CIVE 5699, HW No. 6 Assignment - Due by 4:30 pm on Mon 4/4/16

In this HW assignment, you will obtain and process GRACE data to determine time series of water storage changes

Tasks

- Refer to the instructions (see BB → Assignments → Lab6 → GRACE_Data_Processing.pdf) to find, obtain and process GRACE data as need to complete the below.
- Pick a land region (at least 3 degrees by 3 degrees; 330 km by 330 km). Determine the Latitude/longitude box for your region. Round to the whole degree. What are the latitude and longitude at the four corners of your box?
- Obtain all three GRACE data products (JPL, CSR, or GFZ), scaling factors and errors for monthly total water storage anomalies (TWSA).
- Import one of the GRACE TWSA products (JPL, CSR, or GFZ) and the scaling factors. Select one date and make a map of the scaled-TWSA.
- Use the code provided in Lab 6 to process and extract GRACE TWSA's, scaling factors and errors for your region. Note, for the code, there are a few lines you need to modify. You will have to modify the code to extract data for only your region.
- Determine the mean, scaled-TWSA for each date for each data source: Jet Propulsion Laboratory (JPL), University of Texas, Center for Space Research (CSR), and German Research Centre for Geosciences (GFZ). Note, the scaling factors for each grid cell are the same for each date and for each source. Here, the mean scaled-TWSA is simply the average of all scaled values for a given date (i.e., all the scaled pixels values for your box on a given date). What is the range of mean, scaled-TWSA from each source? Want is the mean monthly range in scaled-TWSA (max-min) from the three sources?
- Determine individual and combined errors for your region using both the arithmetic mean and co-variance methods (see next to last slide for Class: 3-28-16)? What are your two regional Leakage errors? What are your two regional Measurement errors? What are your two regional combined total errors?
- **For full credit, you must write a program (VBA, python, R, other) to determine regional scaled-mean TWSAs (4 pts) and regional errors (6 pts). The code(s), must read in the data, perform all calculations and output results. The code must contain sufficient comments to explain the steps for others to understand and run.**
- Prepare a word file: provide answers/discussions for each of the questions listed above. In addition, provide screen captures/figures of:
  - Maps 1-3→ Overview map for your region; maps for unscaled and scaled TWSA for one of the products (JPL, CSR, GFZ) for one date (list date); and map of scale factors;
  - Plot 1 → mean, scaled-TWSA left y-axis for all three products (JPL, CSR, or GFZ) with date/time on x-axis;
  - Table 1 → summary of all 6 error terms: measurement, leakage, combined for both mean and co-variance methods;
  - Provide code (copy/paste your code file) or sample calculations to show how your determined the mean, scaled-TWSA; mean and co-variance based errors (i.e., include how you determined $d_{i,j}$);

  Save as a PDF file and upload your PDF to BB. <u>If you wrote code, you must also provide all required input files, code file(s) with comments as how to run, and your output files to BB.</u>