

RESEARCH DEPARTMENT
MEMORANDUM



To: RD Scientific Staff and Consultants

Copy: HR, HO, HMD, HMAS, HMOS, J.Hodkinson Jean Pailleux,
François Bouttier, Claude Fischer

From: Deborah Salmond et al.

Date: August 27, 2009

File: R48.4/DS/0960

Subject: IFS Memorandum Cycle CY36R1

Cycle 36r1 was created in August 2009. This cycle comes from CY35R3 which was merged with contributions from Météo-France CY35T2 to make CY36.

Modified libraries: ifs ifsaux odb satrad scat scmec scripts wam

Contributors:

Peter Bechtold, Jean Bidlot, Niels Bormann, Andrew Collard, John Hague, Mats Hamrud, Jan Haseler, Elias Holm, Lars Isaksen, Tony McNally, George Mozdzyński, Gabor Radnoti, Deborah Salmond, Agathe Untch, Tomas Wilhelmsson

Scientific changes

Lars Isaksen

Varqc for 2m relative humidity

Varqc is now applied to 2m relative humidity

Files modified(IFS):

obs_preproc/defrun.F90

Elias Holm

Improved Fixes for 4d-Var TL model instabilities

Files modified(IFS):

adiab/laidditl.F90 laidditlad.F90 laitlitl.F90 laitlitlad.F90 laitritl.F90
laitritlad.F90
parallel/write_spec.F90
var/sujb.F90

Correction for LGPINNER=false

Addition of an extra transform inside jbtomodel to ensures it has same spectral and gridpoint q.

Files modified(IFS):

var/jbtomodel.F90 jbtomodelad.F90

Tony McNally and Andrew Collard

Fixes for Cloud Estimate

Fixes for the case of no IASI or AIRS data.

Files modified(IFS):

op_obs/cf_digital.F90 cloud_detect.F90 cloud_estimate.F90

Jean Bidlot

Small changes to Wave model

For runs with 36 frequencies the value of the minimum Charnock coefficient is adapted and efficiency of the small utility create_wam_bathymetry improved.

Files modified(WAM):

Wam_oper/preproc.F create_wam_bathymetry.F

Gabor Radnoti

Fix for GRTEST

Fix to make Gradient Test work.

Files modified(IFS):

var/grtest.F90

Agathe Untch

HDIFFVO modified for T1279

Files modified(IFS):

adiab/fspglh.F90

Bit Reproducible : Passive and technical changes

Peter Bechtold

New namelist switch LBUDCYCLE

Logical LLDIADCYCLE in callpar.F90 is replaced by a namelist switch LBUDCYCLE.

Files modified(IFS):

```
phys_ec/callpar.F90 module/yoephy.F90 setup/su0phy.F90 namelist/naephy.h
```

Niels Bormann

Fix to remove NANQs from AMSU-A observations

Files modified(SATRAD):

```
rttov/rttov_ec.F90 rttov_calcrad_basic.F90
```

John Hague

Optimisations for IBM Power6

Optimisations improve the T799 Forecast by 10%. For example:

1. Remove store zero's where not necessary
2. Move inner loop calculations to outer loop
3. Move 2D computation to 1D, and 1D to 0D
4. Move Divide outside loop
5. Add @PROCESS HOT (NOVECTOR) NOSTRICT
6. Remove IFs
7. Split store loops

Files created(IFS):

```
module/yoecldpx.F90
```

Files created(IFS AUX):

```
include/fjfnsh
```

Files modified(IFS):

```
phys_ec/cloudsc.F90 cloudvar.F90 cuadjtq.F90 vdfexcu.F90 vdfincr.F90 vdfmain.F90  
vdfouter.F90
```

```
phys_radi/srtm_spcvrt_mcica.F90
```

Mats Hamrud

More GSTATS

Files modified(IFS):

obs_preproc/defrun.F90

var/sujqcor.F90

Jan Haseler

Scripts changes

- Correct triggers for surf_anal family.
- Increase time limit for making wave model constant files.
- Only execute revert_seqnos in odbshuffle if there is more than one analysis subwindow.
- Remove obsolete variables from run_parallel.

