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GEOSYNCHRONOUS INTERFEROMETRIC SYNTHETIC APERTURE RADAR: APPLICATION RESEARCH AND MISSION ANALYSIS

Abstract

Synthetic aperture radar imaging from geosynchronous orbit (GEO) has significant potential advantages over conventional low Earth orbit (LEO) radars in tectonic mapping, disaster monitoring and management, vegetation and soil moisture mapping etc., but also poses many significant technical challenges to overcome that are not in common with LEO SARs.

China is a country that is frequently damaged by natural disasters due to earthquakes and other tectonic disasters. This paper presents China's recent research work on application of geosynchronous interferometric synthetic aperture radar (GEO InSAR) in tectonic disaster monitoring and mission analysis of GEO InSAR satellite. The baseline mission we consider is an L-band repeat pass InSAR in geosynchronous orbit with an orbital inclination of 50–60 degree achieving a spatial resolution of about 50m. A set of mission requirements and technical tradeoffs such as orbit design and determination requirements, baseline design, Earth tides and atmosphere effect on phase, satellite platform requirements etc. that meet the above challenge are identified and discussed. Preliminary results to date suggest that the mission concept is feasible and could be achieved basically using current techniques.