Fringe 96
Comparison of Repeat Track Interferometric Correlation Signatures from ERS-1, ERS Tandem, SIR-C, and JERS-1

Charles L. Werner, Scott Hensley and Paul A. Rosen
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California, USA 91109
cw@vega.jpl.nasa.ogv
http://www.jpl.nasa.gov

Urs Wegmueller
Gamma Remote Sensing AG
Thunstrasse 130
CH-3074 Muri/Bern, Switzerland
gamma_rs@ping.ch
http://www.primenet.com/~gamma

Abstract

The interferometric correlation coefficient is a function of frequency, baseline geometry, temporal separation, scatterer geometry, and sensor parameters such as SNR and resolution. Temporal change and volumetric scattering measured via the correlation is very useful for land use classification, forest studies, agricultural monitoring, natural disaster damage assessment and estimation of topographic errors in interferometrically derived digital elevation models. We compare repeat track interferometric (RTI) data derived from ERS-1, ERS-2/Tandem, SIR-C, JERS-1, over a wide range of terrain classes (desert, tropical rain forest, fields, and forest) from regions in USA, South America, and central Europe. Comparison of SIR-C RTI images over the South American rain forest at both L- and C-Band reveal that only at L-Band is there sufficient correlation for forest classification and mapping. Topographic maps generated for an arid region near Fort Irwin in the Mojave Desert using JERS-1, ERS, and SIR-C are presented and compared to a precision reference DEM. The observed height errors are consistent with those predicted from the correlation coefficient.

C-Band RTI correlation data from the tandem ERS-1/2 mission are used to generate a land use classification map for a region in Switzerland. This will be compared with SIR-C derived classification utilizing both L- and C-band data for a similar region near Lucens in Switzerland.

JERS-1 has demonstrated that long time interval RTI is possible for temperate regions. After the Kobe Earthquake, regions that suffered liquifaction decorrelated demonstrating the potential for earthquake damage assessment.

The impact of these observations on the design of future interferometric missions is discussed.

Keywords: correlation coefficient, classification, interferometry, topography, disaster monitoring