Files modified(SCRIPTS):

def/an.def

gen/ifsmim ifstraj model odbshuffle run_parallel

sms/wconst.sms

sms_an/bufr2odb.sms

George Mozdzynski

Message passing optimisation for DDH

Detailed stats showed a high message passing cost for routine DRESDDH for large numbers of tasks. This is resolved by rewriting the message passing in this routine to use a 2 stage communication scheme.

For a T799L91 model running on c1a, the following is the MPI cost of routine dresddh as a percentage of the total wall time.

Tasks x threads	Control percent	Optimised percent
256 x 4	0.54	0.52
512 x 4	0.61	0.57
2048 x 1	7.04	0.94
4096 x 1	12.47	1.25

This branch produces bit identical results against controls.

Files modified(IFS):

parallel/dresddh.F90 dia/ppeddhec.F90 utility/gstats_label_ifs.F90

Improvement of VARBC for LREPRO4DVAR=T

The purpose of this branch is to simplify those VARBC routines with LREPROD4VAR specific code by removing the use of integer arrays for MPI communication (and the associated scaling) in this configuration.

By using the order independent sum approach developed by Mike Fisher, this branch obtains identical results (i.e. JO=) by just a few calls to a new order_indep_global_sum2 routine (which is a truly reproducible equivalent of MPI.allreduce).

This branch further produces bit identical results (JO='s) to the default LREPRO4DVAR=F 35R3 control 4D-Var.

Files modified(IFS):

module/varbc_eval.F90 varbc_pred.F90 varbc_setup.F90 var/cvarbcad.F90
cvarbcinad.F90 taskob.F90 taskobad.F90

Files modified(IFSAUX):

module/order_independent_summation_mod.F90

GSTATS for 4D-Var rain assimilation

Files modified(IFS):

mwave/mwave_get.F90 mwave_get_ad.F90 mwave_get_tl.F90 mwave_gp2obs.F90
mwave_igp2obs.F90 mwave_iobs2gp.F90 mwave_nearest.F90 mwave_obs2gp.F90
mwave_put.F90 mwave_put_tl.F90
utility/gstats_label_ifs.F90

Deborah Salmond, Tomas Wilhelmsson and Mats Hamrud

Optimisation of Post-processing for Operations

Improvements to the scalability of FULLPOS and WAM associated with the operational post-processed output.

A run of T1279 on 48 nodes has been reduced from 3779 to 3108 seconds.

Files modified(IFS):

fullpos/sumpfpos.F90 sumpfpos_dep.F90

Files modified(WAM):

Wam_oper/spec2fdb.F

Deborah Salmond

Optimisation and Cleaning

- Optimisations of RADLSWTL and RADLSWAD (with Steve White IBM)
- Re-Optimisation of dynamics routines cleaned in CY36.
- Tidy/optimisation of RTTOV_7_SETPREDICTORS (with Ludovic Auger MF)

- Removal of duplicate routines

Files modified(IFS):

adiab/laitri.F90 larche_hlp.F90 lascaw.F90 lascaw_cla.F90 lascaw_clo.F90
 lascaw_vintw.F90
 phys_ec/radlswad.F90 radlswtl.F90 su_aerw.F90
 phys_radi/suecrad.F90

Files modified(IFS AUX):

eclite/bindproc.c

Files modified(ODB):

cma2odb/initmdb.F90

Files modified(SATRAD):

rttov/rttov_setpredictors_7.F90 rttov_setpredictors_7_ad.F90
 rttov_setpredictors_7_tl.F90

Tomas Wilhelmsson

Remove unused subroutine arguments

As agreed with Météo-France, remove unused subroutine arguments from mainly phys.ec. Also corrects some other norm violations.

