VAST, what's new

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Software improvements version 1.4 (after test phase)

- Manual renovation
- BUFR reading problems
- Automatic delete of configuration files
- Possibility to re-run verification without re-load input files
- Check of the verified area
- Improvement in the naming of the files
- Absolute and common paths
- PDF/PNG output choice
- KM/GRID POINTS selection for the space scale

Manual renovation

- A new version of the manual is contained in the installation package «vast_install_1_4»
- Clearer explanation about the resolution of conflicts with the R version on VERSUS machines
- More examples about how to produce different types of verification in only one VAST run
- Correction of previous problems

Manual renovation – for users of old VAST versions

3.2 NOTE for users working on a VERSUS machine

If the user is running VAST on a VERSUS machine, it is possible to find all the needed extra packages for R in the directory `vast_install/documentation/R_packages_versus`
It is mandatory to use the given packages to be installed on the VERSUS version of the R software. Nothing changes for the installation instruction.

R packages:

- bitops_1.0-5.tar.gz
- caTools_1.16.tar.gz
- fields_6.7.6.tar.gz
- gdata_2.12.0.2.tar.gz
- gplots_2.11.0.tar.gz
- gtools_2.7.0.tar.gz
- maps_2.3-6.tar.gz

Manual renovation – verification, examples

- The user wants to obtain the following scores: bias, pod, far
- The user wants to use the following method for all the scores: upscaling
- Result:
  - method1(1)='UP'
  - method1(2)='UP'
  - method1(3)='UP'
  - !method1(4)=*whatever, commented*
  - !method1(5)=*whatever, commented*
  - score1(1)='BIAS'
  - score1(2)='POD'
  - score1(3)='FAR'
  - !score1(4)=*whatever, comented*
  - !score1(5)=*whatever, commented*

Manual renovation – verification examples

- The user wants to obtain the following scores: bias, pod, far
- The user wants to use the following methods: upscaling for bias, minimum coverage for pod, yes/no for far
- Result:
  - method1(1)='UP'
  - method1(2)='MC'
  - method1(3)='YN'
  - !method1(4)=*whatever, commented*
  - !method1(5)=*whatever, commented*
  - score1(1)='BIAS'
  - score1(2)='POD'
  - score1(3)='FAR'
  - !score1(4)=*whatever, commented*
  - !score1(5)=*whatever, commented*

Manual renovation – verification examples

- The user wants to obtain the following score: far
- The user wants to calculate FAR with three different methods: upscaling, minimum coverage, yes/no
- Result:
  - method1(1)='UP'
  - method1(2)='MC'
  - method1(3)='YN'
  - !method1(4)=*whatever, commented*
  - !method1(5)=*whatever, commented*
  - score1(1)='FAR'
  - score1(2)='FAR'
  - score1(3)='FAR'
  - !score1(4)=*whatever, commented*
  - !score1(5)=*whatever, commented*

BUFR reading problems

- Now BUFR are first transformed into a proper LIBSIM format (v7d) and then in GRIB.
  - Elaboration is much faster

```
cat *.bfr > observation.bufr


v7d_transform --input-format=BUFR --output-format=native --disable-qc \
--variable-list=B13011 observation.bufr out_B13011.v7d

v7d_transform --input-format=native --output-format=grib_api:boxtemplate.grib \
 --comp-stat-proc=1:1 --comp-step="$cum" --comp-full-steps \
 --post-trans-type=boxinter:average out_B13011.v7d obspp.grib

rm out_B13011.v7d
```

Automatic delete of the configuration files

- Added in the file «use_libsim_1_4.sh»
- Deleted files:
  - forecast.grib
  - observation.grib
  - single.grib
  - obspp.grib
  - boxtemplate.grib
  - ossi.grib

The input files are left in the input directories

Possibility to re-run verification without re-load input files

- The input files will remain in the input directory
  - For the pre-processing part (BUFR and GRIB, for LIBSIM)
  - For the verification part (TXT files, for VAST)

- The half processed files (OUT, R) will be moved to the backup directory

Check of the verified area

- The forecast grid MUST be regular and complete (the observation grid can have «holes»)
- TIP: use a gridstep at least double if compared to the model resolution (it is useless to verify with this technique the model over the single grid point)
- For the LIBSIM users: now if there are holes in the grid of the CSV forecast files the TXT output will not be created.

Improvement in the naming of the files

- Input files (LIBSIM):
  - There is the possibility to indicate the first 10 (or less) characters of the input forecast files (in «input_libsim.conf»)
    - So also other files can be stored in the forecast input directory but not used in the verification
  - This choice is optional and must be turned on or off

```
#Identification of the files ('y'/'n')
#If 'y' then add string
add_id='y'
id_file='?????'
"
```

Improvement in the naming of the half processed/output files

- Half processed/output files: in all the configuration files the variable «name» has been added.
  - This variable must be a character string with no gaps
  - This variable identifies all the files produced during the verification
  - This allows the user not to delete old files (with different «name») from the directories
  - During the verification VAST will consider only the files containing the «name» string.

Improvement in the naming of the half processed/output files (LIBSIM)

- The software will add the “name” variable to the string creating the CSV and TXT files.
- Example:
  - fcs_20160610_0018_*1-10_06_COSMO2_3h*.csv
  - obs_20160610_1200_*1-10_06_COSMO2_3h*.csv
  - fcs_201606100600_*1-10_06_COSMO2_3h*.txt
  - obs_201606090000_*1-10_06_COSMO2_3h*.txt
    - -> “*1-10_06_COSMO2_3h*”<- is the “name variable”

Improvement in the naming of the input files (VAST)

- The VAST user that produces the input files without LIBSIM must be careful creating the file names.

  - obs_YYYYMMDDHHmm_*NameOfTheVerification*.txt
  - fcs_YYYYMMDDHHmm_*NameOfTheVerification*.txt

- YYYY = Year
- MM = Month
- DD = Day
- HH = Hour
- mm = Minute

- NameOfTheVerification = “ver_name” in “input_fuzzy.nml”

Improvement in the naming of the files (LIBSIM)

- Input files (GRIB forecast):
  - It is now possible to select the run of the forecast grib files to be verified
  - The choice is given in the file «use_libsim.conf»
  - Grib files related to different runs will not be considered during the verification

```
#RUN (for forecast only, use string like '00', '06', '12', etc)
use_run='00'
```

Absolute and common paths

- All the files are opened by using their absolute path with the exception of the file «directories.conf» and «input_libsim.conf» that contain all the information about the other paths
  - These two files should not be removed from the folder «../VAST/src/»
- The «common_path» variable must be set in all the configuration files
  - This has to be done once for every file (not multiple times as before)

```
#COMMON PATH (up to the directory containing VAST)
common_path='/?????/'
"
```

PDF/PNG output choice

- In the file «input_fuzzy.nml» the user can select the format of the output (plots)
  - The user can choose between «pdf» and «png»
- IMPORTANT: if the verification is performed on a VERSUS machine (old version of R) the only allowed format is «pdf»

```
&plot_format
!'png' or 'pdf'
png_pdf='pdf',
```

