

## ARPEGE MEMORANDUM

**From:** GCO **Date:** March 12, 2007  
**To:** GMAP, COMPAS, GMGEC, GMME, DIR/RE/CRC, Mats Hamrud  
**Subject:** New cycle CY32T1

A new cycle CY32T1 has been created. This is not a common cycle with the ECMWF. The different contributions for this cycle are described in the following pages.

**ClearCase label:** CY32T1

**Modified libraries:** aladin, arpege, bl, mpa

**Contributors:**

GCO	Project:arpege	CCase branch:marp001_CY32T0_ibmbf
	Project:arpege	CCase branch:marp001_CY32T0_none
Radmila BROZKOVA	Project:arpege	CCase branch:mrpe684_CY32_cy32t0_alaro02
Ryad EI KHATIB	Project:arpege	CCase branch:mrpm602_CY32T0_fix
SEITY Yann	Project:arpege	CCase branch:mrpm637_CY32T0_arome

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### **GCO**

**Doc:**

*Fix some OMP compiler directives for compilation on IBM .*

**Project:** aladin, arpege  
**ClearCase branch:** marp001\_CY32T0\_ibmbf

**Modified:**

ald/coupling ecoupl1.F90 esrlxt1.F90  
ald/inidata esc2r.F90

**Doc:**

*Remove obsolete routines.*

**Project:** arpege  
**ClearCase branch:** marp001\_CY32T0\_none

**Deleted:**

arp/phys\_dmn acnebpar.F90 acnebt.F90 acpluie\_prog.F90  
acqmesm.F90 acrhcri.F90 acsmi1.F90  
acsnp.F90  
arp/setup surhcri.F90

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### **Radmila BROZKOVA**

**Doc:**

1) Removing obsolete options in physics (LSRCON, LSRCONT, LNEBT, call to pre-ISBA routine ACDDRO). Here the keys LSRCON, LSRCONT and LNEBT are removed including all the mechanics. Routine ACNEBT is removed. The call to CPFHPFS is removed from APLPAR.

2) Proper interface for delta\_m option. This is now done in the routine CPTEND\_NEW, which puts together computations separated before between CPFHPFS and CPTEND. When activating delta\_m (NDPSFI=1), the interface goes via CPTEND\_NEW. All computations with NDPSFI are removed from APLPAR and parameterisation routines.

3) Externalisation of computation of partial cloudiness. This computation was removed from the end of ACNEBN as well as ACNEBR. A new routine ACNPART was created, which is called at the end of the "cloudiness" paragraph in APLPAR.

4) Proper handling of fluxes related to precipitation processes, both resolved and convective. Cleaning APLPAR computations. Till now not every routine computing precipitation was delivering all the fluxes related to these processes, which were used in the interface, like condensation/evaporation, autoconversion, evaporation of precipitating species on top of the resulting precipitation fluxes. It was of course true for the diagnostic routines like ACPLUIE and also for convective parameterisations, where the outputs were not homogeneous either. With the arrival of prognostic resolved precipitation schemes it led to an adjustment of the fluxes at the end of the APLPAR routine, pending usage of this and that scheme. This piece of computation with interlaced "IF(.NOT.LX).AND.OR.IF(LXX)" became unreadable and potential source of bugs. Therefore it was decided to have for each type of the flux four sub-types:

- "stratiform" or "resolved" proces, liquid phase : "SL"
- "stratiform" or "resolved" proces, solid phase : "SN"
- "convective" or "parametrised" proces, liquid phase: "CL"
- "convective" or "parametrised" proces, solid phase : "CN"

The types of the fluxes are as follows:

- condensation/evaporation of cloud species "C"
- autoconversion from cloud species to precipitating species "PFP"
- precipitation "PL"
- evaporation of precipitating species "EVP".

To complete the existing fluxes, the split to resolved and convective sub-types was introduced for the autoconversion and evaporation of precipitating species; therefore four new fluxes were defined. Their computations and/or setup was added to the corresponding parameterisation routines. The interface was properly modified in CPTEND\_NEW. The CPTEND routine itself was not changed except its call from MF\_PHYS in order not to modify the results. The diagnostic code (DDH) was not yet adapted to all these new fluxes; this is the work still to be done.