Files modified(IFS):

adiab/postphy.F90 spchor.F90
 c9xx/aplmlg.F90 chk923.F90 coord_dts.F90 cseaice.F90 geo923.F90 grtestr.F90
 gtoptx2.F90 gtoptxy.F90 gtopty2.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 inirp.F90 inter0.F90 inter6.F90 locmaxi.F90
 ppv923.F90 relnew.F90 relspe.F90 simrel.F90 val923.F90
 canari/cabiyo.F90 cabotu.F90 cacdgu.F90 caclsst.F90 cadavr.F90 caeincw.F90
 cagade.F90 caidgu.F90 caimma.F90 calice.F90 calico.F90 calife.F90 calina.F90
 camelo.F90 caprsurf.F90 carcli.F90 caspia.F90 cavodk.F90 dealcan.F90 sualcan.F90
 climate/cormass3a.F90 updclie.F90 updclie_co2.F90
 control/cmac.F90 cmacad.F90 cmactl.F90 cnmi.F90 cnmitl.F90 cnt2.F90 cnt3.F90
 cnt3ad.F90 cnt4.F90 cnt4ad.F90 cnt4tl.F90 cprep1.F90 cprep4.F90 cprep5.F90
 cva2.F90 forecast_error.F90 gp_model.F90 gp_model_ad.F90 gp_model_tl.F90
 scan2had.F90 scan2htl.F90 scan2mad.F90 sim4d.F90 spc2m.F90 spc2mad.F90
 spchad.F90 spcmad.F90 stepo.F90
 dfi/copsp.F90 corssp.F90 dfi.F90 dfil.F90 difsp.F90 dolfil.F90 gee.F90 optfil.F90
 optfilb.F90 reast.F90 recfil.F90 smpfil.F90 suini.F90 zeroacu.F90
 dia/aro_surf_diagh.F90 chkevo.F90 cpxfu.F90 foutcnorm.F90 gptcnorm.F90
 grnorma.F90 ppfidh.F90 ppsydh.F90 pregrbenc.F90 spmcuf.F90 spnormave.F90
 spnormb.F90 spnormbe.F90 spnormbl.F90 spnormbm.F90 suechk.F90 sumddh.F90
 sunddh.F90 suppdte.F90 wrgridua.F90 wrmlppg.F90 wrtcfou.F90 zeroddh.F90
 fullpos/cpvpospr.F90 cvlaniso.F90 dynfpos.F90 fpfilter.F90 fpgeo.F90 fphor12.F90
 fpmodcfu.F90 fpmodxfu.F90 inilwrfp.F90 ini2wrfp.F90 ini3wrfp.F90 openfpfa.F90
 rdecclimo.F90 sc2rdgfp.F90 sc2wrgfp.F90 spos.F90 su4fpos.F90 sualfpos.F90
 subfpos.F90 sufpcfu.F90 sufpcnf.F90 sufpd.F90 sufpdim.F90 sufpdom.F90

