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ESTIMATION OF ATMOSPHERIC EFFECTS OF RADARSAT-2 D-InSAR PRODUCT USING GROUND BASED AND SPACEBORNE METEOROLOGICAL DATA

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Keywords: Differential Interferometric synthetic (D-InSAR), Ionospheric and Tropospheric Path Delay, Total Electron Content (TEC), Atmospheric Artifacts, path delay

Abstract. Differential Interferometric synthetic aperture RADAR (D-InSAR) has emerged as one of the influential tools for the measurement of Earth's topography deformation. The temporal variability of atmosphere plays a contaminative role in degrading the accuracy of Interferometric measurements as it causes the path delay in the propagating RADAR signal. The Ionosphere and Troposphere are the two atmospheric layers which are responsible for the path delay error in the Interferometric measurement. In this study ground based meteorological data integrated with spaceborne meteorological data was used to mitigate the path delay induced by the atmosphere on the Radarsat-2 data. In this study Jharia Coal Fields, Jharkhand, was selected where active mining has taken place since 1894. The D-InSAR was generated from Radarsat-2 data. In Tropospheric path delay calculation ground based data like water vapor, temperature and humidity acquired during the time of the pass as well as spaceborne meteorological data were used as input. The TEC from IRI-2007 model was used as input to calculate the ionospheric path delay. These Ionospheric as well as Tropospheric delay was subtracted from a Differential Interferogram to obtain atmospheric artifacts free differential interferogram. The corrected Differential Interferogram was used to delineate subsidence areas. We observed that D-InSAR and levelling results shows good agreement with each other. The Differential Interferometric pairs with low coherence causes phase unwrapping problem. Therefore, only those pairs with good coherence were considered for the study. The used technique provides an opportunity to understand the contribution of Ionospheric and Tropospheric path delay effects on the D-InSAR results.

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