ARPEGE MEMORANDUM

From: GCO

Date: Jan 30, 2020

Subject: New cycle CY47T1

A new cycle CY47T1 has been created. This is not a common cycle with ECMWF. The different contributions for this cycle are described in the following pages.

Contributors:

ARBOGAST Etienne	arbogaste_CY47T0_oops-envar arbogaste_CY47T0_update-OOPS arbogaste_CY47T0_validation_davai
BAZILE Eric	bazile_CY47T0_prep_coupling
BOCHENEK Bogdan	bochenek_CY47T0_graupel
BOUTELOUP Yves	boutelou_CY47T0_radgps
CEDILNIK Jure	cedilnik_CY47T0_flash cedilnik_CY47T0_helicity cedilnik_CY47T0_mlcape
EL KHATIB Ryad	khatib_CY47T0_monkey_business khatib_CY47T0_rekjmpieoj khatib_CY47T0_t1.02%fix
ETCHEVERS Ingrid	etcheversi_CY47T0_BGFIX etcheversi_CY47T0_BGVISI etcheversi_CY47T0_NDIAGS
FAURE Ghislain	faure_CY47_t0.01_DisableOMPinSurfex
GCO	gco_CY47T0_main.01%ice gco_CY47T0_t1
GUILLAUME Frank	guillaum_CY47T0_bugfix_netcdf guillaum_CY47T0_from_cy43_11_2019
MARGUINAUD Philippe	marguina_CY47T0_sp
MARY Alexandre	mary_CY47T0_report_pgdfa mary_CY47T0_rpt_IEpgd_RPK
MASEK Jan	masekj_CY47T0_alaro
MICHEL Yann	michel_CY47T0_bf_infllam michel_CY47T0_sqrt-envar
MOLL Patrick	moll_CY47T0_cy46t1_cy47

NAPOLY Adrien	napolya_CY47T0_c933 napolya_CY47T0_ostia_interpol
PAYAN Christophe	payan_CY47T0_main01_scat_amv-updt payan_CY47T0_t1v1_scatbf2
PETITHOMME Harold	petithommeh_CY47T0_conserve
POURRET Vivien	pourretv_CY47T0_02AEOLUS1
RAYNAUD Laure	raynaudl_CY47T0_clustPE
SAEZ Patrick	saez_CY47T0_saez_sufa
SEITY Yann	seity_CY47T0_bfDDHs seity_CY47_from43t2_op
SUZAT Florian	suzat_CY47T0_bf3dvarForArome suzat_CY47T0_bf4dvarArpege

ARBOGAST Etienne

Doc:

OOPS 4D-Var ARPEGE and 3DVar AROME reproduce masterodb with both DPLanczos and SQRTPManczos minimizers. Add OOPS EnVar features for ARPEGE
(EnsembleCovariance, Localization, Interpolator, Advector, ChangeOfVariable).
Simplified physics works in the case LTRAJPST=FALSE for OOPS.

Bug fixes 46T0:
mf blacklist
iasi,cris inter-correlations in OOPS and surad
interfaces for ObsVector and ObsBiasCtlVec
OOPS 4D-Var ARPEGE and 3DVar AROME reproduce masterodb with both DPLanczos and SQRTPManczos minimizers.
Add OOPS EnVar features for ARPEGE (EnsembleCovariance, Localization, Interpolator, Advector, ChangeOfVariable).
Simplified physic works in the case LTRAJPST=FALSE for OOPS.

Bug fixes 47T0:
mf blacklist
iasi,cris inter-correlations in OOPS and surad
interfaces for ObsVector and ObsBiasCtlVec

Bug fixes for IASI cloud detection + bugfix for the assimilation of microwave cloudy radiances

NO NUMERICAL IMPACT IS EXPECTED.

Projects:	aladin, arpifs, blacklist, odb, oops_src, oopsifs
Git branch:	arbogaste_CY47T0_oops-envar

Deleted:

oops_src/src/test/base	TestSuiteB.h, TestSuiteChangeResolution.h, TestSuiteEnsemble.h, TestSuiteModel.h, TestSuiteOpObsTrajFile.h, TestSuiteOpObsTrajModel.h, TestSuiteVariationalFixture.h

Added:

aladin/transform	etransdir_mdl_from_t0.F90, etransdirh_from_t0.F90, etransinv_fields.F90, etransinvad_fields.F90
arpifs/oops	envar_tools_mod.F90, interpolator_ad_mod.F90, interpolator_mod.F90, norm_matrix_mod.F90, polygon_mod.F90
oops_src/src/oops/base	EnsembleCovariance4DWithChangeOfVariable.h, ObserverAnalysis.h, ObserverAnamix.h, ObserverIAU.h
oops_src/src/oops/interface	GenericMatrix.h
oops_src/src/testsuite	DiagnosticEFSO.h, TestSuiteB.h, TestSuiteChangeResolution.h, TestSuiteEnsemble.h, TestSuiteInterpolator.h, TestSuiteMix.h, TestSuiteModel.h, TestSuiteOpObsTrajFile.h, TestSuiteOpObsTrajModel.h,

	TestSuiteVariationalFixture.h
oopsifs/src/ifs	ChangeOfVariable.cc, ChangeOfVariable.h, ChangeOfVariable.interface.F90, NormMatrix.cc, NormMatrix.h, NormMatrix.interface.F90, VerticalProfileMultiplier.cc, VerticalProfileMultiplier.h, VerticalProfileMultiplier.interface.F90, instantiateIFSMatricesFactory.h

Modified:

aladin/var	readjbbal.F90, readjbdat96.F90
arpifs/adiab	cpgad.F90
arpifs/module	fields_base_mod.F90, model_mod.F90, traj_main_mod.F90, traj_physics_mod.F90, traj_physics_mod_oops.F90, trajectory_mod_oops.F90
arpifs/obs_preproc	cloud_detect_setup.F90
arpifs/oops	allobs_error_mod.F90, error_covariance_3d_mod.F90, fields_interp_mod.F90, fields_io_mod.F90, localization_mod.F90
arpifs/op_obs	cloud_detect.F90, hop.F90
arpifs/phys_dmn	aplpar.F90, aplparstl.F90, mf_physad.F90
arpifs/var	surad.F90
blacklist	mf_blacklist.b
odb/ddl	robody_min.sql
oops_src/src/oops/assimilation	DPLanczosJMinimizer.h, Increment4D.h, IncrementalAssimilation.h
oops_src/src/oops/base	Advector.h, Ensemble.h, HybridCovariance4D.h, ObserverAD.h, ObserverTL.h, PostBase.h, PostProcessor.h, instantiateCovarFactory.h, instantiatePostProcessorStateFactory.h
oops_src/src/oops/interface	Increment.h, Interpolator.h
oops_src/src/oops/runs	Variational.h
oopsifs/mains	TestSuiteVariational.cc
oopsifs/src/ifs	AllObsTLAD.h, FieldsIFS.cc, FieldsIFS.h, FieldsIFS.interface.F90, IfsFortran.h, IncrementIFS.cc, IncrementIFS.h, InterpolatorIFS.cc, InterpolatorIFS.h, InterpolatorIFS.interface.F90, ObsBiasCtlVec.interface.F90, ObsVector.interface.F90, VariablesIFS.interface.F90

Doc:

Phasing OOPS developments with 46R1 oops_src and oopsifs.
Import eckit-1.4.2 and fckit-0.6.4.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs, eckits, oops_src, oopsifs, satrad

Git branch: arbogaste_CY47T0_update-OOPS

Deleted:

oops_src/src/oops/interface	ModelAtLocations.h
oops_src/src/test	Setup.h, dummy.F90
oops_src/src/util	random_interface.f
oopsifs/src/ifs	ObsBias.cc, ObsBias.h, ObsBiasCovariance.cc, ObsBiasCovariance.h, ObsBiasCtlVec.cc, ObsBiasCtlVec.h, ObsBiasIncrement.cc, ObsBiasIncrement.h