sufpdyn.F90 sufpf.F90 sufpg2.F90 sufpios.F90 sufpoph.F90 sufpphy.F90
sufpsc2b.F90 sufppwide.F90 suhowl.F90 suvfpos.F90 suvpos.F90 updvpos.F90
wrplfp.F90 wrthlfp.F90
module/aeolus_l2bp_wrapper_mod.F90 control_vectors_comm_mod.F90 gfl_subs_mod.F90
iostream_mix.F90 par_rdlr.F90 parclimf.F90 pardim.F90 pargen.F90 parlvly.F90
parptrs.F90 parrint.F90 parrrtm.F90 perdim.F90 ptrfp4.F90 ptrgfu.F90 ptrgppc.F90
ptrspor.F90 qaboit.F90 qaclim.F90 qacobs.F90 qacoss.F90 qacost.F90 qadiag.F90
qagpsf.F90 qaimpo.F90 qakeki.F90 qalbar.F90 qalola.F90 qamcok.F90 qapabl.F90
qapabo.F90 qapass.F90 qapavu.F90 qapcad.F90 qaref.F90 qasset.F90 qavara.F90
traj_main_mod.F90 traj_surface_mod.F90 varbc_allsky.F90 varbc_eval.F90
varbc_pred.F90 varbc_rad.F90 varbc_setup.F90 varbc_tcwv.F90 varbc_to3.F90
ydualm_tke.F90 yemcli.F90 yemcosjr.F90 yemdim.F90 yemfpg.F90 yemgeo.F90
yemgsl.F90 yemmp.F90 yemspbc.F90 yhlrturb.F90 yoeaerc.F90 yoeaerd.F90 yoeclb.F90
yoeclb.F90 yoeclnd.F90 yoedbug.F90 yoemeth.F90 yoeovlp.F90 yoephli.F90
yoeradghg.F90 yoerip.F90 yoerrtab.F90 yoerrtbg2.F90 yoerrtfr.F90 yoerrtrf.F90
yoerrtrwt.F90 yoesrtab.F90 yom4fpos.F90 yom_cpl.F90 yom_grid_biconserv.F90
yom_ptr_ssmi.F90 yomaer15.F90 yomaerd15.F90 yomalim.F90 yomana.F90 yomaneb.F90
yomangm.F90 yomauxb.F90 yomblinit.F90 yomcddh.F90 yomcfu.F90 yomchcod.F90
yomchet.F90 yomchev.F90 yomclp15.F90 yomcltc.F90 yomcma.F90 yomcmbdy.F90
yomcmddr.F90 yomcmhdr.F90 yomcosjb.F90 yomcosjr.F90 yomcou.F90 yomcpg.F90
yomct0b.F90 yomct1.F90 yomct2.F90 yomct3.F90 yomdag.F90 yomdim.F90 yomdimb.F90
yomdimt.F90 yomectab.F90 yomfa.F90 yomffttc.F90 yomfglim.F90 yomfltxt.F90
yomfoutc.F90 yomfpdim.F90 yomfpg.F90 yomfpg.F90 yomfpgind.F90 yomfpios.F90
yomfpop.F90 yomfpp.F90 yomgco.F90 yomgfl.F90 yomgfub.F90 yomgppb.F90
yomgppcb.F90 yomgpsk.F90 yomini.F90 yominstp.F90 yomiomi.F90 yomios.F90
