Local installation of OOPS LAM 3DVAR at Hungarian Meteorological Service
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1. HPC facility (WFMA)

    uname -a:
    Linux wfma 2.6.18-164.11.1.el5 #1 ... EST 2010 x86_64 x86_64 x86_64 GNU/Linux

    IBM iDataPlex linux cluster with 560 cores (070 nodes)

    WFMA   – name of the headnode of the computer with 8 cores
                – softwares mainly installed and additional volumes mounted here
    WFMCxxx   – names of computing nodes with 8 cores
                – for parallel computation

    PBS TORQUE SERVER 2.4.6

    Intel MPI Library 3.2.1
            MPIICC, MPIIFORT, IFORT Version 11.1

    PERL Version v5.8.8
            (Lately v5.10 is also installed)

    GRIB_API Version 1.9.9

    NetCDF Version 4.1.3

    Auxlib version 2.5

    Boost Library Version 1.33.1 (installed for OOPS)
            (Lately v1.51.1 is also installed)

2. CY40 main pack from beaufix for the basis of OOPS LAM 3DVAR proto

    40_op1.01.mainpack, gmkpack.6.6.0

    –   New version of gmkpack is installed without problems.
    –   Compilation of CY40 crashed due to obsolete version of perl 5.8.8
        (Newer version of perl v5.10 is installed)
    –   Compilation of CY40 crashed due to COPE routines (missing "oda.h", "Exceptions.h",
        boost dependencies) – in compilation script cope routines are put into ignored files
    –   Compilation of CY40 crashed (on Level 19) due to an error in
        error_covariance_3d_mod.F90 routine "name in only-list does not exist
   [SETUP_CTLVEC]". Temporary solution (?) was applied in sualctv.F90 routine:

        [76] USE CONTROL_VECTORS, ONLY : SETUP_CTLVEC, … (replaced)
        [76] USE CONTROL_VECTORS_DATA_MIX, ONLY : SETUP_CTLVEC

- Compilation of CY40 crashed (not regularly on Level 3) due to auto-generated interface blocks: modi_vegetation_update.F90, modi_init_surf_atmn.F90 "Syntax error"
- Compilation was finally done without abort.

3. CY40 userpack with OOPS LAM 3DVAR modset

- Create userpack based on CY40 op1 main and using gmkpack.6.6.0
  gmkpack -r 40 -b op1 -v 01 -u oops -l INTEL111059 -o x -p oovar

- Additional libraries in src/local/ for the modset of OOPS proto
  - oops/
    - ifs/
      - patch
      - mains
      - model
    - src/
      - oops
        - runs
        - base
        - observations
        - assimilation
      - logger
      - util

- Change gmkfile with boost libs
  - LD_USR_BOOST_TEST_FRAMEWORK = $path/of/libboost_unit_test_framework.so
  - Add:
    - LD_USR_BOOST_THREAD = $path/of/libboost_thread.so
    - LD_USR_BOOST_SYSTEM = $path/of/libboost_filesystem.so
  - INCLUDEPATH : add: $path/of/boost/inlcude

- Install newer Boost_1.51 library

- Compilation failed with:
  - ambiguous file ftn_c_string_conversion.o for archive liboops.local.a
  - Remove ftn_c_string_conversion.f90 from oops/src/logger for temporary solution (?)

- Linking failed: undefined reference to 'omp_get_max_threads' in ifs4dvar.cc:23
  - Put new flags to gmkfile (considering gmkfile sent by Meteo-France)
    - FRTFLAGS = … -openmp -openmp-threadprivate compat -openmp-report2
    - VCCFLAGS = … -openmp
    - LNK_FLAGS = … -openmp -shared-intel
    - LNK_FLAGS = … -openmp -openmp-threadprivate compat -shared-intel

- – XML libs have to be linked in a static way and not with shared-object XML libs
- – Compilation of OOPS proto userpack was done without abort after these modifications