Renamed:

oopsifs/src/ifs	ObsBias.interface.F90 oopsifs/src/ifs/ObsBiasVARBC.interface.F90, ObsBias2.interface.F90 oopsifs/src/ifs/ObsBiasTOVSCV.interface.F90, ObsBiasCovariance.interface.F90 oopsifs/src/ifs/ObsBiasCovarianceVARBC.interface.F90, ObsBiasCovariance2.interface.F90 oopsifs/src/ifs/ObsBiasCovarianceTOVSCV.interface.F90, ObsBiasCtlVec.interface.F90 oopsifs/src/ifs/ObsBiasCtlVecVARBC.interface.F90, ObsBiasCtlVec2.interface.F90 oopsifs/src/ifs/ObsBiasCtlVecTOVSCV.interface.F90, ObsBiasIncrement.interface.F90 oopsifs/src/ifs/ObsBiasIncrementVARBC.interface.F90, ObsBiasIncrement2.interface.F90 oopsifs/src/ifs/ObsBiasIncrementTOVSCV.interface.F90, ObsBiasLLists.F90 oopsifs/src/ifs/ObsBiasLListsVARBC.F90, ObsBiasLLists2.F90 oopsifs/src/ifs/ObsBiasLListsTOVSCV.F90

Added:

arpifs/oops	jc_covariance_mod.F90
arpifs/transform	transdirad_fields.F90
oops_src/src/oops/assimilation	CholDecomp.h, ControlObsVector.h, FtnCholDecomp.F90, FtnSymMatSpectrum.F90, HtRinvHdxFG.h, MMatrix.h, MtMatrix.h, QNewtonSqrtLMP.h, RMatrix.h, SQRTBPCGMinimizer.h, SQRTBPFOMMinimizer.h, SQRTBPLanczosMinimizer.h, SpectralSqrtLMP.h, SymMatSpectrum.h, UtHtRinvHdxFG.h
oops_src/src/oops/base	LinearObsOperators.h, ObsErrors.h, ObsOperators.h, ObsSpaces.h, StateSaver.h
oops_src/src/oops/interface	GeoVaLs.h, JcCovar.h, JcCovarBase.h, LinearObsOperBase.h, ModelAuxCtlVec.h, ObsAuxControlBase.cc, ObsAuxControlBase.h, ObsAuxCovarianceBase.cc, ObsAuxCovarianceBase.h, ObsAuxCtlVecBase.cc, ObsAuxCtlVecBase.h, ObsAuxIncrementBase.cc, ObsAuxIncrementBase.h,

	ObsOperatorBase.h, ObsSpaceBase.h
oops_src/src/oops/runs	DualResForecast.h
oops_src/src/test/util	DateTime.cc
oops_src/src/util	Logbook.cc, Logbook.h, LogbookHelper.cc, LogbookHelper.h, LogbookWriter.h, Mpi.cc, Mpi.h, Restart.h, RestartHelper.cc, RestartHelper.h, missingValues.cc, missingValues.h, missing_values_f.cc, missing_values_f.h, missing_values_mod.F90, printStackTrace.h, random.intfb.h, random_f.h, random_interface.f
oopsifs/src/ifs	AllObsBiasCovariance.cc, AllObsBiasCovariance.h, AllObsBiasCovariance.interface.F90, JcCovarIFS.cc, JcCovarIFS.h, JcCovarIFS.interface.F90, Logbook.interface.F90, LogbookIFS.h, ModelBiasCtlVec.h, ObsBiasCovarianceTOVSCV.cc, ObsBiasCovarianceTOVSCV.h, ObsBiasCovarianceVARBC.cc, ObsBiasCovarianceVARBC.h, ObsBiasCtlVecTOVSCV.cc, ObsBiasCtlVecTOVSCV.h, ObsBiasCtlVecVARBC.cc, ObsBiasCtlVecVARBC.h, ObsBiasIncrementTOVSCV.cc, ObsBiasIncrementTOVSCV.h, ObsBiasIncrementVARBC.cc, ObsBiasIncrementVARBC.h, ObsBiasTOVSCV.cc, ObsBiasTOVSCV.h, ObsBiasVARBC.cc, ObsBiasVARBC.h, instantiateJcFactory.h, instantiateObsAuxFactories.h, instantiateObsOpFactories.h

Modified:

arpifs/module	algorithm_state_mod.F90, fields_base_mod.F90, fields_mod.F90
arpifs/oops	allobs_oper_mod.F90, fields_interp_mod.F90
eckits/eckit/mpi	Comm.cc, Parallel.cc, Parallel.h, Serial.cc, Serial.h
oops_src/src/oops/assimilation	BMatrix.h, ControlIncrement.h, ControlVariable.h, ControlVector.h, CostFct3DVar.h, CostFct4DEnsVar.h, CostFct4DVar.h, CostFctWeak.h, CostFunction.h, CostJb3D.h, CostJb4D.h, CostJbJq.h, CostJbState.h, CostJbTotal.h, CostJcDFI.h, CostJo.h, CostTermBase.h, DPLanczosJMinimizer.h, DRGMRESRMinimizer.h, DRIPCGMinimizer.h, DRMinimizer.h, DRPCGMinimizer.h, DRPFOMMinimizer.h, DRPLanczosMinimizer.h, DoubleMinimizer.h, DualMinimizer.h, DualVector.h, FGMRES.h, FullGMRES.h, HBHtMatrix.h, HMatrix.h, HessianMatrix.h, HtMatrix.h, HtRinvHMatrix.h, IncrCtlVec.h, IncrCtlVec4D.h, Increment4D.h, IncrementalAssimilation.h, JbMatrix.h, JqTerm.h, LBGMRESRMinimizer.h, LBHessianMatrix.h, LBMinimizer.h, Minimizer.h, PrimalMinimizer.h, QNewtonLMP.h, RPCGMinimizer.h, RPLanczosMinimizer.h, RinvMatrix.h, SQRTMinimizer.h, SQRTPCGMinimizer.h, SQRTPLanczosMinimizer.h, SaddlePointLMPMatrix.h, SaddlePointMatrix.h, SaddlePointMinimizer.h, SaddlePointPrecondMatrix.h, SaddlePointVector.h, SpectralLMP.h, State4D.h, UtHtRinvHUMatrix.h, instantiateMinFactory.h
oops_src/src/oops/base	Accumulator.h, Advector.h, Departures.h, DiagonalMatrix.h, DolphChebyshev.cc, DolphChebyshev.h, Ensemble.h, EnsembleCovariance.h, EnsembleCovariance4D.h, EnsembleCovariance4DWithChangeOfVariable.h, EnsemblesCollection.h, HybridCovariance.h, HybridCovariance4D.h, ModelSpaceCovariance4DBase.h, ModelSpaceCovarianceBase.h, Observations.h, Observer.h, ObserverAD.h, ObserverAnamix.h, ObserverIAU.h, ObserverTL.h, PostBase.h, PostBaseAD.h, PostBaseTL.h, PostProcessor.h, PostProcessorAD.h, PostProcessorFactory.h, PostProcessorTL.h, PostTimer.cc, PostTimer.h, StateInfo.h, StateWriter.h, StaticCovariance4D.h, TrajectorySaver.h, WeightedDiff.h, WeightedDiffAD.h, WeightedDiffTL.h, WeightedMean.h,

