

**Report of Boryana Tsenova,
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for the Phasing work during 01.06.-20.06.2015**

Table 1. Some information on the different versions tested in the present report

Name	Version	executable
Ref	CY41T1	cy41t1_master-main.01.IMPI500IFC1301_ref.2x.exe
Revert-back version (b427)	CY41T1R2, v04	/tsenovab/SAVE/executables_2015/MASTER_b427*
Version with new RRTM (b431)	CY41T1R2, v04, with corrected bug in RRTM	/tsenovab/SAVE/executables_2015/MASTER_b431**
CY42	CY42	/tsenovab/SAVE/executables_2015/MASTER_42

* taken from /home/gmap/mrpa/bouteloupy/pack/b427

** taken from /home/gmap/mrpa/bouteloupy/pack/b431

1. “Revert-back version” (b427)

For this version, some “backcoding” of RRTM code for CY42 to the version of CY41 were made by ECMWF, as the new version of the code affected considerably the numerical results. For the presented here simulations, additionally to the new version of RRTM coefficient files, previous version of these coefficient files (for CY41) were used.

Mitraillette tests are in

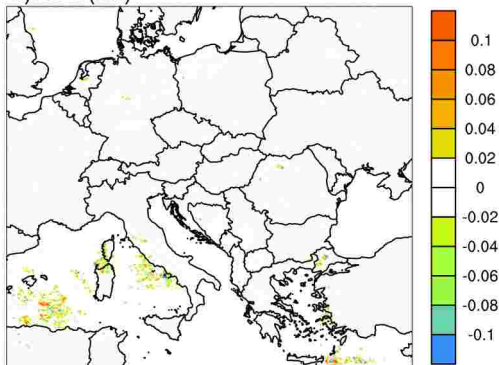
/home/gmap/mrpe/tsenovab/mitraille/cy41t1r2/mitraille_0030 – mono,

/home/gmap/mrpe/tsenovab/mitraille/cy41t1r2/mitraille_0031(0039, 0040) - multi

All mono jobs and mosly all multi jobs are with identical spectral norms with the Reference CY41T1 (Ref). AA1T, AC1T, AC1U have between 11 and 8 identical digits with the reference; AG1T and AR1T – between 5 and 11 identical digits.

Some plots were made to evaluate the temperature difference between the Reference CY41T1 (Ref) and the “Revert-back version” (b427)

T(30)ref-T(30)



T(30)ref-T(30)

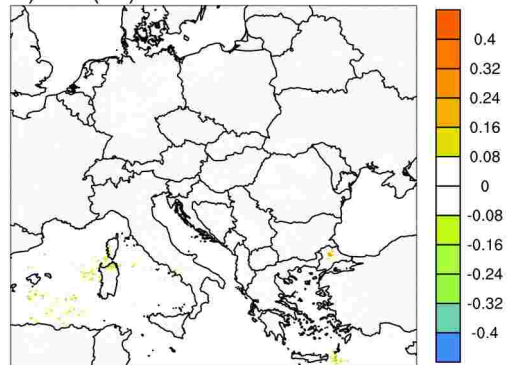


Fig.1. AA1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back

version” (b427) at level 30 after 1 (left) and 2 h (right) of integration

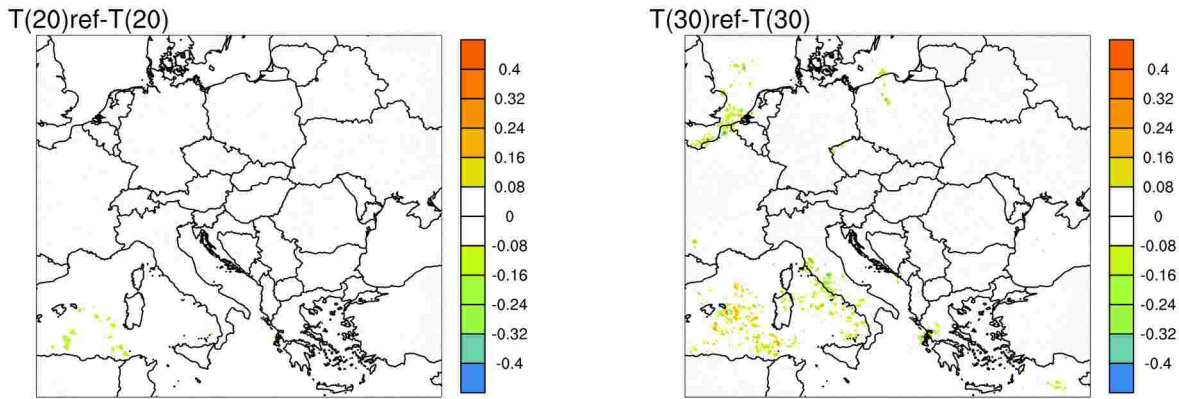


Fig.2. AA1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back version” (b427) at levels 20 (left) and 30 (right) after 12 h of integration

The temperature difference between Reference (Ref) and “Revert-back version” (b427) for AA1T becomes more important ($\sim 0,1K$) at level 30 mostly over sea regions after 1 h of integration (see Fig.1), reaching 0,25K after 12 h (see Fig.2).

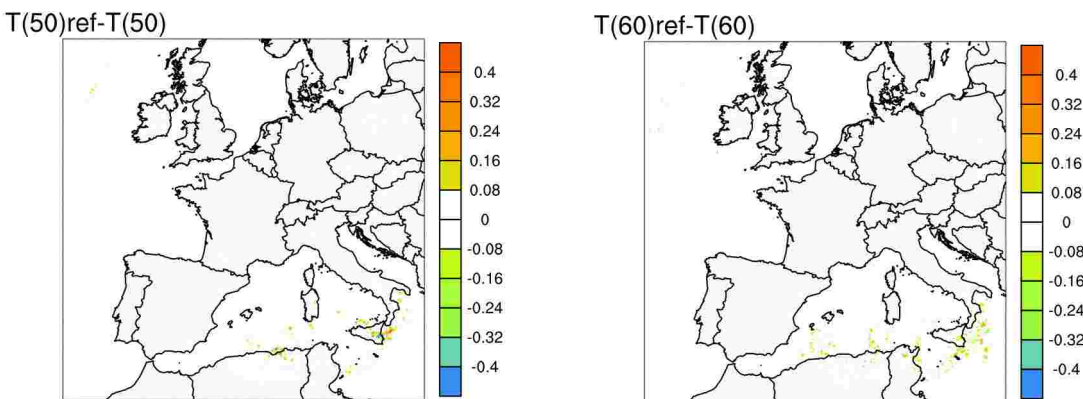


Fig.3. AG1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back version” (b427) at level 50 (left) and 60 (right) after 03 h of integration

The temperature difference between Reference (Ref) and “Revert-back version” (b427) for AG1T becomes more important ($\sim 0,4K$) at levels 50 and 60 also as for AA1T mostly over sea regions after 03 h of integration (see Fig.3). It does not seem to increase with time (see Fig. 4)

