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Displacement partitioning and ring fault segmentation at Tendürek volcano observed by using high resolution InSAR

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Calderas are commonly considered to be structurally defined by steep normal or reverse ring faults that encircle the caldera basin and may have diameters exceeding several kilometers. Analog models and geologic observations have recently shown that these ring-faults may in detail be composed of various sub-faults that intersect each other to define an overall polygonal or 'segmented' outline.
Subsidence of Tendürek volcano in Turkey was measured during 2003-2010 by synthetic aperture radar interferometry obtained from ENVISAT data. Simple analytical source models of a contracting sill-like source could explain most of the observed signal. However, residual displacement gradients revealed additional movement that occurred on a sub-surface ring fault.
New high resolution TerraSAR-X stripmap data from both satellite tracks now enable a more detailed view for the years 2012 and 2013. The subsidence signal continued, but the higher resolution data reveal that displacements are found not along a single ring fault trace, but are instead partitioned along a number of smaller fault traces that intersect with each other to define several segments.
These results are compared to the outcomes of analog experiments, which show similar complexities in the geometries at sagging calderas. Hence, this study is a geodetically measured proof for the existence of active faulting at calderas along various small ring-fault segments.