CHGRES FOR FV3

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FV3GFS Technical Meeting

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Background

- GFDL modified a previous version of 'global_chgres' for FV3.
- Move their modifications to the Q3FY17 version. Started from:
  - https://svnemc.ncep.noaa.gov/projects/gfs/branches/gfs_q3fy17
- My progress is being tracked in this ticket:
  - https://svnemc.ncep.noaa.gov/trac/fv3gfs/ticket/1
  - This is a new subversion project. If you can't view it, contact Fanglin Yang.
  - Please add your comments, suggestions, critiques to the ticket.
- Code updates being committed to this branch:
  - https://svnemc.ncep.noaa.gov/projects/fv3gfs/branches/chgres_fv3

Requirements

- Interpolate GFS atmospheric, surface and NSST restart files to the FV3 grid.
  - Atmospheric restart files in either SIGIO or NEMSIO format.
  - Surface restart files in either SFCIO or NEMSIO format.
  - NSST restart files in either NSTIO or NEMSIO format.
- Data on FV3 grid output in NetCDF format.
  - Each tile in its own file.
  - NSST output in NEMSIO format for now. Can change this once NSST is working in FV3 model.

Requirements

- CHGRES will provide a ‘cold’ start capability.
  - Should a ‘warm’ start be included?
- Will convert from GFS initial conditions on Gaussian grid to FV3 grid only.
  - Converting from one FV3 grid to another to be done by another to-be-written ‘CHGRES’ program.
  - As per Vijay’s directive (see his Dec 5 slides).
- Remove any obsolete GFS related code.
  - Lots of opportunity for clean up and reorganization.

Some Details

- FV3 grid defined by the following 'fixed' files:
  - Cxxx_grid.tile#.nc - contains lat/lon info.
  - Cxxx_oro_data.tile#.nc – contains land mask, terrain and GWD fields.
  - Can these files be combined somehow?
  - Dusan recommends consistent variable names.
  - Can new static fields be added? Ex: soil type, vegetation type and albedo. Currently, the horizontal mapping is done "on the fly" by the 'sfcsub.f' component. But this is not very efficient.

Progress

- Much bigger project than I initially thought.
  - Quicker to write the entire code from scratch?
- Removed obsolete code that wrote the interpolated GFS data to NESMIO or the ‘old’ format.
- Removed reduced grid logic as FV3 tiles are square.

Progress

- Separate logical branches combined.
  - The surface/NSST file conversion used two similar branches based on whether the input file was NEMSIO or the 'old' format. These were combined.
- Obsolete routines and numerous unused variables removed.
- All routines that read/write data were moved to its own source file – read_write.f90.

Progress

- Moved all ‘extra’ routines from chgres.f to its own source file – chgres_utils.f
  - Only contains the driver now.
  - Extra routines include those for vertical interpolation, spectral/grid transforms, ozone, etc.
- The driver itself was reduced from 4600 to 1600 lines (includes comments).
  - Now, chgres.f can be viewed with the subversion trac page!

Progress

- Has been successfully tested using OPS and parallel data.
  - Can change number of vertical layers.
- I encourage folks to try my branch.

To Be Done

- Option to use climo ozone data not tested.
  - Some routines need to be converted from spectral to grid point.
  - Do we even need this option?
- Have not tried to change number of tracers.
- Have not tried FV3 nests.
- The global_chgres.sh script needs updating.
- New routines will need prologs and NCO approved error handling. Current prologs need updating.
- The program only creates one surface/NSST tile. Should a loop be added to process all tiles as with the atmospheric conversion?

QUESTIONS/COMMENTS