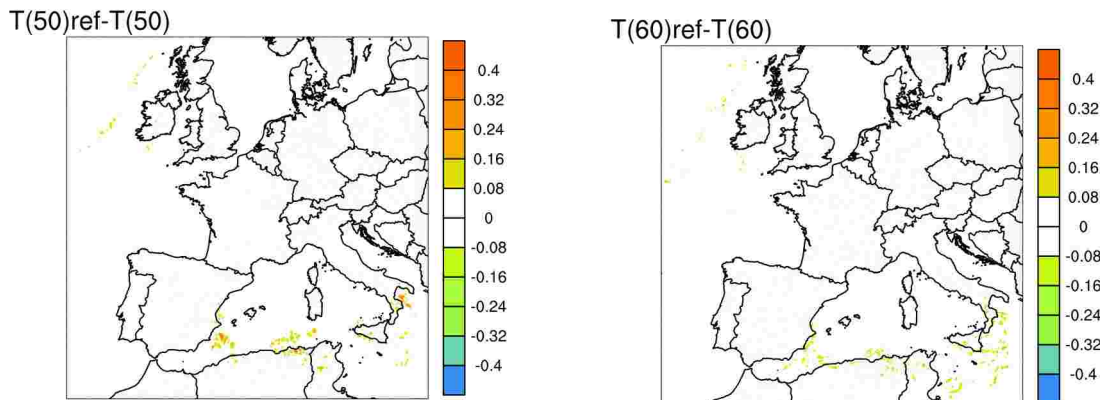


Fig.4. AG1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back

version” (b427) at level 50 (left) and 60 (right) after 12 h of integration

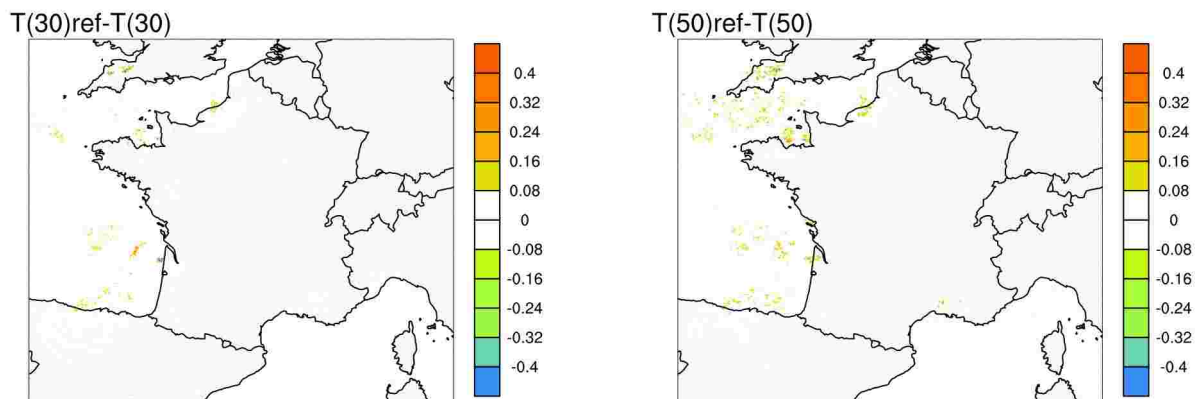


Fig.5. AR1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back version” (b427) at level 30 (left) and 50 (right) after 2 h of integration

The temperature difference between Reference (Ref) and “Revert-back version” (b427) for AR1T becomes more important ($\sim 0,3K$) at levels 30 and 50 also as for AR1T after 03 h of integration mostly over sea regions (see Fig.3).

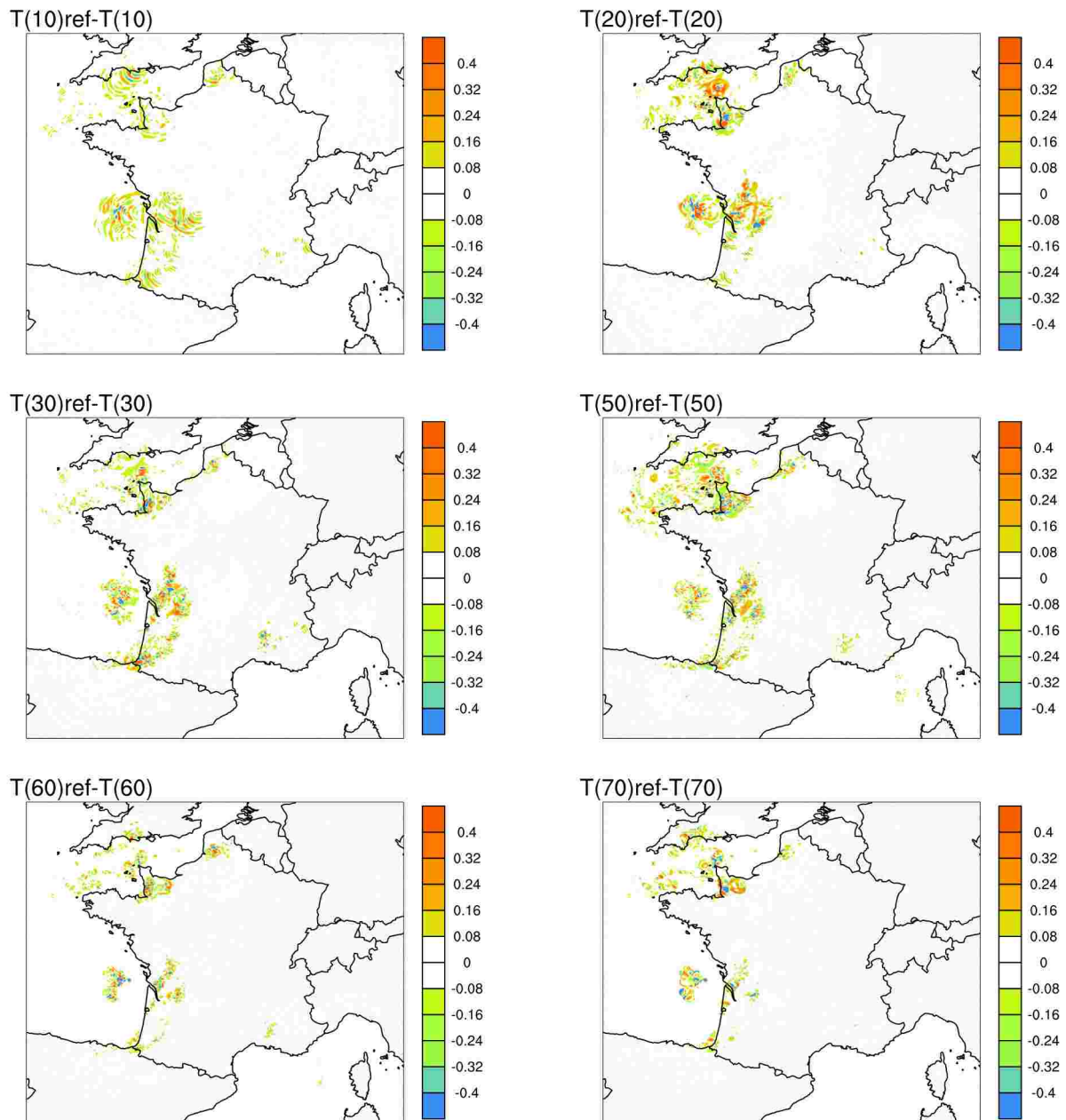


Fig.6. AR1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back version” (b427) at some considered levels after 4 h of integration

From Fig.6 it is visible that there is an increase of temperature difference between Reference CY41T1 (Ref) and “Revert-back version” (b427) with the increase of integration time. The regions with highest temperature differences are mostly over sea and coastal regions.

2. Version with new RRTM (b431)

This is the version of CY41T1R2 with corrected by Yves Bouteloup bug in rrtm_ecrt_140gp.F90.

The monojobs are in /home/gmap/mrpe/tsenovab/mitraille/cy41t1r2/mitraille_0053 and all have identical spectral norms with references.