yomjfh.F90 yomjr.F90 yomladdh.F90 yomleg.F90 yomlfi.F90 yomlvly.F90 yommask.F90
yommpg.F90 yommts.F90 yommul.F90 yomncl.F90 yomnmcod.F90 yomnmev.F90 yomnmib.F90
yomnsv.F90 yomoba.F90 yomobs.F90 yomobset.F90 yomobset_thsafe.F90 yomompdist.F90
yomozo.F90 yompaddh.F90 yomperr.F90 yomppo.F90 yomphy.F90 yomphyds.F90
yomppc.F90 yomrad15.F90 yomradf.F90 yomrdi15.F90 yomres.F90 yomrfpds.F90
yomrgri.F90 yomrinc.F90 yomrip15.F90 yomrplim.F90 yomrstrhbias.F90 yomsree.F90
yomsddh.F90 yomsens.F90 yomsep.F90 yomsig.F90 yomsld.F90 yomsnu.F90 yomspnrm.F90
yomsppco.F90 yomspsdt.F90 yomspt7.F90 yomsptt.F90 yomsrftlad.F90 yomssg.F90
yomsw15.F90 yomtag.F90 yomtdh.F90 yomtim.F90 yomtlevol.F90 yomtnewt.F90
yomvareps.F90 yomvdoz.F90 yomvfp.F90 yomvnm.F90 yomvrtl.F90 yomvvl.F90
yomwm.F90 yomxfub.F90 yophlc.F90
mwave/mwave_nearest.F90 mwave_obsop_test.F90 mwave_setup.F90
nmi/fltmode.F90 fltmodead.F90 houspe3.F90 houspe3ad.F90 mo3dprj.F90
mo3dprjad.F90 moprj.F90 moprjad.F90 moprjm.F90 moprjmad.F90 multfad.F90
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nnmi3tl.F90 rdpinmi.F90 reord.F90 reordad.F90 reordo3.F90 reordo3ad.F90
scinim.F90 scnrm.F90 spehou3.F90 spehou3ad.F90 speimp.F90 speimpad.F90
sualltt.F90 sumode3.F90 sumode3e.F90 sumode3i.F90 sumode3l.F90 sunmi.F90
vtran.F90 vtranad.F90 vtranm.F90 vtranmad.F90
obs_error/finoerr.F90
obs_preproc/ascatif.F90 ascatsm_cdfmatch.F90 ascatsm_cdfpar.F90
biascor_era40.F90 decis.F90 defrun.F90 gen_corr_pert.F90 ifsodbddr1f.F90
ifsodbddr2f.F90 new_thinn_radar.F90 ngedsta.F90 obschar.F90 obsgen.F90
opk_obsor.F90 pre_thinn_radar.F90 prsta.F90 read_iasichans.F90 redrp_no_sq.F90
rh2q.F90 scaqc.F90 sekf_prep_ascat.F90 sonde_country_db_match.F90 suobscor.F90
updots.F90
ocean/sugco0.F90
onedvar/onedvar_adjoint_test.F90 onedvar_diagnostics.F90

