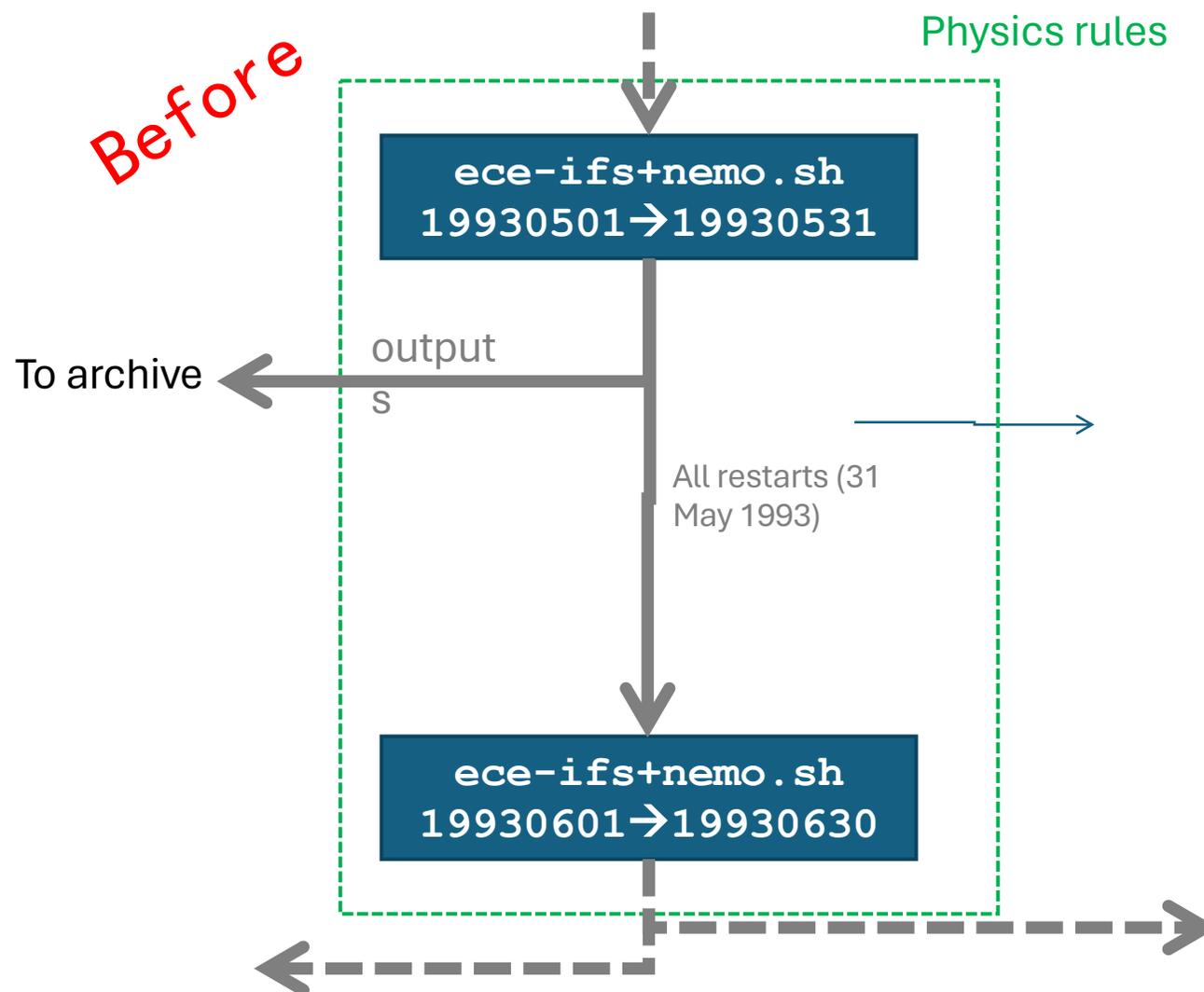