The multijobs are in /home/gmap/mrpe/tsenovab/mitraille/cy41t1r2/mitraille_0049 (~mitraille_0050)

Here are some comparisons of Spectral norms at the end of the iterations for each simulation:

AA1T

b431: SPECTRAL NORMS - LOG(PREHYDS) 0.114968864524816E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.114968865040356E+02

AG1T

b431: SPECTRAL NORMS - LOG(PREHYDS) 0.115091764041816E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.115091762801521E+02

AR1T

b431: SPECTRAL NORMS - LOG(PREHYDS) 0.114844542030078E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.114843306566282E+02

b431: SPECTRAL NORMS - LOG(PREHYDS) 0.114844658163579E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.114843277469275E+02

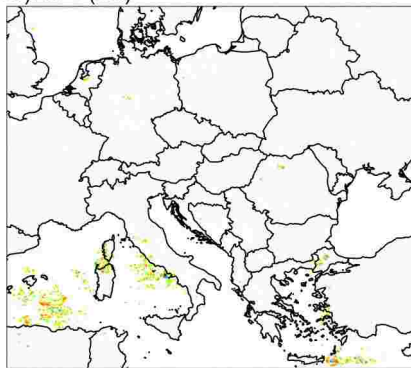
b431: SPECTRAL NORMS - LOG(PREHYDS) 0.114844628352528E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.114843303018619E+02

b431: SPECTRAL NORMS - LOG(PREHYDS) 0.114839955387684E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.114840193388940E+02

b431: SPECTRAL NORMS - LOG(PREHYDS) 0.114840337840112E+02
Ref : SPECTRAL NORMS - LOG(PREHYDS) 0.114840347172628E+02

Some plots were made to evaluate the temperature difference between the Reference CY41T1 (Ref) and the version with new RRTM (b431)

T(30)ref-T(30)



T(30)ref-T(30)

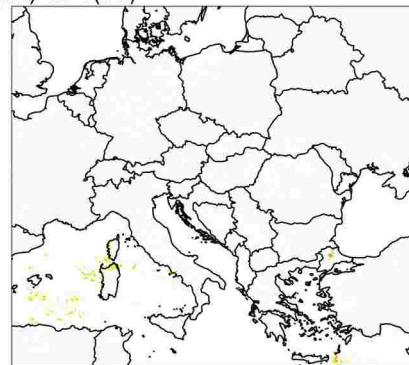


Fig.7. AA1T: Temperature difference between Reference CY41T1 (Ref) and the version with new RRTM (b431) at level 30 after 1 (left) and 2 h (right) of integration

It is visible that Fig.1 and Fig. 7 are identical. After 12 h of integration, also this tested version b431 gives identical temperature differences as the “Revert-back version” (b427) for AA1T. For AG1T is it almost similar. However, from Fig.8 one can see that there are for example some new differences in the temperature at level 70 after 3h of integration that were not present in the “Revert-back version”.

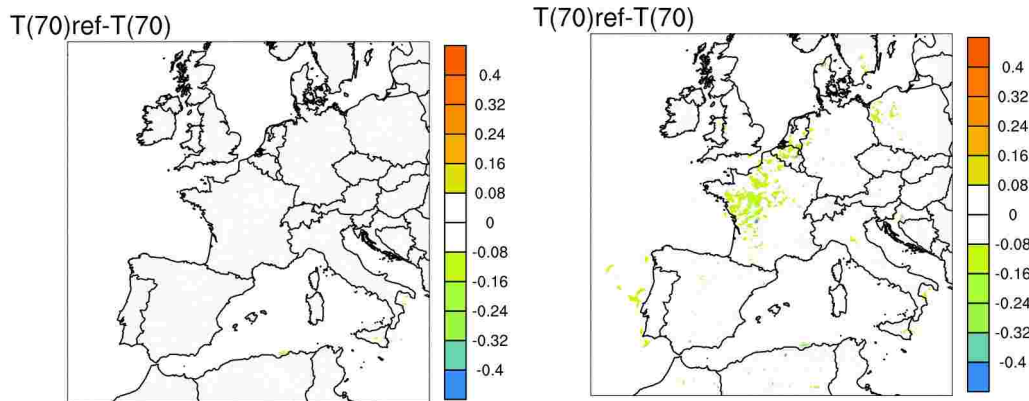


Fig.8. AG1T: Temperature difference between Reference CY41T1 (Ref) and “Revert-back version” - b427 (left) and the version with new RRTM - b431 (right) at level 70 after 3 h of integration

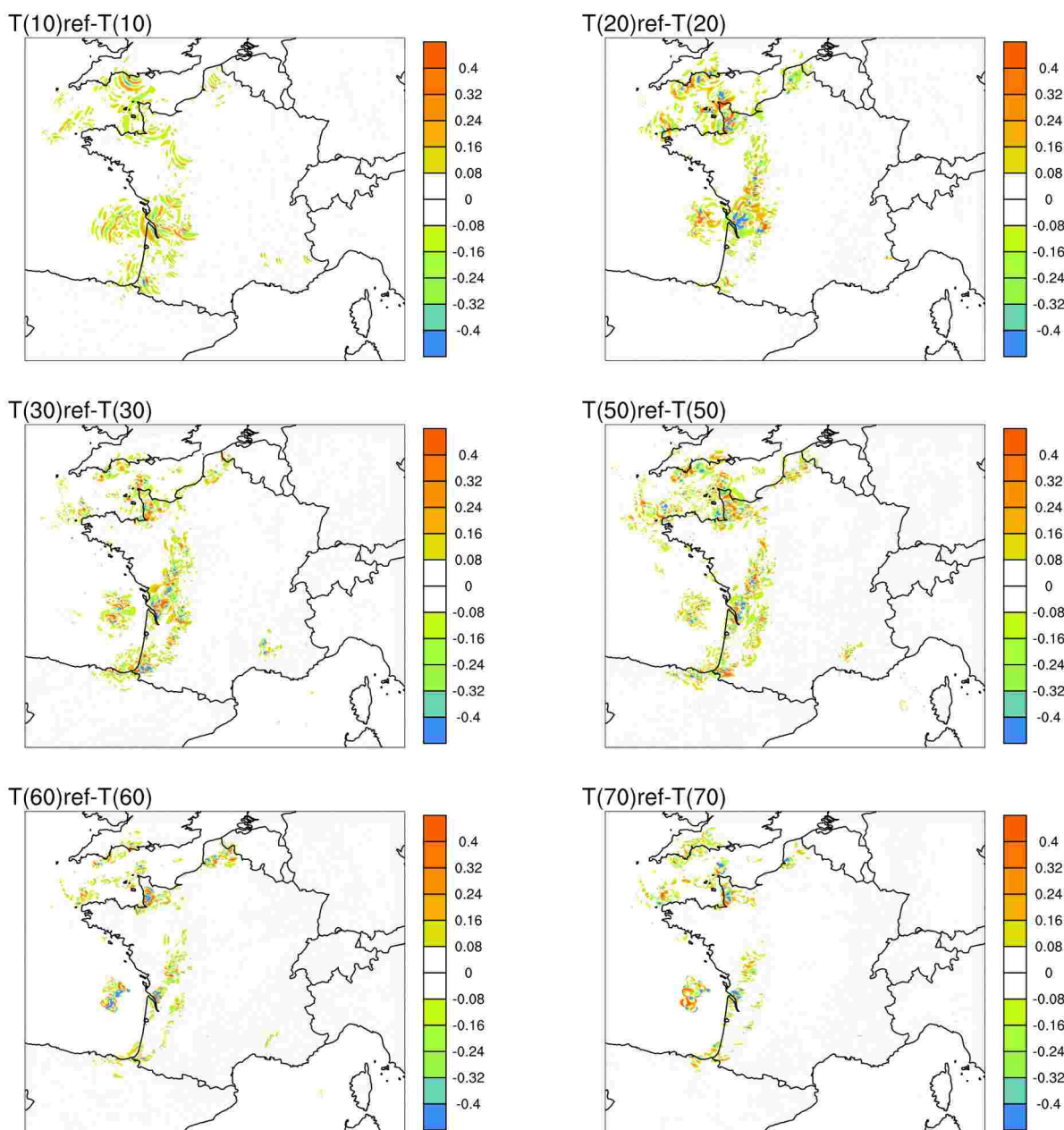


Fig.9. AR1T: Temperature difference between Reference CY41T1 (Ref) and the version with new

RRTM (b431) at some considered levels after 4 h of integration

The comparison of Fig. 9 with Fig. 6 shows similar results for temperature difference with the two considered Pre-CY42 versions – b427 and b431.

3. CY42 version

The monojobs are in /home/gmap/mrpe/tsenovab/mitraille/cy41t1r2/mitraille_0070 – all spectral norms are identical with references.

