msg.F90 get_odb2bufr_varindex.F90 get_varindex.F90
odb2bufr_summary.F90

cma2odb/ctxinitdb.F90 distribute_odb.F90 distributedb.F90 getatdb.F90 getdb.F90
initmdb.F90 map_reportype.F90 putatdb.F90 shuffledb.F90 update_obsdb.F90

ddl/airs.sql black_atovs.sql black_robhdr_4.sql cma.h cycle_biasprep_satpred.sql
ecmwf_matchupsink.sql emiskf_amsua.sql emiskf_amsub.sql emiskf_mhs.sql
fb_getatovs_pred.sql gpsro_2.sql level1cgeos_robhdr_1.sql matchup_atovs_pred.sql
matchupsink.sql mkglobstab_atovs.sql modsurf.h new_thinn_robhdr_2.sql
obsdist_auxiliary.sql obsdist_modsurf.sql obstat_tovs.sql
post_thinn_robhdr_2.sql pre_thinn_robhdr_2.sql radiance.h sat.h sat_atovs.sql
sathdr_screen_atovs.sql smon_hsris.sql ssmi1d.h thinn_robhdr_2.sql

lib/codb.c

module/odb.F90 odb2bufr_varindex_module.F90 odbiomap.F90 varindex_module.F90

pandor/extrtovs/extr_lecdata_1c.F90 module/bator_ecritures_mod.F90

scripts/make.linux_O2 make.linux_O2_new_magics make.linux_O2_pg

tools/hcat.c

Files modified(SCRIPTS):

build/Makefile.root.obstat

def/an.def

gen/AIRS.ddl HIRS.ddl IASI.ddl IRAS.ddl MONDB.ddl ODBCMP.ddl TOVS.ddl
archive_mondb archive_obsgroup create_ioassign mergeodb obstat odb2bufr
odbshuffle satmon_getdat

sms_an/archive_mondb.sms archive_obsgroup.sms odb_mondb.sms odb_prepare.sms

Files deleted(IFS):

obs_preproc/blacksat.F90

Files deleted(ODB):

cma2odb/update_links.F90

ddl.CCMA/obsdist_atovs.sql obsdist_atovs_pred.sql

ddl.ECMA/obsdist_atovs.sql obsdist_atovs_pred.sql obsort_atovs.sql
obsort_atovs_pred.sql update_links_atovs.sql

ddl.ECMASCR/ECMASCR.ddl ECMASCR.dep aeolus.h alloc.h bits.h body.h
bufrdata_presence.sql cdrhook.h check_linksdb.sql cma.h date_time.sql dca.h
ecstdlib.h fb_getatovs_pred.sql fb_getbody.sql fb_getbufr.sql fb_geterrstat.sql
fb_gethdr.sql fb_getreo3.sql fb_getsatob.sql fb_getscatt.sql
fb_getscatt_body.sql fb_gettypes.sql fb_getupdate_1.sql fb_getupdate_2.sql
fb_getupdate_3.sql funcs.h gather4poolmask.sql gather4poolmask_counts.sql hdr.h
idx.h info.h magicwords.h manda_gene_body.sql manda_gene_hdr.sql
manda_laelalo.sql map_ssmi_rain_ssmi.sql mdi.h mobhdr_obsort.sql
mobhdrca_obsort.sql namecfg.h obsort_atovs.sql obsort_atovs_pred.sql
obsort_body.sql obsort_errstat.sql obsort_hdr.sql obsort_hdr2body.sql
obsort_hdr2radar_body.sql obsort_hdr2reo3_body.sql obsort_index.sql
obsort_limb.sql obsort_radar.sql obsort_radar_body.sql obsort_radar_station.sql
obsort_reo3.sql obsort_reo3_body.sql obsort_sat.sql obsort_satob.sql
obsort_scatt.sql obsort_scatt_body.sql obsort_ssmi.sql obsort_ssmi_body.sql
obsort_update_1.sql obsort_update_2.sql obsort_update_3.sql obsortca_body.sql
obsortca_errstat.sql obsortca_hdr.sql obsortca_hdr2body.sql obsortca_index.sql
obsortca_update_1.sql obsortca_update_2.sql obsortca_update_3.sql obstype.h
odb.h odb98.flags odb_macros.h odbcrc.h odbmd5.h pcma_extern.h poolmask_3.sql
ppcode.h pre_thinn_robhdr_10.sql pre_thinn_robody_10.sql privpub.h radar.h
reprod_seqno_1.sql reprod_seqno_2.sql reprod_seqno_3.sql reprod_seqno_4.sql
resat.h robhdr_obsort.sql robhdrca_obsort.sql satbody_radar.sql sathdr_radar.sql
satob.h scatt.h sensor.h small.sql smos.h ssa_robhdr_2m.sql ssa_robhdr_snow.sql
ssa_robody_2m.sql ssa_robody_snow.sql ssmi1d.h swapbytes.h tslot.sql
type_definitions.h update_body_3.sql update_desc_1.sql update_desc_2.sql
update_hdr_1.sql update_hdr_2.sql update_hdr_3.sql update_links_atovs.sql
update_links_ssmi.sql varno.h vertco_type.h

ddl.POSTODB/POSTODB.ddl alloc.h mdi.h obstype.h odb.h odb98.flags privpub.h
sensor.h varno.h

ddl.PREODB/PREODB.ddl PREODB.dep alloc.h bits.h cdrhook.h dca.h ecstdlib.h
funcs.h idx.h magicwords.h mdi.h namecfg.h obstype.h odb.h odb98.flags
odb_macros.h odbcrc.h odbmd5.h pcma_extern.h ppcode.h privpub.h swapbytes.h
varno.h vertco_type.h xcheck.sql

ddl/obsdist_atovs.sql obsdist_atovs_pred.sql obsort_atovs.sql
obsort_atovs_pred.sql update_links_atovs.sql

include/svipc.h

interface/msgpass_obsdata.h

lib/msgpass_obsdata.F90

perl/skeleton.pl

Sylvie Malardel - nas_CY36R4_bugfix

New optional argument to SUTRANS

Files modified(IFS):

setup/sutrans.F90

Mats Hamrud - nar_CY36R4_MPL

More 32 bit options for MPL

Files modified(IFSAUX):

`module/mpl_alltoallv_mod.F90 mpl_scatterv_mod.F90`

John Hague - ibj_CY37_obshor

Cleaning of MPOBSEQ

Files modified(IFS):

`op_obs/mpobseq.F90 mpobseq_pack.F90 obshor.F90`

Deborah Salmond - das_CY37_obshor

Cleaning and Fixes

- Cleaning of observation interpolation
- Reduce memory of varbc_allsky
- Fix for bounds checking for non-zero NVEXTRADYN
- Introduce optional arguments to varbc_biastl and varbc_biasad

Files created(IFS):

`op_obs/cobslagtl.F90 mpobseqtl.F90 mpobseqtl_pack.F90 obshortl.F90 post_obshortl.F90 cobstl.F90 slint_canari.F90 slinttl.F90`

Files modified(IFS):

`canari/canari.F90`
`control/cnt4tl.F90 scan2mtl.F90`
`module/module_obb1_mix.F90 varbc_allsky.F90 varbc_eval.F90 yomsc2.F90`
`mwave/mwave_obsop_tl.F90 mwave_obsop_ad.F90`
`obs_preproc/suobs.F90`
`op_obs/cobsad.F90 cobslagad.F90 hoptl.F90 hopad.F90 mpobseq.F90 mpobseq_pack.F90 mpobseqad.F90 mpobseqad_unpck.F90 obshorad.F90 slint.F90`
`setup/sudim1.F90`