



## **Taking advantage of the ESA G-POD service to study deformation processes in mountain areas**

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In mountain environments, the analysis of surface displacements is extremely important for a better understanding the effects of mass wasting phenomena, such as landslides, rock-glaciers, and glacier activity. In this scenario, the use of straightforward tools and approaches to monitor surface displacements at high spatial and temporal resolutions is a real need. Here we use the Parallel-SBAS service recently released within the ESA's Grid Processing On Demand environment (G-POD, <http://gpod.eo.esa.int/>) to generate Earth's surface deformation time series and interferometric production. This service performs the full SBAS-DInSAR chain starting from Level 0 data, and generates displacement time series. We use the data available on the Virtual Archive 4 (<http://eo-virtual-archive4.esa.int/>), in the framework of Supersite initiative. In the framework of the HAMMER project (part of the NextData initiative, <http://www.nextdataproject.it/>), we produced mean deformation velocity maps, as well as deformation time series, on a regional scale case (Aosta Valley Region, northern Italy), and at local landslide scale (Puy landslide, Piedmont, northern Italy). The possibility to gather the final results in less than 24h (by processing an average of about 30 SAR images for each frame considered), allowed to perform in relatively short time a large number of attempts. By "tuning" the processing, we have maximized for both datasets the final coverage of coherent points, by analysing the effect of SAR images acquired in the winter season, as well as of the impact of perpendicular and temporal baseline constraints. The results obtained with P-SBAS G-POD service on Valle d'Aosta region have been compared to the Deep Seated Gravitational Slope Deformation (DGSD, reference IFFI project), finding a good correlation with the anomalous areas of surface deformation and the catalogued DGSD. In addition, the results obtained on Valle d'Aosta and Piedmont regions show a good agreement to the mean velocity maps available retrieved from the "Portale Cartografico Nazionale" <http://www.pcn.minambiente.it/GN/>, which was instead processed by considering PSInSAR technique on the same Envisat ASAR dataset. Finally, we discuss possible future developments of the P-SBAS G-POD service in the Sentinel-1 scenario, when a large amount of SAR images will be available to a greater audience, and how this may affect the analysis of surface deformation at different spatial and temporal scales.