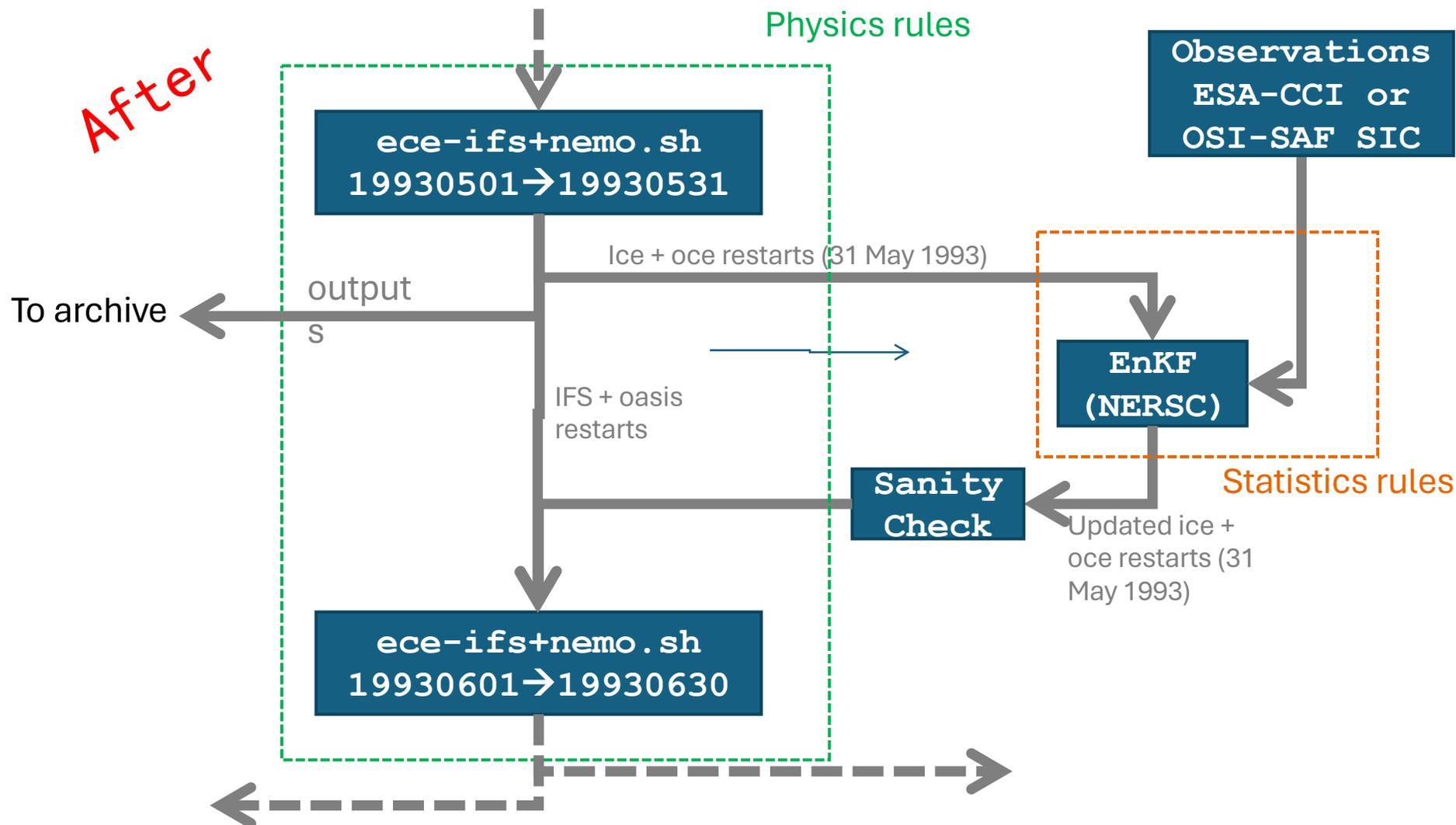


