InSAR atmospheric correction using Geostationary Meteorological Satellites

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InSAR is effective tool to detect land deformation precisely with high spatial resolution. And addition to the spatial resolution, the SAR observations can measure deformation more frequently than leveling. ESA's Sentinel-1 constellation are observing Japan area each 12 days for example. More finely and frequently observation, we face critical problems caused by the atmospheric effects. And to correct this effects there are many ways proposed. The major one is using metrological analysis model like ECMWF. This corrections are very successful in several observations. But there are some problems remained. 1st is that the models aren’ t synchronized SAR observation time. JAXA's ALOS-2 orbit to synchronize the time is designed to observe nearly 0:00 or 12:00 at local time. But the time is not exactly 0:00 or 12:00, varied by orbit. This gap has problems because of the phase shift by the water vapor every second changing. 2nd is the cost of calculation. To simulate atmospheric model like ECMWF we need high performance computers like KEI. It is difficult to use that computers for everyone who want to calculate certain time. And the other methods including GNSS correction also have advantages and disadvantages.
To solve those problems we propose using Geostationary Meteorological Satellites to correct InSAR results.
Next generation geostationary meteorological satellites like Himawari-8 and GOES-16 can observe visible range at every 5 minutes. Especially Himawari-8 can observe Japan area at every 2.5 minutes. And the wavelength ranges are significantly increasing from former generations. Using this wavelength ranges and frequent observation by GMS, we can calculate the phase shift of SAR by the water vapor.
We made InSAR results and using Himawari-8 images to correct these results. To confirm SAR satellite's wavelength effects in correction using Himawari, we used ALOS-2 images and Sentinel-1 images after starting the Himawari-8's observation. SAR processing software we used is GAMMA SAR. And used parameter files of the software to calculate SAR satellite information. Using SAR satellite information and Himawari-8 satellite information, we calculated the length change from SAR satellites by the snell's law. And calculated the phase shift from this length changes.
Himawari-8 data that was used in this study was supplied by the P-Tree System, Japan Aerospace Exploration Agency (JAXA).

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