onedvar_find_satsens.F90 onedvar_fstscrn.F90 onedvar_obsop.F90
 onedvar_obsop_gr.F90 onedvar_passive_ok.F90 onedvar_read_sat_bias.F90
 op_obs/aer_opt_prop.F90 aer_refl_ad.F90 aer_refl_op.F90 aer_refl_tl.F90
 aod_ad.F90 aod_op.F90 aod_tl.F90 atmref_gems.F90 atmref_gems_ad.F90
 atmref_gems_tl.F90 cf_digital.F90 cloud_estimate.F90 co2cldairs.F90 cod_op.F90
 cod_opad.F90 cod_optl.F90 csalbr_gems.F90 discom_gems.F90 discom_gems_tl.F90
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 gpscalc_alpha.F90 gpscalc_alpha2d.F90 gpscalc_alpha2dad.F90
 gpscalc_alpha2dtl.F90 gpscalc_alphaad.F90 gpscalc_alpharkm2.F90
 gpscalc_alpharkm2ad.F90 gpscalc_alpharkm2tl.F90 gpscalc_alphatl.F90
 gpscalc_nr2d.F90 gpscalc_nr2dad.F90 gpscalc_nr2dtl.F90 gpscalc_nrad.F90
 gpscalc_nrtl.F90 gpscalc_refrac.F90 gpscalc_refrac2d.F90 gpscalc_refrac2dad.F90
 gpscalc_refrac2dtl.F90 gpscalc_refractl.F90 gppderivs.F90 gppderivsad.F90
 gppderivstl.F90 gpsro_2dad.F90 gpsro_2dop.F90 gpsro_2dtl.F90 gpsro_ad.F90
 gpsro_oberror.F90 gpsro_op.F90 gpsro_tl.F90 grg_fparam.F90 grg_fparamtl.F90
 hjo.F90 hretr.F90 inv_refl1dstat.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 nox2no2.F90 nox2no2ad.F90 os_gems.F90 os_gems_ad.F90
 os_gems_tl.F90 pre_calc.F90 preints.F90 preintsad.F90 radlcnnead.F90
 radlcobe.F90 reflsim.F90 reflsim_2dop.F90 rt6s_gems.F90 rt6s_gems_ad.F90
 rt6s_gems_tl.F90 rtl_oberror.F90 rtl_screen.F90 scatra_gems.F90
 scatra_gems_ad.F90 scatra_gems_tl.F90 trunca_gems.F90 trunca_gems_ad.F90
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 set2pe.F90 slcomm.F90 slcset.F90 slrset.F90 trmtos.F90 trstom.F90
 phys_dmn/apl_arome.F90 aplpar.F90 radheat15.F90 recmwf.F90 vdfparcelhl.F90
 phys_ec/aer_bdgtmss.F90 aer_cgrowth.F90 aer_clcld.F90 aer_cld.F90 aer_climz.F90
 aer_dmso.F90 aer_drydep.F90 aer_phy1.F90 aer_phy2.F90 aer_phy3.F90 aer_rad.F90
 aer_scavbc.F90 aer_sdust.F90 aer_sedimnt.F90 aer_so2so4.F90 aer_src.F90
 aer_ssalt_ms.F90 aer_straact.F90 aer_straero.F90 aer_stratcl.F90 aer_strclog.F90
 aer_strcomp.F90 aer_strdens.F90 aer_strfind.F90 aer_strfree.F90 aer_strrlog.F90
 aer_strvelo.F90 aer_tau.F90 aer_tau2mixr.F90 aer_unit_conv.F90 callpar.F90
 callparad.F90 callpartl.F90 cldpp.F90 cloud.F90 cloudad.F90 cloudsc.F90
 cloudst.F90 cloudstad.F90 cloudsttl.F90 cloudtl.F90 cloudvar.F90 cond.F90
 condad.F90 condtl.F90 cpspe.F90 cuadjtq.F90 cuadjtqs.F90 cuadjtqsad.F90
 cuadjtqstl.F90 cuancape2.F90 cuascn.F90 cuascn2.F90 cuascn2ad.F90 cuascn2tl.F90
 cuascnad.F90 cuascntl.F90 cubasen.F90 cubasen2.F90 cubasen2ad.F90 cubasen2tl.F90
 cubasenad.F90 cubasentl.F90 cubasmcn.F90 cubasmcnad.F90 cubasmcntl.F90
 cucalln.F90 cucalln2.F90 cucalln2ad.F90 cucalln2tl.F90 cucallnad.F90
 cucallntl.F90 cuccdia.F90 cuccdiaad.F90 cuccdiatl.F90 cuctracer.F90
 cuctracerad.F90 cuctraceratl.F90 cuddrafn.F90 cuddrafn2.F90 cuddrafn2ad.F90
 cuddrafn2tl.F90 cuddrafnad.F90 cuddrafntl.F90 cudlfsn.F90 cudlfsnad.F90
 cudlfsntl.F90 cudtdqn.F90 cudtdqn2.F90 cudtdqn2ad.F90 cudtdqn2tl.F90
 cudtdqnad.F90 cudtdqntl.F90 cududv.F90 cududv2.F90 cududv2ad.F90 cududv2tl.F90
 cududvad.F90 cududvtl.F90 cuentr.F90 cuentrad.F90 cuentratl.F90 cuflx2.F90
 cuflx2ad.F90 cuflx2tl.F90 cuflxn.F90 cuflxnad.F90 cuflxntl.F90 cuinin.F90
 cuinin2.F90 cuinin2ad.F90 cuinin2tl.F90 cuininad.F90 cuinintl.F90 cumastrn.F90
 cumastrn2.F90 cumastrn2ad.F90 cumastrn2tl.F90 cumastrnad.F90 cumastrntl.F90
 cupdra.F90 cupdraad.F90 cupdratl.F90 custrat.F90 define_pointers_mp9.F90
 diag_dcycle.F90 ductdia.F90 ec_phys.F90 ec_phys_ad.F90 ec_phys_drv.F90
 ec_phys_tl.F90 ec_physg.F90 gems_tend_ad.F90 gp_sstaqua.F90 grg_nox2no2.F90
 gwdrag.F90 gwdrag_wms.F90 gwdragad.F90 gwdrags.F90 gwdragtl.F90 gwprofil.F90