The multijobs are in /home/gmap/mrpe/tsenovab/mitraille/cy41t1r2/mitraille_0069 – most spectral norms are identical with references;

- AGIT - 9 digits identical with Ref (CY41T1)
- AG1T - 8 digits identical with Ref (CY41T1)
- AA1T - 9 digits identical with Ref (CY41T1)
- AC1T - 6 digits identical with Ref (CY41T1)
- AC1U - 4 digits identical with Ref (CY41T1)
- AR1T - 6 digits identical with Ref (CY41T1)

Some fields differences with the CY41T1 references (Ref) were plotted.

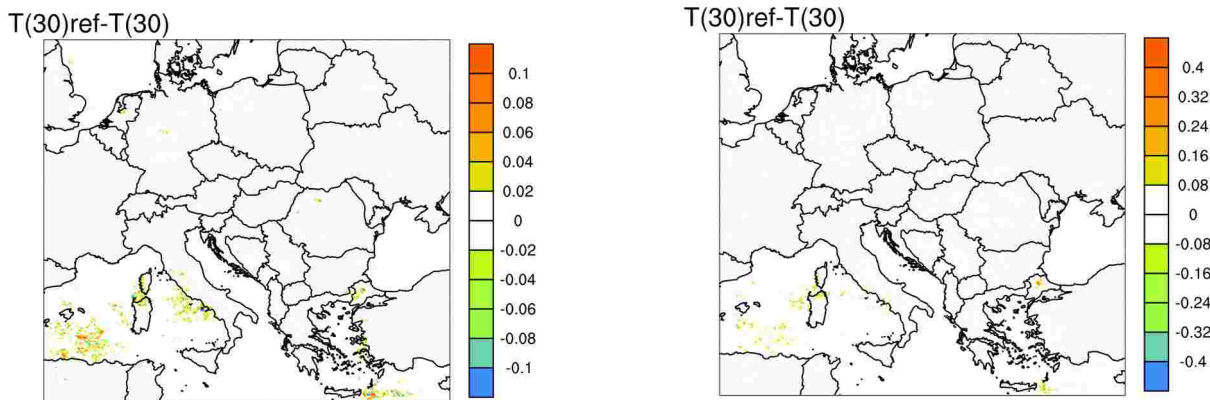


Fig.10. AA1T: Temperature difference between Reference CY41T1 (Ref) and CY42 at level 30 after 1 (left) and 2 h (right) of integration

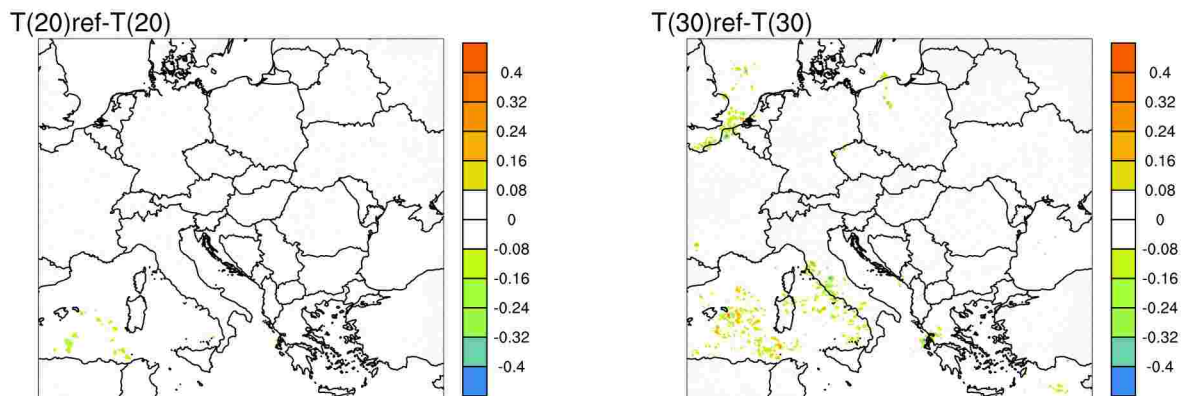


Fig.11. AA1T: Temperature difference between Reference CY41T1 (Ref) and CY42 at level 20 (left) and level 30 (right) after 12h of integration

The temperature fields for AA1T are similar as the two presented above configurations of the Pre-CY42 – b427 and b431.

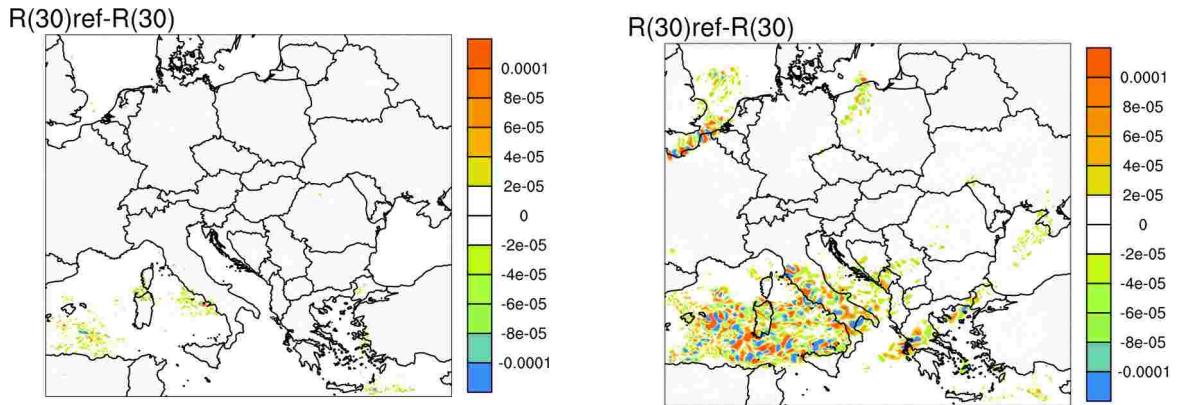


Fig.12. AA1T: Specific humidity difference between Reference CY41T1 (Ref) and CY42 at level 30 after 1h (left) and 12 h (right) of integration
 A difference (increasing with the integration time) of specific humidity is visible at level 30 (see Fig. 12).