4. Running OOVAR (starting from settings of CY38t1 with AROME and ALADIN 3DVAR as well)

- – Hardcoded command line arguments. Use MINI instead of MIN1.
- – Modifications in 3dvar.xml and in fields_interface.F90 in order to change hardcoded dates
- – Add namelist blocks: NAMCVER, NAEPHLI, NAMRLX, NAMCOSJO, NAMTHLIM
- – Remove L_OPENMP_CV, LJCNMTL from NAMVAR and NEINI from NAMINI blocks
- – Crashed in SUTOPH (SIGFPE) ? RMESOQF(JLEV) – New drag meso formulation ? (fetching bugfix from cy40t1_bf02)
- – OOVAR crashed (core dumped) after AllObs destructed. The minim finished the required number of interation and crashed afterwards.
- – Modify 3dvar.xml to get Trace logs and try only single observation (T2m SYNOP) experiments.
- – Switch to DPCG from DIPCG in 3dvar.xml
- – Recompile CY40 userpack (OOPS modset) with debugging compiler options (Use OPTFTR=2 debugging and bound checking) Several warning notes was obtained in Norm check reports!
- – Modifications recommended after Norm checker reports:
  - – allobs_mod.F90
    - – [70] integer :: nnn → integer(kind=jpim) ...
    - – [75] integer :: save → integer(kind=jpim) …
    - – [743] end if → ENDIF
  - – gom_setup.F90
    - – [38] .GT. → “>”
    - – Insert IMPLICIT NONE
  - – obsvec_mod.F90
    - – [799] .LE. → “<=”
    - – [802] .GE. → “>=”
  - – suctrl_gflattr.F90
    - – [1525] .NE. → “/=”
- – Error during compilation:
  - – gom_setup.F90
    - – [40] Change MDB_numtsl_AT_desc → MDB_NUMTSL_AT_DESC
- – After these modifications, ALADIN OOVAR analysis was successfully generated.
- – AROME OOVAR was still crashed.
- – Due to quick visual check of ALADIN 3DVAR increments with this single temperature observation realistic temperature and wrong humidity increments were obtained (see figures below)
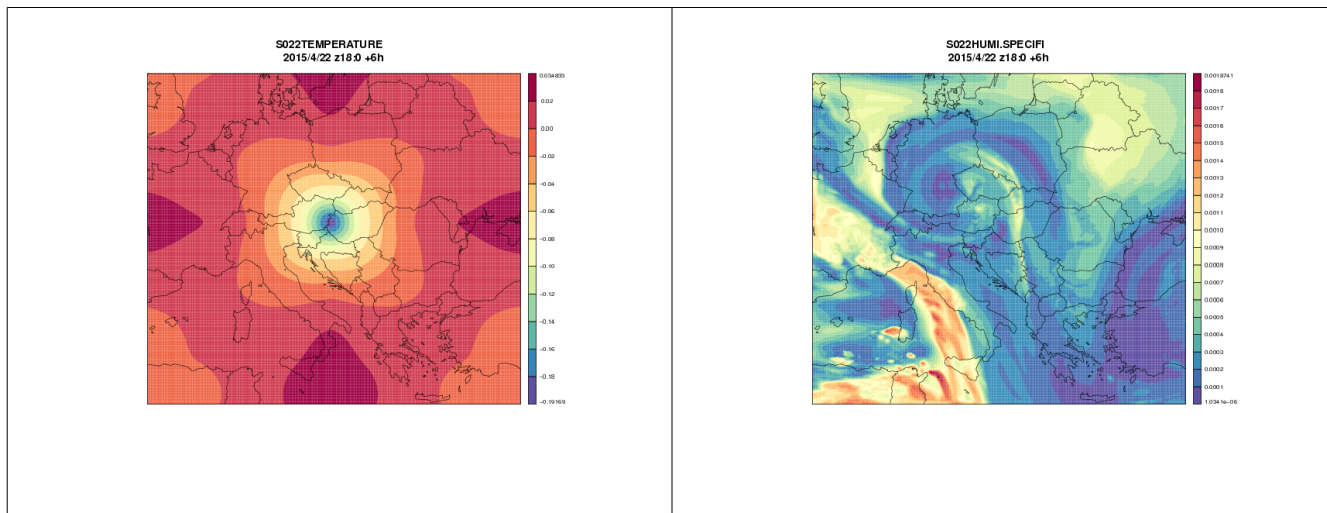
Temperature and Specific humidity increments at model level 22 in ALADIN 3DVAR