Telica Volcano, Nicaragua
Preliminary results of the TESAND experiment

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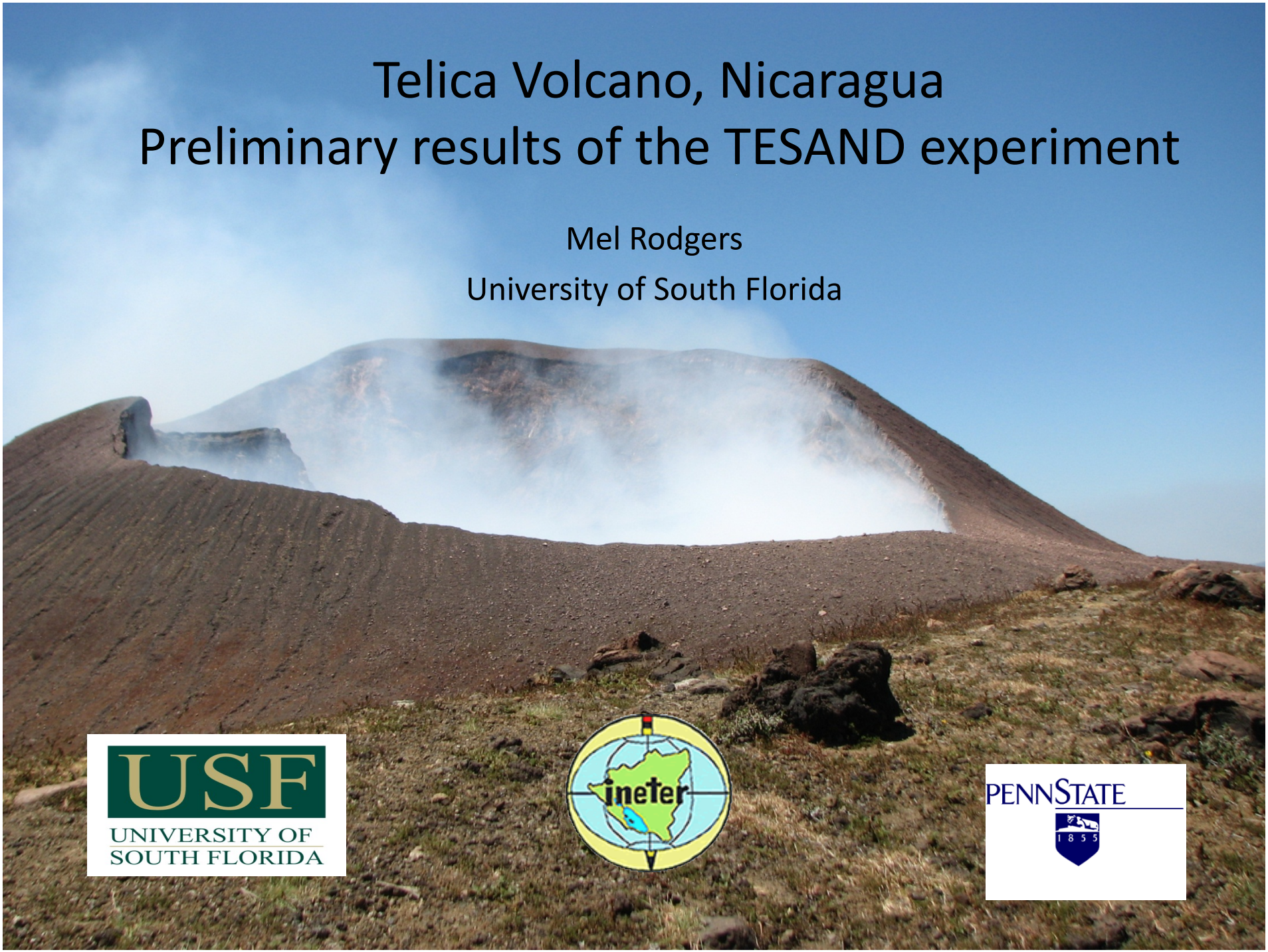
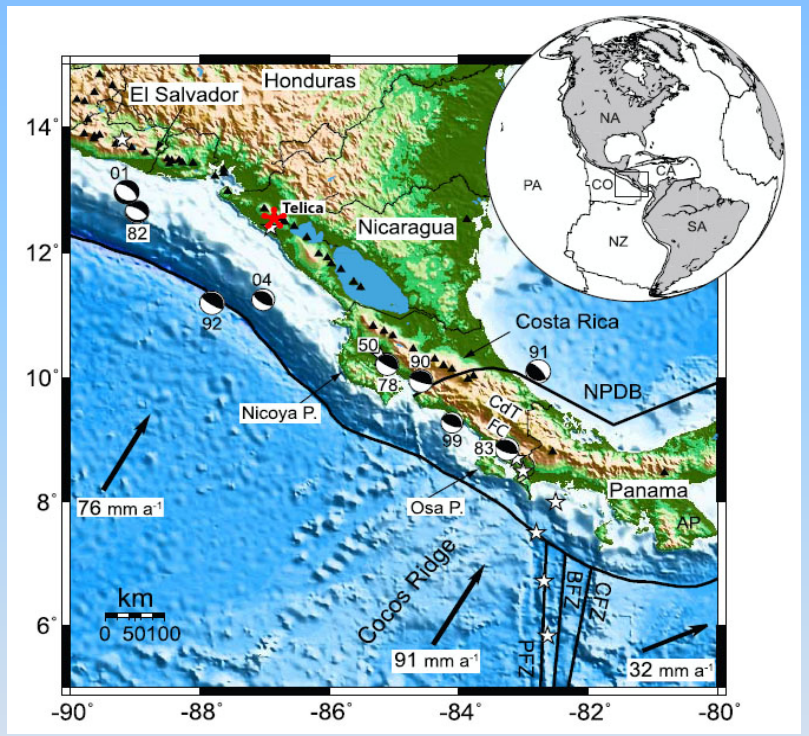
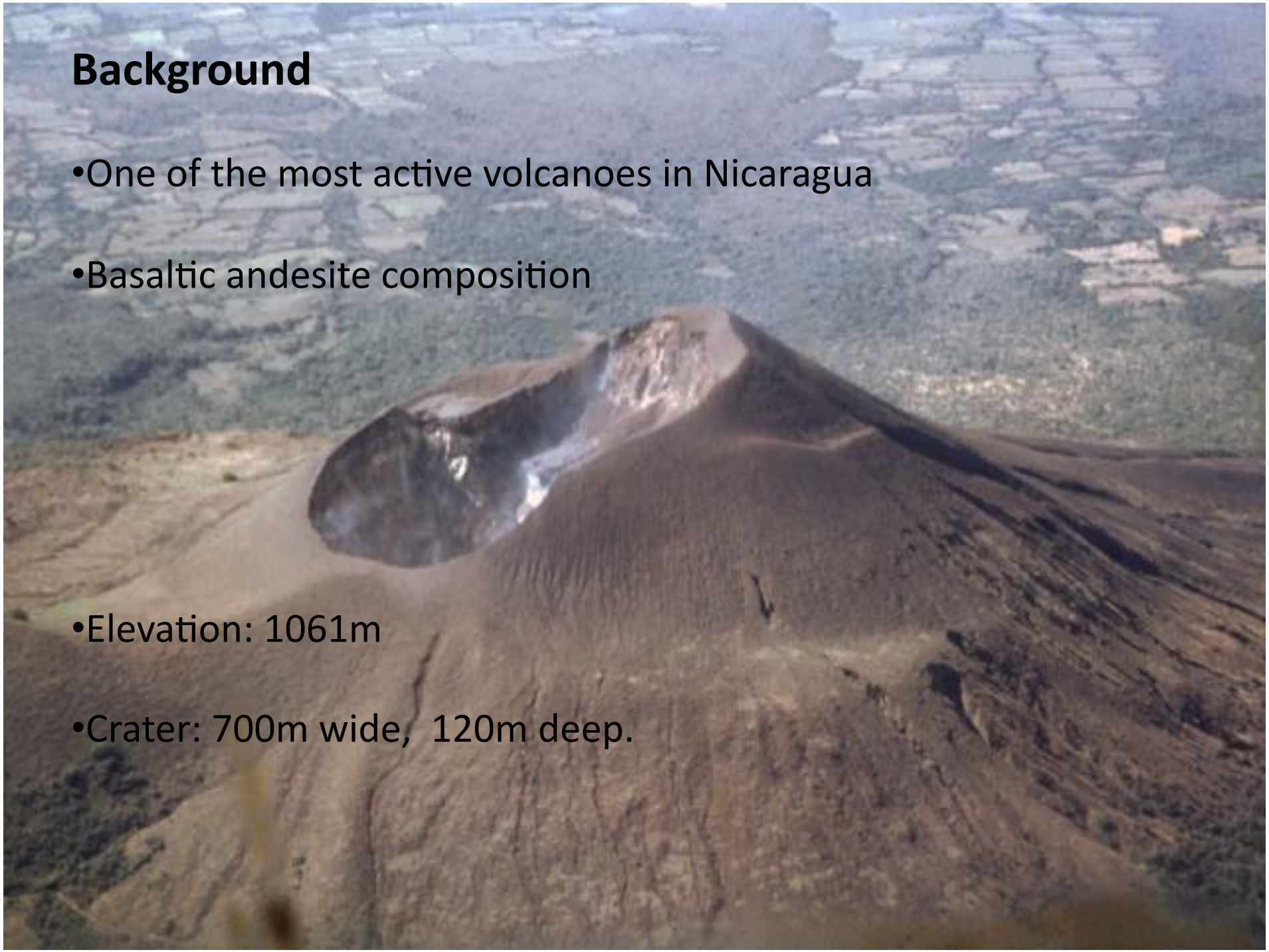


