

Preprocessing on Kupe

Done

- Latest version of GMT was ported to Kupe
- ~~nhm2srf, nhm2vm~~, gcmt2srf, srfinfo2vm codes are modified to suit HPC environment
- Fully automated 2 paths
 1. GCMT -> SRF, SRF info->VM
 2. NHM-> SRF, SRF info->VM
- Only 1 slurm script to submit.
- Automated VM integrity test.

Issues and solutions

- GMT doesn't run in MPI unless all processes run GMT in unison. Abandoned MPI and chose multiprocessing.
- GMT 6.xx "spatial" output was broken. Downgraded to GMT 5.4.3. The bug reported. (<http://gmt.soest.hawaii.edu/issues/1245>)
- HDF5 on Cray : File locking issue: Needs `export HDF5_USE_FILE_LOCKING=FALSE` (<https://github.com/ALPSCore/ALPSCore/issues/348>)
- gs for psconvert is not available on Kupe compute node. Copying and placing gs binary doesn't work as files in `/usr/share/ghostscript/9.15/` are missing. ImageMagick can be tried instead. For now, we don't produce png.

NHM2SRF_VM.sl

```
#!/bin/bash
# script version: slurm
# Please modify this file as needed, this is just a sample
#SBATCH --job-name=nhm2srf_vm
#SBATCH --account=nesi00213
#SBATCH --partition=NeSI
#SBATCH --ntasks=1
#SBATCH --time=03:00:00
#SBATCH --output nhm2srf_vm-%j.out
#SBATCH --error nhm2srf_vm-%j.err
###SBATCH --mail-type=all
###SBATCH --mail-user=test@test.com
###SBATCH --mem-per-cpu=16G
###SBATCH -C avx
#SBATCH --hint=nomultithread
## END HEADER
source machine_env.sh
# user specific parameters
export NUMPROCS=40
export SELECTION_FILE=`pwd`/nhm_selection_geo_si.txt #nhm_selection_sample2.txt #
# important paths
export SRFGENPATH=/nesi/nobackup/nesi00213/tmp/Pre-processing/SrfGen
export QCOREPATH=/nesi/nobackup/nesi00213/tmp/qcore
export GMPEMODELSPATH=/nesi/nobackup/nesi00213/tmp/post-processing/im_processing/computations/GMPE_models
# leave these alone
export PYTHONPATH=$QCOREPATH:$PYTHONPATH:$SRFGENPATH:$GMPEMODELSPATH
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/nesi/nobackup/nesi00213/gmt/gmt-stable/lib64
# to fix HDF5 file locking issue https://github.com/ALPSCore/ALPSCore/issues/348
export HDF5_USE_FILE_LOCKING=FALSE
echo "SRF generation starts"
date
python2 $SRFGENPATH/NHM/nhm2srf.py $SELECTION_FILE -n $NUMPROCS
echo "SRF generation completed"
date
echo "VM generation starts"
srun python2 $SRFGENPATH/srfinfo2vm.py "autosrf/*/Srf/*.info" -n $NUMPROCS
date
echo "VM generation completed"
```

