Mapping intracontinental strain in the Alpine-Himalayan Belt with Sentinel-1: Progress and Challenges

Tim Wright[*1], Jonathan Weiss[2], Andy Hooper[2], Karsten Spaans[2], Nicholas Greenall[2], and Richard Walters[3]

[1]School of Earth and Enrironment [Leeds] (SEE) – Maths/Earth and Environment Building The University of Leeds Leeds. LS2 9JT, United Kingdom
[2]COMET, School of Earth and Environment, University of Leeds – United Kingdom
[3]COMET, Department of Earth Sciences, Durham University – United Kingdom

Abstract

The launches of Sentinel-1A in 2014 and Sentinel-1B in 2016 are providing the first systematic SAR acquisitions over the Earth's intracontinental tectonic belts. Sentinel-1 SAR images at least every 12 days on both ascending and descending passes and these offer an unprecedented opportunity for understanding deformation in large intracontinental regions. Within the LiCS and EwF projects, COMET is processing SAR data systematically with the aim of producing the first high-resolution velocity field and strain map of the Alpine-Himalayan Belt (AHB). Here we will present a progress report on the achievements to date and the challenges we have faced. Since December 2017, we have been processing short-interval Sentinel-1 interferograms and serving these to the community, with more than 100,000 interferograms online by June 2018. By the end of 2018 we expect to have preliminary time series and velocities available for the AHB and the first strain maps.

Here we will describe our processing methodology and show early results from the system. We will discuss some of the technical challenges and share some of our solutions. We will describe the results of synthetic experiments that are designed to understand the improvements in resolution and accuracy that we should expect in strain maps when combing InSAR results with velocities from GNSS. We will discuss future improvements, such as the possibility of including estimates of along-track velocities from the Sentinel-1 burst overlap regions. Finally, we will solicit feedback from the community on what is required to make our results useful for expert and non-expert users.

This work is funded by the UK Natural Environment Research Council through COMET and the LiCS and EwF large grants. It is possible because of the EU Copernicus programme and its open data policy.

[*]Speaker