gwsetup.F90 gwsetupad.F90 gwsetuptl.F90 o3chem.F90 phys_ad.F90 phys_nl.F90
 phys_tl.F90 qnegat.F90 radcfg.F90 raddrv.F90 radheat.F90 radheatad.F90
 radheatn.F90 radheattl.F90 radina.F90 radinaad.F90 radinatl.F90 radint.F90
 radintg.F90 radlsw.F90 radlswad.F90 radlswr.F90 radlswtl.F90 radozc.F90
 radozcmf.F90 radpar.F90 restore_surftstp.F90 restore_vdfout.F90 satur_ld.F90
 sltend.F90 sltend1.F90 sltend2.F90 store_surftstp.F90 store_vdfout.F90
 su_ghgclim.F90 suaerh.F90 sucldp.F90 suclop.F90 suclopn.F90 suecaec.F90
 sugwwms.F90 sumethox.F90 suvdf.F90 suwcou.F90 vdfdifcstl.F90 vdfdpbls.F90
 vdfexcu.F90 vdfhghtn.F90 vdfincr.F90 vdfmain.F90 wvrg2xf.F90 wvxf2gb.F90
 phys_radi/mcica_cld_gen.F90 mcica_cld_generator.F90 radghg.F90
 rrtm_ecrt_140gp.F90 rrtm_ecrt_140gp_mcica.F90 rrtm_taumol12.F90
 rrtm_taumol13.F90 rrtm_taumol3.F90 rrtm_taumol4.F90 rrtm_taumol5.F90
 rrtm_taumol7.F90 rrtm_taumol9.F90 srtm_reftra.F90 srtm_setcoef.F90
 srtm_spcvrt_mcica.F90 srtm_srtm_224gp.F90 srtm_srtm_224gp_mcica.F90
 srtm_taumol17.F90 srtm_taumol19.F90 su_c11clim.F90 su_c12clim.F90 su_c22clim.F90
 su_ccl4clim.F90 su_ch4clim.F90 su_co2clim.F90 su_gozoclim.F90 su_no2clim.F90
 su_ozoclim.F90 suaerl.F90 suecozc.F90 suecozcaqua.F90 suecso4his.F90 sulw.F90
 sulwn.F90 surrtftr.F90 surrtfrf.F90 susw.F90 sw.F90 uvclr.F90
 pp_obs/aerod_ad.F90 aerod_tl.F90 poaero.F90 ppleta.F90 ppltemp.F90 pplteta.F90
 tjquaa.F90 tjqud.F90
 prism/couplo4_definitions.F90 couplo4_exchange.F90
 sekf/pertsekf_v2.F90 sekf_backgerr.F90 sekf_costf.F90 sekf_gain.F90
 sekf_magn_rh.F90 sekf_matinv.F90 sekf_write.F90 sm_ekf_main.F90
 store_sekf_cv.F90 susekf.F90
 setup/cpledna.F90 dilat.F90 dilatb.F90 suadbuffer.F90 suadmi.F90 suafn.F90
 suafn3.F90 sualdyn.F90 sualfoutc.F90 sualmp0.F90 sualmp1.F90 sualmp2.F90
 suarpio.F90 sucslint.F90 sudefo_gflattr.F90 sudefo_vv1.F90 sudim1.F90
 suecphypo.F90 sufrag.F90 sugem1b.F90 sugem2.F90 sugenord.F90 sugmre.F90
 sugrib.F90 sugridg.F90 sugrido.F90 sugridu.F90 sugridua.F90 sugridug.F90
 suhdf.F90 suhdfvareps.F90 suhloption.F90 suos.F90 sulfi.F90 sulun.F90
 sumetric.F90 sumpioh.F90 sumsc.F90 sumts.F90 suncmax.F90 sunh_vertfeld.F90
 sunh_vertfeldd.F90 sunmen.F90 suoaf.F90 suorog.F90 suprocgp.F90 surand1.F90
 surand2.F90 surayfric.F90 surcof.F90 surcoftc.F90 surcordi.F90 surip.F90
 susavtend.F90 susc2a.F90 suscm.F90 susimpr.F90 suslad1.F90 suslad3.F90
