

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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STT057-13

Room:105

Time:May 24 15:15-15:30

Effect of the traveling ionospheric disturbances on space-borne SAR observation

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We investigated the ionospheric effect on the Interferometric Synthetic Aperture Radar (InSAR) observation from the ALOS satellite. The plasma is a dispersive media for radio wave. It will delay the propagation of radio waves according to its density and the radio frequency. The plasma in the ionosphere below the satellite orbit affects the L-band frequency radio wave of PALSAR on the ALOS satellite. The ionospheric structures whose horizontal spatial scale is shorter than the field-of-view of PALSAR cause the error of the ranging. In InSAR observations, the error can cause the pseudo ground movement. We compared the ionospheric plasma structures that was observed by a ground-based GPS network with the InSAR observational data, and concluded that most of the large scale structures of the apparent ground movement seen in InSAR data was error caused by the medium scale traveling ionospheric disturbances whose scale size is a few kilometer. The relation between the ionospheric structures and the structures seen in InSAR data will be discussed in the presentation.

Keywords: SAR, Ionosphere, ALOS, PALSAR, InSAR