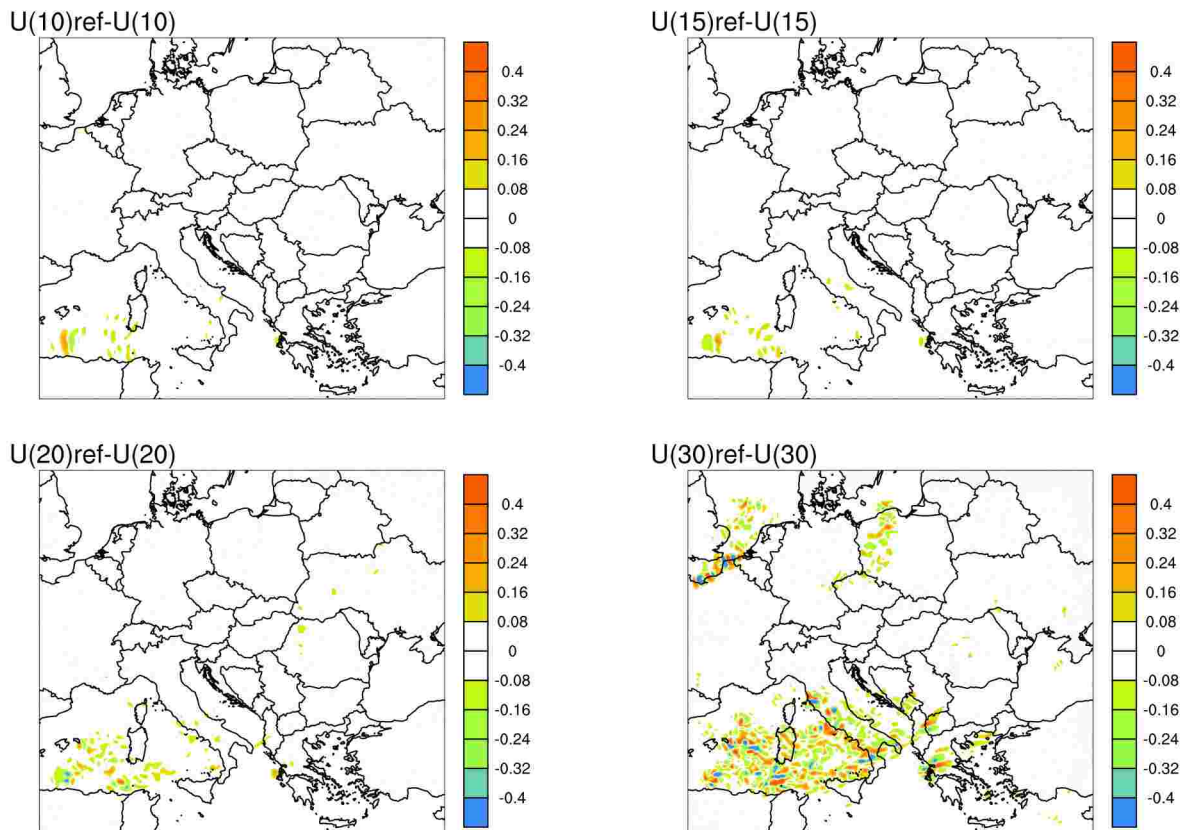


Fig.13. AA1T: U-wind component difference between Reference CY41T1 (Ref) and CY42 at some levels after 12 h of integration

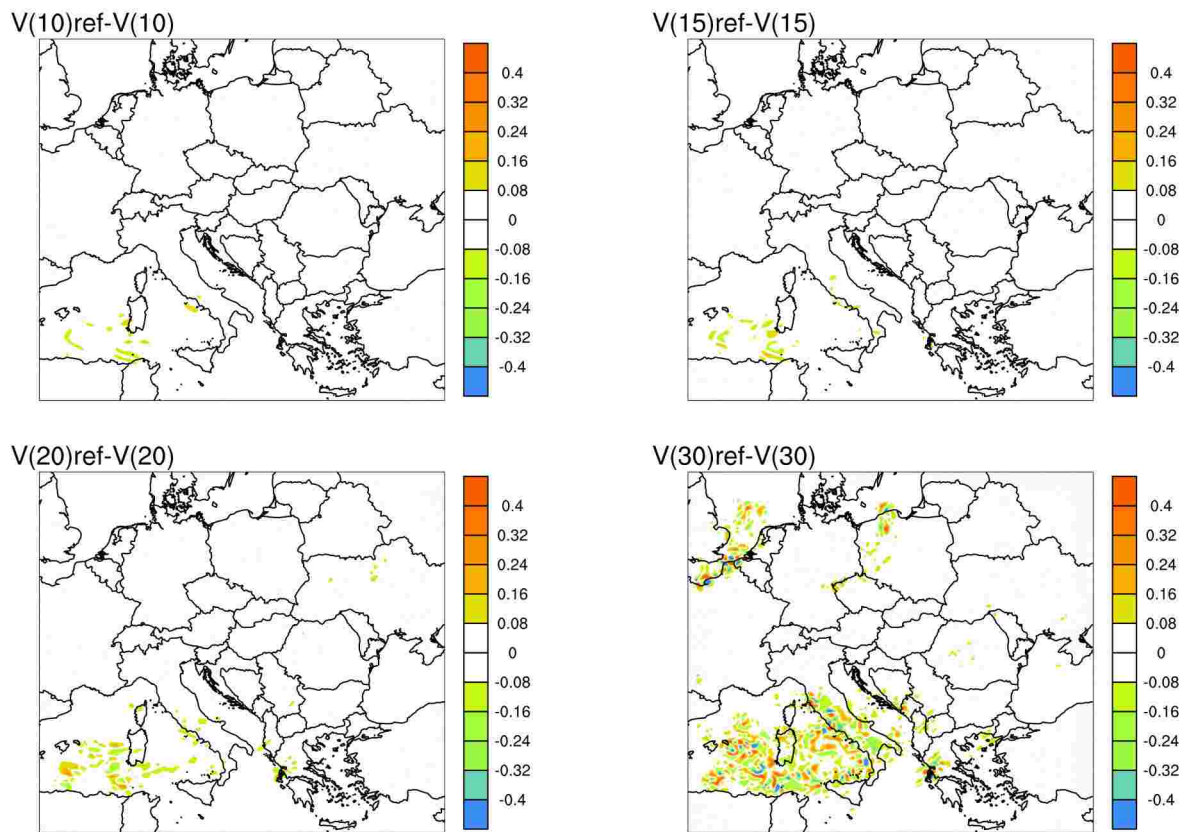


Fig.14. AA1T: V-wind component difference between Reference CY41T1 (Ref) and CY42 at some levels after 12 h of integration

From Fig. 13 and 14, where the wind fields differences between CY41T1 (Ref) and CY42 for AA1T at some levels are presented, it is visible that the differences are a little bit more significant for the zonal (U) wind components.

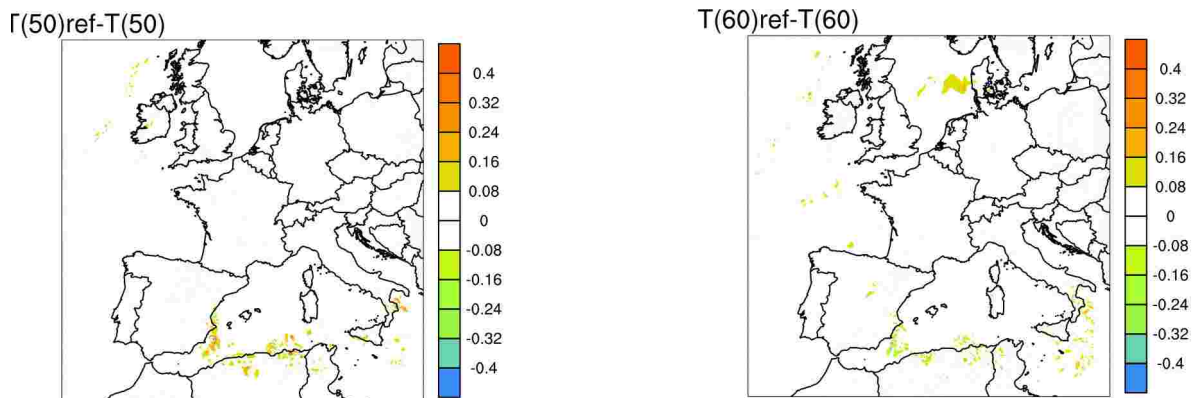


Fig.15. AG1T: Temperature difference between Reference CY41T1 (Ref) and CY42 at level 50 (left) and 60 (right) after 12 h of integration

Fig.15 shows temperature differences between Reference CY41T1 (Ref) and CY42 similar to those with previous considered Pre-CY42 – b427 and b431.