 susmap.F90 suspec.F90 suspeca.F90 suspecb.F90 suspecg.F90 suspecg1.F90
 suspecg2.F90 suspectcfou.F90 suspgm.F90 suspssp.F90 sutimincli.F90 sutstep.F90
 suvsplip.F90 updcelaut.F90
 sinvect/chnorm.F90 chsymeig.F90 cun2.F90 cun3.F90 eof_matrix.F90 lcztoald.F90
 nalan2.F90 opak.F90 rdtllcz.F90 store.F90 su_subspace.F90 wrtllcz.F90 wrtsv.F90
 transform/spdico.F90 spdicoad.F90 spodts.F90 spodtsad.F90 spolts.F90 sports.F90
 sportsad.F90 sprotaad.F90 sprotlon.F90 trageo.F90 trageoad.F90
 utility/copygom5t0.F90 dealddh.F90 dealsekf.F90 dealspa.F90 dealtc.F90 emptb.F90
 emptb3.F90 fcgeneralized_gamma.F90 fillb.F90 fillb3.F90 freemem.F90 gpnorm2.F90
 grid_psglobal.F90 maxgpfv.F90 mod_ini.F90 model2moderr.F90 modeltojb.F90
 modeltojbmad.F90 newfa.F90 pkspeca.F90 pre_grid_biconserv.F90 prtjo.F90
 prtspno.F90 rdfufa.F90 rdgpfv.F90 reftim.F90 reset_accfie_vareps.F90 sbs5to3.F90
 sc2rdg.F90 sc2wrg.F90 spconvert.F90 spreord.F90 state2spec.F90 state2specad.F90
 sualspa1.F90 sualspajb.F90 tsl.F90 updmoon.F90 write_grid_traj.F90 wrresf.F90
 xutrii.F90
 var/bgvecs.F90 cvargpad.F90 cvargptl.F90 evjcdfi.F90 gp_ssmi.F90 jbachvar.F90 jbtomodel.F90
 jbtomodelad.F90 jghcos.F90 jghcosad.F90 jghcosi.F90 jghcosiad.F90 rdfpinc.F90 rokfcovar.F90
 rtsetup.F90 setran.F90 sualcos.F90 suamv.F90 suinfce.F90 sujb.F90 sujbbal.F90 sujbachvar.F90

sujbcov.F90 sujbdatt.F90 subjstd.F90 subjtest.F90 subjvcoord.F90 subjwavelet0.F90 sujr.F90
sulimb.F90 supavarc.F90 suprecov.F90 suprepjcdfi.F90 suqnorm.F90 surad.F90 suscal.F90
sushfce.F90 symtransin.F90 taskob.F90 taskobtl.F90

Files modified(SCMEC):

source/cpg1c.F90

Simplify running 4D-var in reproducible mode

By setting the PrepIFS variable LREPRO4DVAR in "Variational analysis", the "4dvar" family can now be rerun with different values for NPES and get exactly the same JO= printouts.

To make it easier to compare two different experiments in reproducible mode, the setting of NPOOLS has been moved to the top "an" family.

Files modified(SCRIPTS):

def/an.def

gen/ifsmin ifstraj mknam_fp

sms_an/bufr2odb.sms

Fix some use of uninitialized variables for prescat

Makes it possible to run the prescat task with F90_DEBUG=full, i.e. with checks for out of bounds accesses and use of uninitialized variables.

Files modified(SCAT):

programs/bufr_qscat.F qscat_filter_bufr25km.F

qretrieve/regroup.F