LIMA: Progress on the Landsat Image Mosaic of Antarctica: An IPY Project

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Since the launch of Landsat-7 in April 1999, over 20,000 images of Antarctica have been acquired, offering unprecedented coverage of the continent by high resolution optical imagery. This quality imagery is commonly in demand for an array of scientific and aesthetic purposes that include map-making, change detection, feature tracking, surface grain size studies, and elevation mapping using "shape from shading" models. It is highly desired in field work situations for assessing the safety of surface travel and to identify safe aircraft landing sites. The International Polar Year will include extensive field programs and large amounts of scientific research on Antarctica, and there will be associated public outreach activities. Landsat data are perfectly suited to many purposes involving the IPY, and beyond. While the other image data available for Antarctica as continental-scale mosaics (AVHRR, Synthetic Aperture Radar (RAMP), and MODIS (MOA)) are in common use, their coarser spatial resolution or microwave wavelength does not match the level of utility that would be provided by a Landsat mosaic, particularly for field planning.

The creation of a digital Landsat mosaic of Antarctica to 82 degrees South latitude has been funded by the National Science Foundation and the British Antarctic Survey (BAS). Scene selection performed at NASA Goddard Space Flight Center identified 1058 individual images for the mosaic, 60 of these scenes cover the Antarctic Peninsula, and the Peninsula portion of the mosaic will be generated by BAS. The digital mosaicking of the remainder of the continent will be performed at the U.S. Geological Survey's EROS Data Center. Distribution of the final products will be handled by the National Snow and Ice Data Center.

Technical details of mosaicking include processing individual images to Level 1G and then orthorectifying them. A comparative study of 3 candidate DEMs of Antarctica resulted in the RAMPv2 DEM being chosen as the base for orthorectification. Individual bands will next be transformed from radiance to reflectance values, and then mosaicked. The final step will be contrast enhancement to optimize the detail seen in all types of terrain. This will be accomplished by use of an adaptive filtering method that is under development.

Available products planned are a panchromatic band mosaic at 15 meter resolution, a 3-band false color composite at 30 meter resolution, a 3-band true color composite at 30 meter resolution, and the individual Level 1G orthorectified scenes. We aim for completion in March 2007.