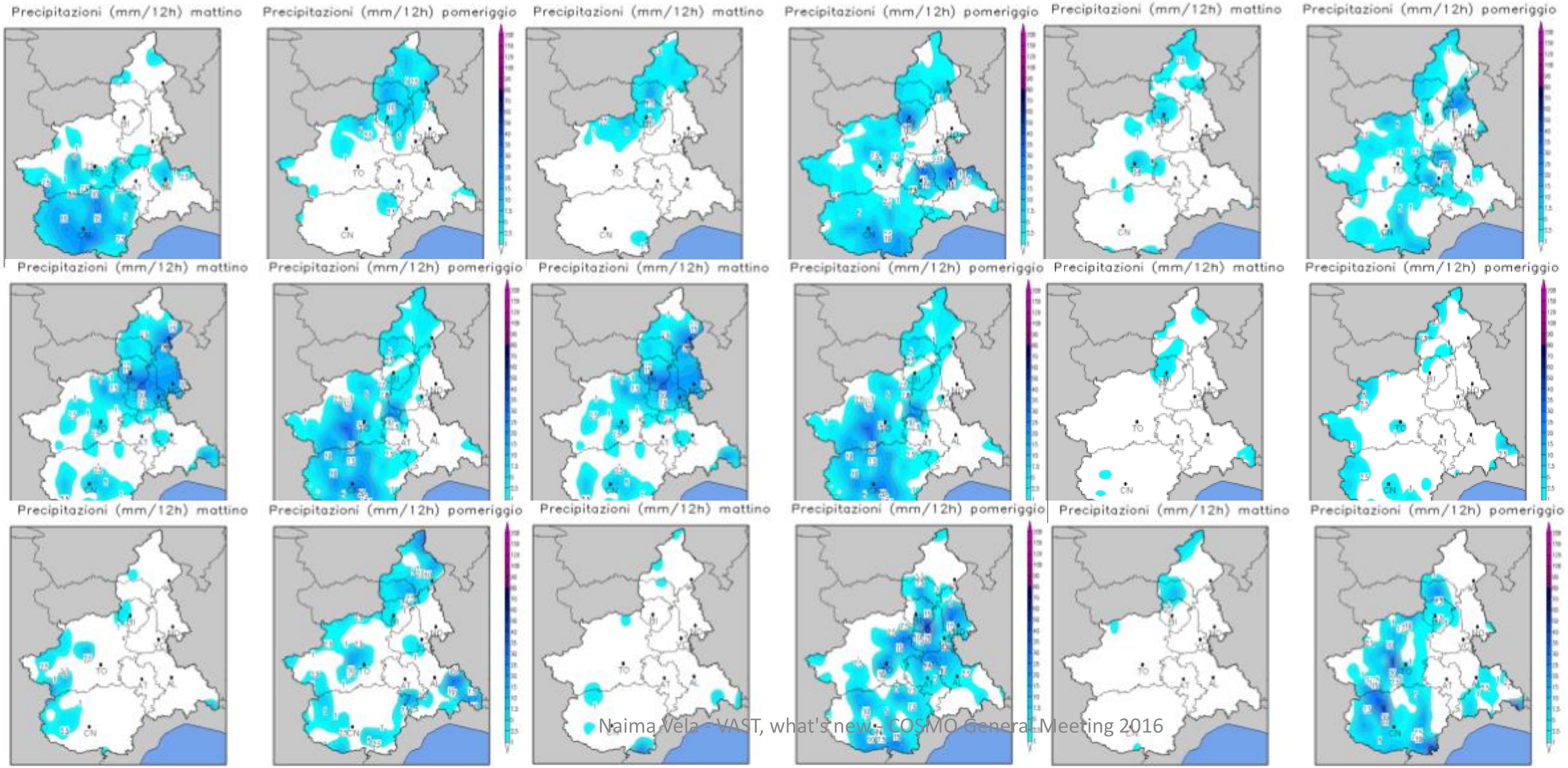
KM/GRID POINTS selection for the space scale

- In the file «input_fuzzy.nml» it is possible to select the unit of measurement of the spacial scale
- The user can choose between «km» (kilometers) or «gp» (grid points) If the user chooses «km», the distance will be calculated starting from the value of the variable «grid_step» (same file)

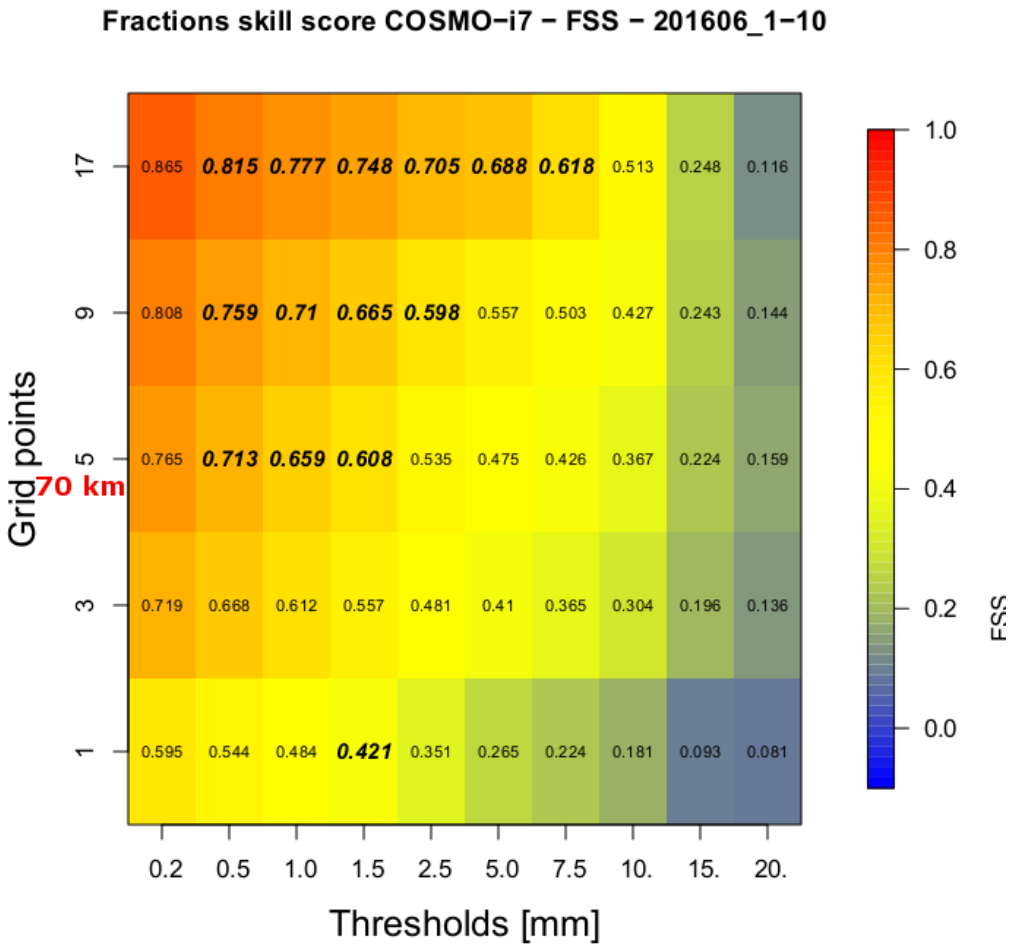
```
!'km' for kilometers, 'gp' for grid points
km_points='gp',
```

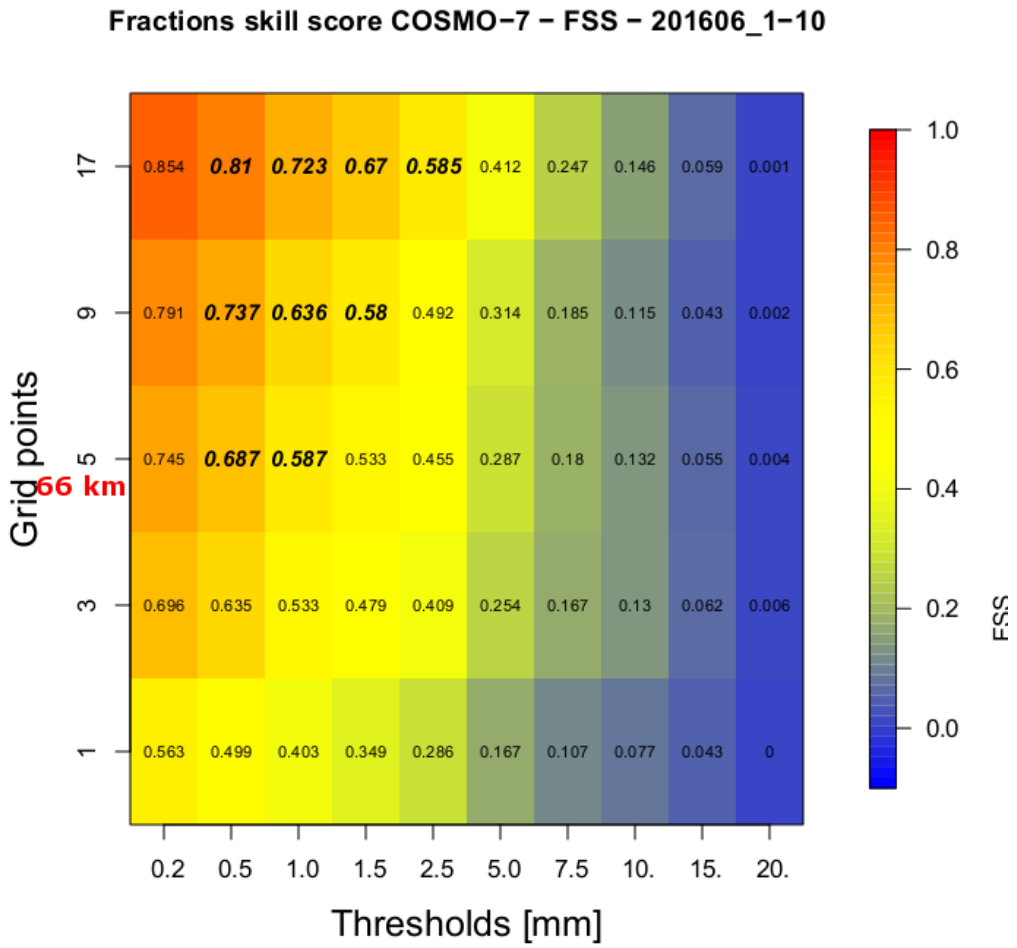
```
!NEW: Grid resolution (km) used in plot definition
grid_step=8
```

