1. Introduction

The objective of this deliverable is to obtain and process data products from NASA's Gravity Recovery & Climate Experiment (GRACE) mission. GRACE measures gravity fields that can be converted to changes in water storage.

2. Methodology

Data download
Level 3 data products specifically developed for land areas were downloaded from the GRACE Data FTP site in netCDF format. These files included scale factors and error terms for each grid and monthly data from three distribution centres: Jet Propulsion Laboratory (JPL), The University of Texas, Center for Space Research (CSR), and German Research Centre for Geosciences (GFZ).

Data processing

An R code provided by the class instructor was used to process the NetCDF files. The input information for the code to run properly included files location and a bounding box (i.e. -3.5<lat< 1& 30.5<lon<35.2 for Lake Victoria). Exploration of the data was performed using ArcMap shown in Figure 1.

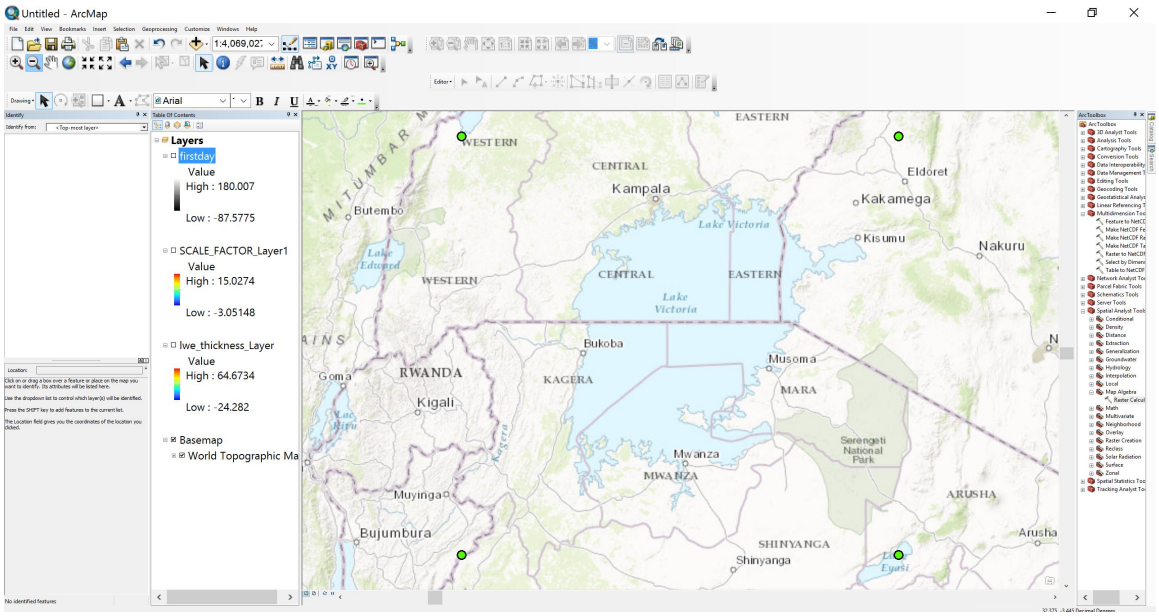

Figure 1. Overview map for chosen region

The following information was extracted from the NetCDF files: modified Julian date; days since 1/1/2002 00:00:00, latitude (deg), longitude (deg), JPL, CSR, GFZ TWSA values (cm), scale factor , leakage error (cm), and measurement error (cm).

An R script was developed to obtain mean TWSA values for all three products (JPL, CSR, GFZ), total pixel error (tperror) and regional error (rerror) for the bounding box.

