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Jian Feng, Weimin Zhen, Zhensen Wu

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Ionospheric effects on repeat-pass SAR Interferometry

Jian Feng¹, Weimin Zhen², Zhensen Wu^{1,*}

1. School of Physics and Optoelectronic Engineering, Xidian University, Xi'an Shanxi 710071, China

2. China Research Institute of Radiowave Propagation, Qingdao Shandong 266107, China

Abstract

InSAR measurements can be significantly affected by the atmosphere when the radar signal propagates through the atmosphere since it varies with space and time. Great efforts have been made in recent years to better understand the properties of the tropospheric effects and to develop methods for mitigating these effects. By using the basic principles of InSAR, the quantitative analysis of ionospheric delay effects on topography and surface deformation have been introduced for the first time. The measurement errors can be related to the vertical ionospheric total electron content (vTEC). By using the ionospheric observations, the effects of temporal ionospheric variations on InSAR have been analyzed. The results indicate that the ionospheric variations with time, season, solar cycle and geomagnetic activities can compromise the effectiveness of InSAR for both the measurement of topography and surface determination. The repeat-pass SAR interferometry errors induced by ionosphere should be corrected by actual measurements.

Keywords: InSAR; Ionospheric variations; Total electron content; Topography; Surface determination

* Corresponding author. Tel.: +86 29 88202144; fax: +86 29 88201284

E-mail address: wuzhs@mail.xidian.edu.cn (Z. S. Wu).

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