	WeightingFct.cc
oops_src/src/oops/generic	LinearModelId.h, ObsErrorDiag.h
oops_src/src/oops/interface	ErrorCovariance.h, GenericMatrix.h, Geometry.h, IncrEnsCtlVec.h, IncrModCtlVec.h, Increment.h, Interpolator.h, LinearModel.h, LinearModelBase.h, LinearObsOperator.h, Localization.h, Locations.h, Model.h, ModelAuxControl.h, ModelAuxCovariance.h, ModelAuxIncrement.h, ObsAuxControl.h, ObsAuxCovariance.h, ObsAuxCtlVec.h, ObsAuxIncrement.h, ObsErrorBase.h, ObsErrorCovariance.h, ObsOperator.h, ObsVector.h, ObservationSpace.h, PostProcessorModel.h, State.h, Variables.h
oops_src/src/oops/runs	EnsForecasts.h, ExternalDFI.h, GenEnsPertB.h, HofX.h, MakeObs.h, Run.cc, Run.h, Test.h, Variational.h
oops_src/src/test	TestEnvironment.h, TestFixture.h
oops_src/src/testsuite	DiagnosticEFSO.h, TestSuiteB.h, TestSuiteChangeResolution.h, TestSuiteEnsemble.h, TestSuiteInterpolator.h, TestSuiteMix.h, TestSuiteModel.h, TestSuiteOpObsTrajFile.h, TestSuiteOpObsTrajModel.h, TestSuiteVariationalFixture.h
oops_src/src/util	DateTime.cc, DateTime.h, Duration.cc, Duration.h, LibOOPS.cc, LibOOPS.h, Logger.h, ObjectCountHelper.cc, ObjectCountHelper.h, ObjectCounter.h, PrintAdjTest.h, Timer.cc, Timer.h, TimerHelper.cc, TimerHelper.h, abor1_cpp.cc, config.intfb.h, config_f.cc, config_f.h, config_mod.F90, dateFunctions.cc, datetime_f.cc, datetime_mod.F90, formats.h, string_f_c_mod.F90
oopsifs/mains	TestSuiteVariational.cc, ifs4dvar.cc, ifsForecast.cc
oopsifs/src/ifs	AllObs.cc, AllObs.h, AllObs.interface.F90, AllObsCovariance.cc, AllObsCovariance.h, AllObsCovariance.interface.F90, AllObsTLAD.cc, AllObsTLAD.h, AllObsTLAD.interface.F90, ErrorCovariance3D.cc, ErrorCovariance3D.h, FieldsIFS.cc, FieldsIFS.h, FieldsIFS.interface.F90, FullPosIFS.h, GeometryIFS.h, GeometryIFS.interface.F90, GomData.cc, GomData.h, GomData.interface.F90, GomsIFS.h, IfsFortran.h, IfsTraits.h, IncrEnsCtlVecIFS.cc, IncrEnsCtlVecIFS.h, IncrModCtlVecIFS.cc, IncrModCtlVecIFS.h, IncrModCtlVecIFS.interface.F90, IncrementIFS.cc, IncrementIFS.h, InterpolatorIFS.h, LinearModelIFS.cc, LinearModelIFS.h, LinearModelIFS.interface.F90, LocalizationMatrixIFS.cc, LocalizationMatrixIFS.h, LocationsIFS.cc, LocationsIFS.h, ModelBias.h, ModelBiasCovariance.h, ModelBiasIncrement.h, ModelIFS.cc, ModelIFS.h, ModelIFS.interface.F90, ObsSpaceODB.cc, ObsSpaceODB.h, ObsSpaceODB.interface.F90, ObsTraj.h, ObsVector.cc, ObsVector.h, ObsVector.interface.F90, RunIFS.cc, RunIFS.h, RunTestIFS.cc, RunTestIFS.h, StateIFS.cc, StateIFS.h, VariablesIFS.h, VariablesIFS.interface.F90, instantiateObsErrorFactory.h, instantiateTlmFactory.h, pm_link_mod.F90, pm_linked_list_mod.F90
satrad/rttov/ifs	rttov_dealloc_allcoef.F90

Doc:

Use sat_atovs.sql instead of sat_atovs_hyper.sql(ecmwf case) in screening.
Fix gpssol handling in screening.

Fix declaration of namelist variables in sucfu.
Fix declaration of argument PW in gpnorm_trans.
Import yomlocs.F90 from 47R1 (with related radar_profs.F90).
Fix splitted errgrib files read (unbalanced sigma-b).

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs, etrans, trans

Git branch: arbogaste_CY47T0_validation_davai

Modified:

arpifs/module	yomlocs.F90
arpifs/obs_preproc	radar_profs.F90, upecma.F90
arpifs/oops	error_covariance_3d_mod.F90
arpifs/op_obs	hop_decide_required_sqls.F90
arpifs/setup	sucfu.F90
arpifs/var	suinfce.F90
etrans/external	egpnorm_trans.F90
trans/external	gpnorm_trans.F90
trans/module	gpnorm_trans_ctl_mod.F90

BAZILE Eric

Doc:

Modification of the soil temperature in case of frozen soil for the force restore scheme in the PREP.

EXPECTED IMPACT:
Only if the initial surfex file is created. No CPU impact.

Projects: surfex

Git branch: bazile_CY47T0_prep_coupling

Modified:

surfex/SURFEX	prep_ver_isba.F90

BOCHENEK Bogdan

Doc:

Modification of prognostic graupel code. Bugfixes to get more realistic results in case of LGRAPRO=TRUE for ALARO.

No impact of norms in case of LGRAPRO=FALSE in ALARO.
No impact of norms in other tests.

Projects: arpifs

Git branch: bochenek_CY47T0_graupel

Modified:

arpifs/adiab	cptend_new.F90, cputqy.F90
arpifs/phys_dmn	acacon.F90, accdev.F90, accoll.F90, acevmel.F90, acmodo.F90, acupd.F90, acupm.F90, aplmini.F90, aplmphys.F90, aplpar.F90, initaplpar.F90, mf_phys.F90

BOUTELOUP Yves

Doc:

Report of operationnal anti-GPS evolution (Arpege) + cleaning of the radiation interface and interface to the new ecrad radiation
scheme (Arpege and Arome).
acradin.F90 is now a "dead" routine and can be deleted.

EXPECTED IMPACT:
The both modifications implies no bit reproductability of the models due to reorganization of some calculus.

Projects: arpifs

Git branch: boutelou_CY47T0_radgps

Deleted:

arpifs/phys_radi	acradin.F90

Modified:

arpifs/module	yomphy0.F90
arpifs/namelist	namphy0.nam.h
arpifs/phys_dmn	accvimp.F90, accvimpgps.F90, apl_arome.F90, aplpar.F90, suphy0.F90
arpifs/phys_radi	acradin.F90, radheat.F90, recmwf.F90
arpifs/setup	su0phy.F90

CEDILNIK Jure

Doc:

Lighnting diagnostics, AROME only (needs hail).

Projects: arpifs

Git branch: cedilnik_CY47T0_flash

Added:

arpifs/phys_dmn	diagflash.F90

Modified:

arpifs/adiab	cpg.F90, cpg_dia.F90
arpifs/dia	cpcfu.F90
arpifs/fullpos	sufpcfu.F90
arpifs/module	ptrgfu.F90, yomafn.F90, yomcfu.F90, yomfa.F90
arpifs/namelist	namafn.nam.h, namcfu.nam.h
arpifs/phys_dmn	apl_arome.F90, mf_phys.F90
arpifs/setup	suafn1.F90, suafn2.F90, suafn3.F90, sucfu.F90, sufa.F90

Doc:

Helicity diagnostics (and additionally storm motion compuation).

Projects: arpifs

Git branch: cedilnik_CY47T0_helicity

Added:

arpifs/fullpos	fpsrh.F90, fpstrmm.F90

Modified:

arpifs/fullpos	endpos.F90, phymfpos.F90, sufpc.F90

arpifs/module	yomafn.F90, yomfa.F90, yomfpc.F90
arpifs/namelist	namafn.nam.h, namfpc.nam.h
arpifs/setup	suafn1.F90, suafn2.F90, suafn3.F90

Doc:

Mixed layer CAPE computation (CAPETYPE=6).