CASE STUDY COSMOI7-COSMOI2 vs COSMO7-COSMO2-COSMO1 – OBSERVED PRECIPITATION

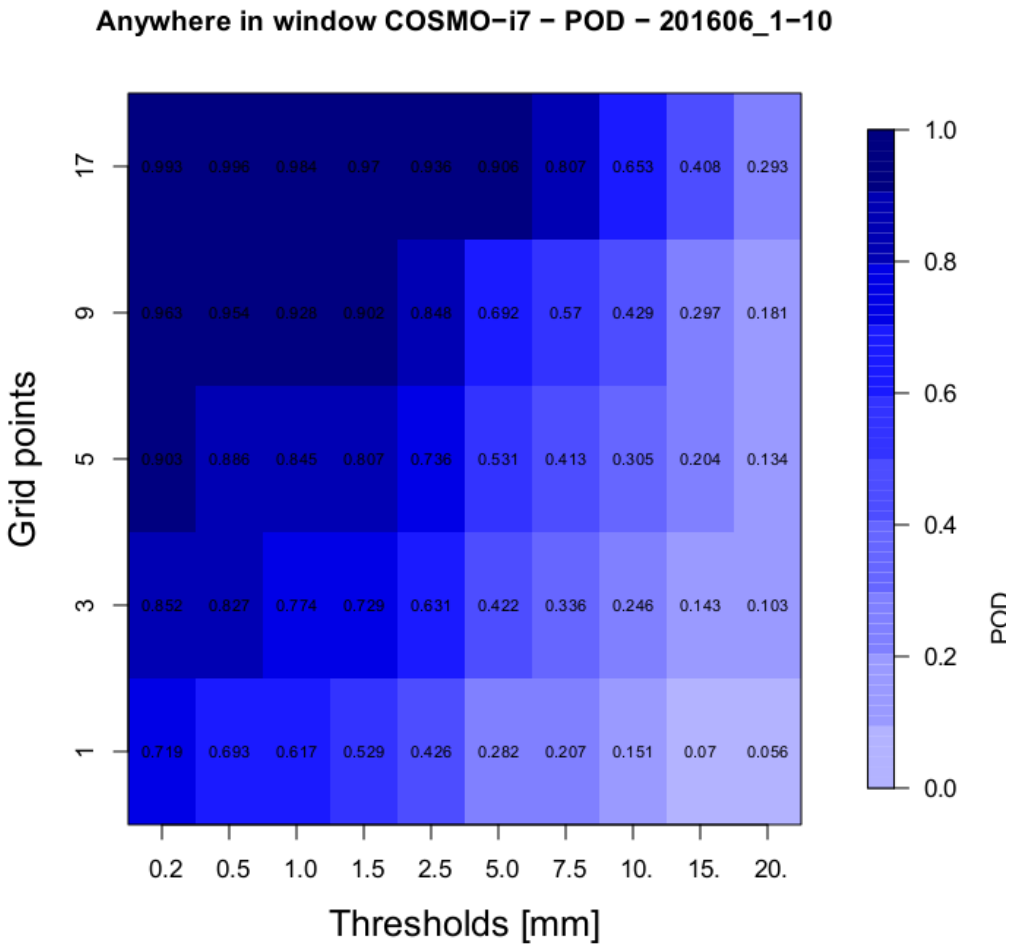


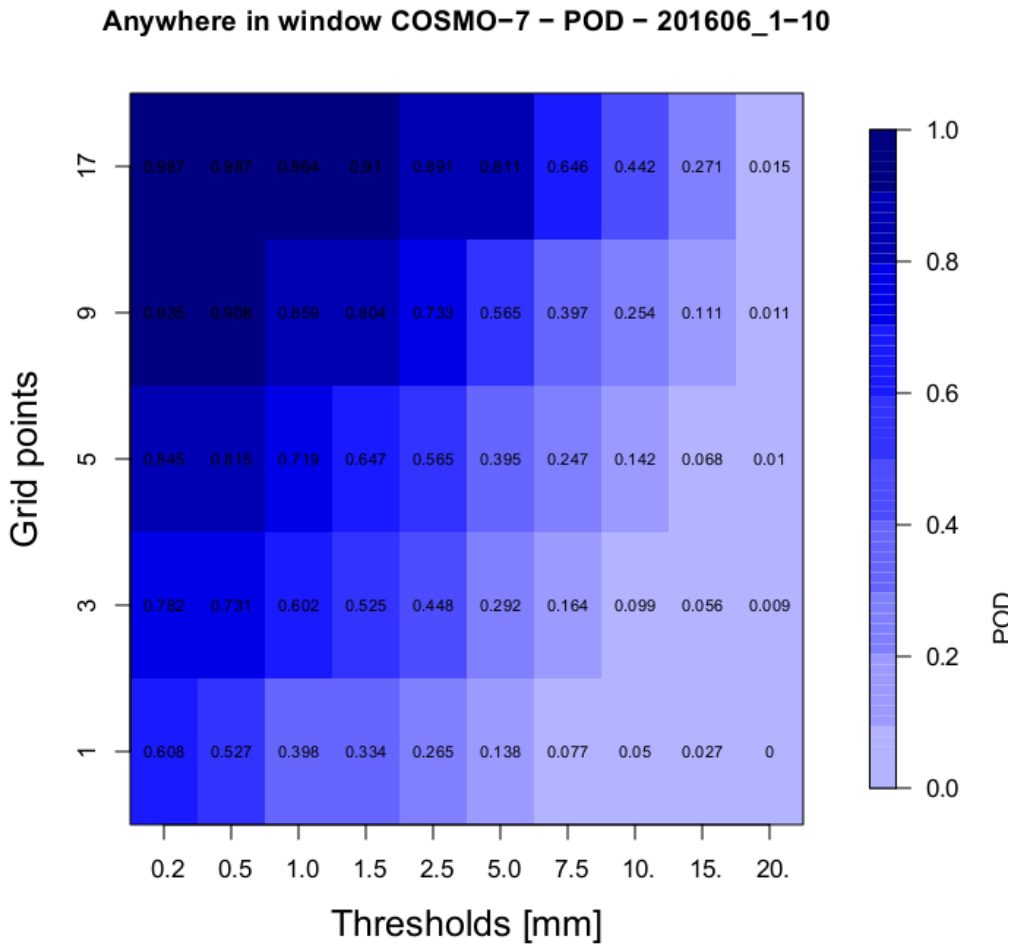
CASE STUDY - COSMOI7 vs COSMO7 - FSS



