Terrain Mapping Sub-group (TMSG) Report on DA-06-02

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Progress on subgroup topics

Specific Issues from TMSG

- Definition of co-ordinates/datum and map projection systems and how these are encoded is critical to success (e.g. UTM, Zone 31N, Clarke 1886. Co-ordinate refers to the centre of the pixel grid)
- How data is resampled is also crucial including if we have data in different projections at different resolutions.
- What order in which inter-comparisons are performed can also make a difference, e.g. project EO-DEM into “ground truth” co-ordinate system vs resampling “ground truth” into EO-DEM co-ordinates
- How to handle missing data: Optimum is to ensure that all data is float and employ IEEE NaN so these values are ignored
- In addition to inter-comparisons of co-aligned, co-registered DEMs, it is also crucial to perform an inter-comparison with point or small footprint samples (e.g. laser altimetry or kinematic or static GPS)
- One of the chief characteristics of much DEM data is that it is either (a) proprietary (i.e. ©); (b) a state secret
- This causes TMSG to adopt a very flexible approach on how QA is performed, by whom and how it is reported as well as restrictions on who can have access to “ground truth” DEM datasets

CEOS-WGCV-TMSG test site characteristics

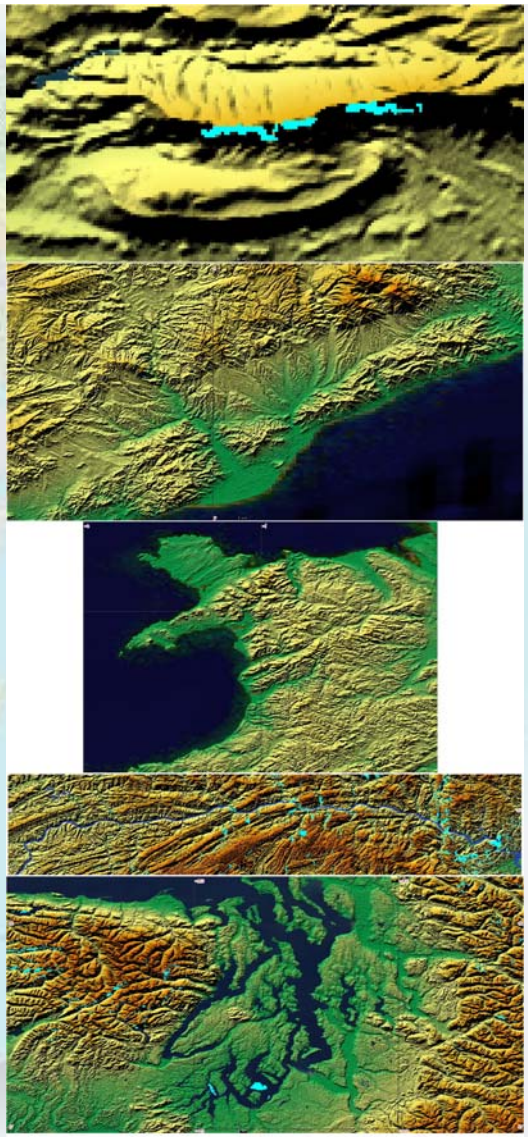
- Montagne Sainte-Victoire, France referred to as Aix-en-Provence
  5.528-5.685ºE, 43.502-43.560ºN
  mixed arable, forest, limestone

- Barcelona, Spain
  1.5-2.75ºE, 41.25-41.82ºN
  urban, mixed arable, forest

- North Wales, UK
  3-5ºW, 52-53.5ºN
  urban, pasture, forest

- Three Gorges, China
  108.252-111.302ºE, 30.638-31.229ºN
  forest, arable, limstone shales
- Puget Sound, WA, USA
  -121.397 to -123.897ºW, 46.364-48.864ºN
  forest, urban, wetlands

N.B. screenshots from ICEDS extracts



Cal/Val Workshop Action #3: Muller (TMSG)

- **Review & establish test site template to define (best practices) requirements for test site identification within the subgroup domain**
- Missing items (in draft sent by G. Chander on :
  - Web-site location where all the metadata is linked to display
  - KML file showing test site area (based on ARC shapefile)
  - All field digital photos should be geolocated, preferably panoramic mosaics and linked to panoramio.com and via this to Google Earth, see http://www.panoramio.com/user/1353814
  - Replace photos by links to WMS/WCS (e.g. ICEDS) showing topography and Landsat imagery over this site as well as GE
  - On-site Instrumentation makes no sense for topography
  - For topography need “ground truth” such as
    - DEM of accuracy at least 3, peferably 10 times better than DEM it is being used to assess
    - Kinematic GPS tracks, where available
    - Survey points, where available
  - Auxiliary data is too specific to Landsat. Should be replaced by

Cal/Val Workshop Action #7: Muller (TMSG)

- **Establish & define key cal/val terminology as an input into a WGCV dictionary**
- There are a variety of specialist terms for geomatics, e.g.
  - http://www.lib.berkeley.edu/EART/abbrev.html
- Each DEM generation system has its own specialist terminology
  - InSAR includes phase coherence as a key quality metric
  - Stereo photogrammetry includes internal matcher metrics (e.g. precision of the variance-covariance matrix when employing Adaptive Least Squares Correlation)
  - Lidar includes information one echo waveform sampling as well as first and last return echo detection
  - Map contour vector digitisation depends heavily on details of manual editing, the resolution chosen for gridding cf map-scale and the contour interval

Cal/Val Workshop Action #10: Muller (TMSG)

- **Formulate a draft list of key common best practices for cal/val**
- Comparison with “ground truth” data is key. Elevation for the test sites, chosen to date, changes very little over time at the resolution that spaceborne DEM is capable of achieving (e.g. no observable mining activities)
- However, land cover does change (e.g. deforestation in Pacific NW site at Puget Sound) but the enormous cost of collecting multiple ground truth is too prohibitive to support except from 3rd parties (WA, EPA, NFS, NASA support annual acquisition of airborne lasre altimetry)
- Kinematic GPS is crucial to obtain an assessment of heights at well-defined positions which can also be identified using satellite imagery
- For 90m and 30m DEMs (e.g. SRTM, ASTER) it may be acceptable to use spaceborne laser altimetry to provide global assessments over different land covers
- Alternatively, high resolution stereoscopic systems such as ALOS-PRISM (2.5m Zrms) may be appropriate to set up new test sites and obviate the need to obtain permission to obtain DEMs over territories where such DEMs are either proprietary or secret. However, there will still be a need for GPS measurements. This is a real issue in many countries.

Cal/Val Workshop Action #13: Muller (TMSG)

- **Define wish list of requirements for functionality from the cal/val portal and feedback to the cal/val portal maintainers (ESA)**
- Need wiki method of developing text for the TMSG including use of mathematical symbols
- This should include links to dictionary for any acronyms employed as well as links via DOI to the published literature
- Need simple templates for entering basic information on each test site including links to Google Earth, ICEDS, etc
- Need method for easily downloading validation data and providing report back to the web-site when these data are employed. This could either be a DOI or link to a conference paper or link to an online report
- If “ground truth” data is proprietary, need mechanism where user signs an online license agreement before data is made available