

The Shuttle Radar Topography Mission (SRTM)

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ABSTRACT

Remote sensing with space-borne platforms has long since played an important role in Earth observation. Some examples are SEASAT (NASA, 1978), ALMAZ (USSR, 1991), E-ERS-1 (ESA, 1991), J-ERS-1 (NASDA, 1992), and RADARSAT (Canada, 1995). Two radar missions on board the US Space Shuttle (SRL-1, SRL-2, both in 1995) demonstrated for selected sites that seasonal differences on the surface of the Earth can be determined.

In February 2000 Space Shuttle Endeavour rocketed into the blue skies over Kennedy Space Centre on her 14th mission into Low Earth Orbit. On board: 6 astronauts and a state-of-the-art space radar interferometer. The goal of this Shuttle Radar Topography Mission (SRTM): a digital, three-dimensional model of the landmass of Earth between 60N and 57S.

The first radar interferometer in space faced substantial challenges. Most critical: the accurate determination of the interferometric baseline between the two radar antennas. The main antenna had been mounted in the orbiter's payload bay, the secondary antenna on a 60-m mast. Observing the Earth from two slightly different points in space allows for the evaluation of the height profile.

The 60-m mast was deployed just hours after Endeavour reached her final orbit of 235 km. For nearly 11-days radar beams were scanning the Earth's terrain, generating more than 14 Terabyte of data. These raw data had been recorded onboard Endeavour on special high data rate recorders at a speed of 270 Mb/sec.

From an operational point of view, SRTM was highly successful: 99,97% of the targeted data had been recorded once, 94,6% twice or more. Re-construction of the radar baseline and radar data reduction is still on going: it will take another two years until the final three-dimensional, digital maps will be available.

The presentation will describe the SRTM mission, an international project, involving institutions from the US, Germany, Italy and Japan, from the operational perspective of the astronauts. Preliminary results will illustrate that spaceflight today has emerged in just a little over 40 years far beyond a state of infancy, its results benefiting people around the globe.