When submitted and executed, it creates two directories `autosrf` and `autovm`

```
baes@kupe01: /scale_akl_nobackup/filesets/nobackup/nesi00213/tmp/auto_preproc/nhm_test/autosrf$ ls
AhuririR      Caswell14      FiordMarl&2    Hundalee       MilB5GeoR2     NorthCant13    Springbank
Akatore       Caswell15      FiordSZ03      Hunter          MilfordB1      NorthCant2     Springfield
Albury        CaswellH10     FiordSZ09      HuttPeelNorth  MoonlightNth   NorthCant4     Spylaw
AlpineF2K     CaswellH67     FiveFingers    HuttPeelSouth  MoonlightSth   NorthCant8     Stonewall
AlpineK2T     CaswellH8      Fowlers        Hyde            MS01           OhariuS        Swedge1
AlpineR       CaswellH9      FoxPk          Inangahua      MS02           OldMan         Swedge2
Ashley        CBalleny       GeorgeR1       IrishmanC       MS04           Omihi          Swedge3
AwatereNE     Chalkylto3     Gimmerburn     JorKekCha      MS05           Opawa          Swedge5
AwatereSW     Chalky4to8     Grandview      JorKekNeed     MS09           Ostler         Swedge6to10
AwatNEVer     Cheeseman      Hammer        KaiwaraN       MtWhite        Otematata      TaieriR
AwatNEVerC1   ClarenceCentr  Harper         KaiwaraS       Nevis          PaparoaRF      Takitimu1
Barefell      ClarenceNE     Hauroko        Kakapo         NMFZ1819      Pegasuslnw    Takitimu2
Billys        ClarenceSW     HikWgtmmax     KekerenguBF   NMFZ4647      Pisa           TeAnau
BlueLk        Cust           HikWgtmmin     KekNeed        NMFZB0        Port2GreyL     Torlesse
BlueMtn       Cw4Swedge411  Hokonui        Kelly          NMFZB1        Port2GreyS     UpperSlope
BooBooALL     Cwedge123     Hollyford      Kirkliston     NMFZB2        Poulter        WaimeaN
Brothers      Dalgety        Hope1888       LeesV          NMFZE1        QuartzCk       WaimeaS
Browning      DoubleHill     HopeConway     LindisP        NMFZE2        Raggedy        Waipiata
BrunAnt       Dryburgh       HopeConwayOS   LkHeron        NMFZF1        Rakaia        WairarapNich
CardronaN     Dunstan        HopeCW         logfile.txt    NMFZF2        Ranfurly       Wairau
CardronaS     Esk            HopeTARA       LongVlly       NorthBranch   Settlement     Waitangi
Caswell1      fault_traces.gmt HopeTeRapaln2  Lowry          NorthCant1    SFiordMg13     Waitohi
Caswell211    FernGully      Hororata       Lyell          NorthCant10   SFiordMg1to9  WharaToCampB
Caswell13     Fidget         HumpR          Maimai         NorthCant11   Solander       WhiteCk
```

```
baes@kupe01: /scale_akl_nobackup/filesets/nobackup/nesi00213/tmp/auto_preproc/nhm_test/autosrf/Akatore$ ls
Srf Stoch
baes@kupe01: /scale_akl_nobackup/filesets/nobackup/nesi00213/tmp/auto_preproc/nhm_test/autosrf/Akatore$ cd Srf
baes@kupe01: /scale_akl_nobackup/filesets/nobackup/nesi00213/tmp/auto_preproc/nhm_test/autosrf/Akatore/Srf$ ls
Akatore_HYP01-04_S1244.info Akatore_HYP02-04_S1284.info Akatore_HYP03-04_S1324.info
Akatore_HYP01-04_S1244.srf Akatore_HYP02-04_S1284.srf Akatore_HYP03-04_S1324.srf
Akatore_HYP01-04_S1254.info Akatore_HYP02-04_S1294.info Akatore_HYP04-04_S1334.info
Akatore_HYP01-04_S1254.srf Akatore_HYP02-04_S1294.srf Akatore_HYP04-04_S1334.srf
Akatore_HYP01-04_S1264.info Akatore_HYP03-04_S1304.info Akatore_HYP04-04_S1344.info
Akatore_HYP01-04_S1264.srf Akatore_HYP03-04_S1304.srf Akatore_HYP04-04_S1344.srf
Akatore_HYP02-04_S1274.info Akatore_HYP03-04_S1314.info Akatore_HYP04-04_S1354.info
Akatore_HYP02-04_S1274.srf Akatore_HYP03-04_S1314.srf Akatore_HYP04-04_S1354.srf
baes@kupe01: /scale_akl_nobackup/filesets/nobackup/nesi00213/tmp/auto_preproc/nhm_test/autosrf/Akatore/Srf$
```

Similarly, `autovm` directory contains velocity model files for each location.

```
baes@kupe01: /scale_akl_nobackup/filesets/nobackup/nesi00213/tmp/auto_preproc/nhm_test/autovm/Akatore$ ls
gridfile_rt01-h0.400      model_coords_rt01-h0.400  params_vel.py  VeloModCorners.txt
gridout_rt01-h0.400      model_params_rt01-h0.400  params_vel.pyc vp3dfile.p
model_bounds_rt01-h0.400  nzvm.cfg                  rho3dfile.d    vs3dfile.s
```

To Do

- Technical debts: /nesi/nobackup/qcore /nesi/nobackup/post-processing need to be updated, and other codes that depend on old versions need to be revised