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Contribution of coherence-loss InSAR time series to map erosion in arid catchments of the Atacama Desert.

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In this study, we benefit from a long Sentinel-1 InSAR time series of interferometric coherence images in order to map the spatial patterns of erosion in the catchments that feed alluvial fans after an ENSO-related storm in the Atacama Desert. The erosive impact of large storms in arid catchments remains difficult to predict and is thus a key factor on the entrainment of sediments necessary to generate debris flow that finally form alluvial fans. Unfortunately, the lack of high-resolution topographic change maps, associated with a single hydro-meteorological event, requires a regional strategy to understand the source to sink relationships; within catchments and between catchments and alluvial fans situated at the catchment outlets. Thus, having the opportunity to track and relate the source sediment areas (with interferometric coherence images) with the sedimentological analysis of the debris flows present at the alluvial fans (sinks zones), provides a unique approach to understand the sediment routing of arid watersheds.

Our work presents the impacted areas at ~29ºS caused by the March 2015 storm event (Wilcox et al., 2016; Barret et al., 2016; Jordan et al., 2019). This event triggered numerous debris flows that heavily contributed in the formation of alluvial fans. The first results from InSAR time series of interferometric coherence images together with field observations, indicate that variations in regolith thickness control the heterogeneous distribution of erosion within the catchments.