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Flank instability of Stromboli volcano detected by long-term GB-InSAR monitoring

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Stromboli is a volcanic island in Southern Italy characterized by explosions of variable energy every 10-20 minutes and periodically interrupted by more energetic blasts emitting large volumes of material. The pressurization of volatile-poor, high-porphyritic magma column that is gas-recharged by the deep-seated, volatile-rich, low-porphyritic magma precedes such events and produces deformations on the NW flank of the volcano, called Sciara del Fuoco. By integrating geomorphological observations with long-term deformations measured by a ground-based interferometric radar since December 2007, we managed to map two landslides whose movements are strongly related with volcanic activity. Deformation patterns obtained through a novel long-term analysis of GB-InSAR data, usually exploited for real time monitoring and early warning of slope with high risk, permitted us to hypothesize the type of movement and depth for both landslides. During the last 5 years their deformation velocity reached a maximum of more than 2 mm/day. Furthermore their position allowed us to affirm that the effusive vent formed in 2007 at 400 m a.s.l., was the result of the deflection of a feeder dike operated by landslide fractures, thus showing the important role of geomorphological discontinuities in volcanic environments. The study of slope instability of the Sciara del Fuoco is also relevant with reference to tsunami risk, especially considering that mass movements similar to those detected may take place also in other portions of the volcano flank not visible by the current installation.