3. Results

Unscaled, scaled, and scale factors for the chosen region on the 16th of April 2002 are presented in Figure 2, Figure 3, and Figure 4, respectively

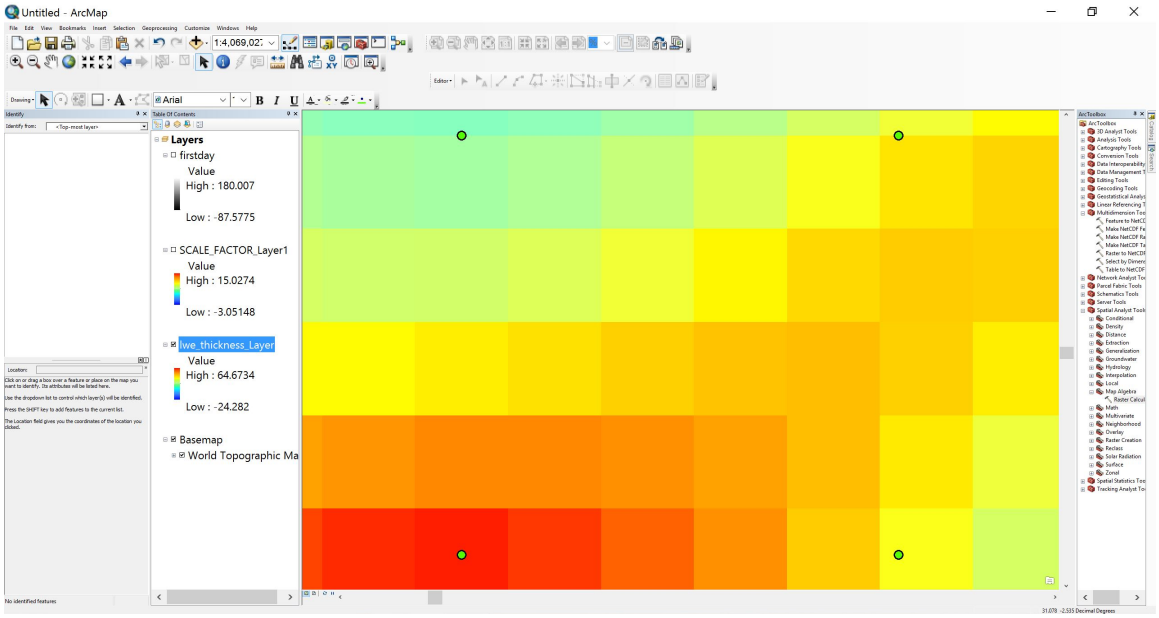

Figure 2. Unscaled Map for one of the products JPL for one date (4/16/2002)