Projects: arpifs

Git branch: cedilnik_CY47T0_mlcape

Modified:

arpifs/fullpos	endpos.F90, fpcica.F90, phymfpos.F90, sufpc.F90
arpifs/module	yomcape.F90

EL KHATIB Ryad

Doc:

(Clever) monkey business on (e)gpnorm_trans.F90 and (e)spnorm_ctl_mod.F90 .

NO NUMERICAL IMPACT IS EXPECTED.

Projects: etrans, trans

Git branch: khatib_CY47T0_monkey_business

Added:

trans/module	gpnorm_trans_ctl_mod.F90

Modified:

etrans/external	egpnorm_trans.F90
etrans/module	espnorm_ctl_mod.F90, espnormc_mod.F90
trans/external	gpnorm_trans.F90
trans/module	spnorm_ctl_mod.F90, spnormc_mod.F90

Doc:

Contribution from Ryad El Khatib :
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- fix the "IFL OUT OF BOUNDS" issue in the LAM model.
- New option LGPTOT_CAP in namelist NAMPAR1 to cap LAM domain in gridpoint space to C+I + east part of the E-zone.
Default is true. LGPTOT_CAP=.FALSE. will trigger the computation over the whole extension zone. This option may improve the computational load balance. Setting LGPTOT_CAP=.FALSE. has no impact on the scientific results, though
it would change the overall gridpoint norms (because the extension zone is modified along the run, then).
- Substantial re-write of apl_arome.F90 (and many side subroutines) for optimization (memory bandwidth saving, mostly).
This re-write comes with a few more coding conventions (described in the subroutine itself) in order to identify 3D variables with extra-levels and and 2D or 3D variables not sized NPROMA (KLON) but KFDIA to fit Arome/Meso-NH
physical parameterizations interfaces.
Reference: Aladin-Hirlam newsletter nr 13.
- Fullpos optimization : horizontal interpolations of model fields are now computed once for all the surface-dependent post-processing levels. This modification has no impact on the results but it does change the prints order in the listing.
- Fullpos configuration 903 does not initialize the halo of the semi-lagrangian scheme

- Various MPI optimizations :
** Reverse digits NGPSET2PE to optimize memory accesses.*
** substantial re-write of dist_spec_control_mod.F90 and dist_grid_ctl_mod.F90 (communications and computations overlapping, less but larger messages, LAM monkey business)*
** optimize slrset.F90 by use of non-blocking and collective communications*
** fix Fullpos halo managements for a huge number of tasks*
- CFU/XFU flexibility : individual fields will be disabled if their FA name is not initialized (all FA names can be set in namelist NAMFA)
- Bugfixes against uninitialized variables (average_diag.F90,io_serv_suiosctmpl.F90)
- Fix erroneous bounds violations in radaer.F90
- miscellaneous cleanings

Contribution from Jean-Marcel Piriou :
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Phasing 46t1_bf branch modifications (pack n605):
** Introduce convective gusts in AROCLDIA*
** Correct historical "small" bug in APLPAR microphysics: cloud sedimentation is no longer added to PFPLSL, only to ZFPLSL.*
> ./arpifs/module/yomphy2.F90
> ./arpifs/module/yomtoph.F90
> ./arpifs/namelist/namphy2.nam.h
> ./arpifs/phys_dmn/acevadcape.F90
> ./arpifs/phys_dmn/apl_arome.F90
> ./arpifs/phys_dmn/aplpar.F90
> ./arpifs/phys_dmn/arocldia.F90
> ./arpifs/phys_dmn/suphy2.F90
> ./arpifs/phys_dmn/sutoph.F90
Phasing 46t1_bf branch modifications (pack n641):
** Modifcations to reproduce operational PEARP predictions PCMT LGPRONI1 (PROtection against Non-linear Instability), add LCVRESDYN approach.*
> ./arpifs/module/yomphy0.F90
> ./arpifs/namelist/namphy0.nam.h
> ./arpifs/phys_dmn/acmtud.F90
> ./arpifs/phys_dmn/acpcmt.F90
> ./arpifs/phys_dmn/acpluiz.F90
> ./arpifs/phys_dmn/aplpar.F90
> ./arpifs/phys_dmn/suphy0.F90
** Add KESsler evaporation Correction (LKESC) to suppress rain under deep dry PBLs in the Bougeault convection scheme (pack n754):*
> ./arpifs/module/yomphy0.F90
> ./arpifs/namelist/namphy0.nam.h
> ./arpifs/phys_dmn/accvimp.F90
> ./arpifs/phys_dmn/suphy0.F90
** Correct small bug in CHECKMV, about local solar time computation.*
> ./arpifs/phys_dmn/checkmv.F90
** Modify PPFIDH to allow more than 1000 DDH domains.*
> ./arpifs/dia/ppfidh.F90

** PCMT scheme modifications from climate*

Contribution from Ingrid Etchevers :
==========

Implementation of the diagnostic of visibilities related to fog and precipitation.
Implementation of the diagnostic of the types of precipitation.
Addition of T'w at all levels for AROME-PI and HYDRE
To enable visibilities diagnostics :
- LXVISI=.TRUE. in NAMXFU
- NAMDVISI must be present
- Do not forget changes the names in NAMFA ou NVISIPERIOD in NAMXFU, as you want
To enable diagnostics of precipitation types :
- LDPRECIPS=.TRUE. in NAMPHY
- NAMDPRECIPS must be present

- Do not forget changes the names in NAMFA ou NDPRECPERIOD in NAMPHY, as you want

Contribution from Olivier Jaron :
==========

new post processed fields : PTOP - REFLECT_DBZ ('REFLECT_DBZ.MAX','REFLEC_DBZ') - ECHOTOP ('ECHOTOP')
Bugfix in arguments order during aplpar calling
POS : modification of LRPLANE condition to compute deformation terms.
SUAFN3 : add control on SREDB
NAMAFN : add TOPR field in namelist list
CONV_BASE_TOP : The TOP reset in case of no deep convection
GPPECHOT : modification in interpolation

Namelist keys :
LPTOPC in NAMPHY : key of activation of pressure of top deep convection in ACNEBN
LXCTOP in NAMXFU : activates pressure of top deep convection

EXPECTED IMPACT:
possibly slight modification of arpege forecast (bugfix from JMP).

Projects: aladin, arpifs, etrans, mpa, surfex, trans

Git branch: khatib_CY47T0_rekjmpieoj

Added:

arpifs/adiab	gppechot.F90
arpifs/fullpos	lcheck4nhfields.F90, stepo_fpos_hv.F90, stepo_fpos_hvlag.F90, stepo_fpos_vh.F90
arpifs/module	yomdprecips.F90, yomdvisi.F90
arpifs/namelist	namdprecips.nam.h, namdvisi.nam.h
arpifs/phys_dmn	acevadcape.F90, dprecips.F90, dprecips_xfu.F90, sudprecips.F90, sudvisi.F90

