

An aerial photograph of a mountain range covered in snow. The peaks are sharp and pointed, with deep shadows in the valleys. The sky is a clear, pale blue. The overall scene is bright and serene.

Formation sur les derniers développements dans le modèle
ARPEGE/IFS

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The assigned task was the validation of the new ARPEGE/ALADIN cycle CY30T1. For this purpose, CY30T1 was tested with respect to every possible configuration using the « mitraillette » script.

These validations showed that most configurations ran without problems, yet unclear aborts occurred in « multi-proc » mode in the following configurations:

- AQ1T (hydrostatic adiabatic E001 with SL2TL advection scheme and variable q in gridpoint);
- AN4E (non-hydrostatic adiabatic E401 with Eulerian advection scheme); and
- ANFS (non-hydrostatic fullpos tests).

I shared the work with Nihed Bouzouita (Tunisia) who attended to the aborts in AQ1T and later in AN4E configurations whereas I worked on ANFS configuration.

Below you can find the present status of the ANFS validation. Chapter 1 shows an overview of the conducted tests, chapter 2 an overview of the results and chapter 3 the details. Chapter 4 summarizes the present status of my gained insights.

1.Overview of conducted tests

- (A) configuration ANFS in « mono-proc » mode (reference run).
- (B) configuration ANFS in « multi-proc » mode.
- (C) only off-line fullpos in « multi-proc » mode.
- (D) as (B) but without fullpos.
- (E) as (B) but without fullpos and without model physics.
- (F) as (B) but with modified advection scheme.
- (G) as(B) but with modified advection scheme and without fullpos.
- (H) as (B) but with modified advection scheme and withLSPLIT=.TRUE.

2.Overview of test results

- (A) OK.
- (B) Abort in part 8 of STEPO (direct transforms).
- (C) OK.
- (D) Abort in part 8 of STEPO (direct transforms), same as in (B).
- (E) OK.
- (F) Abort in part 3 of STEPO (gridpoint computations).
- (G) OK.
- (H) Abort in part 3 of STEPO (gridpoint computations), same as in (F).

3.Details

(A) configuration ANFS in « mono-proc » mode:

Namelist: the operational namelist « nam_inl_nh_fp1_nofrein ».

Result: OK.

(B) configuration ANFS in « multi-proc » mode:

Namelist: the operational namelist « nam_inl_nh_fp1_nofrein ».

Result: an abort in the following program chain:

STEPO (part 8: direct transforms) ->

ETRANSDIRH ->

ETRANSDIR_MDL ->

EDIR_TRANS ->

EDIR_TRANS_CTL ->

EFTDIR_CTL ->

TRGTOL ->

MPL_RECV

(C) only off-line fullpos in « multi-proc » mode:

For this test, the off-line fullpos was launched using some historical files from previous test runs.

Namelist: the operational namelist « nam_inl_nh_fp1_nofrein ».

Result: OK.

(D) configuration ANFS in « multi-proc » mode without fullpos:

Namelist: "nam_inl_nh_fp1_nofrein_exp", with the following modifications with respect to the operational one:

&NAMCT0

LPC_OLD=.FALSE.,

NFRSDI=1,

NSDITS(0)=1,

NSDITS(1)=1,

NFRPOS=1

NPOSTS(0)=1

NPOSTS(1)=5

/

&NAMDYN

```

    NSITER=0,
/
&NAMFPC
    # emptied
/
&NAMFPG
    # emptied
/
&NAMPAR0
    LMPOFF=.substr2.,
/
&NAMPAR1
    NSTRIN=substr1,
    NSTROUT=substr1,
    LSPLIT=.FALSE.
/
&NAMPARAR
/
&NAMPHY
    LMPHYS=.TRUE.,
    LFGEL=.FALSE.,
    LSOLV=.FALSE.,
/
&NAMPHY0
    RCEVAP=0.25
/

```

Result: Same abort as in (B).

(E) configuration ANFS in « multi-proc » mode without fullpos and without model physics:

Namelist: "nam_inl_nh_fp1_nofrein_nophys", as in (D) but with the following additional modification:

```

&NAMPHY
    LMPHYS=.FALSE.,
/

```

Result: OK.

(F) configuration ANFS in « multi-proc » mode with modified advection scheme.

Namelist: "nam_inl_nh_fp1_d4_2t1sl_nofrein", with the following modifications with respect to the operational namelist:

```
&NAMCT0  
LPC_OLD=.FALSE.,  
LPC_FULL=.TRUE.,  
LPC_NESC=.FALSE.,  
LTWOTL=.TRUE.,
```

```
/
```

```
&NAMDYN  
VESL=0.,  
XIDT=0.1,  
SITR=350.,  
SIPR=100000.,  
SITRA=50.,  
BETADT=1.0,  
LSETTLS=.FALSE.,
```

```
/
```

```
&NAMDYNA  
NVDVAR=4,  
NPDVAR=2,  
LGWADV=.FALSE.,
```

```
/
```

```
&NAMPAR0  
LMPOFF=.substr2.,
```

```
/
```

```
&NAMPAR1  
NSTRIN=substr1,  
NSTROUT=substr1,  
LSPLIT=.FALSE.
```

```
/
```

```
&NAMPARAR
```

```
/
```

```
&NAMPHY  
LMPHYS=.TRUE.,
```

```
LFGEL=.FALSE.,
LSOLV=.FALSE.,
/
&NAMPHY0
RCEVAP=0.25
/
```

Result: an abort in the following program chain:

```
STEPO (part 3: gridpoint computations) ->
SCAN2H ->
SCAN2MDM ->
GP_MODEL
```

(G) configuration ANFS in « multi-proc » mode with modified advection scheme and without fullpos:

Namelist: "nam_inl_nh_fp1_d4_2t1sl_nofrein_exp", with the residual "exp" modifications as listed in (D) with respect to « nam_inl_nh_fp1_d4_2t1sl_nofrein » as showed in (F).

Result: OK.

(H) configuration ANFS in « multi-proc » mode with modified advection scheme and with LSPLIT=.TRUE.:

Namelist: "nam_inl_nh_fp1_nofrein_new", with the following modification with respect to « nam_inl_nh_fp1_d4_2t1sl_nofrein » as showed in (F):

```
&NAMPAR1
LSPLIT=.TRUE.,
/
```

Result: same abort as in (F).

4.Summary

In the configuration ANFS an abort occurs when run in « multi-proc » mode. The abort happens in part 8 of STEPO (direct transforms) when the model is run with as well as without fullpos. Off-line fullpos works, and also the ANFS configuration works in « mono-proc » mode.

Further tests with a modified advection scheme revealed an abort at another place, namely in part 3 of STEPO (gridpoint computations), but only when launched with fullpos; there where no problems without fullpos.

Unluckily I was not yet able to find the exact reason of the abort, but I hope this description of the tests can be a little help for further efforts.