**ASSESSMENT 40**

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| **Course:** | IIRS Outreach Program on Satellite Photogrammetry | **USN:** | 4AL16EC068 |
| **Topic:** | Photogrammetric products from satellite stereo images | **Semester & Section:** | VIII  ‘B’ |
| **Github Repository:** | Sheela-Course |  |  |

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| **REPORT**  C:\Users\india\Downloads\WhatsApp Image 2020-07-03 at 9.16.03 PM.jpeg  C:\Users\india\Downloads\WhatsApp Image 2020-07-03 at 9.16.03 PM (3).jpeg  C:\Users\india\Downloads\WhatsApp Image 2020-07-03 at 9.16.03 PM (2).jpeg  C:\Users\india\Downloads\WhatsApp Image 2020-07-03 at 9.16.03 PM (1).jpeg  C:\Users\india\Downloads\WhatsApp Image 2020-07-03 at 9.16.03 PM (4).jpeg  On January 9, 2012 China launched a new remote sensing satellite, carrying three high-resolution panchromatic cameras and an infrared multi-spectral scanner (IRMSS). The panchromatic cameras are viewing in forward (22º viewing angle), nadir (0º) and backward direction (-22º). The two oblique viewing cameras have a spatial resolution of 3.5m and 52.3km ground swath, while the nadir viewing camera has a spatial resolution of 2.1m and 51.1km ground swath. The IRMSS is slightly looking forward (6º) and has a spatial resolution of 5.8m and 51.0km ground swath. The satellite is positioned on a 506 km sun-synchronous solar orbit with 97.421 degree inclination and has a designed life expectancy of five years. It can survey areas between 84 degrees north and 84 degrees south latitude with a re-visit cycle of 5 days. A second version of the satellite (ZY-3B) is planned to be launched in 2014. It will provide 2.1m spatial resolution for all three panchromatic cameras and full alignment of the multispectral and the high resolution nadir view.  Imagery Description The imagery was captured on November 15, 2012. It consists of a high-resolution panchromatic stereo triplet and a multispectral image covering an area of ca. 50km x 50km north-west of Barcelona, Spain. It includes a mostly rural landscape with moderate and mountainous height relief. Also some clouds are depicted, located mostly in the Southern part. The b/h ratio is 0.4 for the oblique-nadir stereo combinations and 0.8 for the forward and backward view. The image characteristics are listed.  DSM Generation A DSM of 5m grid spacing was generated with Trimble’s Match-T/DSM software using the estimated RPC of the stereo triplet. The DSM quality was analyzed in different areas a 35km x 30km wide area excluding most of the clouds, a 4km x 2km wide mountainous area, a 1.3km x 0.5km wide open area including a 2 hectare big area free of buildings and vegetation. ICGC’s LiDAR DTM of Catalonia of 2m grid spacing and 15cm accuracy has served as a reference except for area, where a DSM was used deduced from the original LiDAR point cloud. The statistical results of the differences between the automatically generated DSM and the LiDAR reference surface are listed in Table 3. After generation, the DSM was neither manually edited nor filtered. Statistics of height differences between generated DSM and LiDAR reference Test area 1 covers an area of approximately 1000km2 (40% of the image) and excludes most of the clouds located in the Southern parts. The statistical values confirm a global DSM RMS error better than 4.5m, which includes some blunders mainly caused by remaining clouds and also systematic height differences between the created DSM, representing the visible surface, and the reference DTM, representing the bare Earth without vegetation and manmade objects. These systematic differences explain the mean height offset of 2.6m between the DSM and the DTM. The obtained sigma of 3.6m corresponds approximately to 1 GSD of the oblique viewing images. Test area 2 is located in a 4km x 2km wide mountainous region with a maximum elevation difference of 250m. Using a DSM as reference surface the mean height offset becomes insignificant and, consequently, the obtained RMS error is smaller indicating a DSM accuracy of 3m. Test area 3 includes no buildings, only little vegetation and a moderate height relief with a maximum elevation difference of 70m. Here the obtained accuracy is 2.5m, corresponding approximately to the GSD of the high resolution nadir image. The small flat test area 4 with the size of 2 hectare includes 740 DSM grid points and is completely free of vegetation. Here the obtained RMS error is below 1m. |