Arrowsmith blog

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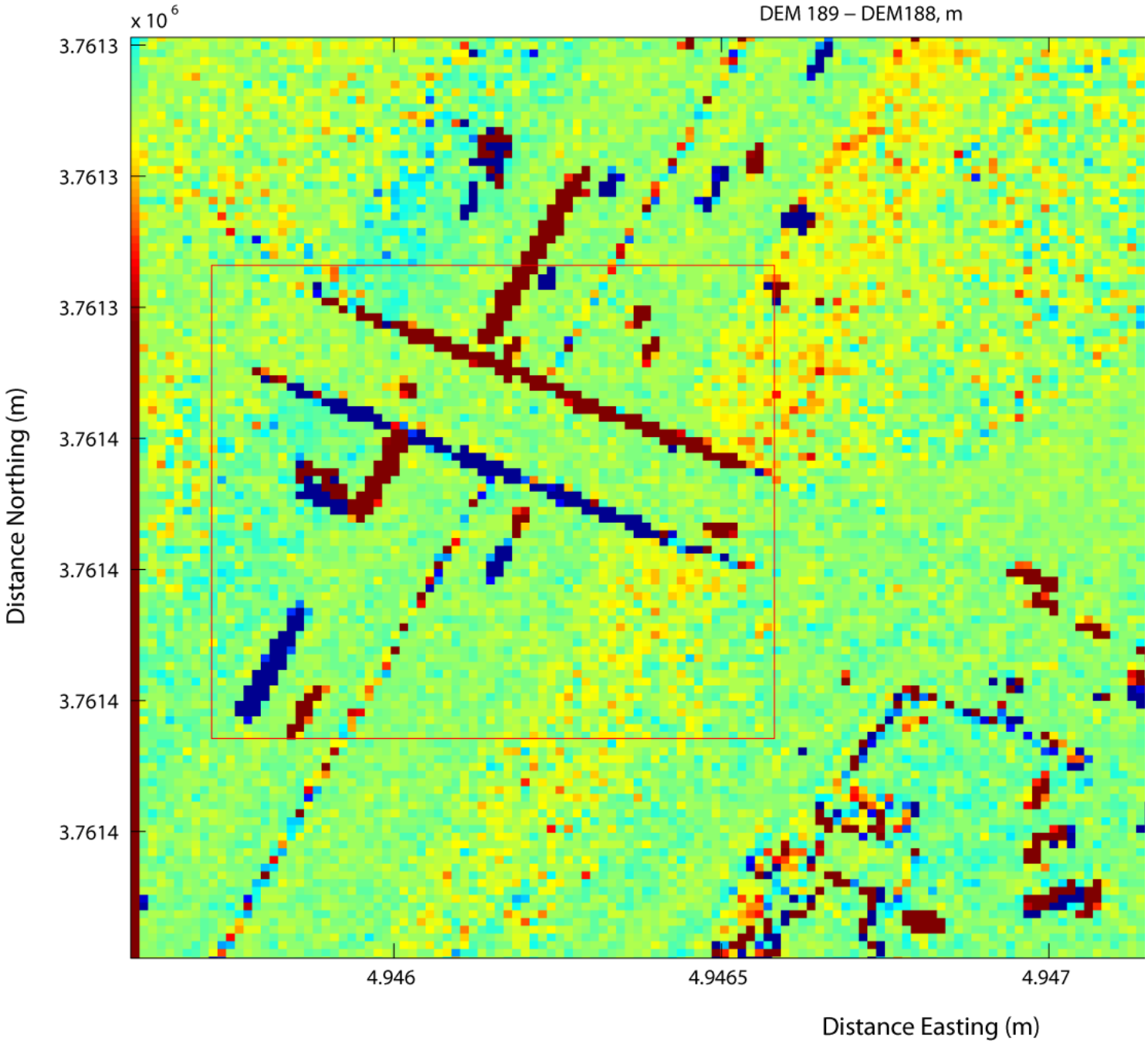
« New special volume of Geomorphology: Understanding earth surface processes from remotely sensed digital terrain models
Workshop: Using GeoEarthscope and B4 LiDAR data to analyze Southern California's active faults »