5) Modularisation of the resolved condensation/evaporation scheme (ALARO-0). Here the code was cleaned and unified to incorporate two existing options to compute the resolved condensation/evaporation together with its critical humidity profile and resulting cloudiness. One option is the Smith scheme modified by Luc Gerard (option LSMGCDEV), the other one is the scheme developed from the Xu-Randall approach, used previously in ACPLUIE\_PROG (option LXRCDEV). Two new modular routines ACNEBCOND (critical humidity and cloudiness) and ACCDEV (condensation/evaporation) replace the previous routines. In addition, the microphysics computations were modularised to processes (ACACON for autoconversion, ACCOLL for collection, ACEVMEL for evaporation and melting) in order to account for the geometry of clouds.

6) Introduction of the prognostic convection scheme in the 3MT cascade. There are routines ACCVUD (prognostic updraught) and ACMODO (prognostic downdraught). With this scheme 6 new prognostic or pseudo-historic variables are used (already defined in SUDIM1).

7) Introduction of "update" routines in the 3MT cascade. After each process (updraught, microphysics, downdraught) there is an update of variables by routines ACUPU, ACUPM and ACUPD. The update due to negative values will be externalised later and everywhere in APLPAR.

8) With the help of LLCONTROL switch one may avoid the abort due to absence of the land-sea mask in the input grib files of the configuration 901. This is essential when one wants to treat spectral fields only. When LLCONTROL is set to .FALSE. and land-sea mask is not present in the input files, the job does not abort but fills in just sea points:

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```

IF (.NOT.LLLSM) THEN
  IF (.NOT. LLCONTROL) THEN
    WRITE(NULOUT,*) 'WARNING: NO LAND/SEA MASK IN GRIB FILE!!!'
    WRITE(NULOUT,*) 'ALL POINTS ARE SEA POINTS!!!'
    ZFALSM(1:NGPTOTG)=0._JPRB
  ELSE
    CALL ABOR1('CPREP1: NO LAND/SEA MASK IN GRIB FILE')
  ENDIF
ENDIF
ENDIF

```

.....

The second modification allows to set-up the forecasting range in the datum description of the file. This modification is already present in the cycle 31:

.....

*! Initialize date.*

```

IDATEF(1)=100*(ISEC1(21)-1)+ISEC1(10)
IDATEF(2)=ISEC1(11)
IDATEF(3)=ISEC1(12)
IDATEF(4)=ISEC1(13)
IDATEF(5)=ISEC1(14)
IDATEF(6)=ISEC1(15)
IDATEF(7)=ISEC1(16)
IDATEF(8)=ISEC1(17)
IDATEF(9)=ISEC1(18)
IDATEF(10)=ISEC1(19)
IDATEF(11)=ISEC1(20)

```

*! Write out date.*

*added decks:*  
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*arp/phys\_dmn/*

```

acacon.F90 : microphysics - autoconversion.
accdev.F90 : resolved condensation/evaporation for input to microphysics.
accoll.F90 : microphysics - collection.
accvud.F90 : prognostic updraught.
acevmel.F90 : microphysics - evaporation/melting.
acnebcond.F90 : resolved critical humidity and cloudiness for condensation/evaporation processes for
input to microphysics.
acnpart.F90 : externalised computation of partial cloudiness.
acmodo.F90 : prognostic downdraught.
acupd.F90 : update after downdraught in the 3MT cascade.
acupm.F90 : update after microphysics in the 3MT cascade.
acupu.F90 : update after updraught in the 3MT cascade.

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*modified decks:*  
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*arp/adiab/*

```

cpfhps.F90 : removing the delta_m option (NDPSFI); adding the option for sensible heat of
precipitations (LPHSPSH).
cpg.F90 : four new fluxes: convective autoconversion and evaporation of precipitation, both for solid
and liquid phase.
cpg_dia.F90 : idem as for cpg.F90.
cptend.F90 : removing the delta_m option (NDPSFI).
cptend_new.F90 : introducing properly the delta_m option (NDPSFI) and four new convective fluxes.
cputqy.F90 : introducing properly the option for pseudo-prognostic TKE.

```

*arp/control*

*cgr1.F90* : removing LNEBT option.  
*cva1.F90* : removing LNEBT option.

*arp/module/*

*yomphy.F90* : removing obsolete options and cleaning 3MT options.  
*yomphy0.F90* : cleaning 3MT constants.

*arp/namelist*

*namphy.h* : removing obsolete options and cleaning 3MT options.  
*namphy0.h* : cleaning 3MT constants.