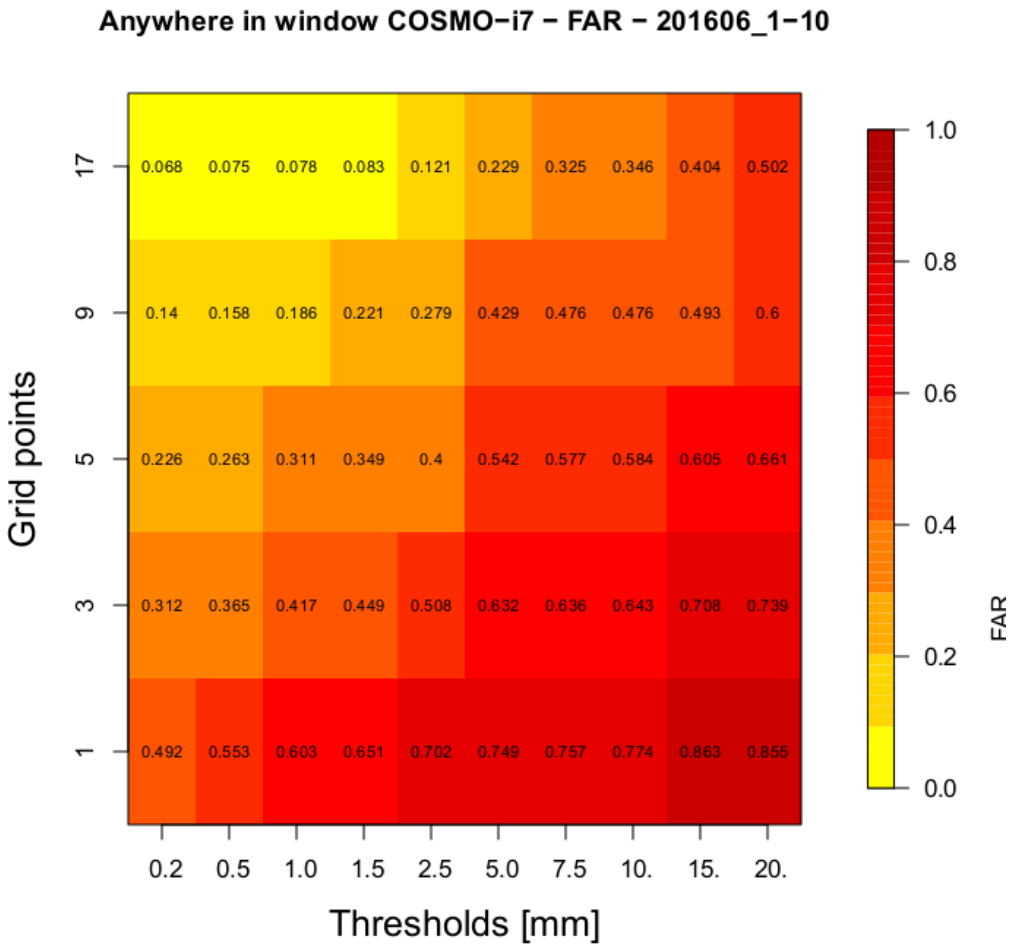


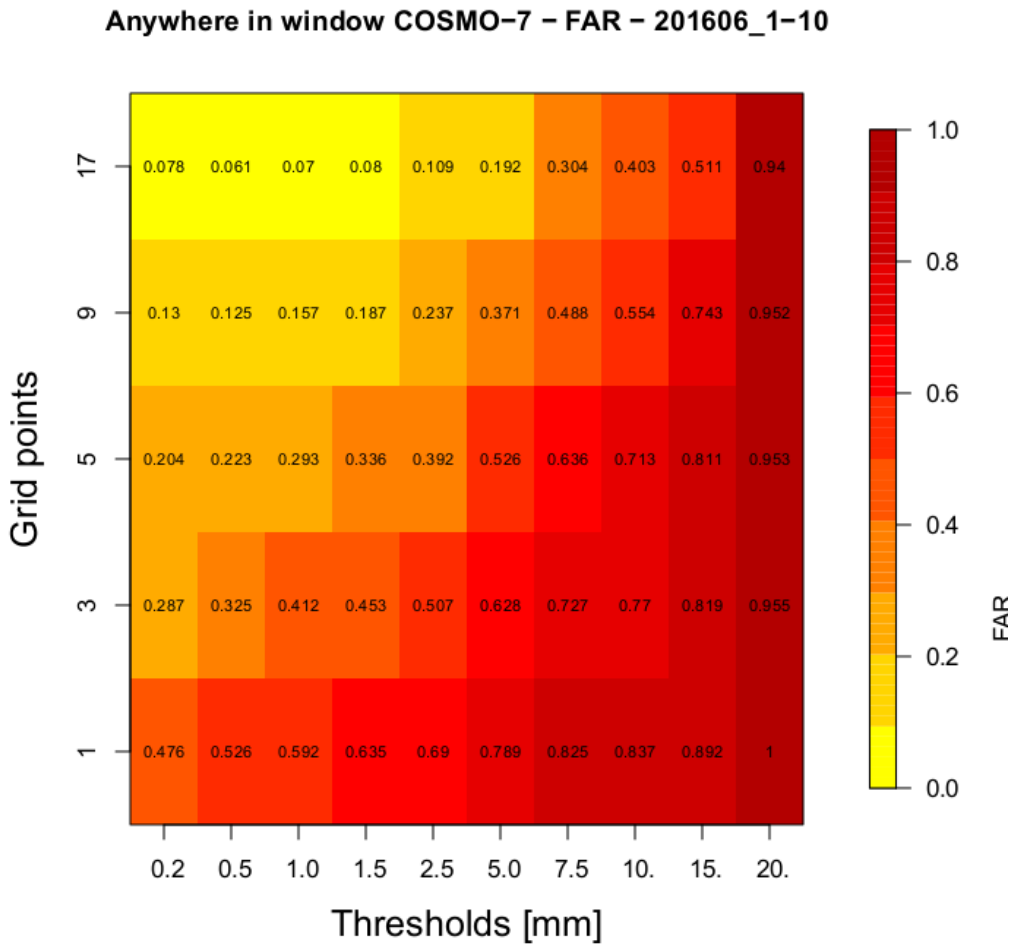
CASE STUDY - COSMOI7 vs COSMO7 - POD



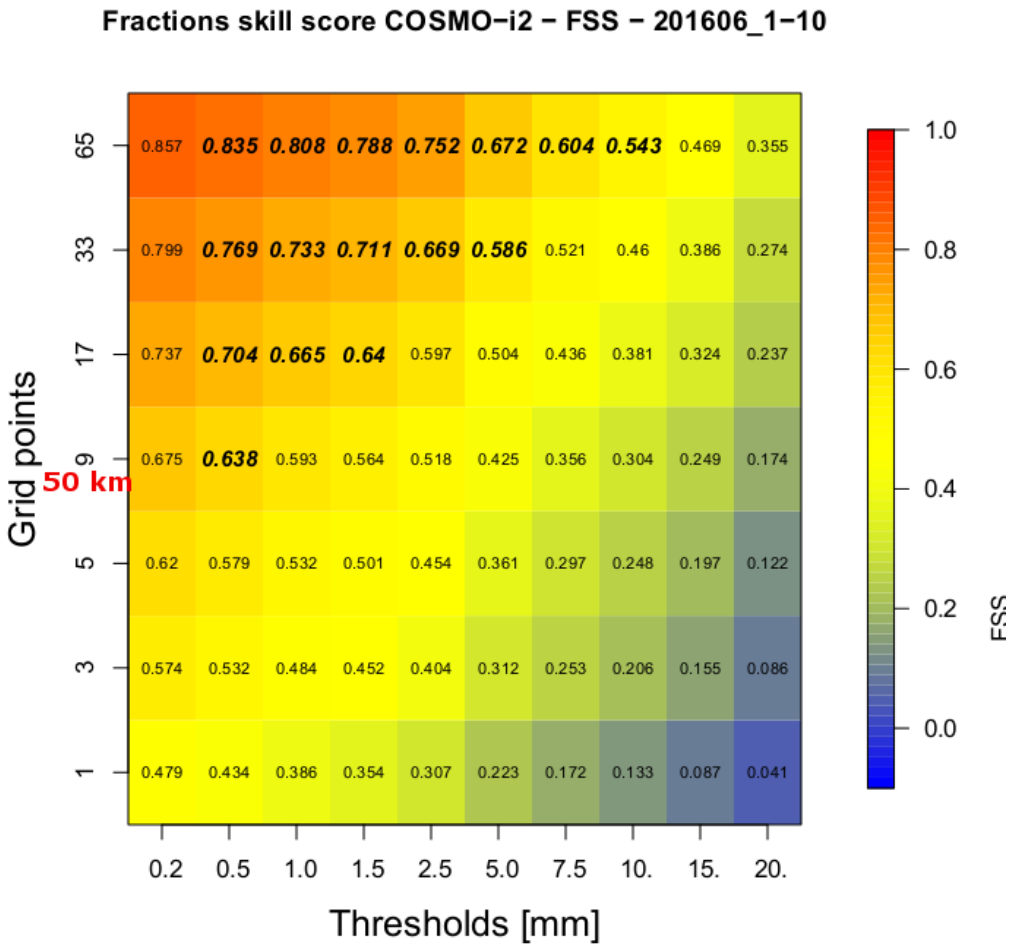


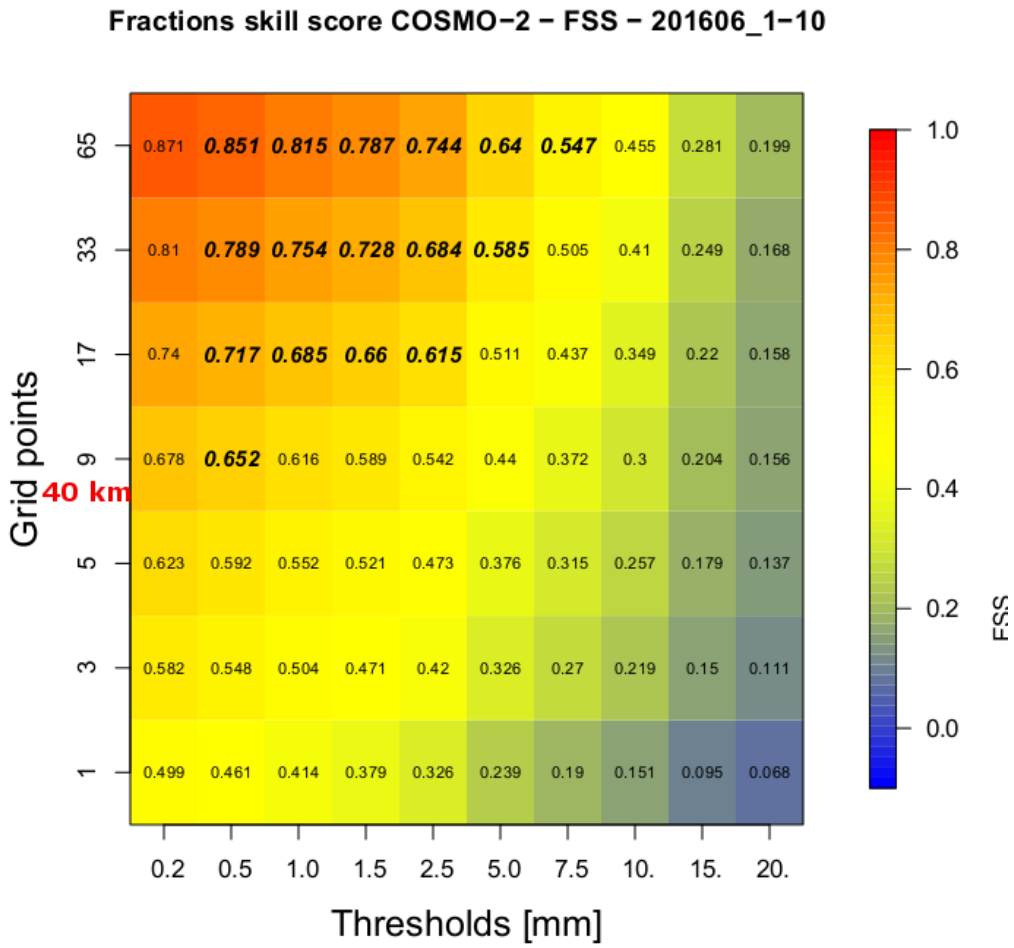
