

The Impact Project 2000: Terrain-Visualization and Remote Sensing of Lake El'gygytgyn, a REU Study

Peter Prokein and Matt Nolan (University of Alaska Fairbanks, prokein@arcs.edu, fnman@uaf.edu)

Lake El'gygytgyn lies inside of an 18km wide meteorite-impact crater in a remote area of northeastern Siberia, and is a research site for several NSF and NASA projects aimed at understanding the crater morphology, the paleoclimate record contained in the lake sediments and the regional modern climate trends. These researchers require various remote sensing and terrain-visualization products for their research. The aim of this project was to investigate the availability of these products, obtain a sampling of them, properly geolocate or georectify them, and provide them in a useful way to the scientific community.

Russian topographic maps at 1:50,000 scale were obtained and digitized to produce a Digital Elevation Model (DEM). This DEM was then input into several terrain visualization software packages to produce animated fly-throughs, using shaded relief of elevation with no texture.

Bathymetry of the lake was obtained through Russian sources and then digitized, and added to the DEM for use in lake-level change modeling and visualization projects. Software was written to flood the empty lake basin and tilt it in various ways per user specifications. Several of these model runs were compiled into an MPEG/Quicktime movie for visualization.

ERS-2 and Radarsat-1 Synthetic Aperture Radar (SAR) data were obtained and corrected for the terrain distortions inherent to SAR using the DEM. These georectified images were assembled into several MPEG/Quicktime format movies from a time series of 130+ images spanning a two-year period. These movies clearly show several features of lake ice dynamics, including ice surface depression below water level due to snowfall and lake ice breakup in July 1998, 1999, and 2000. These data will also be used in studying land-cover dynamics including snowmelt, soil moisture, and freeze/thaw cycles. The 2000 data were partially obtained as Quicklooks in near real time (6 hour delay) and made available to the expedition en route to the lake via email.

Landsat-7 and Ikonos high-res optical data were obtained over the crater region during summer 2000. These were geolocated using the DEM, and then made into ArcView layers for possible use in terrain and vegetation classification studies. They were then laid over the DEM as texture information and fly-throughs were again produced using various combinations of this data.

The products will be demonstrated on a computer at the poster session and are available over the Internet from the authors.