Modified:

aladin/adiab	elarmes.F90, elarmes5.F90, elarmesad.F90
aladin/interpol	elascaw.F90, elascawtl.F90, eslextpol.F90
aladin/setup	suemp.F90, suetrans0.F90, suezone.F90
arpifs/adiab	call_sl.F90, call_sl_tl.F90, cpg.F90, cpg_dia.F90, cpg_drv.F90, cpg_gp_hyd.F90, cpg_gp_nhee.F90, cpg_gp_nhqe.F90, gpmasscor.F90, gpprs0d.F90
arpifs/cma2odb	grid_nearest.F90
arpifs/control	allfpos.F90, gmassdiag.F90, gp_model.F90, jmgfixer.F90, negfixer.F90, pfixer.F90, qmfixer.F90, qmfixer2.F90, tracmf.F90, varfpos.F90
arpifs/dia	cpxfu.F90, ppfidh.F90, sumddh.F90
arpifs/fullpos	dynfpos.F90, endpos.F90, endpos_prepgfl.F90, endvpos.F90, fpcorphy.F90,

	fpmodprec.F90, hpos_xfu.F90, stepo_fpos.F90, sufpcfu.F90, sufpxfu.F90, suprocfp.F90, vpos.F90
arpifs/interpol	slrset.F90
arpifs/io_serv	io_serv_suiosctmpl.F90
arpifs/module	disgrid_mod.F90, diwrgrid_mod.F90, model_mod.F90, ptrxfu.F90, surface_fields_mix.F90, yomafn.F90, yomfa.F90, yommp0.F90, yomphy.F90, yomphy0.F90, yomphy2.F90, yomphyds.F90, yomtoph.F90, yomxfu.F90
arpifs/namelist	namafn.nam.h, namfa.nam.h, nampar1.nam.h, namphy.nam.h, namphy0.nam.h, namphy2.nam.h, namxfu.nam.h
arpifs/obs_preproc	mkglobstab_model.F90
arpifs/oops	ifs_init.F90
arpifs/parallel	disgrid_surf_ext.F90, diwrgrid_surf_ext.F90, gl2ll.F90
arpifs/phys_dmn	accvimp.F90, acmtddd.F90, acmtud.F90, acnpart.F90, acpcmt.F90, acpluiz.F90, actqsat.F90, apl_arome.F90, aplpar.F90, arocldia.F90, checkmv.F90, initaplpar.F90, mf_phys.F90, suozon.F90, suphy0.F90, suphy2.F90, sutoph.F90, vdfhghthl.F90, vdfhghtnhl.F90
arpifs/phys_radi	radaer.F90
arpifs/pp_obs	pos.F90
arpifs/programs	foomaster.F90
arpifs/setup	su0phy.F90, su0yoma.F90, su_surf_flds.F90, suafn1.F90, suafn2.F90, suafn3.F90, sucfu.F90, sufa.F90, sufpilmod.F90, sugridug.F90, sump.F90, sump0.F90, suprocgp.F90, sutrans0.F90, suxfu.F90
etrans/external	edist_grid.F90, edist_spec.F90
etrans/module	edist_spec_control_mod.F90
mpa/chem/externals	aro_mnhc.F90, aro_mnhdust.F90, aro_rainaero.F90
mpa/chem/interface	aro_mnhc.h, aro_mnhdust.h, aro_rainaero.h
mpa/micro/externals	add_bounds.F90, aro_convbu.F90, aro_startbu.F90, aro_suintbudget.F90
mpa/micro/interface	aro_convbu.h, aro_startbu.h
mpa/micro/module	modi_add_bounds.F90
mpa/turb/externals	aro_shallow_mf.F90, aro_turb_mnh.F90
mpa/turb/interface	aro_shallow_mf.h, aro_turb_mnh.h
mpa/turb/internals	turb.F90

mpa/turb/module	modi_turb.F90
surfex/SURFEX	average_diag.F90
trans/external	dist_grid.F90, dist_spec.F90
trans/module	dist_grid_ctl_mod.F90, dist_spec_control_mod.F90, trltog_mod.F90

Doc:

Bugfixes.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs, etrans, ifsaux, surfex, trans

Git branch: khatib_CY47T0_t1.02%fix

Modified:

arpifs/dia	suppdate.F90
arpifs/module	control_vectors_base_mix.F90
arpifs/phys_dmn	apl_arome.F90, aplpar.F90
arpifs/phys_radi	radheat.F90
etrans/external	egpnorm_trans.F90
ifsaux/fa	facgrm.F90
surfex/SURFEX	diag_surf_atmn.F90
trans/external	gpnorm_trans.F90
trans/module	gpnorm_trans_ctl_mod.F90

ETCHEVERS Ingrid

Doc:

2 bugfixes in apl_arome.F90 and pos.F90

EXPECTED IMPACT:
Without these bugfixes, your masterodb in cycle 47t0_t1.01 with activation of the diagnostics can crash.

Projects: arpifs

Git branch: etcheversi_CY47T0_BGFIX

Modified:

arpifs/phys_dmn	apl_arome.F90
arpifs/pp_obs	pos.F90

Doc:

Bugfix in new diagnostic of visibilities.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs

Git branch: etcheversi_CY47T0_BGVISI

Modified:

arpifs/phys_dmn	acvisih.F90

Doc:

Optimization of visibilities and precipitation type diagnoses.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs

Git branch: etcheversi_CY47T0_NDIAGS

Added:

arpifs/phys_dmn	accldia.F90, acvisih.F90, dprecips_old.F90

Modified:

arpifs/dia	cpxfu.F90
arpifs/phys_dmn	apl_arome.F90, aplpar.F90, arocldia.F90, dprecips.F90, dprecips_xfu.F90

FAURE Ghislain

Doc:

Remove OpenMP in Surfex aroini_surfc to prevent random crashes.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: mse

Git branch: faure_CY47_t0.01_DisableOMPinSurfex

Modified:

mse/externals	aroini_surfc.F90

GCO

Doc:

Catch-up from CY43T2_op2: introduce source code for tool ICS_NETCDF, allowing to convert a NETCDF sea ice file to an Obsoul file.

Projects: utilities

Git branch: gco_CY47T0_main.01%ice

Renamed:

utilities/ice	ice_grb.F90 to utilities/ice/programs/ice_grb.F90

Added:

utilities/ice/module	mod_lececr_netcdf.F90
utilities/ice/programs	ice_netcdf.F90

Doc:

1) traj_main_mod.F90 & yomarphy.F90: fix phasing bugs.

2) aplpar.F90: move CALL to ACPCMT after ACNEBCOND, to initialize ZQLIS from ACTKE or ACNEBCOND. Small impact on, arpifs, environment buoyancy, and therefore PCMT results (Jean-Marcel Piriou).

Projects: arpifs

Git branch: gco_CY47T0_t1

Modified:

arpifs/module	traj_main_mod.F90, yomarphy.F90
arpifs/phys_dmn	aplpar.F90

GUILLAUME Frank

Doc:

Routine seviri(): si aucun canal n'est retenu, le vecteur channels() était désalloué sans être alloué.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: odb

Git branch: guillaum_CY47T0_bugfix_netcdf

Modified:

odb/pandor/module	bator_decodnetcdf_mod.F90

Doc:

Bugfixes et ajouts BATOR :
- correction préventive du nombre de 'wagons' prévus dans le décodage des données AMDAROMM (non actif actuellement),
- correctif des routines SYNOP) pour prendre en compte correctement les messages des stations côtières USA (actuellement en BDMO
intégration) ainsi que les stations radome française.
- adaptation de Radiosondage() aux données TEMPDROP. (actuellement en BDMO intégration),
- préparation du prétraitement des messages METAR.
- bugfix dans les appels à Dr Hook (bator_datetime_mod).
- quelques remplacements de JPRB en JPRD

NO NUMERICAL IMPACT IS EXPECTED.

Projects: odb

Git branch: guillaum_CY47T0_from_cy43_11_2019

Modified:

odb/pandor/module	bator_datetime_mod.F90, bator_decodbufr_mod.F90, bator_ecritures_mod.F90, bator_init_mod.F90, bator_lectures_mod.F90, bator_module.F90, bator_pool_balance_mod.F90, bator_util_mod.F90

MARGUINAUD Philippe

Doc:

Modifications to pass mitraillette tests in single precision.

EXPECTED IMPACT:
The routine ecume_flux has been modified. The results are slightly altered, but these changes should not have a meteorological impact.

Projects: ifsaux, surfex

Git branch: marguina_CY47T0_sp

Modified:

ifsaux/fa	fasgra.F90
ifsaux/programs	faconvgrib.F90
surfex/SURFEX	ecume_flux.F90

MARY Alexandre

Doc:

Report from a branch from 43T2_op:
- allow FA-GMAP style in PREP/PGD;
- fix data size in step 6 of c923;
- deactivate OpenMP in a loop of RGRID (non-repro otherwise - to be fixed more properly).