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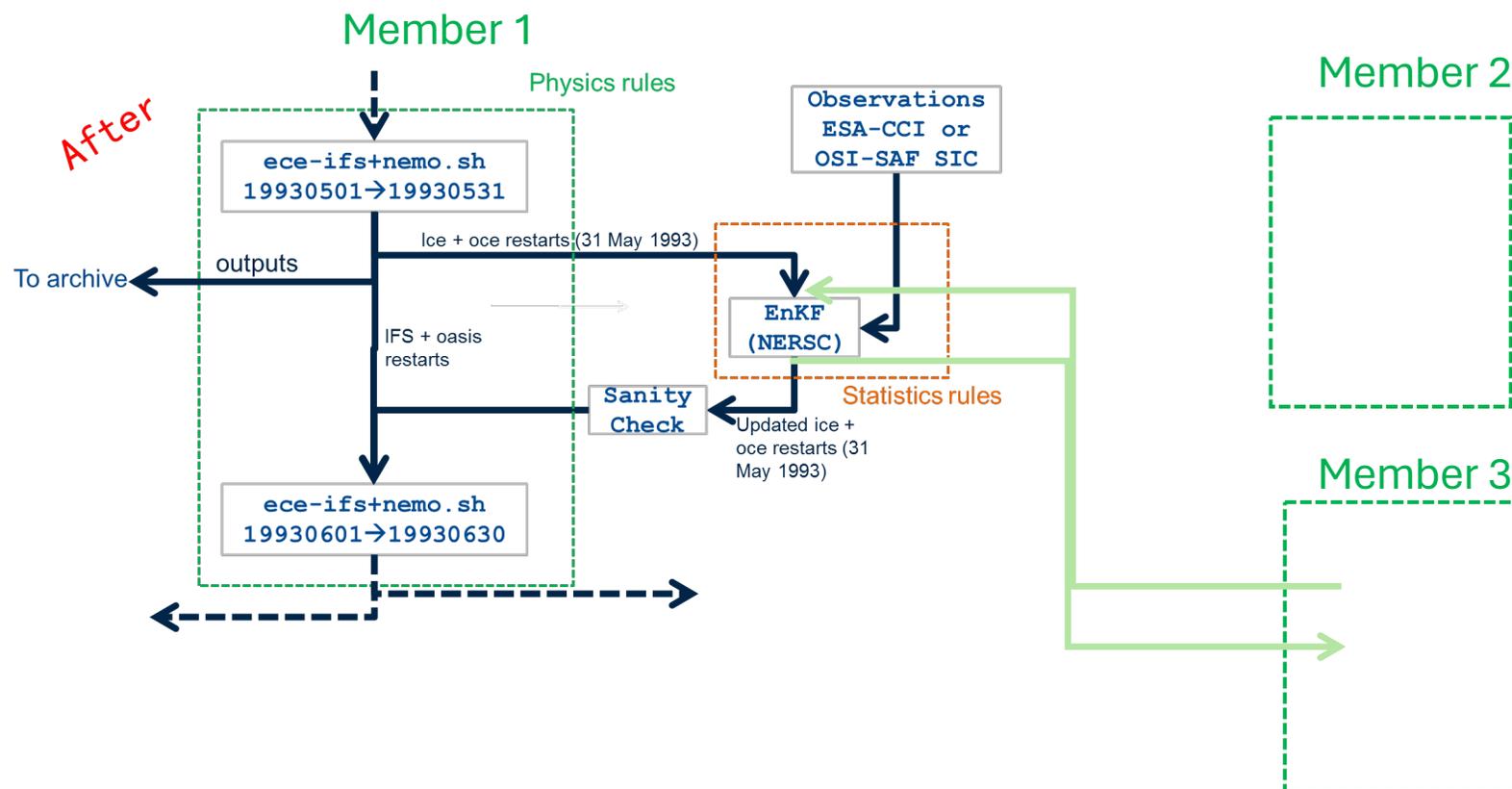
## 1. How does it affect the workflow?

