Geotherm Programme - InSAR, surface movement and dating of Paka volcanic products, Northern Kenya Rift

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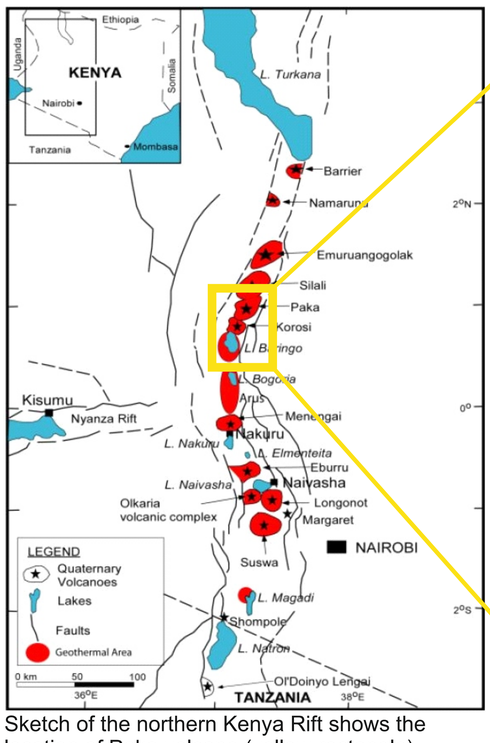
Background

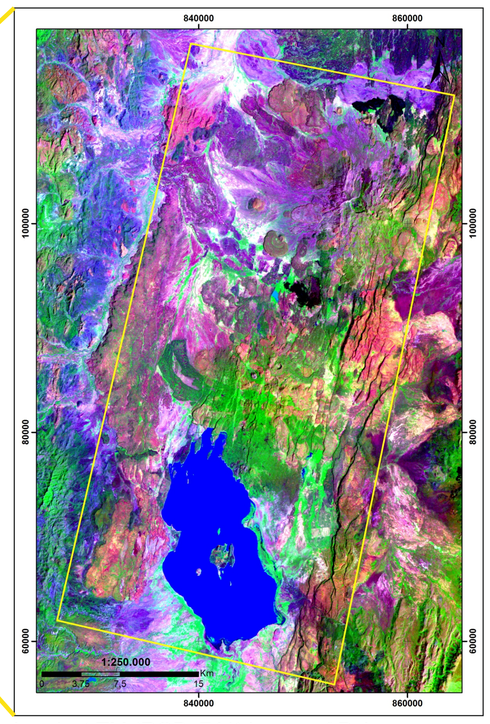
Within the **„Geotherm Programme - Promoting the use of geothermal energy“** BGR started a project with the Geothermal Development Company at Paka volcano.

Major aim of the project is to improve the **knowledge of Paka** volcano´s **former and recent activity** with regard to **eruptive history** of the volcanic sequences and **recent and historic surface movements** of the study area.

This is realized by **40Ar/39Ar-age dating** of different lava flows, an **Envisat InSAR study** for the years 2006 to 2010, an **TerraSAR-X InSAR study** for a six month period in 2013, and the generation of a high-resolution **digital terrain model**.

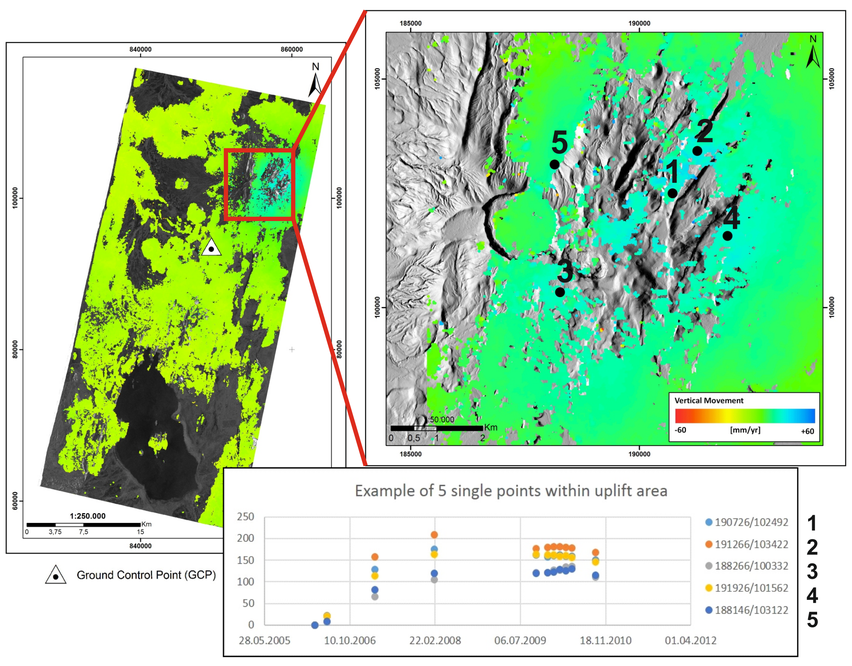


Sketch of the northern Kenya Rift shows the location of Paka volcano (yellow rectangle).