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs, mse, trans

Git branch: mary_CY47T0_report_pgdfa

Modified:

arpifs/c9xx	incli0.F90
mse/programs	pgd.F90, prep.F90
trans/programs	rgrid.F90

Doc:

This modset:
- enables to create FA LAM PGD files with E zone directly inside (controlled by namelist)
- tune the width of the I-zone (controlled by namelist)
- fix missing zonal wavenumbers in header of FA Gauss-grid PGD files
- fix RPK to be > 0 in FA header written from Surfex.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs, surfex

Git branch: mary_CY47T0_rpt_IEpgd_RPK

Modified:

arpifs/c9xx	relnew.F90
surfex/SURFEX	grid_modif_conf_proj.F90, mode_gridtype_conf_proj.F90, pack_grid_conf_proj.F90, read_gridtype_conf_proj.F90, read_nam_grid_conf_proj.F90, read_nam_grid_gauss.F90, split_grid_conf_proj.F90, write_header_fa.F90

MASEK Jan

Doc:

ALARO-1 modset for cy47t1.

Contributors: L. Gerard, R. Brozkova, P. Smerkol, M. Hrastinski, J. Masek

Description:

Modset contains several ALARO developments, not affecting standard ARPEGE and AROME configurations. Both ALARO-0 and ALARO-1 are affected:

1a) Fix of autoconversion temperature dependence (L. Gerard):

arpifs/phys_dmn/acacon.F90
arpifs/phys_dmn/aplmini.F90
arpifs/phys_dmn/aplmphys.F90

Modification changes ALARO results. Old situation can be restored by uncommenting old expression for ZQICR (2 lines starting by !OLD in subroutine ACACON) and commenting the new expression. Old expression will be removed in future.

1b) Fix of cloud water. If there is no cloud anymore after the adjustment, initial ZQL, ZQI are not set to zero, but are allowed to evaporate (L. Gerard):

arpifs/phys_dmn/accdev.F90

Modification changes ALARO results, touching LXRCDEV option. Old situation can be recovered by setting local switch LLOLDADJ to true (in submitted modset it is set to true). The old computation will be removed in future.

1c) New (research) version of non-saturated downdraft scheme, ready for tests (L. Gerard):

arpifs/phys_dmn/aplpar.F90 - modified call to ACNSDO
arpifs/phys_dmn/acnsdo.F90 - new version of subroutine

This code is not yet operationally used, so it does not affect validation of canonical model configurations.

2a) Introduction of more NDIFFNEB options on ALARO side (R. Brozkova):

arpifs/module/yomphy.F90
arpifs/phys_dmn/aplpar.F90

For explanation, see description in module arpifs/module/yomphy.F90. Note that for historical reasons, meaning of NDIFFNEB option depends on turbulence scheme. Namely, NDIFFNEB=1 in ACDIFUS corresponds to NDIFFNEB=5 in TOUCANS. Results for previously existing NDIFFNEB values are not affected.

2b) Fix to use Betts' temperature for ice/liquid partition when computing the coefficient for diffusion of conservative variables (R. Brozkova):

arpifs/phys_dmn/acdifv3.F90

Modification changes ALARO-1 results, it can be deactivated by commenting new calculation of ZALPHA1 between tags !NEW{ and !}NEW, and uncommenting old ZAPLHA1 calculation between tags !OLD{ and !}OLD.

2c) Minimum value of TKE and TTE set via namelist NAMPHY0 variable ETKE_MIN (J. Masek):

arpifs/module/yomphy0.F90
arpifs/phys_dmn/aplpar.F90
arpifs/phys_dmn/acptkes.F90
arpifs/phys_dmn/suphy0.F90

Default of ETKE_MIN is set to a former hard-coded value (1.0E-08), ensuring bit identical results.

3) TOMS fixes in TOUCANS turbulence scheme (P. Smerkol):

arpifs/phys_dmn/acdifv3.F90

These fixes were not yet sufficiently evaluated and are therefore commented between !NEW{ and !}NEW tags. To activate them, they must be uncommented and corresponding code between tags !OLD{ and !}OLD must be commented. In future the old code will be removed.

4) Added diagnostics of TKE and TTE budgets to old DDH (LFLEXDIA=F; M. Hrastinski):

arpifs/adiab/cpg.F90
arpifs/adiab/cpg_dia.F90
arpifs/dia/cpdyddh.F90
arpifs/dia/cpphddh.F90
arpifs/dia/iniapft_bp002.F90
arpifs/dia/ppfidh.F90
arpifs/dia/sunddh.F90
arpifs/phys_dmn/acptke.F90
arpifs/phys_dmn/aplpar.F90
arpifs/phys_dmn/mf_phys.F90

Modification does not affect model results.

5) Modularization of ACRANEB2 shortwave and logwave solvers, enabling efficient calculation of clearsky fluxes without duplicit evaluation of gaseous transmissions (J. Masek):

arpifs/phys_dmn/apl_arome.F90 - corrected dimensioning of PGMU0, added clearsky ACRANEB2 fluxes
arpifs/phys_dmn/aplpar.F90 - removed clearsky call of ACRANEB2
arpifs/phys_radi/acraneb2.F90 - modified interface; NER solver moved to ACRANEB_SOLVT; evaluation of solar fluxes moved to ACRANEB_SOLVS; solvers called twice to deliver clearsky and cloudy fluxes
arpifs/phys_radi/acraneb_solvs.F90 - modified interface; avoided INOUT arguments in order to preserve inputs; added evaluation of solar fluxes
arpifs/phys_radi/acraneb_solvt.F90 - new subroutine containing NER solver
arpifs/phys_radi/acraneb_solvt1.F90 - renamed from acraneb_solvt.F90; modified interface
arpifs/phys_radi/acraneb_solvt3.F90 - modified interface

Top level solver subroutines ACRANEB_SOLVS and ACRANEB_SOLVT now preserve input arguments, so that they can be called twice to deliver clearsky and cloudy fluxes. Modularized solvers deliver clearsky fluxes by increasing the cost of ALARO-1 integration by less than 1%. For the reference code

with double call of ACRANEB2 the cost increase was around 8%. (Diagnostics of clearsky fluxes at every model timestep is activated by setting LFRRC=.T. in namelist NAMCFU and NRADFR=1 in namelist NAERAD. Value of NAERAD is copied to module variable NFRRC and passed to ACRANEB2 as argument KNFRRC).

Modularization of solvers should yield bit identical results. However, with ifc version 18 on beaufix and usual -O2 optimization, this is the case only when solar intermittency is off (NSORAYFR=1). With solar intermittency on, bit reproducibility was obtained only when concerned routines in both modset and reference were recompiled with -O0. Change of results with -O2 optimization is meteorologically insignificant and it concerns only ALARO-1 with NSORAYFR /= 1.

Subroutines ac_cloud_model.F90 and ac_cloud_model2.F90 were moved from directory arpifs/phys_dmn/ to arpifs/phys_radi/, since the calculation of cloud optical properties belongs to radiation stuff.

6) To respect coding rules, declaration of namelist NAMCVER was moved from module YOMCVER to separate header file (J. Masek):

arpifs/module/yomcver.F90 - namelist declaration included from file
arpifs/namelist/namcver.nam.h - new file with namelist declaration

7) Fix of blend utility including use of ERIEN, reading/writing new FA date structure using FADIEX/FANDAX, corrected dimensioning of some FA arrays, and reactivation of namelist variable Z_NSIGN that has disappeared for unknown reason (J. Masek):

aladin/programs/blend.F90

Blend utility must be run with enviroment variable DR_HOOK_NOT_MPI=1, so that DR_HOOK does not invoke MPI. Unfixed blend utility aborts due to call of ECHIEN with argument KINF=1, which must be replaced by ERIEN. After doing so it crashes on segmentation violation in ifsaux/fa/facsim.F90 and the problem seems to be there at least from cy43. The cure was not found yet.