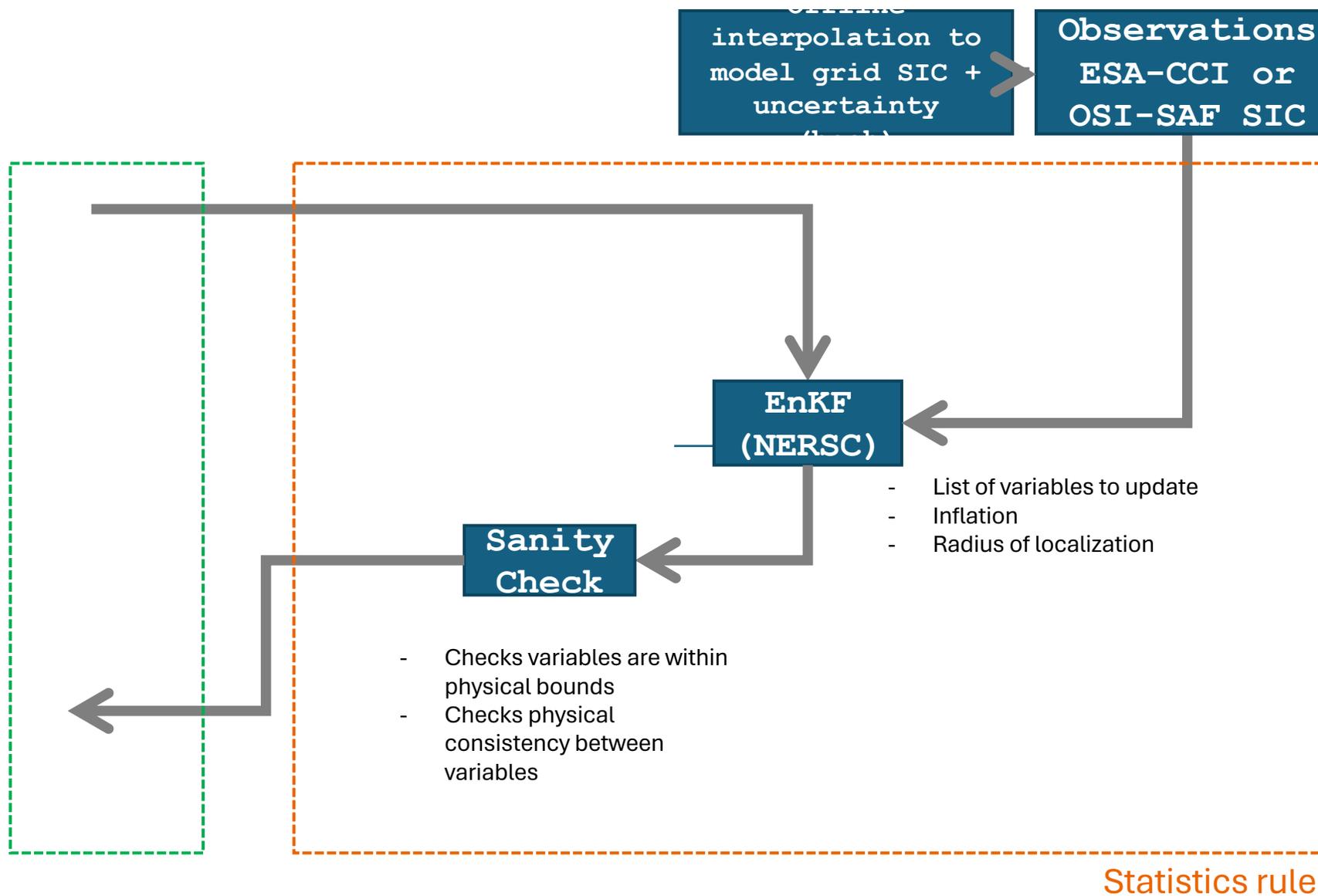


## 1. How does it affect the workflow?



# How does an EnKF work?





```
fmasson@frontal02:~/git/EnKF # ls
EnKF-MPI-TOPAZ README.md conversion_uf enkf_modules_to_load.txt interpolate_observations sanity_check
fmasson@frontal02:~/git/EnKF #
```