Location

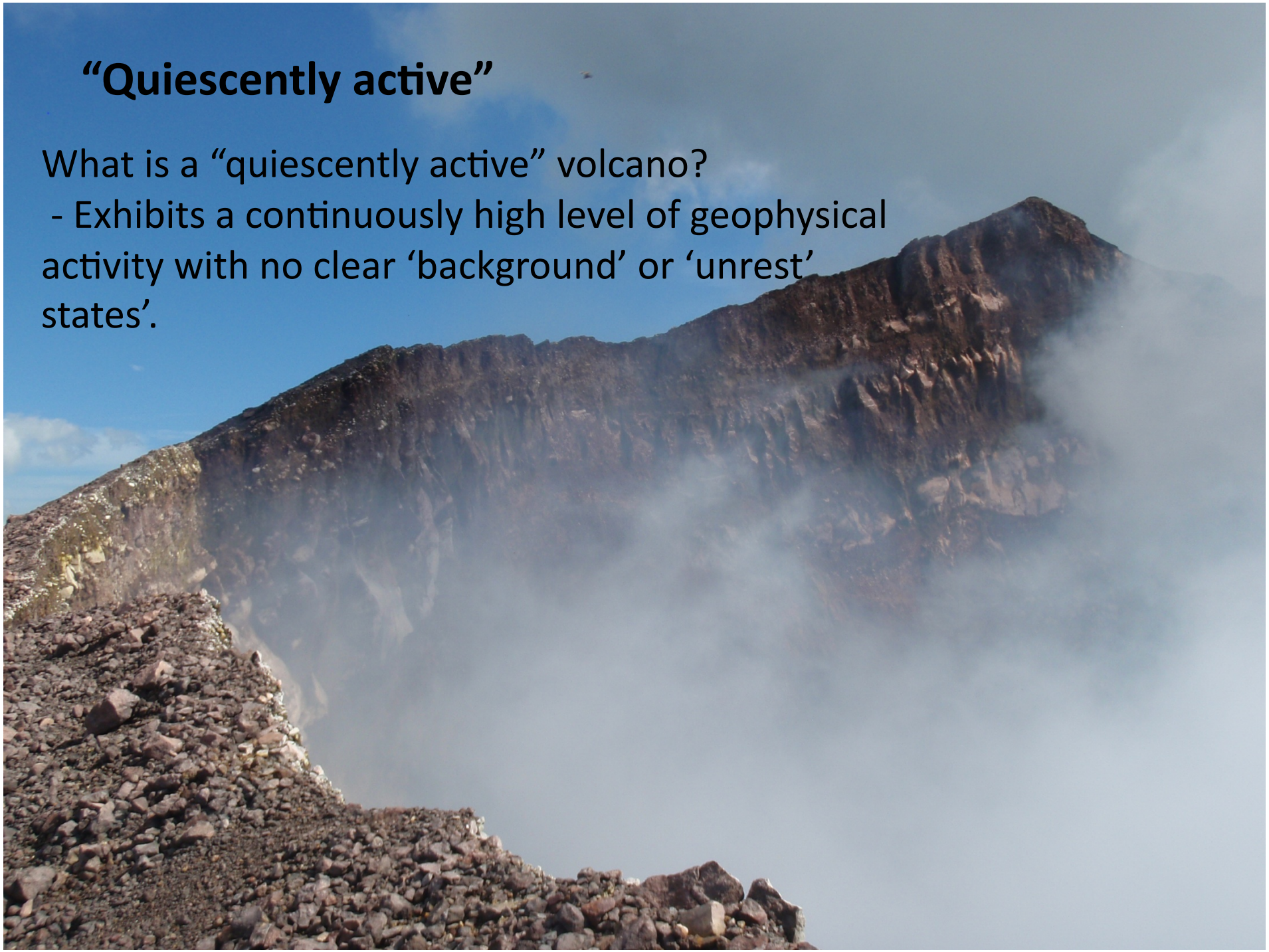


(adapted from LaFemina et al. 2009)



Background

- One of the most active volcanoes in Nicaragua
- Basaltic andesite composition
- Elevation: 1061m
- Crater: 700m wide, 120m deep.



