A deep Learning approach for detecting transient deformation in InSAR

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Active faults release tectonic stress imposed by plate motion through a wide variety of slip events, from creep to slow, aseismic events, to dynamic, seismic slip. Systematic characterization of all modes of slip is key to unravel the physics of tectonic faulting and the interplay between slow and fast earthquakes. Rapid and large amplitude ground deformation induced by large magnitude earthquakes are now routinely imaged by InSAR, but measuring interseismic and postseismic slip, both of smaller amplitude and slower than earthquakes, remains challenging due to atmospheric propagation delays which may exceed the signature of deformation in InSAR time series. Although atmospheric correction methods improve our ability to observe slow and small (i.e. mm/yr) deformations, expert interpretation and *a priori* knowledge of fault systems is always required to highlight deformation signals. Here we introduce a deep learning architecture, tailored to remove atmospheric delays due to turbulence and layering of the atmosphere, as well as to identify and extract transient episodes of ground deformation.

Mots-Clés : Interferometric Synthetic Aperture Radar, Deep Learning, Slow Slip

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