CASE STUDY - COSMOI7 vs COSMO7 - FAR



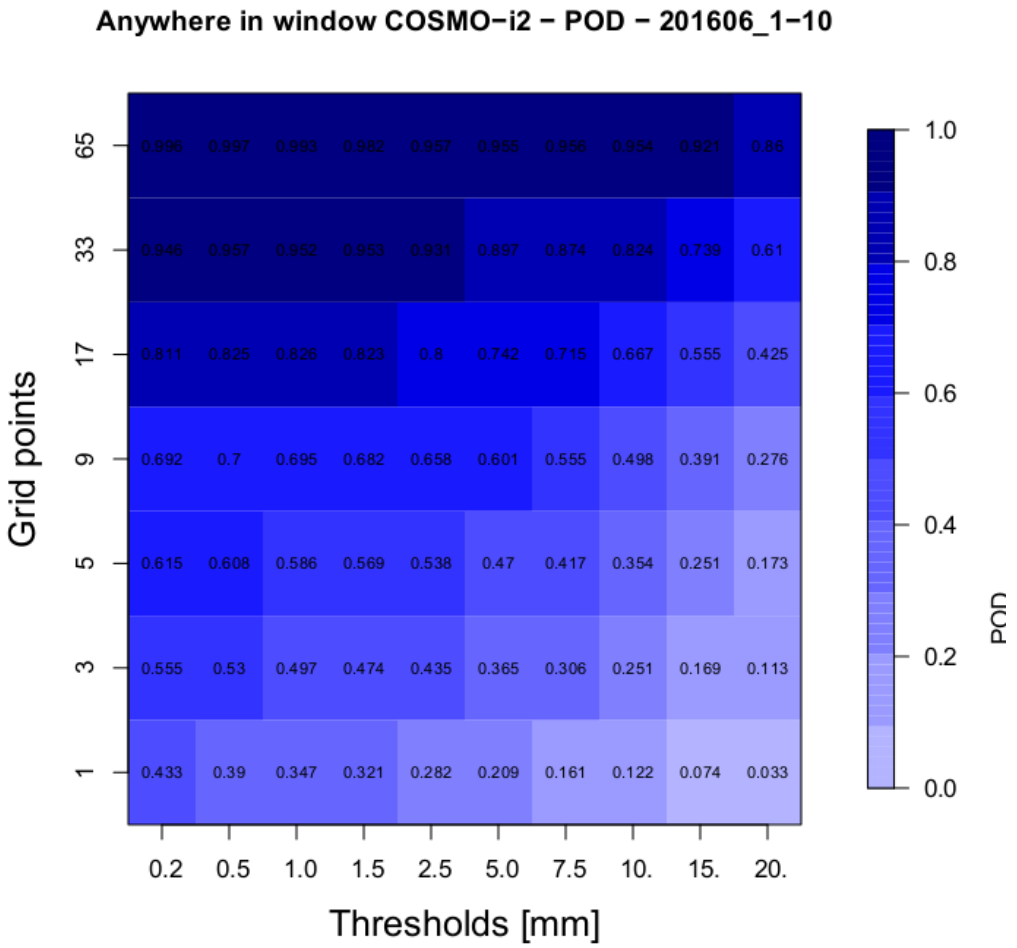


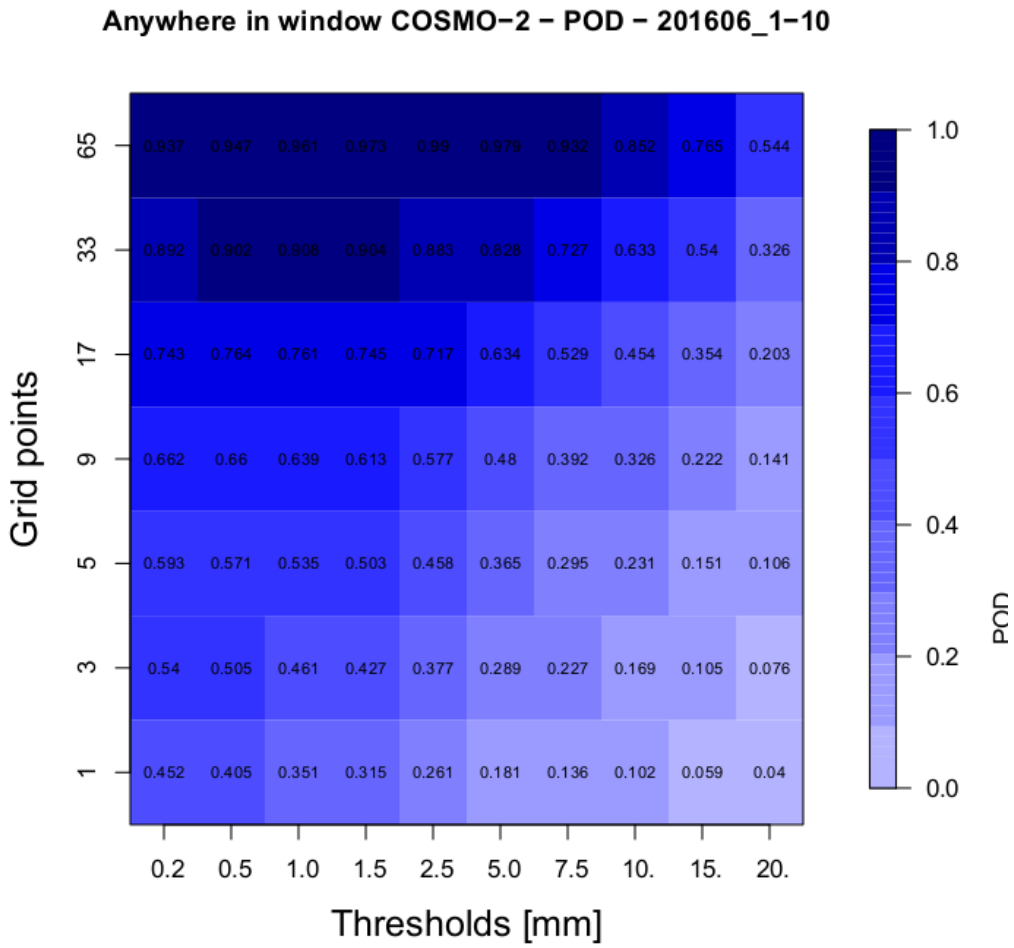
CASE STUDY – COSMOI2 vs COSMO2 - FSS





CASE STUDY – COSMOI2 vs COSMO2 - POD