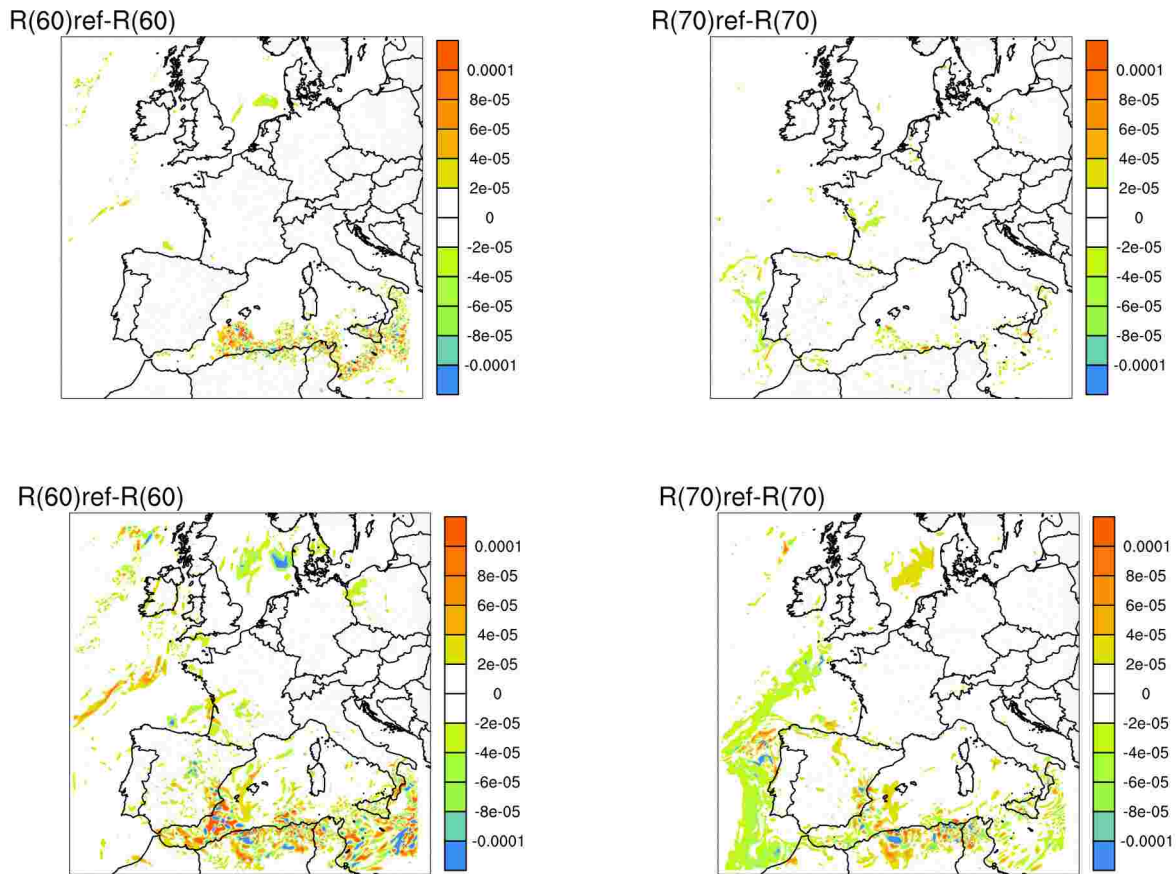


Fig.16. AG1T: Specific humidity difference between Reference CY41T1 (Ref) and CY42 after 3h (top) and 12 h (bottom) at levels 60 (left) and 70 (right)

Fig. 16 shows increasing with time differences in specific humidity fields between CY41T1(Ref) and CY42 for AG1T.

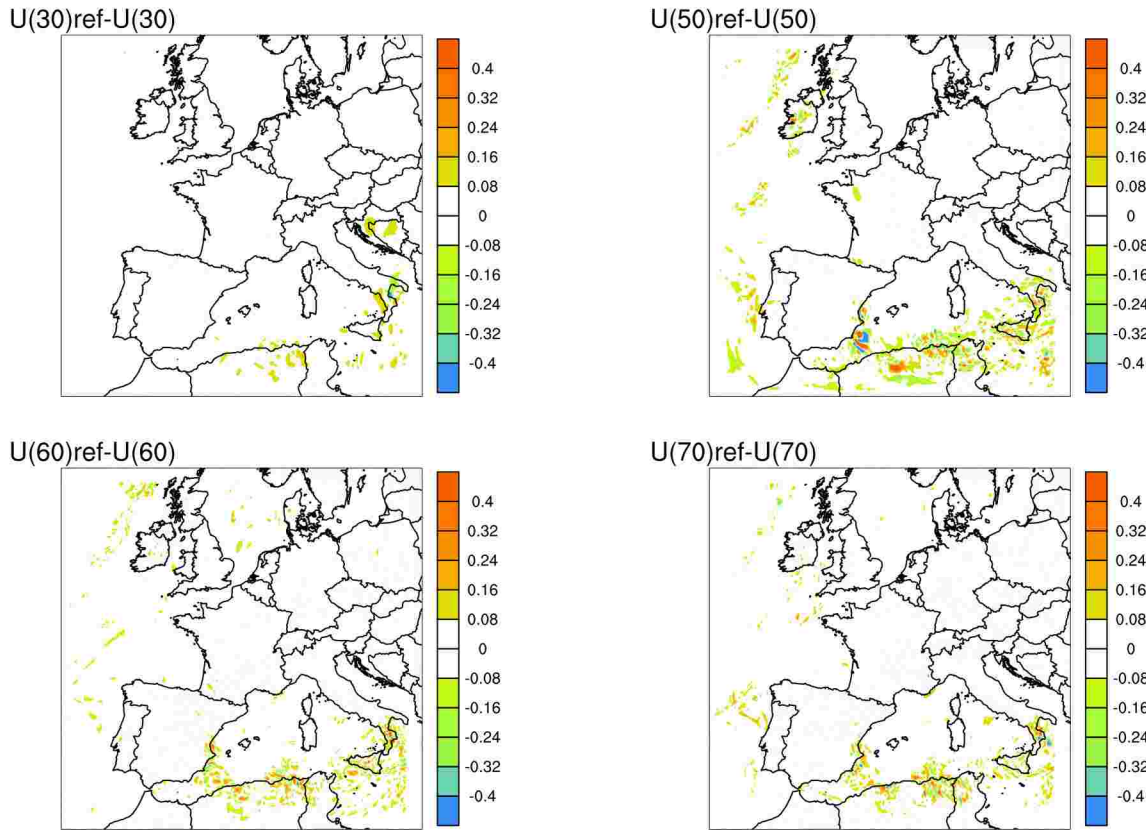


Fig.17. AG1T: U-wind component difference between Reference CY41T1 (Ref) and CY42 at some levels after 12 h of integration

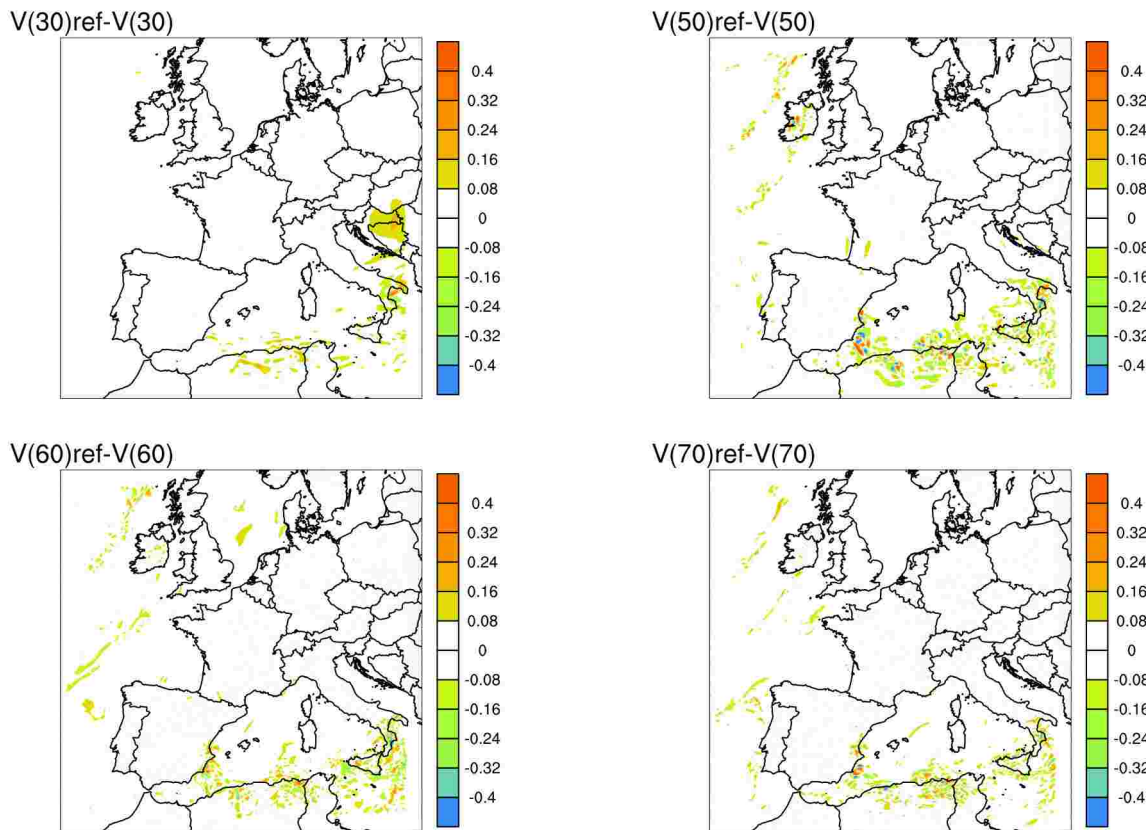


Fig.18. AG1T: V-wind component difference between Reference CY41T1 (Ref) and CY42 at some levels after 12 h of integration