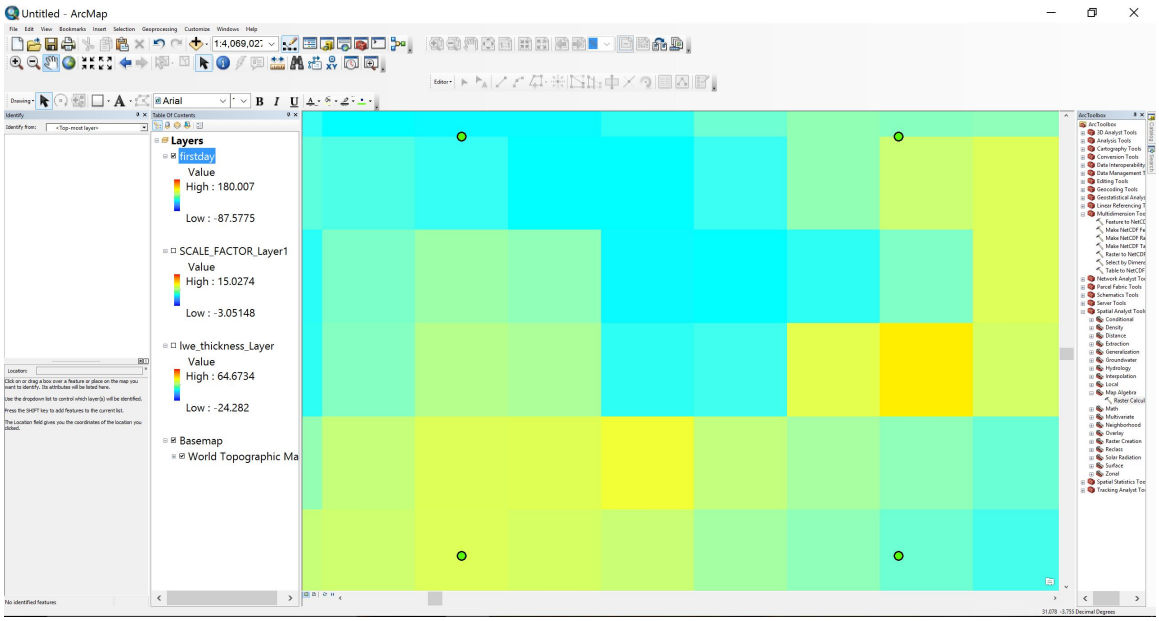

Figure 3. Scaled Map for one of the products JPL for one date (4/16/2002)

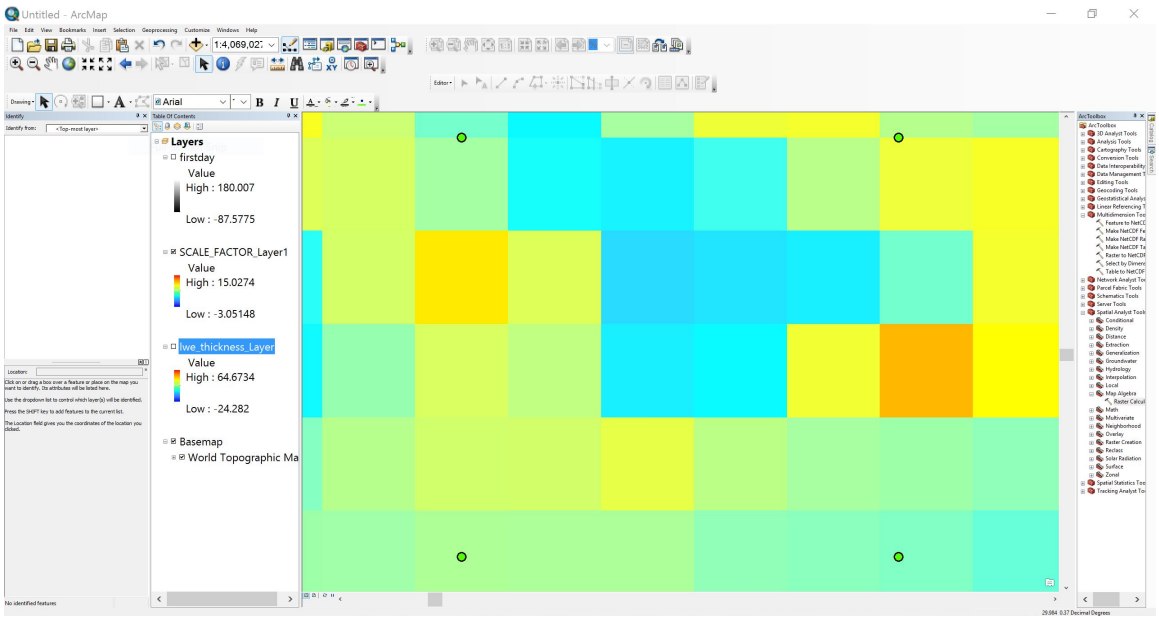

Figure 4: Map of scale factors

Table 1: Summary of all 6 error terms: mean leakage (leakem), mean measurement (measem), total pixel error (tperror), regional leakage error (rleake), regional measurement error (rmease), regional error (rerror).

leakem	measem	tperror	rleake	rmease	rerror
6.106058768	1.700785064	6.338503255	1.349903908	0.404693202	0.572322615

