MATLAB script for visualizing geoid height and other elevation data on rotating 3D globe

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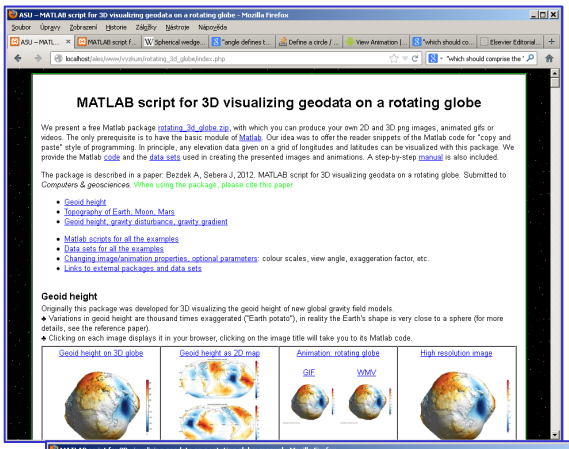
Research highlights

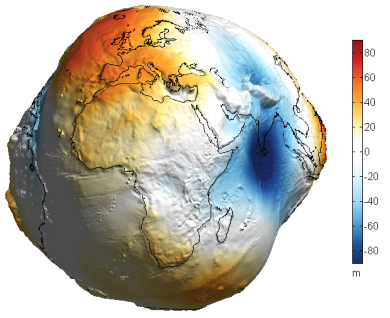
- A Matlab package for visualizing global data on 3D sphere.
- Possibly, rotation of the 3D sphere can be animated.
- For all examples shown, Matlab code is provided on the package website.
- Any global longitude-latitude scalar data can be visualized.
- The package is available for free download.
- Bezdek A, Sebera J, 2013. MATLAB script for 3D visualizing geodata on a rotating globe. *Computers & geosciences*, http://dx.doi.org/10.1016/j.cageo.2013.03.007



Program description

- This Matlab code will produce the PNG image shown:

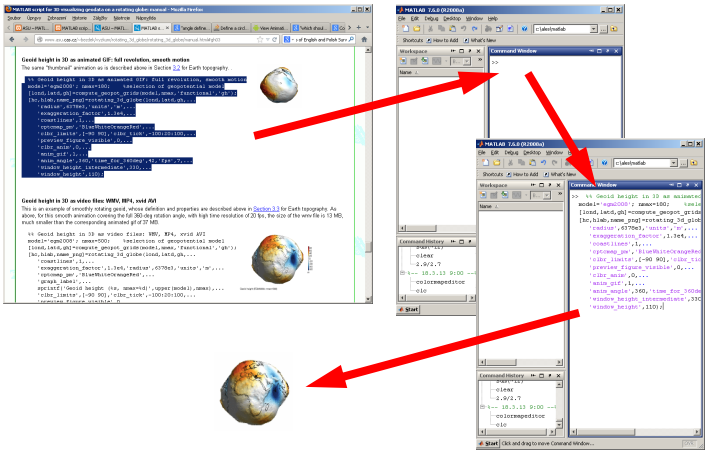
```
%% Selection of geopotential model and computation/loading of the grid values
model='egm2008';  nmax=500;
% Computation of grid for the selected geopotential functional
[lond,latd,gh]=compute_geopot_grids(model,nmax,'functional','gh');

%% Geoid height in 3D as PNG image
[hc,hlab,name_png]=rotating_3d_globe(lond,latd,gh,'coastlines',1,...
'exaggeration_factor',1.3e4,'radius',6378e3,'units','m',...
    'graph_label',sprintf('Geoid height (%s, nmax=%d)',upper(model),nmax),...
    'clbr_limits',[-90 90],'clbr_tick',-100:20:100,...
    'cptcmap_pm','BlueWhiteOrangeRed',...
    'preview_figure_visible',1,...
    'window_height',650);
```



Geoid height (EGM2008, nmax=500)

Simple usage: Copy and paste

- More precisely: copy, paste and modify according to your needs



Input data

- Matrix of global scalar data on a longitude-latitude grid

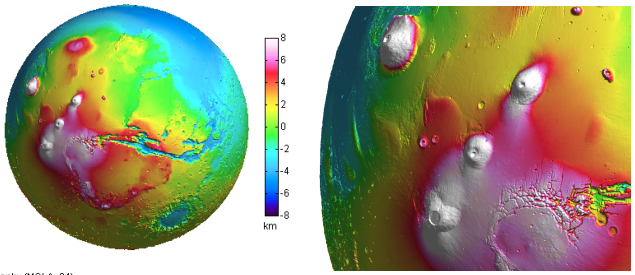
Output formats

- PNG images of data projected on 3D globe
- Animation of 3D globe: avi/wmv video; animated gif
- 2D geographical map of data (based on M_Map package)

Examples of application

Topography of Mars

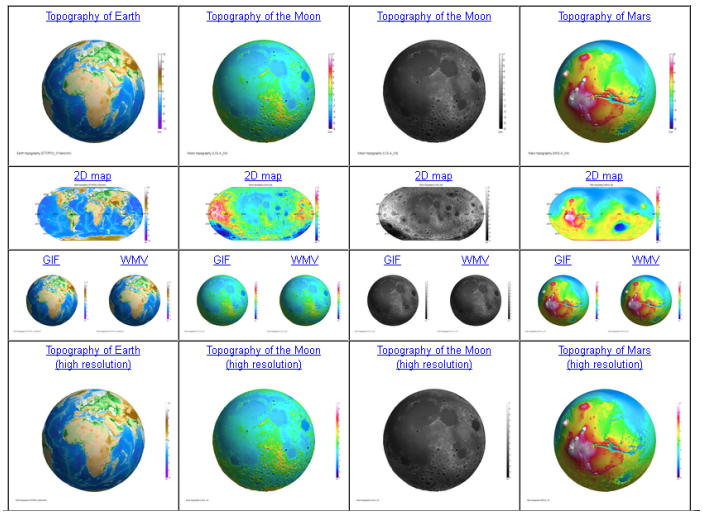
- Data: MOLA (Mars orbiter laser altimeter, NASA)



