



## **Wavelet based InSAR time series (WabInSAR): volcanic and tectonic applications**

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Modern geodetic techniques like InSAR and GPS provide valuable observations of the deformation field. Because of the variety of environmental interferences (atmosphere, topography distortion...) and incompleteness of the models (assumption of the linear model for deformation), those observations are usually tainted by different sources of systematic and random errors. Therefore the task of filtering unwanted periodic or episodic artifacts to obtain accurate and precise deformation measurements is necessary in neotectonic and volcanism. Here we present and implement a new InSAR (WabInSAR) time series approach based on wavelet transforms. Since wavelets are excellent tools for identifying hidden pattern and capturing transient signals, we utilize full capacity of different wavelet functions in different stage for reducing the effect of atmospheric delay and also the digital elevation models (DEM) inaccuracy. The WabInSAR favors being model free, reducing DEM inaccuracy in each individual interferogram using a 2D spatial Legendre polynomial wavelets filters, reducing atmospheric delay using a 3D spatio-temporal wavelet transform filter and a novel technique for pixel selection. At last to evaluate WabInSAR we applied the technique to several targets such as Hawaii Island, and mountain building process in Iran and volcanism in Africa. All targets are chosen to investigate large and small amplitude signals, variable and complex topography and atmospheric effects. In this presentation we explain different steps of the technique compare to other high resolution processing methods (PS-InSAR, SBAS) and discuss the result. Furthermore, where independent data (like GPS observation) is available we validated the results.