SIMULATED RAIN RATE EFFECTS ON SAR INTERFEROGRAMS

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ABSTRACT:

ERS1 and ERS2 provide 2D measurements of the earth surface with a high resolution of 25m. The phase value of every resolution cell is defined as a superposition of the term which corresponds to the geometric distance, a term which corresponds to propagation effects, and the term which represents the scattering within the resolution cell. By creating an interferogram, effectively the phases corresponding to two measurements are subtracted from each other and if objects within resolution cells did not move and did not change from one acquisition to the other, the differential phase is mainly defined by the propagation effects and the difference in observation geometries. Furthermore, if a reference elevation model is available one can remove the topographic phase component. The remaining phase would fully be determined by the propagation through the ionosphere and atmosphere. Indeed, the atmospheric component in its turn depends on hydrostatic part, propagation through the dry atmosphere, wet delay, propagation through water vapor and liquid part, caused by propagation through volume filled with liquid droplets. The hydrostatic and ionospheric parts are dominating the delay signal, but they hardly vary over the interferogram and may easily be removed from the rest of the signal. The wet part, caused by propagation throw a volume filled with liquid particles, have a stochastic spatial behavior and therefore it is more difficult to compensate for them. In this paper we will discuss influence of rain on the atmospheric phase delay. Calculations of the path delay for different rain rate intensities was made by considering a physical model for the rain drops and applying the Rayleight approximation. Then in order to illustrate our study, some interferograms were generated and discussed.

TOPIC: Microwave remote sensing
ALTERNATIVE TOPIC: Image processing and pattern recognition