

Test of Intermap IFSAR data as a substitute for existing elevation data in Oregon

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I examined the question of whether the IFSAR data provided by Intermap would be a significant improvement over existing elevation data for parts of Oregon without lidar or with poor prospects for future lidar. High resolution lidar is clearly superior in resolution and accuracy and is now available over 20% of the state, covering about 90% of Oregon's population. Large swaths of uninhabited or sparsely populated area remain, and are not likely to see lidar coverage any time soon. I looked at how much improvement IFSAR data could provide over existing topographic data (NED) by comparing both to existing lidar data. The NED in Oregon is derived from topographic maps with contour intervals of 10, 20, 40 and 80 feet, and land cover ranges from bare agricultural or grasslands to heavy forest. I chose 7 quadrangles to test the range of conditions (Figure 1);

- Owhyee, little vegetation, 10 ft contours
- Sydney, moderate vegetation, 10 ft contours
- Ballston, little vegetation, 20 ft contours
- Wanoga Butte, moderate vegetation, 20 ft contours
- Bridge, heavy vegetation, 40 ft contours
- Boulder Butte, moderate-sparse vegetation, 40 ft contours
- Wahtum Lake, heavy vegetation, 80 ft contours

I used the same procedures to test each quad:

- Download 1/3 arc second NED data from USGS, reproject to Oregon Lambert meters, 4 m cells (to match IFSAR)
- Clip IFSAR data from Intermap WCS DTM layer to quad boundary, reproject to Oregon Lambert, meters, 4m cells.
- Subtract NED and IFSAR from Lidar bare earth DEM (3 ft cell)
- Tabulate statistics
- For resolution comparisons, slopeshade images were made from the lidar, IFSAR and NED data using the same shading settings.

The comparison statistics are summarized in Table 1. Images showing the elevation residuals and a comparison of resolution at 1:10,000 are provided in a separate pdf (Oregon_IFSAR-NED_Test_Images.pdf).

Observations:

- Both the NED and IFSAR data were always within the one-half contour interval error range for each quad.
- IFSAR data was always more accurate than NED data, the improved accuracy ranged from 4% to 50 %, averaging 20%.
- In steeper, more vegetated areas, the IFSAR data is clearly based on the NED data, this is apparent from examining the slopeshade images and noting the presence of contour like steps in the IFSAR data, and also from comparison of the NED and IFSAR data that show they are very similar.
- The resolution of the IFSAR data is somewhat better than NED in flat unvegetated areas, but offers little improvement in steep vegetated areas.
- The IFSAR data introduces noise on flat surfaces and exaggerates features like ditches on flat surfaces. The NED data does very poorly on flat surfaces, and does not show ditches at all.
- The IFSAR data typically represents channels of major streams better than NED.

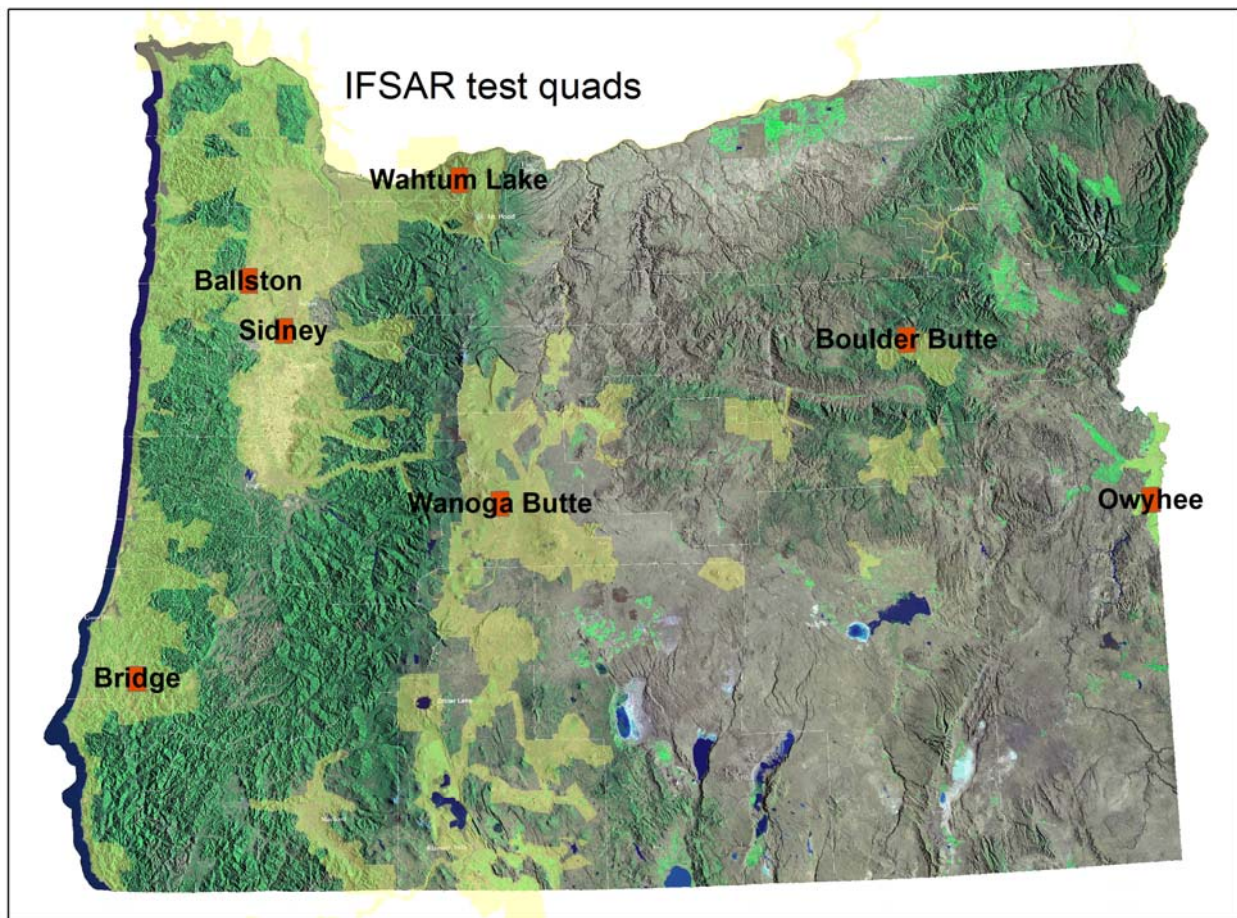


Figure 1. IFSAR test quads in red, yellow shade is current lidar coverage