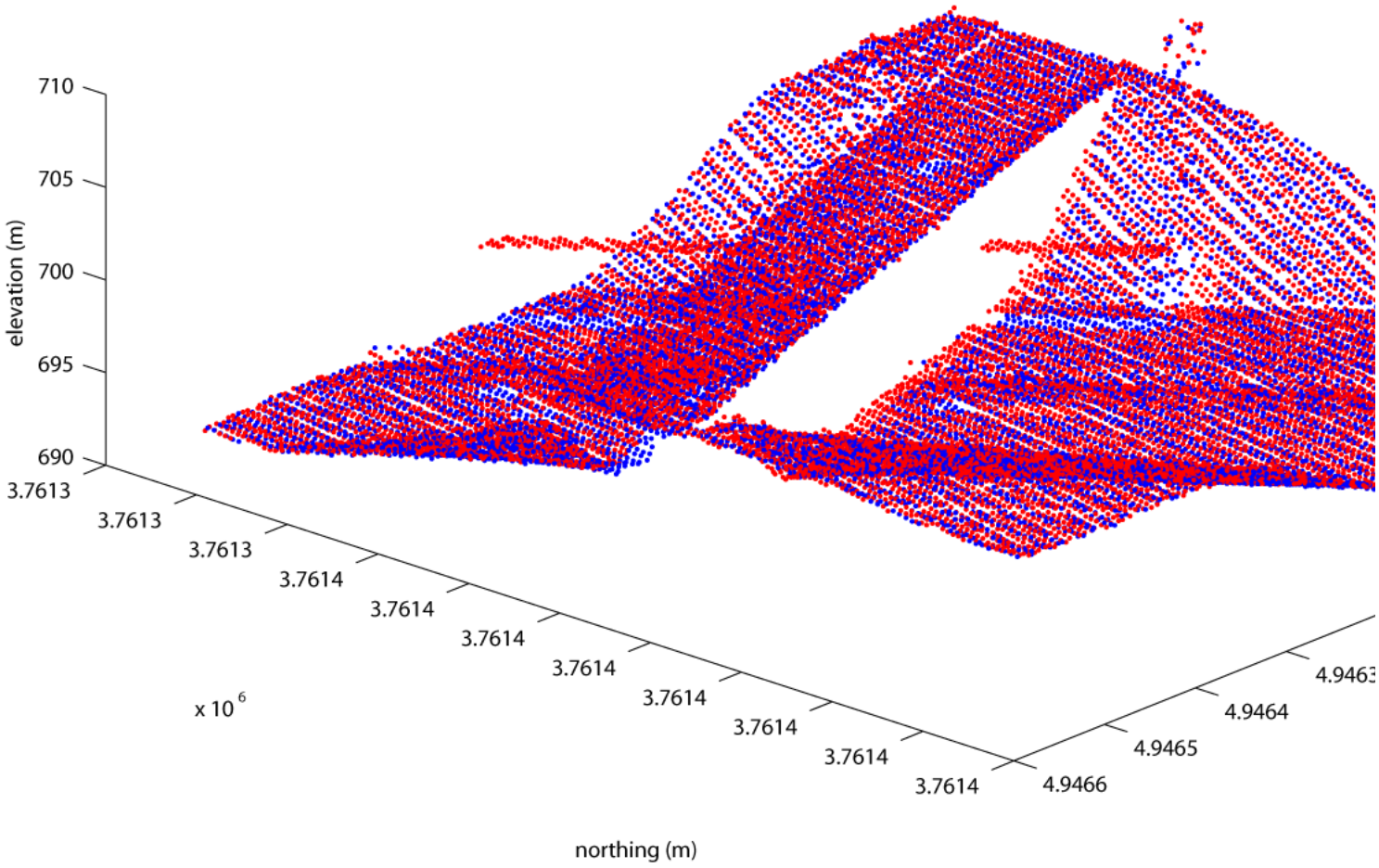
Differencing sequential LiDAR scans to look for GPS error and target movement

I just finished a little analysis differencing successive airborne LiDAR swaths covering the same targets in an example study area near Calimesa California. See this link http://lidar.asu.edu/KnowledgeBase/124875615909578.kmz for a more extensive KMZ file which can be browsed in GoogleEarth. The data are from the B4 project and are available from OpenTopography. I was able to find that the major differences in successive LiDAR scans of a particular target are actually due to variations in scan illumination direction and in feature movement. I did not easily find the GPS-induced error for which I was looking except for a hint of it in the bias between the finer differences of scans.

Here is my report including all the MATLAB code: Analysis of B4 overlapping swaths



DEM subtraction flight 189 minus flight 188 zoomed to the overpass of I-10. The difference range is limited here to -0.5 to 0.5. The clear aspect variation in elevation difference is a result mostly of aircraft position relative to the target. The red box shows the selection area for the points in the next figure.



Point cloud comparison from selection area indicated by red box in prior figure. 3D view looking southeast. Red points are from Str_189 and blue points are from Str_188. This view also shows the better illumination from the north in Str_189 (note the red points further under the bridge). “Red” and “blue” vehicles are also apparent.