Landsat TM (RGB, 741) image of Paka volcano; yellow rectangle displays the extent of the InSAR studies.

InSAR study using Envisat data (2006 - 2010)



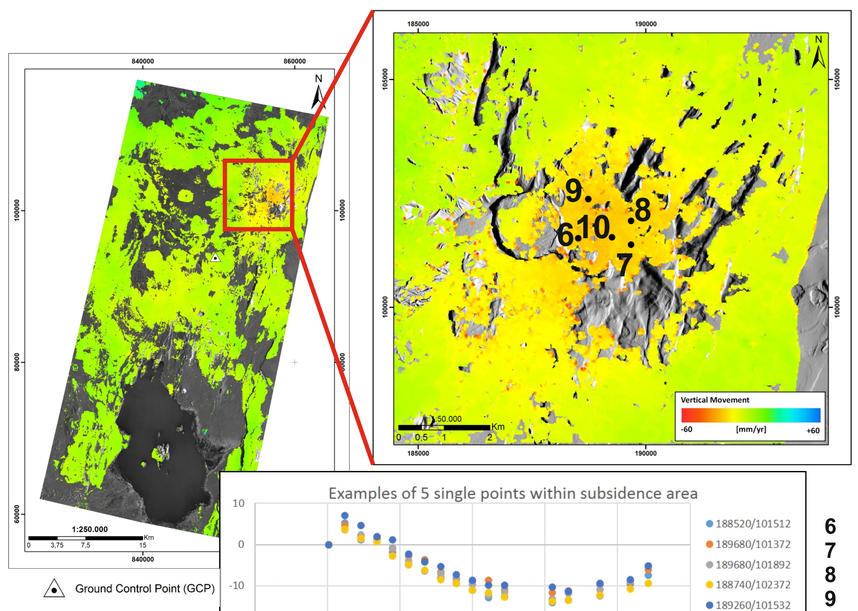
Ground Control Point (GCP)

Both data sets show **non-linear** movements.

5 exemplarily chosen points within the movement area show **an uplift of up to ~ 20 cm** between March 2006 and February 2008; between February 2008 and September 2010 the area appears to **be nearly stable.**

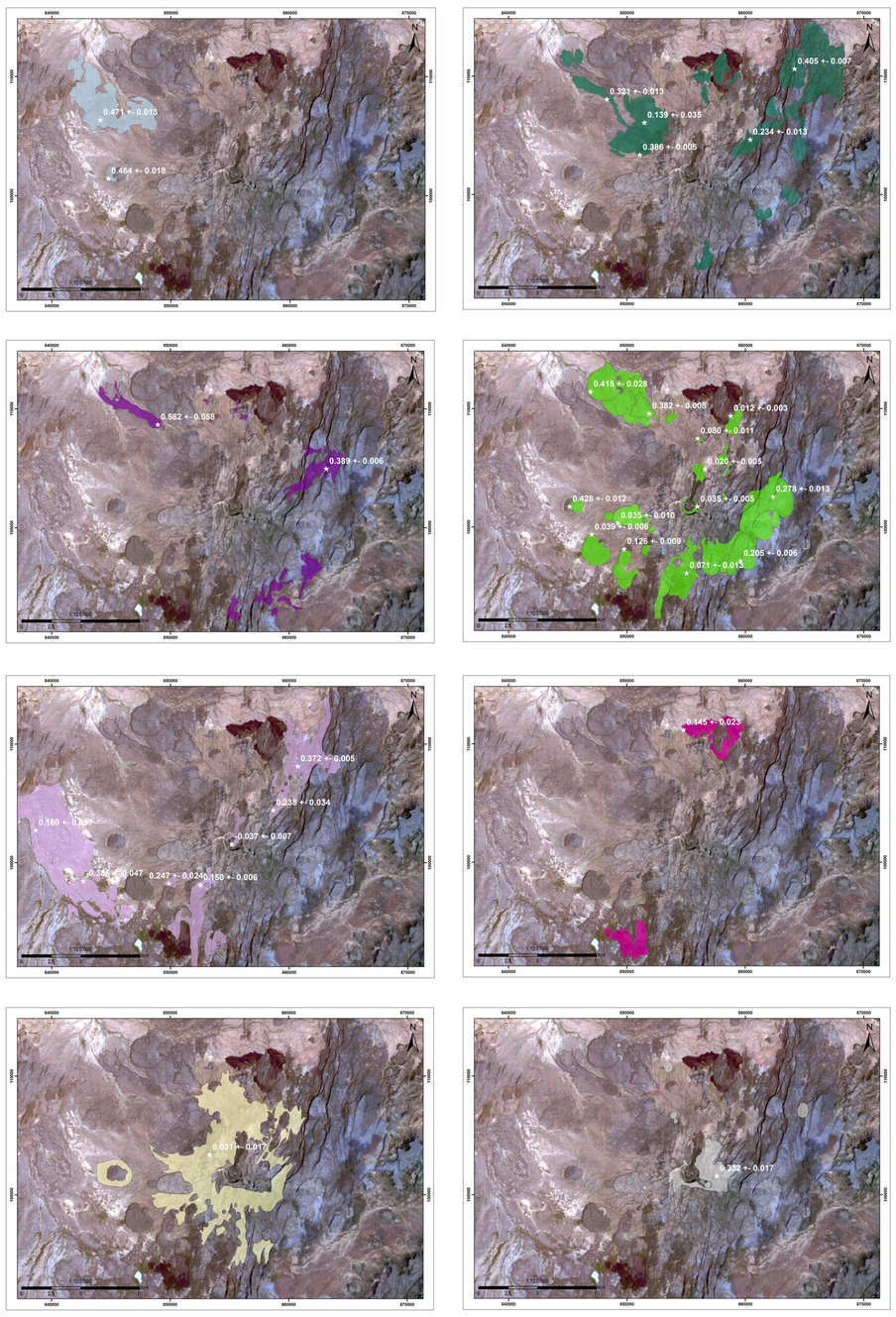
5 exemplarily chosen points show **subsidence of up to ~ 20 mm** between March and July 2013; from July to August the points stay **nearly stable**; between August and October 2013 an **uplift of ~ 5 mm** was recorded.