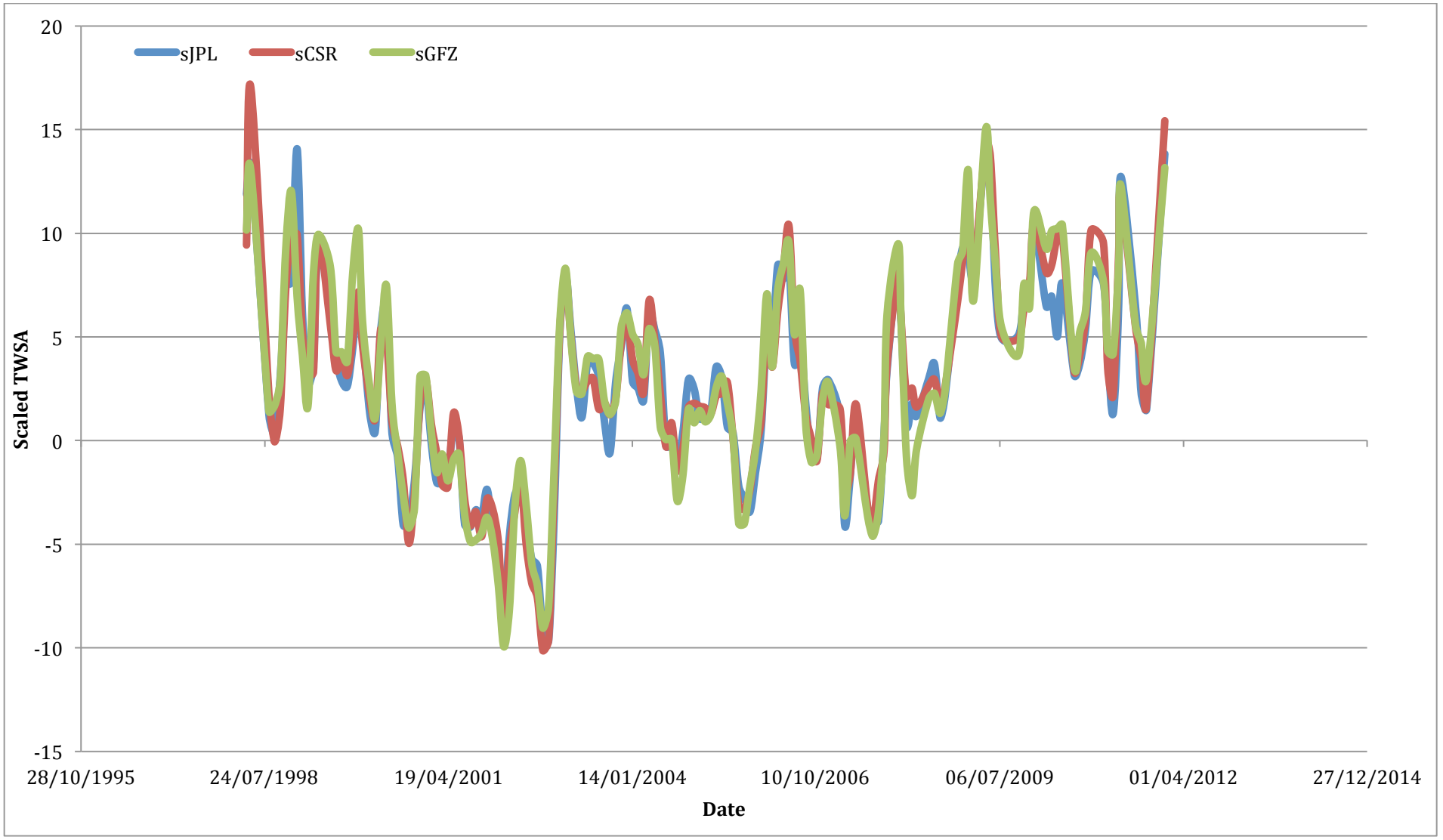

Figure 5: Plot of mean, scaled TWSA vs date for all three products (JPL, CSR, GFZ)