EnKF source code

General documentation

Pre-processing scripts to turn NetCDF files to \*uf or \*txt format eatable by the EnKF

Modules to be loaded before compilation and use of the EnKF code (« source enkf\_modules\_to\_load .txt »)

Pre-processing scripts to interpolate obs data to model grid (not needed in twin context)

Post-processing scripts to make the restarts eatable by NEMO

```

fmasson@frontal02:~/git/EnKF/EnKF-MPI-TOPAZ # ll
total 510
-rwxr--r-- 1 fmasson fmasson 1386 Mar 11 14:38 CHANGELOG
drwxr--r-- 2 fmasson fmasson 4096 Mar 11 15:42 Config
-rwxr--r-- 1 fmasson fmasson 10257 Mar 11 14:38 EnKF.F90
-rwxr--r-- 1 fmasson fmasson 142 Mar 11 14:38 MODEL.CPP
drwxr--r-- 2 fmasson fmasson 4096 Mar 11 14:38 Prep_Routines
-rwxr--r-- 1 fmasson fmasson 110 Mar 11 14:38 README.txt
drwxr--r-- 2 fmasson fmasson 4096 Mar 11 15:46 TMP
drwxr--r-- 2 fmasson fmasson 4096 Mar 11 14:38 Tools
-rwxr--r-- 1 fmasson fmasson 1444 Mar 11 14:38 analysisfields.in
-rwxr--r-- 1 fmasson fmasson 129113 Mar 11 14:38 cfortran.h
-rwxr--r-- 1 fmasson fmasson 3087 Mar 11 14:38 distribute.F90
-rwxr--r-- 1 fmasson fmasson 346 Mar 11 14:38 list.txt
-rwxr--r-- 1 fmasson fmasson 14275 Mar 11 14:38 m_Generate_element_Si.F90
-rwxr--r-- 1 fmasson fmasson 3023 Mar 11 14:38 m_bilincoeff.F90
-rwxr--r-- 1 fmasson fmasson 3046 Mar 11 14:38 m_confmap.F90
-rwxr--r-- 1 fmasson fmasson 5195 Mar 11 14:38 m_get_mod_fld.F90
-rwxr--r-- 1 fmasson fmasson 8000 Mar 11 14:38 m_get_mod_grid.F90
-rwxr--r-- 1 fmasson fmasson 2354 Mar 11 14:38 m_get_mod_nrens.F90
-rwxr--r-- 1 fmasson fmasson 2701 Mar 11 14:38 m_get_mod_xyz.F90
-rwxr--r-- 1 fmasson fmasson 24809 Mar 11 14:38 m_insitu.F90
-rwxr--r-- 1 fmasson fmasson 6380 Mar 11 14:38 m_io_mod_fld.F90
-rwxr--r-- 1 fmasson fmasson 36170 Mar 11 14:38 m_local_analysis.F90
-rwxr--r-- 1 fmasson fmasson 11334 Mar 11 14:38 m_obs.F90
-rwxr--r-- 1 fmasson fmasson 1172 Mar 11 14:38 m_oldtonew.F90
-rwxr--r-- 1 fmasson fmasson 7977 Mar 11 14:38 m_parameters.F90
-rwxr--r-- 1 fmasson fmasson 3312 Mar 11 14:38 m_parse_blkdat.F90
-rwxr--r-- 1 fmasson fmasson 1377 Mar 11 14:38 m_pivotp.F90
-rwxr--r-- 1 fmasson fmasson 11069 Mar 11 14:38 m_point2nc.F90
-rwxr--r-- 1 fmasson fmasson 27506 Mar 11 14:38 m_prep_4_EnKF.F90
-rwxr--r-- 1 fmasson fmasson 2458 Mar 11 14:38 m_put_mod_fld.F90
-rwxr--r-- 1 fmasson fmasson 1071 Mar 11 14:38 m_random.F90
-rwxr--r-- 1 fmasson fmasson 2559 Mar 11 14:38 m_read_icemod.F90
-rwxr--r-- 1 fmasson fmasson 2613 Mar 11 14:38 m_set_random_seed2.F90
-rwxr--r-- 1 fmasson fmasson 894 Mar 11 14:38 m_spherdist.F90
-rwxr--r-- 1 fmasson fmasson 2874 Mar 11 14:38 m_uobs.F90
lrwxrwxrwx 1 fmasson fmasson 17 Mar 11 15:09 make.inc -> Config/make.lucia
-rwxr--r-- 1 fmasson fmasson 1631 Mar 11 15:40 makefile
-rwxr--r-- 1 fmasson fmasson 4653 Mar 11 14:38 mod_analysisfields.F90
-rwxr--r-- 1 fmasson fmasson 1609 Mar 11 14:38 mod_measurement.F90
-rwxr--r-- 1 fmasson fmasson 11141 Mar 11 14:38 mod_raw_io.F
-rwxr--r-- 1 fmasson fmasson 278 Mar 11 14:38 namelist.txt
-rwxr--r-- 1 fmasson fmasson 22117 Mar 11 14:38 nfw.F90
-rwxr--r-- 1 fmasson fmasson 3003 Mar 11 14:38 order.c
-rwxr--r-- 1 fmasson fmasson 58690 Mar 11 14:38 qmpi.F90