*arp/phys\_dmn*

*ac\_cloud\_model.F90*: improvement of the optical coefficient computation.  
*accvimp.F90* : new convective fluxes.  
*accvimp\_v3.F90* : new convective fluxes and removing NDPSFI.  
*accvimpgy.F90* : new convective fluxes and removing NDPSFI.  
*acdifus.F90* : correction for the first time-step when LPTKE, preparation for more general tuning of the PTKE scheme.  
*acnebn.F90* : computation with convective cloudiness when 3MT; externalisation of computation of partial cloudiness.  
*acnebr.F90* : externalisation of computation of partial cloudiness.  
*acpluie.F90* : new resolved fluxes.  
*acpluis.F90* : new resolved fluxes.  
*aplmpphys.F90* : updated code of microphysics and split to processes.  
*aplpar.F90* : removing obsolete features, cleaning, interfacing new convective fluxes, call to new 3MT routines, removing NDPSFI.  
*cpchet.F90* : new four convective fluxes.  
*cpozo.F90* : removing NDPSFI (comment line only).  
*initaplpar.F90* : new four convective fluxes.  
*hl\_aplpar.F90* : removing obsolete options, removing NDPSFI, proper call to modified routines.  
*mf\_phys.F90* : mechanics of new four convective fluxes. Call to CPTEND\_NEW when NDPSFI=1 ( $\delta_m = 1$ ).  
*suphy0.F90* : set-up of new constants and abort control.

*arp/setup*

*su0phy.F90* : removing obsolete and/or useless options; control of aborts.  
*sudim1.F90* : removing obsolete options; default values for gfl field attributes.  
*suallo.F90* : removing allocation of the critical humidity vertical column array as useless.  
*suhloption.F90* : abort if the option for the sensible precipitation heat is activated together with the option to interface tendencies and not fluxes.

*arp/sinvect*

*cun1.F90* : removing LNEBT option.

*deleted decks:*

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*arp/phys\_dmn*

*acnebpar.F90* : useless.  
*acnebt.F90* : obsolete.  
*acpluie\_prog.F90*: replaced by *accdev.F90*.  
*acqmesm.F90* : replaced by *accdev.F90*.  
*acrhcri.F90* : replaced by *acnebcond.F90*.  
*acsmi1.F90* : replaced by *acnebcond.F90*.  
*acsnp.F90* : useless.

*arp/setup*

*surhcri.F90* : useless; replaced by code in *acnebcond.F90*.

**Project:** arpege  
**ClearCase branch:** mrpe684\_CY32\_cy32t0\_alaro02

**Added:**

arp/phys_dmn	acacon.F90	accdev.F90	accoll.F90
	accvud.F90	acevmel.F90	acmodo.F90
	acnebcond.F90	acnebpar.F90	acnpart.F90
	acqmesm.F90	acrhcri.F90	acsmi1.F90
	acsnp.F90	acupd.F90	acupm.F90
	acupu.F90		

**Modified:**

arp/adiab	cpfhpfs.F90	cpg.F90	cpg_dia.F90
	cptend.F90	cptend_new.F90	cputqy.F90
arp/control	cgr1.F90	cprep1.F90	cva1.F90
arp/module	yomphy.F90	yomphy0.F90	
arp/namelist	namphy.h	namphy0.h	
arp/phys_dmn	ac_cloud_model.F90	acacon.F90	accdev.F90
	accoll.F90	accvimp.F90	accvimp_v3.F90
	accvimpgy.F90	accvud.F90	acdifus.F90
	acevmel.F90	acmodo.F90	acnebcond.F90
	acnebn.F90	acnebpar.F90	acnebr.F90
	acnpart.F90	acpluie.F90	acpluie_prog.F90
	acpluis.F90	acqmesm.F90	acrhcri.F90
	acsmi1.F90	acsnp.F90	acupd.F90
	acupm.F90	acupu.F90	aplmpphys.F90
	aplpar.F90	cpchet.F90	cpozo.F90
	hl_aplpar.F90	initaplpar.F90	mf_phys.F90
	suphy0.F90		
arp/setup	su0phy.F90	suallo.F90	sudim1.F90
	suhloption.F90	surhcri.F90	
arp/sinvect	cun1.F90		

**Ryad EI KHATIB****Doc:**

*With this modification, it is possible now to pre-compile METEO-FRANCE's blacklist file on a linux platform .*

**Project:** bl  
**ClearCase branch:** mrpm602\_CY32T0\_fix

**Modified:**

bla/compiler generate.c

**SEITY Yann****Doc:**

*Fix for budgets.*

**Project:** mpa

**ClearCase branch:** mrpm637\_CY32T0\_arome

***Modified:***

mpa/micro/internals rain\_ice.mnh