InSAR study using TerraSAR-X data (2013)



Ground Control Point (GCP)

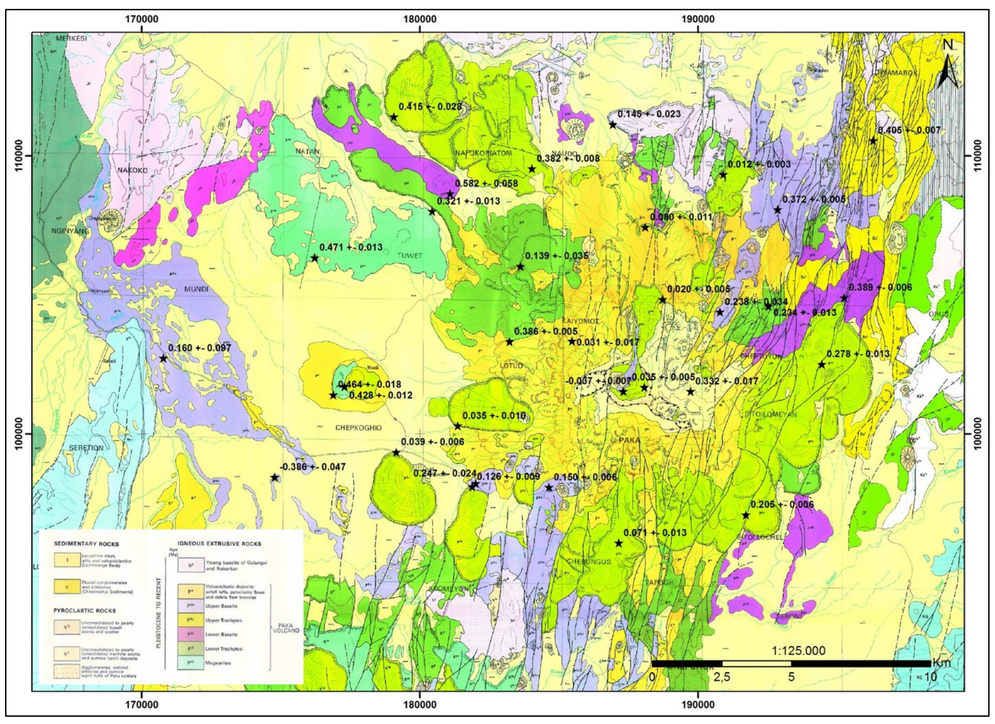
Age dating of lava flows and pyroclastic deposits



Sampling was based on the geological map and a Landsat TM image. 32 lava flows and pyroclastic deposits were sampled.

Three phases of pronounced volcanic activity can be recognized:
(1) between 0.428 and 0.372 Ma, (2) between 0.160 and 0.126 Ma, and
(3) between 0.039 and 0.012 Ma.
Basaltic and trachytic lava flows were repeatedly erupted during these intervals.

First preliminary comparisons with the geological map from Dunkley et al. (1991) show that obtained ages do not coincide with the geological units and require further discussion.
The age distribution of the lava flows and pyroclastic deposits can not be correlated with recent ground movements obtained via InSAR analyses of Envisat and TerraSAR-X data.



Geological Map modified after Dunkley et al. (1991)

InSAR processing was performed by Airbus Defence & Space.

Age dating was performed at the University of Potsdam.

german cooperation
DEUTSCHE ZUSAMMENARBEIT

GEOTHERM

GDC Geothermal Development Company
Powering the Vision

Poster presented at GRSG, December 2014.