



## 1. DATASET FULL NAME

2013 Baluchistan, Pakistan Post-Earthquake Stereogrammetric DEMs

## 2. OVERVIEW DESCRIPTION

This dataset is composed of a suite of post-seismic 2m resolution DEMs spanning the 2013 M<sub>w</sub>7.7 Baluchistan earthquake. The DEMs were constructed using the open-source software package SETSM (<https://mjremotesensing.wordpress.com/setsm/>) from DigitalGlobe base imagery (©DigitalGlobe 2018). DEMs were mosaicked and vertically registered using the Ames StereoPipeline (<https://ti.arc.nasa.gov/tech/asr/groups/intelligent-robotics/ngt/stereo/>). The base imagery included 0.5m and 0.3m resolution panchromatic imagery from QuickBird, GEOEYE, WorldView1, WorldView2, and WorldView3 (©DigitalGlobe 2018). The dataset includes DEMs generated from in-track stereo imagery, as well as DEMs constructed from mixed pairs of non-in-track stereo images. The post-event DEMs are not vertically registered to a pre-existing DEM in order to avoid removal of relative co-seismic offsets between the pre- and post-event pairs. The generation of this dataset was funded by NASA in cooperation with the U.S. Geological Survey. A complete description of the generation of this dataset and the images that were used to construct the DEMs can be found in the associated manuscript. The naming description of individual DEMs is as follows:

*sensor1sensor2\_date1ndate2\_HOSHAB\_id1\_id2\_2m\_dem\_ll\_srtm.tif*

where *sensor1* and *sensor2* are the sensors from which imagery was acquired (QB02- QuickBird, GEO- GEOEYE, WV01- WorldView1, WV02-WorldView2, WV03-WorldView3), *date1* and *date2* are the acquisition dates in format YYYYMMDD (i.e., 13AUG11), and *id1* and *id2* are the image identifier numbers provided by DigitalGlobe. Files lacking "srtm" in the filename were not registered to the SRTM DEM.

**Note:** The actual data products for this project are the individual 2 meter DEMs that were constructed with the SETSM open-source software (described above). Users who want access to the source datasets are encouraged to download these files by using the "Bulk Download" option on the OpenTopography website.

To facilitate use of these datasets with the OpenTopography webmap interface, these DEMs were mosaiced using a simple average for overlapping pixels to create a single seamless mosaic of post-earthquake topography. Details on how this single mosaic was created are in the section below

## 3. HORIZONTAL COORDINATE SYSTEM

UTM Zone 41N, WGS 84 Meters

## 4. VERTICAL COORDINATE SYSTEM

WGS84

## 5. DATASET KEYWORDS

2013 Baluchistan Earthquake, Pakistan, Hoshab Fault, Makran Accretionary Prism

## 6. PROJECT ROLES

FUNDER(s): NASA Earth Surface and Interior Program

PARTNER(s): US Geological Survey

COLLECTOR(s): DigitalGlobe (data accessed under NextView license)

## 7. MOSAIC METHODOLOGY

In order for the datasets to be viewed in the OpenTopography webmap viewer, the original DEMs had to be mosaicked to a single seamless post-earthquake DEM. This task was performed using Global Mapper V18. All individual post-earthquake DEMs were loaded into Global Mapper, and were combined to create a new single 2 meter mosaic. In areas where pixels overlapped, a mean of all overlapping pixels was performed. Because the post-event DEMs were not registered to any DEM, a static offset was applied to approximate ground control on the post-earthquake mosaic. To achieve this, the following steps were performed:

1. Difference grid was created by performing: PreEarthquakeMosaic – PostEarthquakeMosaic.
2. A mean of the difference grid was calculated using GDAL. Mean value of the grid is 32.885. This agrees with a mean geoid value of -31.87 for the region.
3. Applied a constant value of 32.885 to the PosttEarthQuakeMosaic using `gdal_calc.py`  
*gdal\_calc.py -A PostEarthquakeMosaic.tif --outfile PostEarthquakeMosaic\_MinusStaticOffset.tif --calc="A-32.885" --NoDataValue=0*

This final PostEarthquakeMosaic with the static offset applied is what is being used in the OpenTopography webmap for this dataset. As a result, users are cautioned that files created using the webmap interface will use the averaged, mosaic data. For certain applications, users may wish to utilize the source datasets by downloading the original DEMs via the “Source” directory under the “Bulk Download” section of the OpenTopography website.