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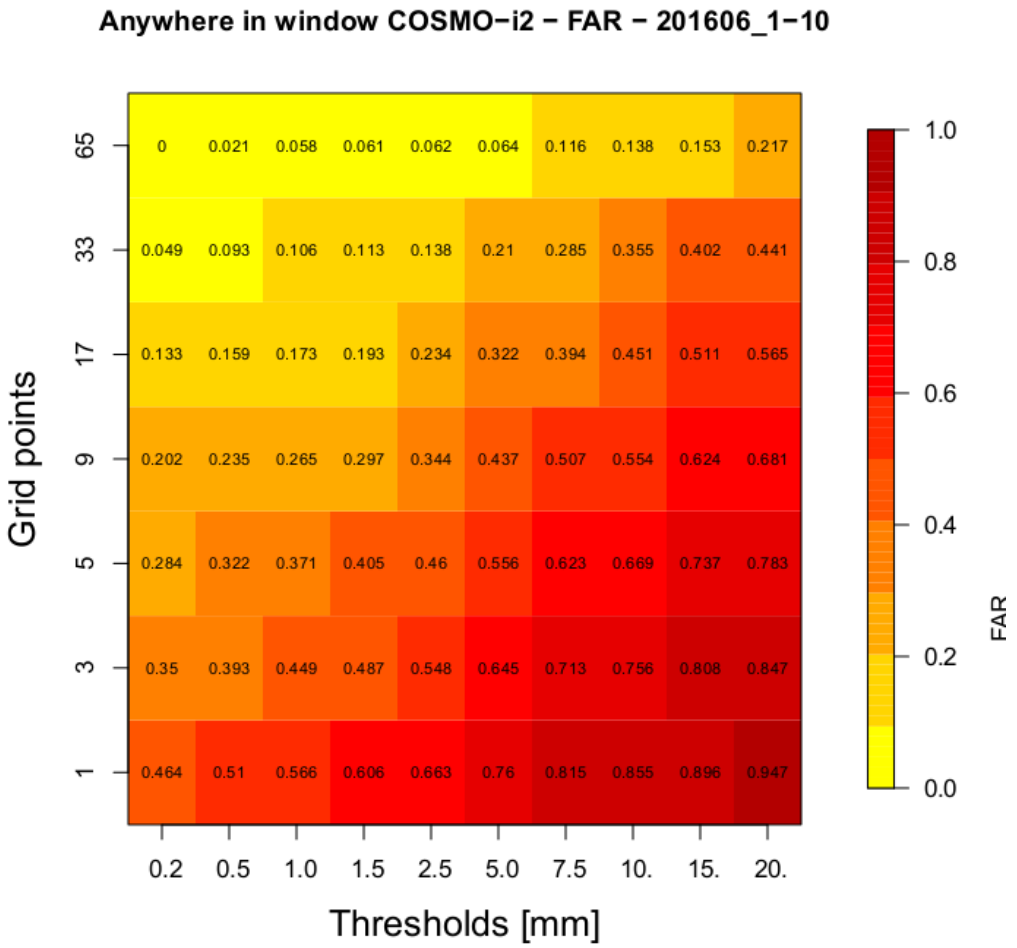
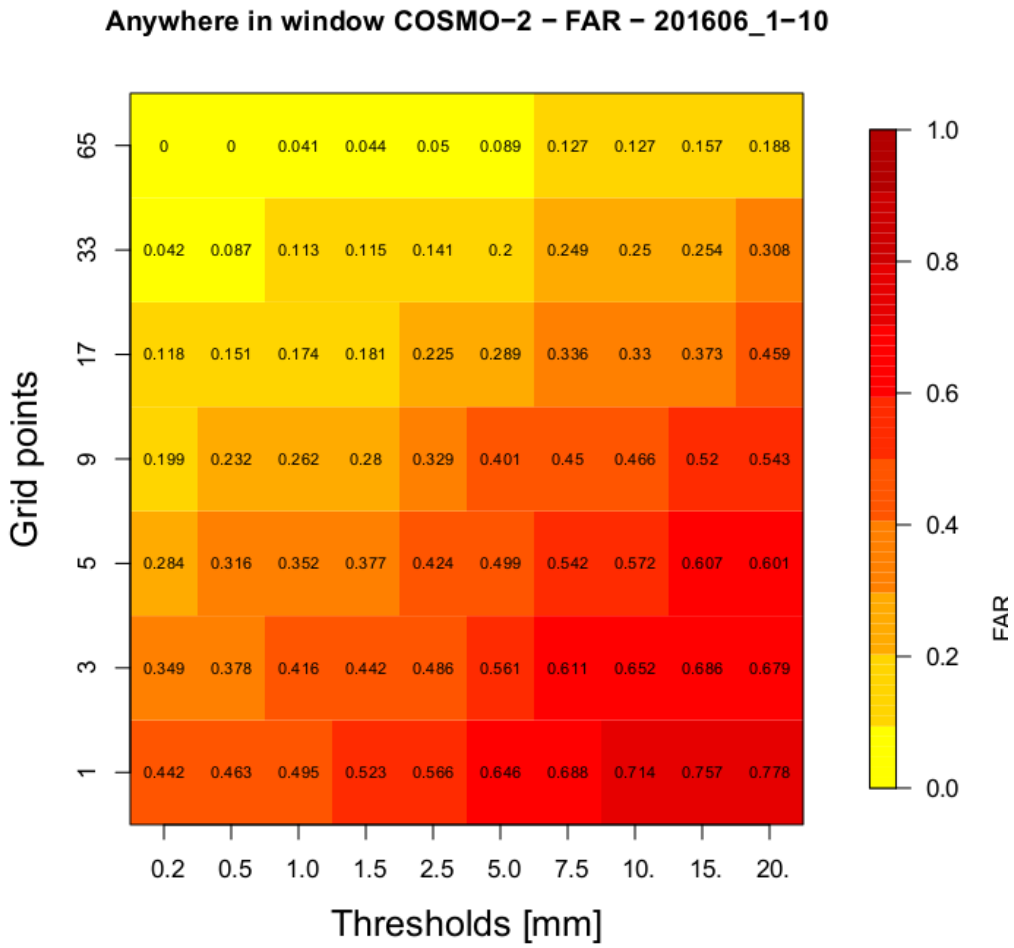
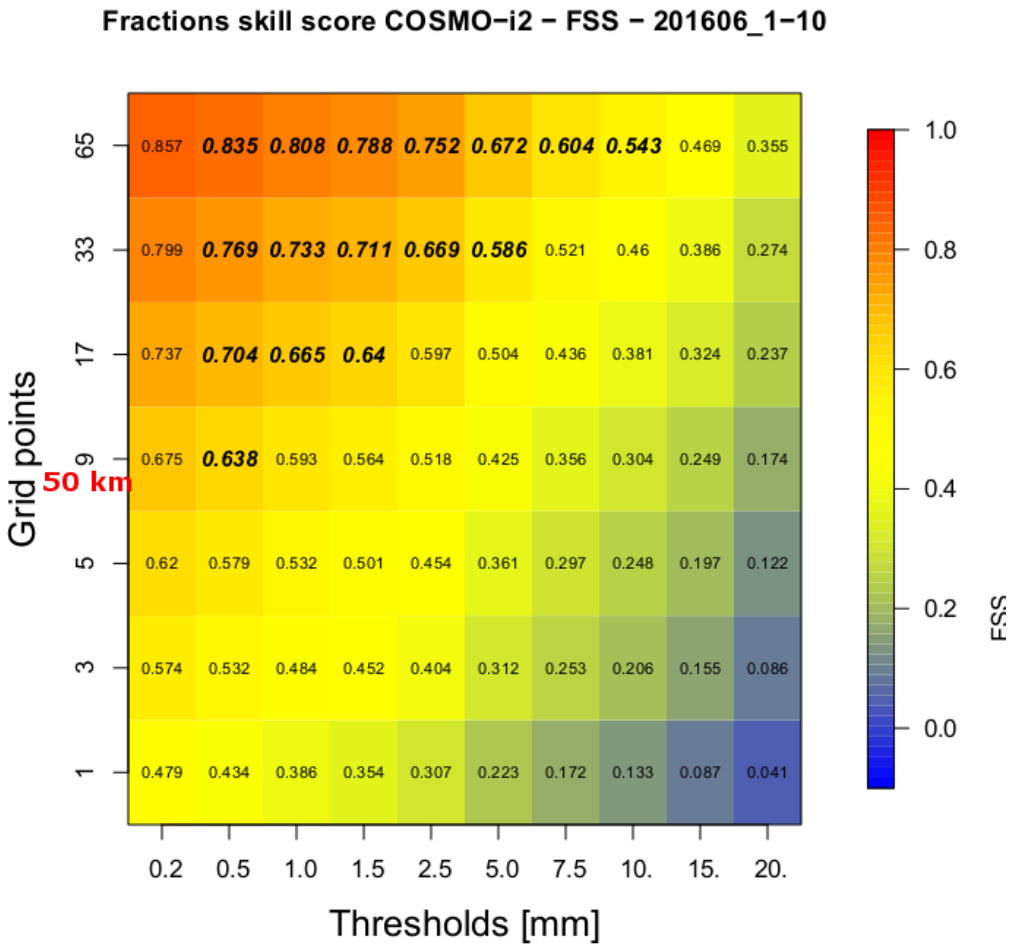
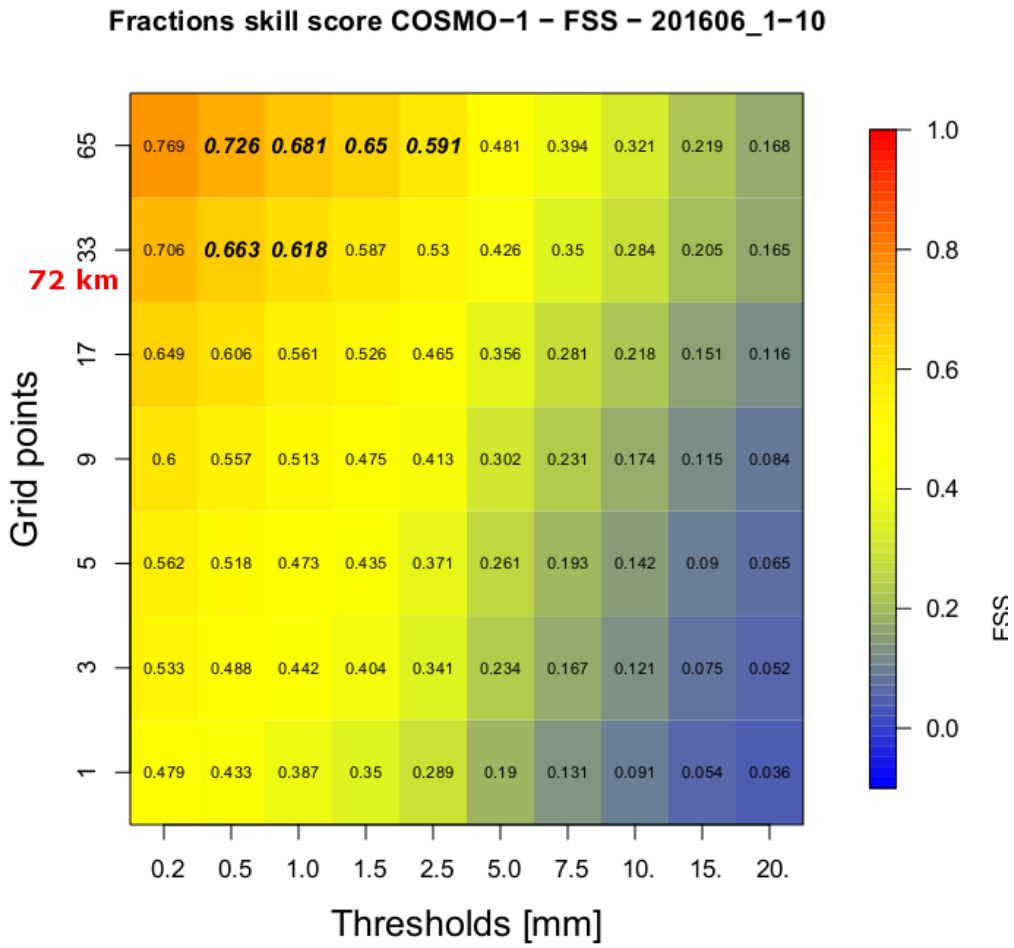


