

ACTIVE VOLCANOES ARE AMONG THE PHENOMENA FOR WHICH SATELLITE IMAGERY IS MOST USEFUL, ESSENTIALLY BECAUSE THEY ARE OF DIFFICULT ACCESS AND DANGEROUS, AND SHOW NEARLY CONSTANT ACTIVITY.

SURFACE DEFORMATION IN VOLCANIC AREAS IS CAUSED BY PRESSURE VARIATION OF HOT FLUIDS (MAGMA, GASES) INSIDE THE VOLCANO PLUMBING SYSTEM. FOR THIS REASON GROUND DEFORMATION IS A POSSIBLE PRECURSOR OF AN ERUPTION, AND IS A PARAMETER NORMALLY MONITORED OVER MANY WORLD VOLCANOES.

RASOR CAN PROVIDE HIGH RESOLUTION AND ACCURATE GROUND DEFORMATION MEASUREMENTS OF VOLCANIC EDIFICES USING SAR AND OPTICAL SATELLITE IMAGERY. DURING AN ERUPTION WE CAN ALSO PROVIDE CONTINUOUSLY UPDATED MODELS THE MAGMA SOURCE, IMPORTANT TO ESTIMATE THE DURATION AND MAGNITUDE OF THE PHENOMENON.

## PRE-ERUPTIVE GROUND DEFORMATION MAP

This product is the volcanic counterpart of the Inter-seismic ground deformation map generated for the Seismic Prevention Service. For volcanic phenomena, given the faster dynamic behaviour, the inter-eruption ground deformation may be characterised by much stronger variations, which in some cases may actually lead to an eruption. For this reason this product normally requires a more frequent update than the Inter-seismic ground deformation map.

As the inter-seismic map, it is generated outside of the RASOR platform by the project partners, using multitemporal InSAR methods as PS and/or SBAS over the available SAR image datasets.

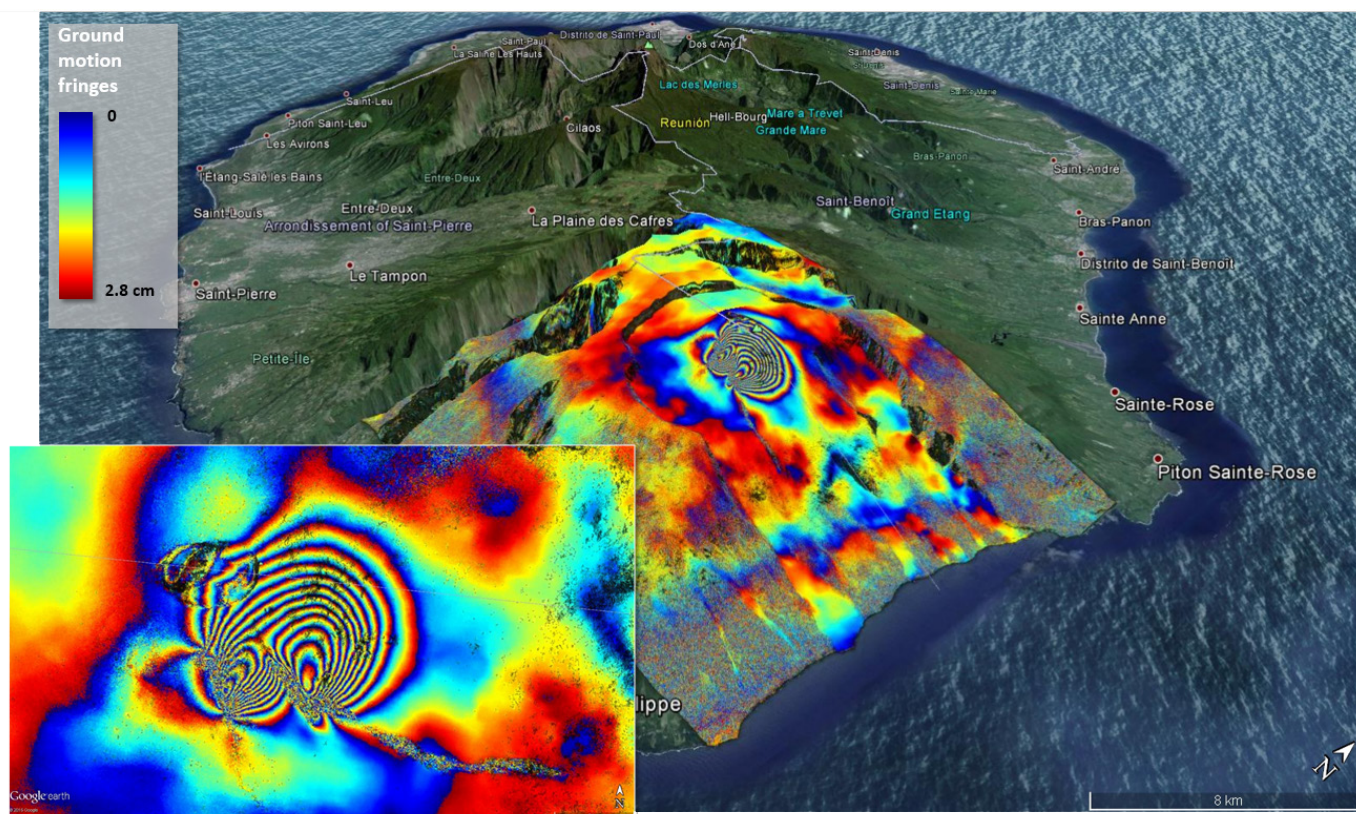


Nissyros volcano, Aegean Sea.