Mars topography (MOLA_04)

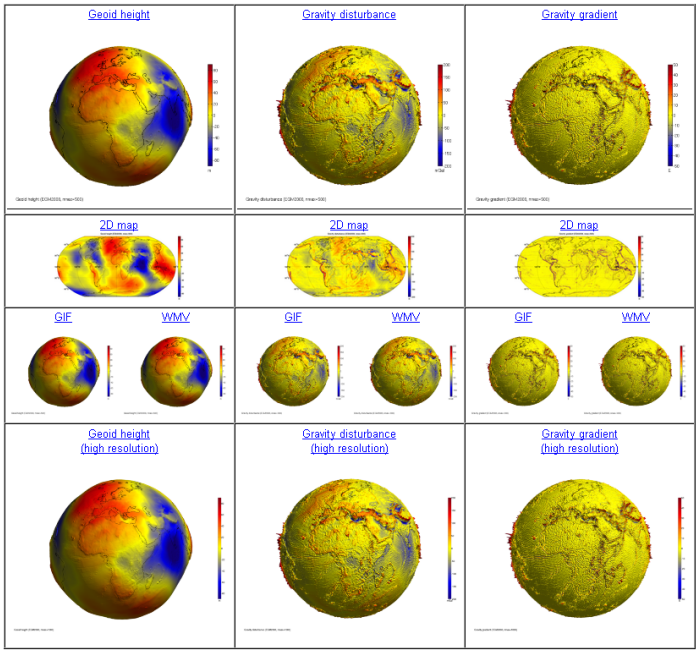
Topography of Earth, Moon, Mars

- Data: Etopo2 (NOAA); LOLA (NASA); MOLA (NASA)
- Colour scales: GMT_globe & GMT_wysiwygcont; gray (Matlab)



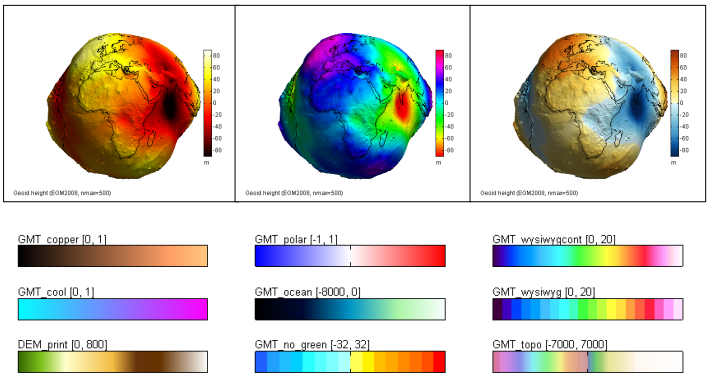
Gravity potential, disturbance, gradient

- Increasing order of differentiation highlights the local features
- Colour scale: clrmap_byr1 (created by authors)
- Data: EGM2008, max degree 500



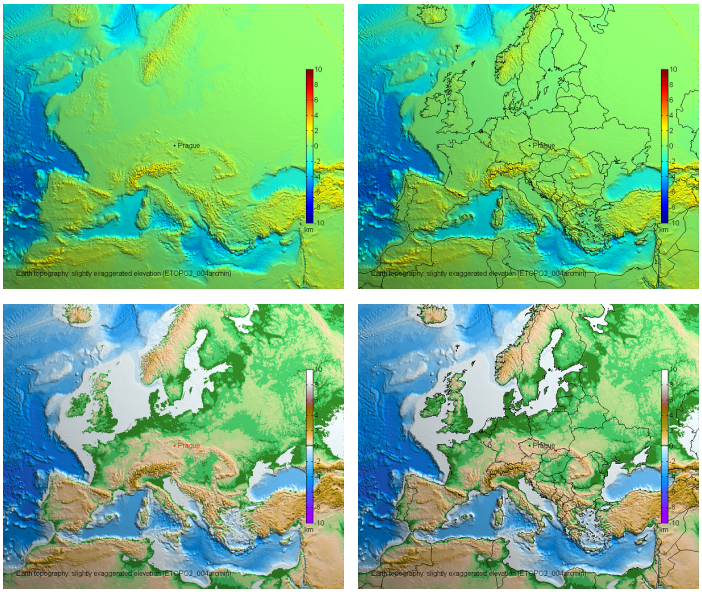
Easy use and modification of various colour scales

- Matlab: several built-in colormaps
- GMT color palette tables (cpt)
- Easy editing and creating by using the Matlab colormapeditor



Importance of using a proper colour scale

- Default colour scale: shelf seas indistinguishable from land
- Earth topography needs special colour scales



Program availability and system requirements

- Only the basic module of Matlab is needed
- The package is available for free download:
  http://www.asu.cas.cz/~bezdek/vyzkum/rotating_3d_globe/