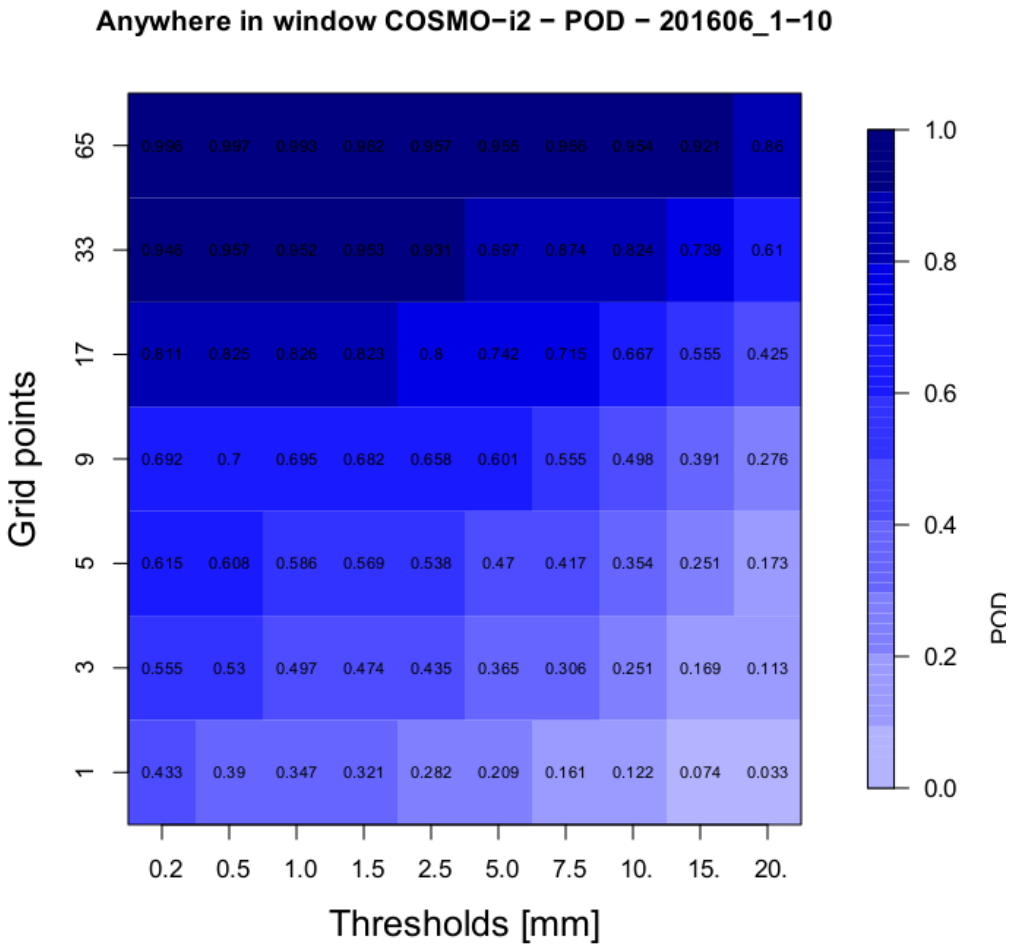


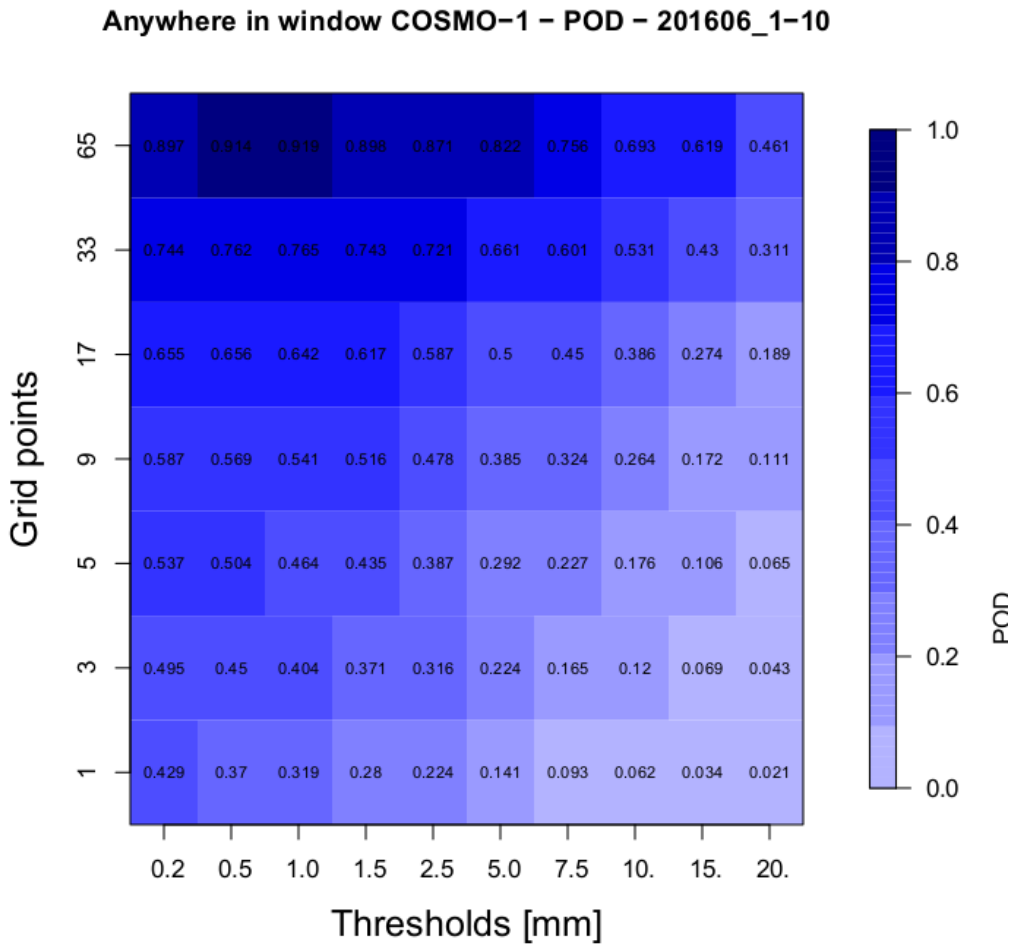
CASE STUDY – COSMOI2 vs COSMO1 - FSS



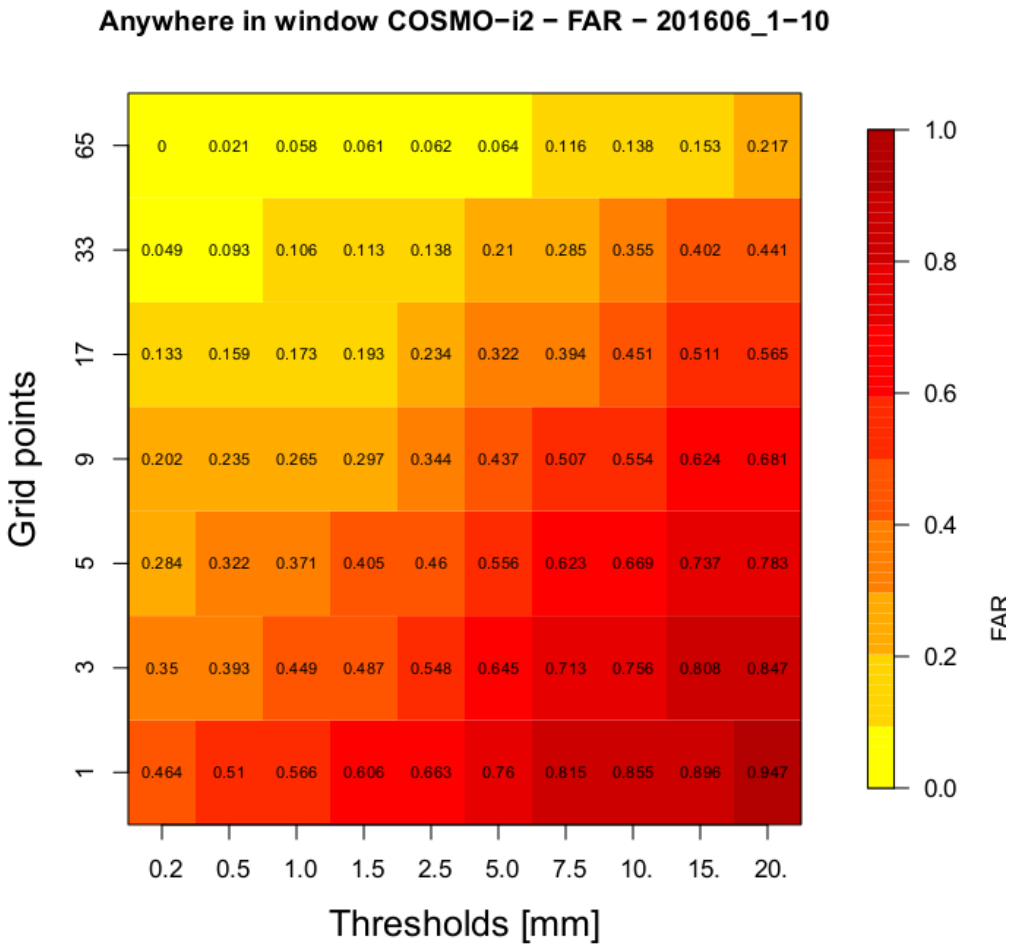


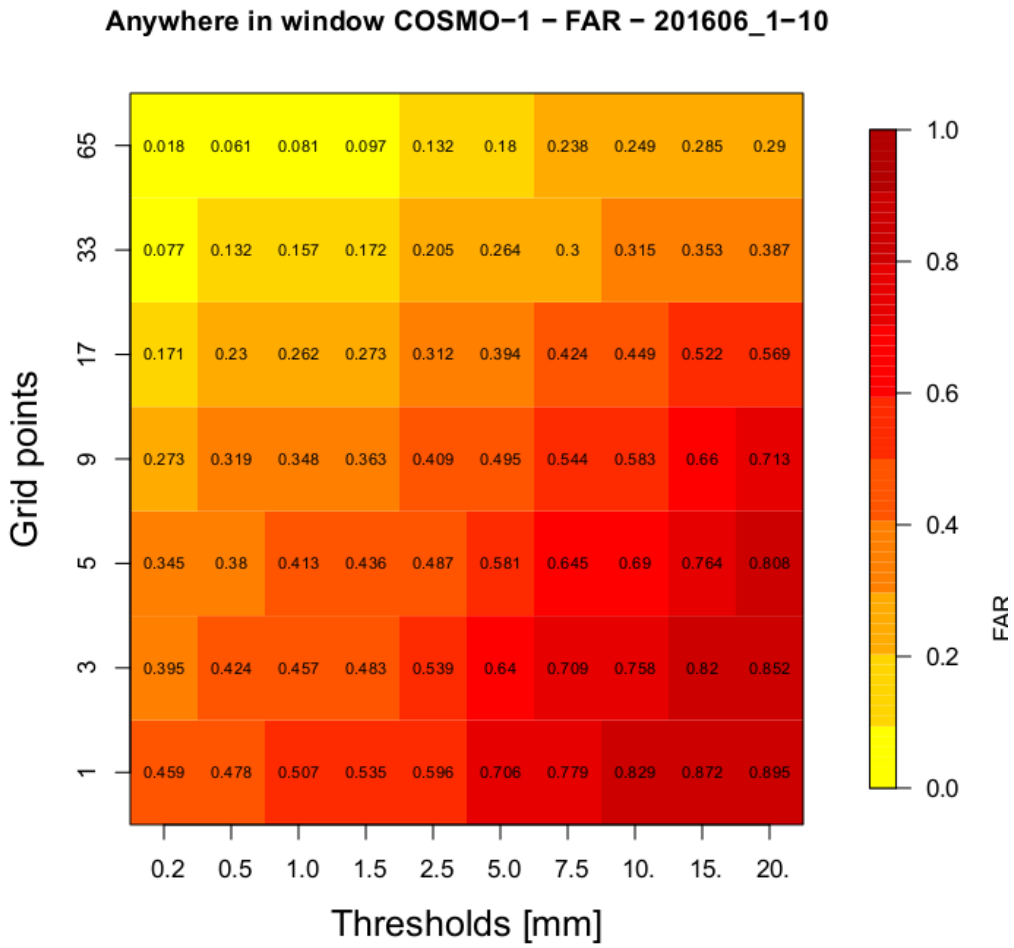
CASE STUDY – COSMOI2 vs COSMO1 - POD





CASE STUDY – COSMOI2 vs COSMO1 - FAR





Future developements

- Possibility to verify other variables:
  - Total cloud cover
  - 2 m temperature
  - Wind speed
- Extention of the verification to the time dimension
  - Possibility to add a dimension to the verification
- Code refinements

THANK YOU FOR YOUR ATTENTION!