From Figs. 17 and 18, where differences in wind components between CY41T1 (Ref) and CY42 are shown, it is visible that wind is affected for AG1T mostly over sea regions.

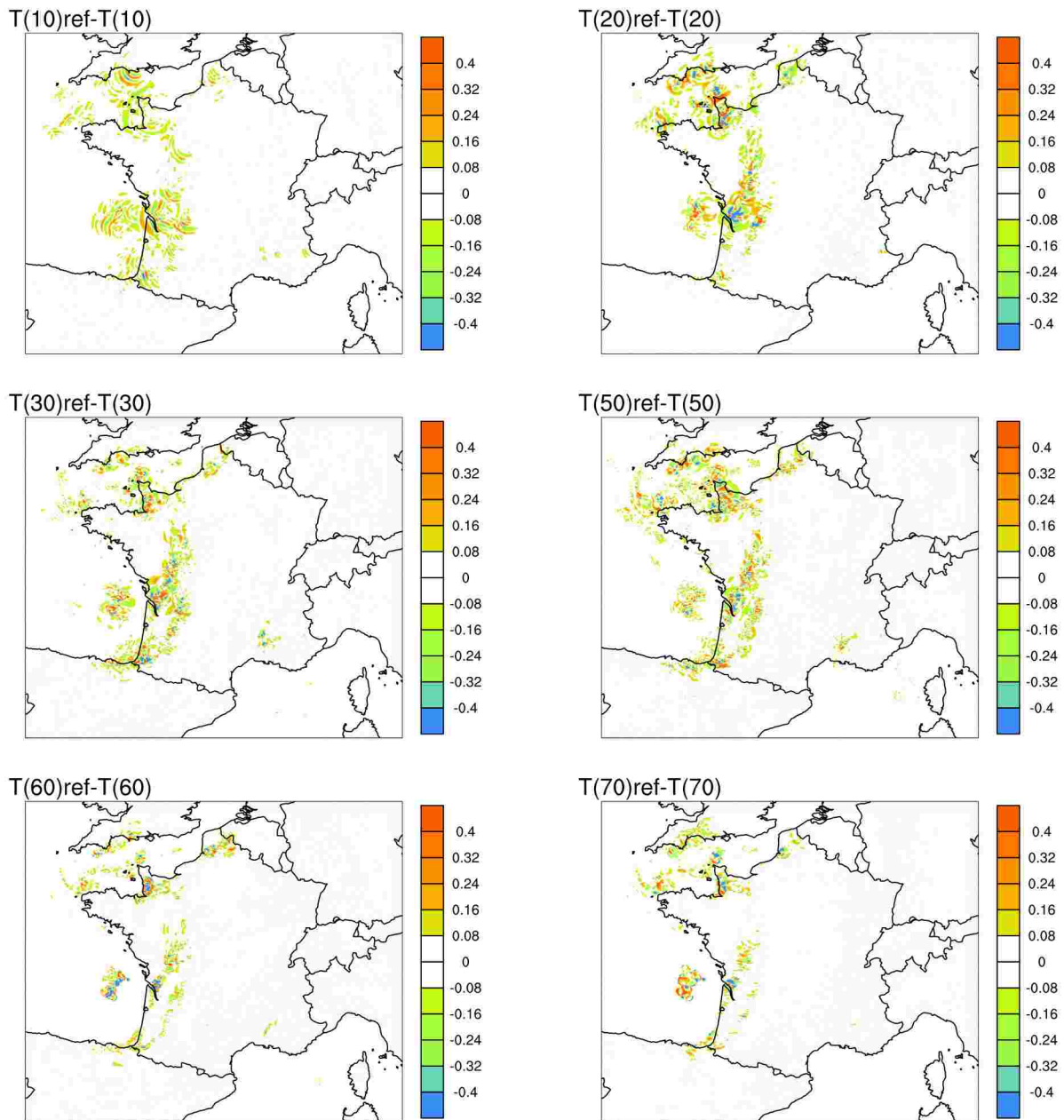


Fig.19. AR1T: Temperature difference between Reference CY41T1 (Ref) and CY42 at some levels after 4 h of integration

From Fig.19, it is visible that for AR1T the highest differences in temperatures are at level 20 (which was similar while the other b427 and b431 configurations were used). At all levels, temperature differences reach values about 0.5K for AR1T.

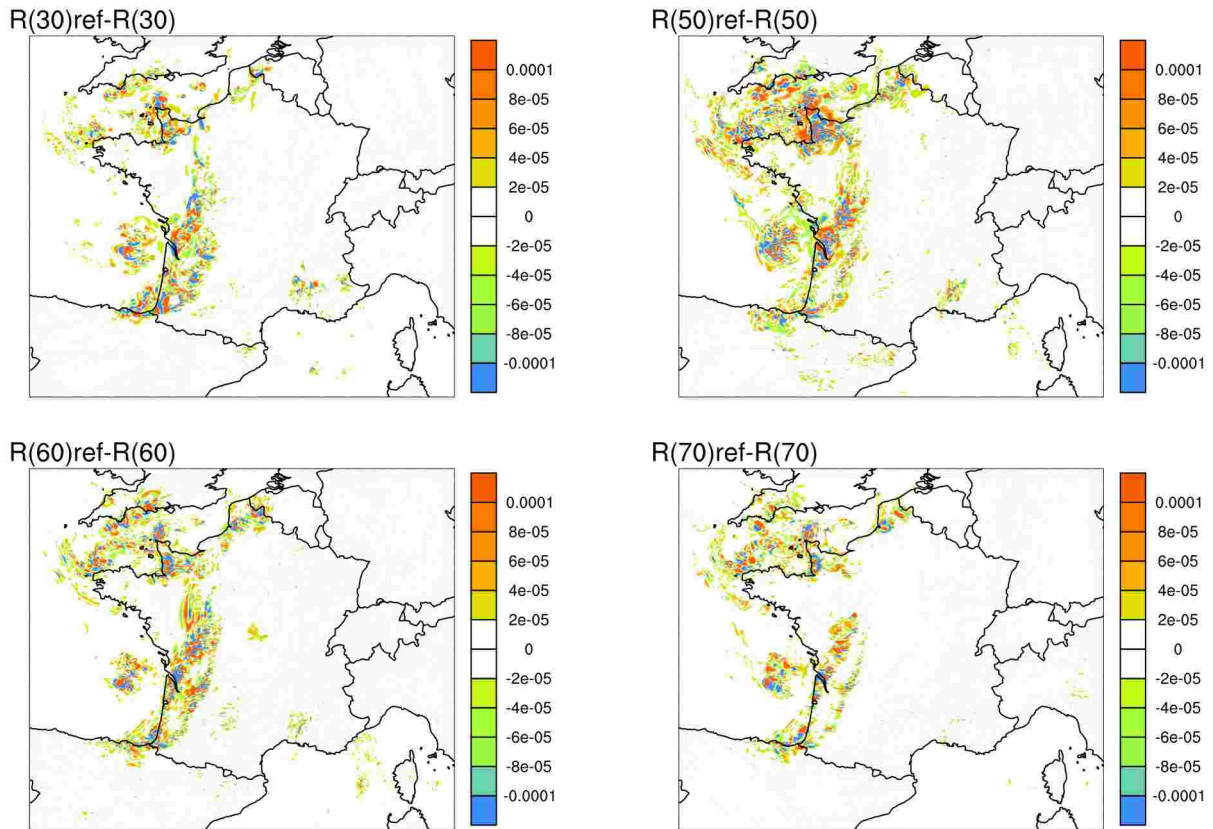


Fig.19. AR1T: Specific humidity difference between Reference CY41T1 (Ref) and CY42 at some levels after 4 h of integration

Differences in specific humidity for AR1T after 4h of integration are represented in Fig.19, showing highest and largest different regions at level 50.