```

Machine-dependent set of makefiles

Main EnKF code

Folder necessary for building the executable

List of variables to be *updated* at the assimilation step

Calculates X5 and applies local analysis

Reads observations

Projects model state to observation space

Paths libraries

makefile

Namelist with filter type, localization, inflation, etc.

analysisfields.in

```
a_i_htc1 0 0 1
a_i_htc2 0 0 1
a_i_htc3 0 0 1
a_i_htc4 0 0 1
a_i_htc5 0 0 1
oa_i_htc1 0 0 1
oa_i_htc2 0 0 1
oa_i_htc3 0 0 1
oa_i_htc4 0 0 1
oa_i_htc5 0 0 1
smv_i_htc1 0 0 1
smv_i_htc2 0 0 1
smv_i_htc3 0 0 1
smv_i_htc4 0 0 1
smv_i_htc5 0 0 1
snwice_mass 0 0 1
snwice_mass_b 0 0 1
tempt_il1_htc1 0 0 1
tempt_il1_htc2 0 0 1
tempt_il1_htc3 0 0 1
tempt_il1_htc4 0 0 1
```

variable name

level\_start

level\_end

ice(1)/ocean (2)

```
fmasson@frontal02:~/git/EnKF/conversion_uf # ll
total 131347
-rwxr-xr-x 1 fmasson fmasson    118 Mar 11 14:38 MODEL.CPP
-rwxr-xr-x 1 fmasson fmasson    244 Mar 12 09:18 README.txt
-rwxr-xr-x 1 fmasson fmasson   1186 Mar 11 14:38 convert.bash
lrwxrwxrwx 1 fmasson fmasson    36 Mar 11 14:38 make.inc -> ../EnKF-MPI-TOPAZ/Config/make.zenobe
-rwxr-xr-x 1 fmasson fmasson   1019 Mar 11 14:38 makefile
-rwxr-xr-x 1 fmasson fmasson  8773952 Mar 11 14:38 mask-ORCA1.nc
-rwxr-xr-x 1 fmasson fmasson 125670820 Mar 11 14:38 mask-ORCA25.nc
-rwxr-xr-x 1 fmasson fmasson   3587 Mar 11 14:38 mod_measurement.F90
-rwxr-xr-x 1 fmasson fmasson  10065 Mar 11 14:38 p_prep_obs_ORCA1.F90
-rwxr-xr-x 1 fmasson fmasson   8646 Mar 11 14:38 p_prep_obs_ORCA25.F90
```