Validation:

Modset does not affect standard ARPEGE and AROME configurations. Due to changes in microphysics, both ALARO-0 and ALARO-1 are affected. ALARO-1 is further affected by changes in TOUCANS turbulence and ACRANEB2 radiation.

Meteorological impact of ALARO fixes was evaluated locally in Prague, on top of cy43t2_bf.10. Tested configuration was ALARO-1, using rainy situations from May 2019:

1a) has a very little impact on model scores.

1b) causes more evaporation (DDH result). It yields slightly better scores around 700hPa level.

2b) has a slightly positive impact on model scores.

3) has not yet been extensively evaluated and therefore it is disabled.

Safety of modset phased on top of cy47t0 was tested on beaufix, by comparing the results against cy47t0 reference. Test integration started on 29-Jun-2017 at 00 UTC, using old CHMI domain (dx = 4.7km, 87 levels, timestep 180s). When modifications 1a), 1b) and 2b) are disabled in the code, bit reproducibility of ALARO-0 results is obtained. For ALARO-1 this is the case only when NSORAYFR=1 (solar intermittency off). With NSORAYFR /= 1 meteorologically insignificant differences appear (spectral norms 2 hours after sunrise are identical to at least 3 digits). In this case bit reproducibility could

be ensured only when subroutines from point 5) were recompiled without optimizations (both in the modset and in the reference).

Comparing the impact of modifications 1a), 1b) and 2b) on ALARO-1 results in cy43t2_bf.10 and in cy47t0 has still to be done.

Projects: aladin, arpifs

Git branch: masekj_CY47T0_alaro

Renamed:

arpifs/phys_dmn	ac_cloud_model.F90 arpifs/phys_radi/ac_cloud_model.F90, ac_cloud_model2.F90 arpifs/phys_radi/ac_cloud_model2.F90

Added:

arpifs/namelist	namcver.nam.h
arpifs/phys_radi	acraneb_solvt1.F90

Modified:

aladin/programs	blend.F90
arpifs/adiab	cpg.F90, cpg_dia.F90
arpifs/dia	cpdyddh.F90, cpphddh.F90, iniapft_bp002.F90, ppfidh.F90, sunddh.F90
arpifs/module	yomcver.F90, yomphy.F90, yomphy0.F90
arpifs/phys_dmn	acacon.F90, accdev.F90, acdifv3.F90, acnsdo.F90, acpscc.F90, acptke.F90, acptkes.F90, apl_arome.F90, aplmini.F90, aplmphys.F90, aplpar.F90, mf_phys.F90, suphy0.F90
arpifs/phys_radi	acraneb2.F90, acraneb_solvs.F90, acraneb_solvt.F90, acraneb_solvt3.F90

MICHEL Yann

Doc:

Report of 46T1 bugfix allowing to run inflation (LAM case in traj_main_mod).

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs

Git branch: michel_CY47T0_bf_infllam

Modified:

arpifs/module	traj_main_mod.F90

Doc:

Redesign of some attributes of the control variable (ARPEGE+AROME)
NETCDF IO of the control variable (ARPEGE+AROME)
OpenMP parallelization of localization for AROME 3DEnVar
Hybrid 4DVar with multiple outer-loops (ARPEGE)
Lagged ensemble (ARPEGE+AROME)
Adjoint test (ARPEGE+AROME)
Dirac test (ARPEGE+AROME)
Randomization of hybrid B (ARPEGE+AROME)

NO NUMERICAL IMPACT IS EXPECTED.

Projects: aladin, arpifs

Git branch: michel_CY47T0_sqrt-envar

Added:

aladin/var	eloc_setup_sphorz.F90, eloc_setup_spvert.F90
arpifs/utility	ncerr.F90
arpifs/var	dot_product_cv.F90, gaspari_cohn99.F90, horz_loc_sp.F90, loc_mult_sqrt_sp.F90, loc_mult_sqrt_sp_ad.F90, loc_setup_sp.F90, set_imgzero.F90, sualctv_ens.F90, sucvtest.F90, suscal_je.F90, vert_loc_sp.F90

Modified:

aladin/module	yom_pll_recf.F90

aladin/var	ediagb_psot.F90, suenscov.F90, suensdim.F90, sugpensmem.F90, sugploc.F90, susploc.F90
arpifs/module	control_vectors_base_mix.F90, control_vectors_comm_mod.F90, control_vectors_data_mix.F90, control_vectors_mod.F90, control_vectors_oper_mod.F90, jb_control_vectors_base_mod.F90, yomenscov.F90
arpifs/namelist	namenscov.nam.h
arpifs/parallel	dot_product_ctlvec.F90
arpifs/setup	rdfa2sp.F90, su0yomb.F90
arpifs/utility	openfainfo.F90, prt_ctlvec_max.F90, prt_ctlvec_norms.F90, random_ctlvec.F90, setimzero.F90, write_ctlvec_grib.F90
arpifs/var	apply_rf1d.F90, apply_rf1dad.F90, censcov3.F90, censcov3ad.F90, eapply_pll_rf3d.F90, egploc.F90, egplocad.F90, esploc.F90, esplocad.F90, getmini.F90, getmini2.F90, jb2model_hybrid.F90, jb2model_hybrid_ad.F90, savmini.F90, savmini2.F90, sualctv.F90, suscal.F90

MOLL Patrick

Doc:

Remaining phasing of cycle CY46T1_bf .

Projects: arpifs, odb

Git branch: moll_CY47T0_cy46t1_cy47

Added:

odb/ddl.CCMA	calico_robhdr.sql, calico_robody.sql, caraco_robhdr.sql, carnak.sql
odb/ddl.ECMA	calico_robhdr.sql, calico_robody.sql, caraco_robhdr.sql, carnak.sql
odb/ddl	calico_robhdr.sql, calico_robody.sql, caraco_robhdr.sql, carnak.sql

Modified:

arpifs/canari	caapar.F90, cabiyo.F90, cacova.F90, cadavr.F90, cah2as.F90, cahuax.F90, caifc1.F90, calico.F90, calver.F90, camelo.F90, canaco.F90, canada.F90, canami.F90, canape.F90, canari.F90, cancer.F90, caneva.F90, cantik.F90, capito.F90, capotx.F90, capsax.F90, caraco.F90, caratk.F90, carcfo.F90, caredo.F90, carnak.F90, casela.F90, casetup.F90, casgqa.F90, casgra.F90, casgva.F90, casino.F90, casnas.F90, caspia.F90, cassva.F90, castas.F90, castor.F90, cat2as.F90, catrma.F90, cav1as.F90, caviar.F90, caviso.F90, cavodk.F90, cavtax.F90, sualcan.F90
arpifs/cma2odb	ctxinitdb.F90
arpifs/control	ca_scan2m.F90
arpifs/module	qadore.F90, qaeteo.F90, qaimpo.F90, qakeki.F90, qalori.F90, qavara.F90, varbc_rad.F90
arpifs/namelist	nam_canape.nam.h
arpifs/obs_preproc	redgps.F90, sugoms.F90
arpifs/setup	su1yom.F90
arpifs/var	ecset.F90, sucos.F90, sushfce.F90
odb/ddl	canada_robhdr.sql, canada_robody.sql, canari_robhdr.sql, cancer_robody.sql, caredo_robhdr.sql, caredo_robhdr_2.sql, caredo_robody.sql

NAPOLY Adrien

Doc:

New configuration c933 that merge the c931 and c932 configurations. The reading of external files is also strongly optimized.

EXPECTED IMPACT:
CPU needed for this new task is divided by at least 2 compared to the sum of the 2 previous tasks.
A minor numerical impact is expected of about 1E-2 on both field (SST and sea ice concentration).

