instructions for ‘Introduction to ocean data-model analysis’ (MIT, IAP 2016)

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source: http://mitgcm.org/viewvc/MITgcm/MITgcm_contrib/gael/comm/course-idma2016/

0) downloading matlab toolboxes

0.1) create a directory called `iap-idma' and two subdirectories called `iap-idma/matlab' and `iap-idma/release1'

0.2) open a web browser and download the following two files:
ftp://mit.ecco-group.org/ecco_for_las/version_4/checkpoints/gcmfaces_20160114.tar.gz
ftp://mit.ecco-group.org/ecco_for_las/version_4/checkpoints/c65r_MITprof.tar.gz

0.3) move these two files to the idma/ directory and uncompress them.

0.4) the iap-idma directory should now contain two new subdirectories named `gcmfaces' and `c65r_MITprof'. Rename c65r_MITprof as `MITprof'. At this point the iap-idma directory should contain ‘matlab/', 'release1/','MITprof/', and 'gmcfaces/'.

Notes :
- disk space requirement ~ 9M (plus session specific items that will be added later)
- 2011 or later matlab version is needed (for native netcdf implementation)
- for session 1 you only need MITprof but gcmfaces will come handy later so your might as well download both right away

1) instruction for session #1 activity

1.1) see 'downloading matlab toolboxes'

1.2) download idma_float_plot.m, idma_box_subset.m, and idma_box_mean.m from
http://mitgcm.org/viewvc/MITgcm/MITgcm_contrib/gael/comm/course-idma2016/matlab/

1.3) move these files to the iap-idma/matlab/ directory

1.4) use your favorite ftp client (e.g. fetch in iOS, secureFX in MS-windows, or wget in LINUX) to download ftp://mit.ecco-group.org/ecco_for_las/version_4/release1/MITprof_release1

1.5) move the MITprof_release1/ directory inside the iap-idma/release1/ directory

1.6) start matlab, go to the iap-idma directory, and type:

```
addpath matlab/
[p]=idma_float_plot('4900828');
box_l=[-180 -140]; box_L=[-10 10]-30; box_D=[0 300];
[prof_T,prof_Testim,prof_Tweight]=idma_box_subset(box_l,box_L,box_D);
[boxmean,tim,dep]=idma_box_mean(prof_T,prof_Tweight);
figureL; pcolor(tim,-dep,boxmean); colorbar;
```

Notes :
- disk space requirement ~ 6.4G
- idma_float_plot.m and idma_box_subset.m add the MITprof/ directories to the matlab path
- idma_box_subset is the most time consuming of the three scripts and may take ~3 minutes

2) instruction for session #2 activity

2.1) see 'downloading matlab toolboxes'. *Note: make sure to use gcmfaces_20160114.tar.gz or a later version (e.g. the up to date version of gcmfaces from CVS).*

2.2) download the m_map plotting toolbox (use the 'zip archive' link) from https://www.eoas.ubc.ca/~rich/map.html and then unzip and move it inside iap-idma/

2.3) use your favorite ftp client (e.g. fetch in iOS, secureFX in MS-windows, or wget in LINUX) to download the nctiles_grid/ directory (145M) at ftp://mit.ecco-group.org/ecco_for_las/version_4/release1/nctiles_grid and move it inside iap-idma/

2.4) use your favorite ftp client (e.g. fetch in iOS, secureFX in MS-windows, or wget in LINUX) to download the nctiles_climatology/ directory (14G) at ftp://mit.ecco-group.org/ecco_for_las/version_4/release1/nctiles_climatology and move it inside iap-idma/release1/

2.5) start matlab, go to the iap-idma/ directory, and type:

```
p = genpath([pwd filesep 'gcmfaces/']); addpath(p);
p = genpath([pwd filesep 'MITprof/']); addpath(p);
p = genpath([pwd filesep 'm_map/']); addpath(p);
```

```
grid_load;%load ECCO v4 grid into mygrid
gcmfaces_global;%declare mygrid as global
disp(mygrid);%displays grid variables
diags=example_transports;%computes transports (takes ~ 2 minutes)
example_transports_disp(diags);%display results
```

Then proceed as explained in section 5 of gcmfaces/gcmfaces.pdf to use diags_driver.m and diags_display.m (takes ~ 5 minutes).

3) instruction for session #3 activity

3.1) see session #2 instructions (2.1 through 2.4 are needed here)

3.2) use your favorite ftp client (e.g. fetch in iOS, secureFX in MS-windows, or wget in LINUX) to download the binary_inputs/ directory (230M) at ftp://mit.ecco-group.org/ecco_for_las/version_4/release1/binary_inputs and move it inside iap-idma/release1/

3.3) download idma_interp_2d.m, idma_area_mean.m, and idma_load_fields.m from http://mitgcm.org/viewvc/MITgcm/MITgcm_contrib/gael/comm/course-idma2016/matlab/ and move them inside the iap-idma/matlab/ directory

3.4) start matlab, go to the iap-idma/ directory, and type:

```
addpath matlab;
p = genpath([pwd filesep 'gcmfaces/']); addpath(p);
p = genpath([pwd filesep 'MITprof/']); addpath(p);
p = genpath([pwd filesep 'm_map/']); addpath(p);
grid_load;%load ECCO v4 grid into mygrid
gcmfaces_global;%declare mygrid as global
idma_load_fields;%loads various types of variables to memory
```

Then type `help idma_interp_2d.m' and proceed with its example.
Then type `help idma_area_mean.m' and proceed with its example.

4) instruction for session #4 activity

Note: the following activity requires a linux computer or a MAC where the following software is already installed: CVS (Concurrent Versions System), make or (preferably) GNU make, a FORTRAN compiler (e.g. gfortran), and a C compiler (e.g. gcc). Steps 4.4 to 4.6 below are computationally intensive and require a cluster with at least 24 cores and an installation of MPI.

4.1) install MITgcm as explained @ http://mitgcm.org/public/source_code.html directly in your iap-idma/ directory

4.2) at the command line, type

```
cd MITgcm/verification/
./testreport -t tutorial_global_oce_latlon
```

4.3) start matlab, go to the iap-idma/ directory, and type:

```
addpath matlab;
p = genpath([pwd filesep 'gcmfaces/']); addpath(p);
p = genpath([pwd filesep 'MITprof/']); addpath(p);
p = genpath([pwd filesep 'm_map/']); addpath(p);
%
dirExp='MITgcm/verification/tutorial_global_oce_latlon/run/';
nFaces=1; frmt='straight';
grid_load(dirExp,nFaces,frmt);%load grid from this experiment
gcmfaces_global;
%
THETA=rdmds2gcmfaces([dirExp 'T.0000000001']);%load a temperature field
SST=mygrid.mskC(:,:,1).*THETA(:,:,1);%get first level and apply land mask
figure; qwckplot(fld);%basic plot of the model SST
```

4.4) follow instructions provided @ http://mitgcm.org/viewvc/*checkout*/MITgcm/MITgcm_contrib/gael/verification/eccov4.pdf to install the ECCO v4 setups (section 1.3) and run the 20 year ECCO v4 solution (section 2.1).

4.5) start matlab and proceed as in #4.3 above but with `dirExp' set to your run directory, 'nFaces' set to 5 and 'frmt' set to 'compact'.

4.6) proceed as explained in section 5 of gcmfaces/gcmfaces.pdf to use diags_driver.m and diags_driver_tex.m to generate the standard analysis document.