

ACCURACY ASSESSMENT OF THE FIRST HIGH-RESOLUTION IFSAR CAMPAIGN OVER THE COORONG REGION OF SOUTH AUSTRALIA

Carl Menges^[1], Fabrice Marre^[1], Tishampati Dhar^[1]

^[1]Apogee Imaging International
12B, 1 Adelaide-Lobethal Rd.
Lobethal, SA 5241
Australia

1. ABSTRACT

Intermap Technologies LTD has commercially operated X-band single pass interferometric SAR systems since 1996. Much of Europe and North America has been mapped with these systems in the recent years under the NEXTMap program. In 2008 the Intermap X-band IFSAR system was upgraded with increased pulse repetition frequency and 300MHz bandwidth to allowing imaging at 62cm resolution and digital surface model production with 2.5m posting and 50cm vertical accuracy. This upgrade significantly improves the quality of mapping data produced with no loss in collection speed. IFSAR high-resolution mode will be used for rapid countrywide elevation model generation.

This sensor was flown for the first time in Australia in a campaign in April 2008 to map the important coastal area of Coorong and the River Murray mouth. The same area was also collected with the existing 1.25m resolution , 5m elevation posting system for comparison purposes. This area provides important wetland habitat and water reserve during times of drought and has distinctive coastal dune systems and vegetation. The high resolution and vertical accuracy is needed to clearly identify the low elevation surface features and perform coastal inundation modeling.

Subsequent field work was carried out in this low lying area to asses the accuracy of the produced surface and terrain models, judge the increased level of detail available in the SAR image with the high bandwidth system and study the performance of the X-band system in coastal vegetation.

Ground truth data was collected using an RTK-GPS and field photographs of vegetation cover and height noted. This dataset serves as the primary measure of accuracy. Survey marks are used where available and the error performance with and without occlusion from buildings and vegetation noted. The IFSAR DTM production process uses feature identification and removal to arrive at the ground height , the validity of this method is studied through performance measurement in occluded areas. The higher resolution improves object identification and removal from the DSM.

Most elevation model accuracy studies use other elevation models for comparison purposes and do not measure any horizontal error terms. At this high-resolution surface elevation may be changing rapidly enough to warrant assessment of the location of the elevation cell. The horizontal accuracy is also important in coastal areas where the tidal zones need to be clearly delineated and sea-level changes noted for flood risk evaluation. X-Y accuracy assessment is also performed with geolocated object photography and aerial survey. The availability of the orthorectified RADAR image makes X-Y accuracy check feasible unlike other elevation model collection mechanisms such as LIDAR. The coherent imaging mode of the SAR system performs averaging over all the points in the resolution cell and this need to be taken into account while collecting field data.

As a result of this study overall spherical error performance of the IFSAR 300Mhz system is derived in an test area where vertical and horizontal accuracy is important. This campaign serves as a path finding mission to map the rest of Australia at similar level of detail.