Fringe 96
GEMSAR: DLR's project for the generation of global digital elevation models

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Abstract

Exact knowledge of terrain height is an indespensable prerequisite of remote sensing applications e.g. for the interpretation of SAR data from mountaineous and hilly terrain. The usage of currently available digital elevation models (DEMs) is handicapped by a number of reasons: they are not global, not homogeneous, the resolution is not adequate and they are expensive.

The conventional approach for generating DEM's is to use stereo cameras or digitized maps. For the past ten years techniques applying interferometric SARs (INSAR) have been developed, e.g. the ERS tandem data are a new and operational source for the generation of DEM's.

DLR has been receiving ERS tandem data at its Neustrelitz receiving station. However, the most important source of interferometric SAR data in the future will be the SRTM (Shuttle Radar Topography Mission) carrying a modified SIR-C? X-SAR instrument used as a single pass interferometer: the SIR-C C-band SCANSAR will deliver a global and homogeneous DEM of all landmasses between 60 deg. north and 60 deg. south, and in parallel X-SAR will deliver regional DEMs of high resolution. SRTM will be launched in May 2000 on a two-week shuttle mission.

Therefore, within the GEMSAR (Global Elevation Models from SAR) project algorithms will be developed for the generation of interferograms from ERS tandem, X-SAR and SIR-C data, including automatic phase unwrapping and mosaicking of continent wide DEMs. The systems to be built up comprise SAR processors, interferogram generators and DEM generators.

The DEMs will be archived in a growing DEM data base and will be made available through a user interface which allows for the specification of arbitrarily shaped areas, resolutions and cartographic representations. This data base will be capable of storing DEMs from different sensors, including optical sensors.

Keywords: SAR, INSAR, DEM, GEMSAR, SRTM, X-SAR