Projects: arpifs

Git branch: napolya_CY47T0_c933

Added:

arpifs/module	lececr_netcdf_mod.F90

Modified:

arpifs/c9xx	cseaice.F90, csstbld.F90, geo923.F90, inclitc.F90, intice.F90
arpifs/control	cnt0.F90
arpifs/module	yomct0.F90, yomice.F90
arpifs/setup	suct0.F90, suctrl_gflattr.F90, sudim.F90, sudimf1.F90, sudimf2.F90, sugeometry.F90

Doc:

The surface analysis of sst over sea and lakes by canari used to correct the input data due to the altitude. This is no longer necessary
with the OSTIA analysis that we use.

EXPECTED IMPACT:
There will numerical impact around lakes. Mainly the ones with high altitude. The Victoria lake is certainly the most impacted.
No impact on memory or cpu is expected.

Projects: arpifs

Git branch: napolya_CY47T0_ostia_interpol

Modified:

arpifs/canari	caclsst.F90

PAYAN Christophe

Doc:

AMV: GOES-17 AMV assimilation permitted by mf_blaclist.b
Scatterometer:
- oscatin.F90 routine removed (kscatin.F90 used instead)
- some variables renamed (mainly regarding historical data from ERS serie)
- the swath widths (in term of wind vector cell numbers) were defined twice, inducing error risks (one family of definition was removed)

EXPECTED IMPACT:
In case where GOES-17 AMV is available, this one may be assimilated.
No impact for scatterometer winds.

Projects: arpifs, blacklist

Git branch: payan_CY47T0_main01_scat_amv-updt

Deleted:

arpifs/obs_preproc	oscatin.F90

Modified:

arpifs/module	parersca.F90, yomcosjo.F90, yomersca.F90, yomscc.F90, yomthlim.F90
arpifs/namelist	namscc.nam.h
arpifs/obs_preproc	defrun.F90, ers1if.F90, iniersca.F90, kscatin.F90, new_thinn.F90, oscatin.F90, scaqc.F90, sufglim.F90
blacklist	mf_blacklist.b

Doc:

Second bf regarding CFOSAT/FY3E scatterometer winds processing
1) Addition of fixes regarding the QC of CFOSAT/FY3E scatterometer winds in screening (extension of LLF/WSCAT variables use in scaqc
routine).
2) NOAA-20 winds (AMV) blacklisting.

EXPECTED IMPACT:
In case of CFOSAT/FY3E scatterometer winds processing otherwise not impact.

Projects: arpifs, blacklist

Git branch: payan_CY47T0_t1v1_scatbf2

Modified:

arpifs/obs_preproc	scaqc.F90
blacklist	mf_blacklist.b

PETITHOMME Harold

Doc:

1) Adding module conserve for mass/water conservation.

conserve is a different version from cormass (mass fixer)
this module is used by MF (climate department), but not already phased in common code
in addition to conserve, some other changes are made in modules, setup or phys_dmn
some utility routines are also available for blocks management in blocks.F90 .

2) Suppress tabs in files with spaces.

Projects: arpifs

Git branch: petithommeh_CY47T0_conserve

Added:

arpifs/module	blocks.f90, conserve.F90

Modified:

arpifs/control	cnt4.F90
arpifs/dia	cpcfu.F90
arpifs/module	surface_fields_mix.F90, yomct0.F90
arpifs/namelist	namct0.nam.h
arpifs/phys_dmn	mf_phys.F90
arpifs/setup	su_surf_flds.F90, suct0.F90

POURRET Vivien

Doc:

Phasing of branches CY43T2 04, 07aeolus, 09AEOLUS, 09Aeolus and 04AEOLUS in 47t0.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs, odb

Git branch: pourretv_CY47T0_02AEOLUS1

Added:

odb/ddl.CCMA	bator_hdr_7.sql, matchup_aeolus_l2c.sql, sat_aeolusl2c.sql
odb/ddl.ECMA	bator_hdr_7.sql, matchup_aeolus_l2c.sql, obsort_aeolus_auxmet.sql, obsort_aeolus_hdr.sql, obsort_aeolus_l2c.sql
odb/ddl	bator_hdr_7.sql, matchup_aeolus_l2c.sql, obsort_aeolus_auxmet.sql, obsort_aeolus_hdr.sql, obsort_aeolus_l2c.sql

Modified:

arpifs/cma2odb	ctxinitdb.F90, matchupdb.F90, shuffledb.F90, xchangedatadb.F90
arpifs/op_obs	hop_decide_required_sqls.F90
odb/pandor/module	bator_decodbufr_mod.F90, bator_init_mod.F90, bator_module.F90
odb/pandor/namelist	bator_namelist.nam.h

RAYNAUD Laure

Doc:

Report of clustering modifications for PEARO.

NO NUMERICAL IMPACT IS EXPECTED.

Projects: utilities

Git branch: raynaudl_CY47T0_clustPE

Modified:

utilities/pearome	clust.F90

SAEZ Patrick

Doc:

Simple correction of printing format in listing setup for variable NVGRIB (old I2, new I3).

NO NUMERICAL IMPACT IS EXPECTED.

Projects: arpifs

Git branch: saez_CY47T0_saez_sufa

Modified:

arpifs/setup	sufa.F90

SEITY Yann

Doc:

QL DDH budgets are not correct without this bf.
It is also the case in previous cycles (since cy43t2_op)...

NO NUMERICAL IMPACT IS EXPECTED.

Projects: mpa

Git branch: seity_CY47T0_bfDDHs

Modified:

mpa/micro/internals	rain_ice.F90

Doc:

1) Rattrapage bugfixes 43t2_op (seity_CY43T2_bf + seity_CY43T2_bfthetav branches).
2) albedo_ta96.F90: bugfix.
3) Modify some comments in AROME physics (suparar,yomparar,yomarphy,modd_param_lima).

EXPECTED IMPACT:
Impact over sea (zenithal solar angle bf in albedo_ta96)

Projects: arpifs, mpa, mse, surfex

Git branch: seity_CY47_from43t2_op

Modified:

arpifs/fullpos	endpos.F90
arpifs/module	yomarphy.F90, yomparar.F90
arpifs/phys_dmn	suparar.F90
arpifs/setup	sucfu.F90
mpa/micro/module	modd_param_lima.F90
mse/module	sfxflddesc_mod.F90
surfex/SURFEX	albedo_ta96.F90

SUZAT Florian

Doc:

Add eslexpol_obs.F90 routine in order to copy the silent and savage ECMWF monkey business refactoring on slextpol.F90 (creation of
slextpol_obs.F90 routine with inversion of array dimensions).

The problem was that gom horizontal interpolation was failing for some observations. Routines cobsall.F90 and cobsalltl.F90 have been
changed to call the new eslexpol_obs.F90 fonction.

Notice that cobsallad.F90 do not contains a eslextpol_ad routine, but uses the ARPEGE slexpol.F90 one. We must look a it and maybe write
the adjoint version of eslextpol_obs....

A minor fix was also introduced in hretr_rad.F90 to avoid some call ABOR1

EXPECTED IMPACT:
3dvar now works and it's almost (numerical diff in radar obs) bit repro versus 46t1.

Projects: aladin, arpifs

Git branch: suzat_CY47T0_bf3dvarForArome

Added:

aladin/interpol	eslextpol_obs.F90

Modified:

arpifs/op_obs	cobsall.F90, cobsalltl.F90, hretr_rad.F90

Doc:

1) Canari first order debug.
2) LDRYTL dirty fix.
3) Remove old "FLO" comment that where injected into the main .branch

EXPECTED IMPACT:
4dvar is now running!

Projects: arpifs

Git branch: suzat_CY47T0_bf4dvarArpege

Modified:

arpifs/control	cva1.F90, scan2mtl.F90

arpifs/module	field_gfl_wrapper.F90, fields_mod.F90, gom_plus.F90, yomcst.F90
arpifs/obs_preproc	obatabs.F90
arpifs/op_obs	bgobs.F90, hjo.F90
arpifs/setup	sudimf1.F90
arpifs/var	chavarin.F90, chavarinad.F90, cvar2in.F90, jbtomodel.F90, jbtomodelad.F90