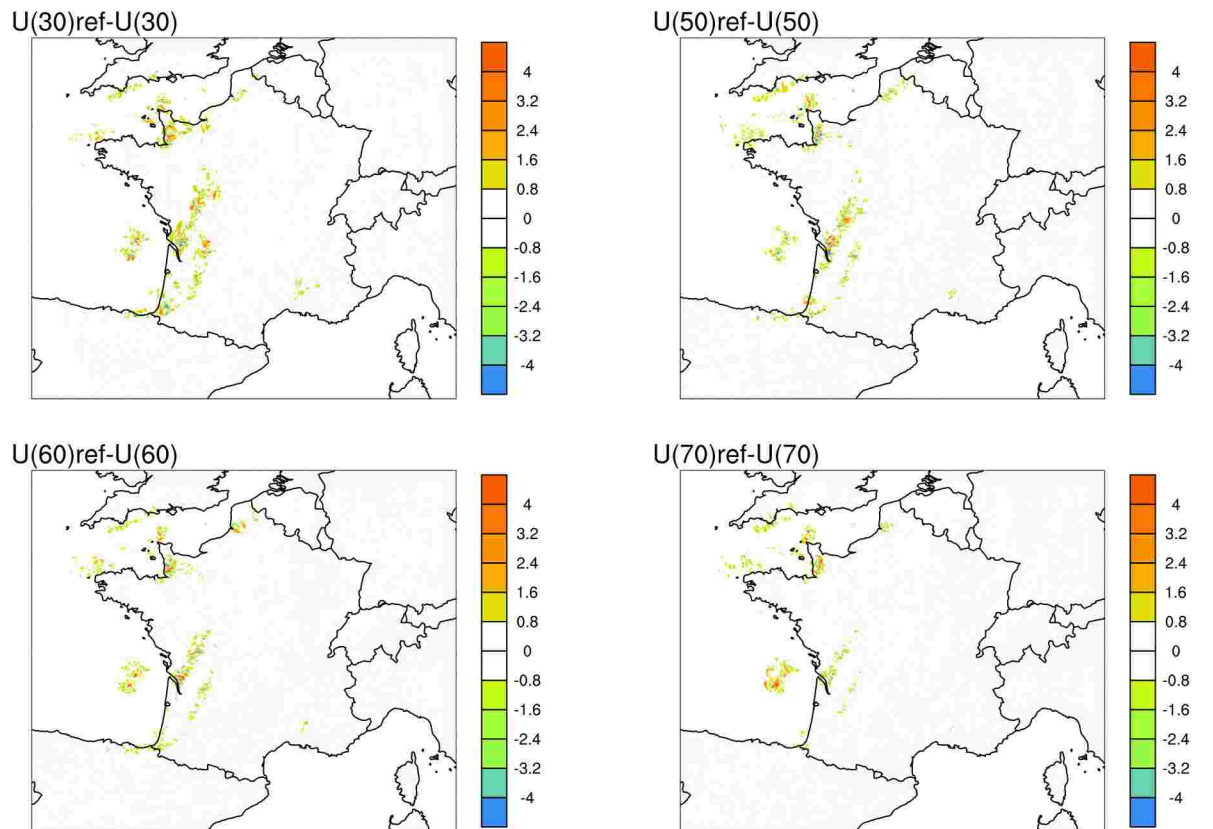


Fig.20. AR1T: U-wind component difference between Reference CY41T1 (Ref) and CY42 at some levels after 4 h of integration

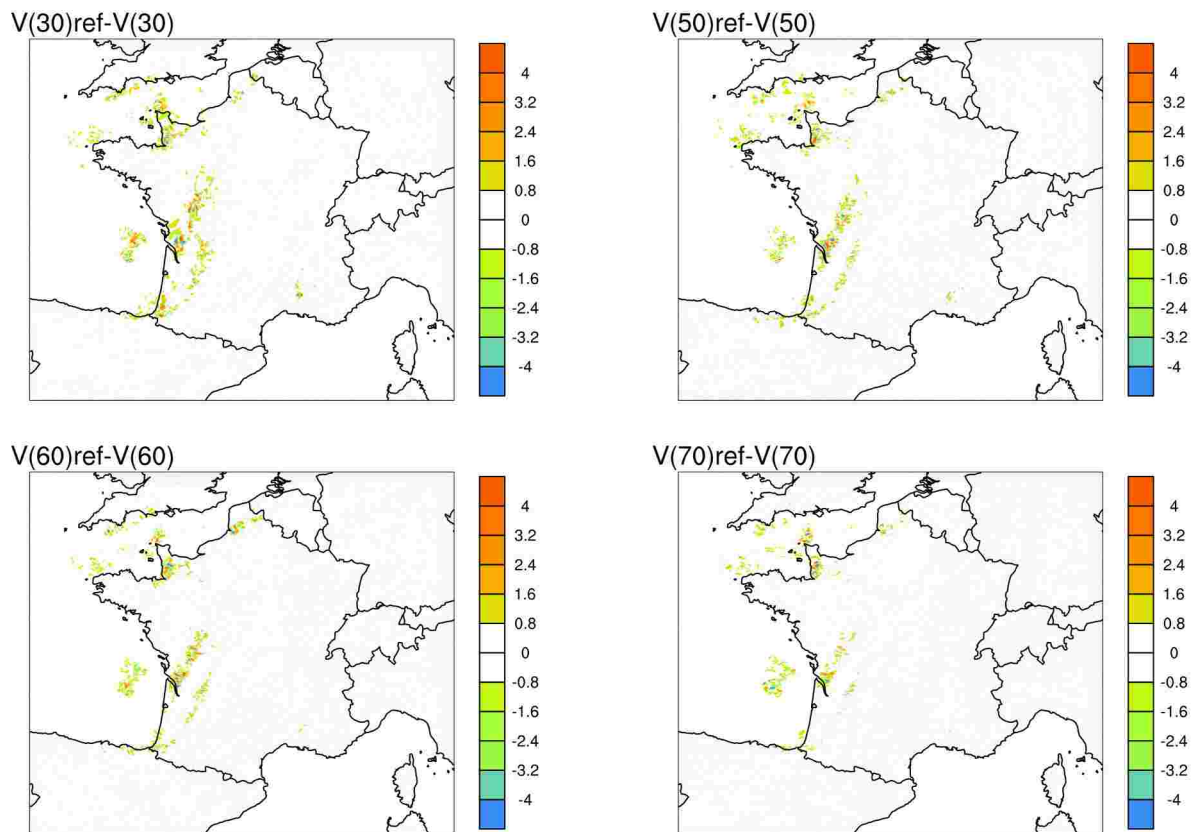


Fig.21. AR1T: V-wind component difference between Reference CY41T1 (Ref) and CY42 at some levels after 4 h of integration

In Fig. 20 and 21 are shown differences in wind fields for AR1T. It has to be mentioned that they reach values about 4 m/s, which are considerably higher in comparison to AA1T and AG1T.