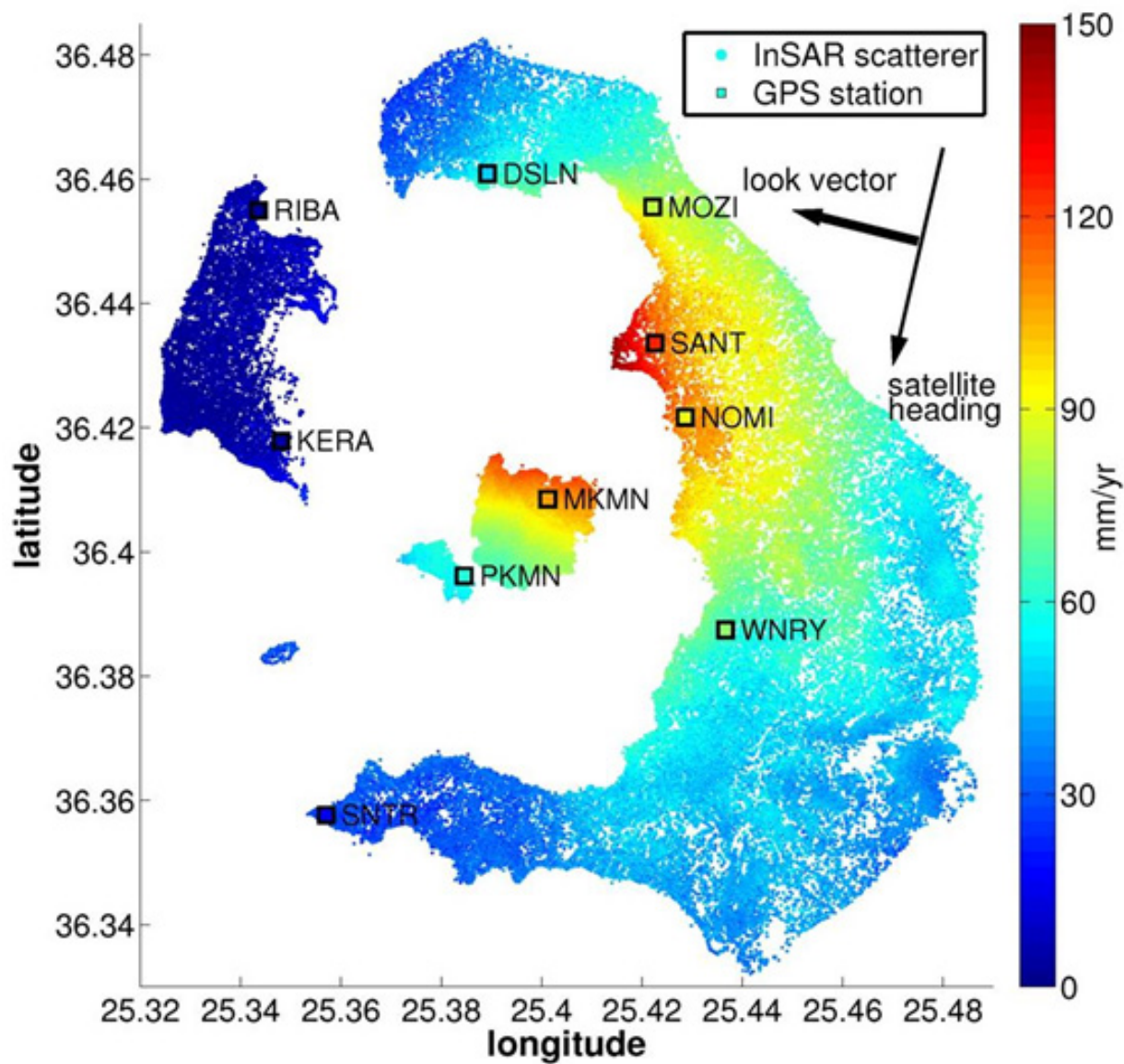
## SYN-ERUPTIVE GROUND DEFORMATION MAP

The monitoring of ground deformation during an eruption is needed to model the magmatic sources, and to estimate the duration of the phenomenon, since the rate of outflow of magmatic material is related to the rate of deflation of the volcanic edifice. This product will be updated after the acquisition of new satellite images.

This product is generated by the consortium outside of the RASOR platform, using multitemporal InSAR methods as PS and/or SBAS over the available SAR image datasets.



Piton de la Fournaise (Reunion Island). Differential Interferogram SENTINEL-1 (08/05/2015 – 20/05/2015). ALTAMIRA INFORMATION.



Permanent Scatterer (SAR) image of the Santorini volcano, Greece, with various colours representing LOS velocities for the period 2011-2012. SAR data are from ESA's ENVISAR Satellite (Papoutsis et al., 2013). The deformation map shows uplift of the volcano reflecting magmatic inputs to the shallow magma chamber beneath the caldera.

## VOLCANIC SOURCE MODEL

The dynamic description of the volcanic source is a fundamental parameter for emergency management during an eruption. Repeated surface deformation measurements by satellite data can be used to constrain models which provide a description of the magma distribution and movement in the subsurface.

The RASOR consortium uses state of the art analytical and numerical modeling simulations to generate volcanic source

models with different geometries: planar, spherical or ellipsoidal. Depending on the deformation data available, the product can be updated after each major deformation pulse to provide a dynamic view of the eruption. These models are validated and enhanced by using further available information from in situ data (geochemical, seismological, etc.).

## OTHER PRODUCTS

Damage assessment, Affected population and atmospheric ash dispersion monitoring/model.