

Overview of SIR-C/X-SAR Geologic Studies in Arid Regions

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The Spaceborne Imaging Radar-C, X-Band Synthetic Aperture Radar (SIR-C/X-SAR) was launched on space shuttle Endeavour on April 9 and again on September 30, 1994. Soon after each launch, the radars were activated and began around the clock operations which lasted for the next 10 days. One hundred per cent of the science data planned for these two flights were acquired for use by the international science community to better understand the global environment and how it is changing. Over 125 terabits of data were recorded on three on-board recorders. In addition to acquiring high quality data over all planned targets, long swaths of interferometric data were acquired, and digital elevation models have been generated at all three radar frequencies.

Coverage priorities for the two flights were determined by the SIR-C/X-SAR Science Team based on their individual experiment objectives, and research themes which were developed for the overall SIR-C/X-SAR mission. SIR-C/X-SAR took data at more than 400 sites around the globe. Nineteen of those were designated as "supersites," making them the highest priority targets and the focal point for many of the scientific investigators. There were additional 15 backup supersites. Geology supersites and backup supersites are the Galapagos islands, the Sahara Desert, Death Valley CA, the Andes Mountains, Hawaii, Saudi Arabia, and northwestern China.

Investigations in Death Valley, northwest China and the Sahara Desert focus on past climate changes and their impact on the land surface. These investigations, in turn improve our understanding of how changes in climate are manifested locally. Results from Death Valley and northwest China focus on the formation of alluvial fans through climatic and tectonic processes; the nature and rates of weathering on fans, soil formation, and the transport of sand and dust by the wind. Investigations in the Sahara Desert focus on integrating and mapping relic Cenozoic drainage systems and their relations to the basic tectonic elements in North Africa.

Data are also being used in studies of soils processes such as erosion, transportation, deposition and degradation which not only affect the amount of arable land available for cultivation, but have an impact on sedimentation in estuaries, deltas and other coastal environments. They are also being used to determine areas that are susceptible to sand and dust storms as a result of climate change or human activities. Finally, geologic mapping, and volcanic and tectonic process studies make up the remainder of the SIR-C/X-SAR geology investigations.