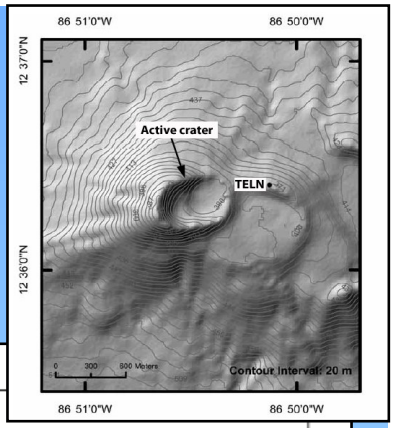
“Quiescently active”

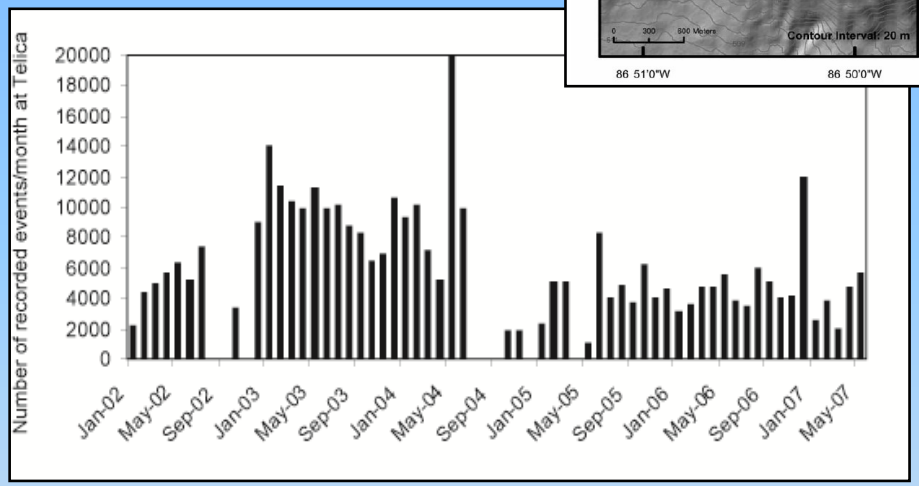
What is a “quiescently active” volcano?

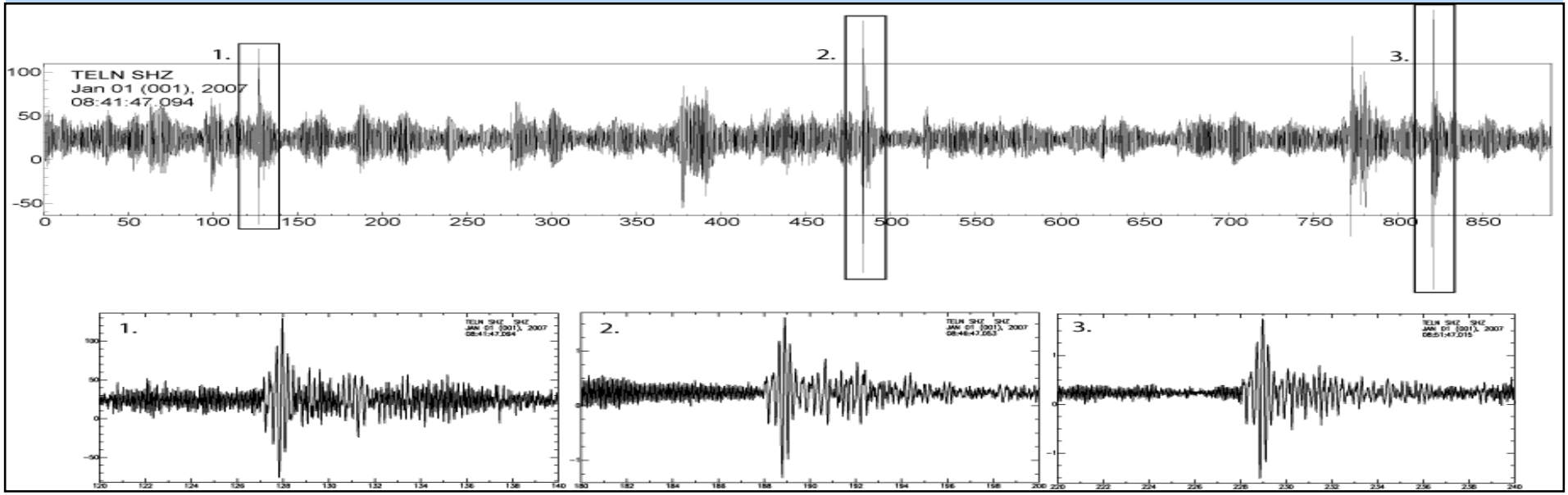
- Exhibits a continuously high level of geophysical activity with no clear ‘background’ or ‘unrest’ states’.

Seismicity

High rate of LP seismicity with an average of several hundred events per day.







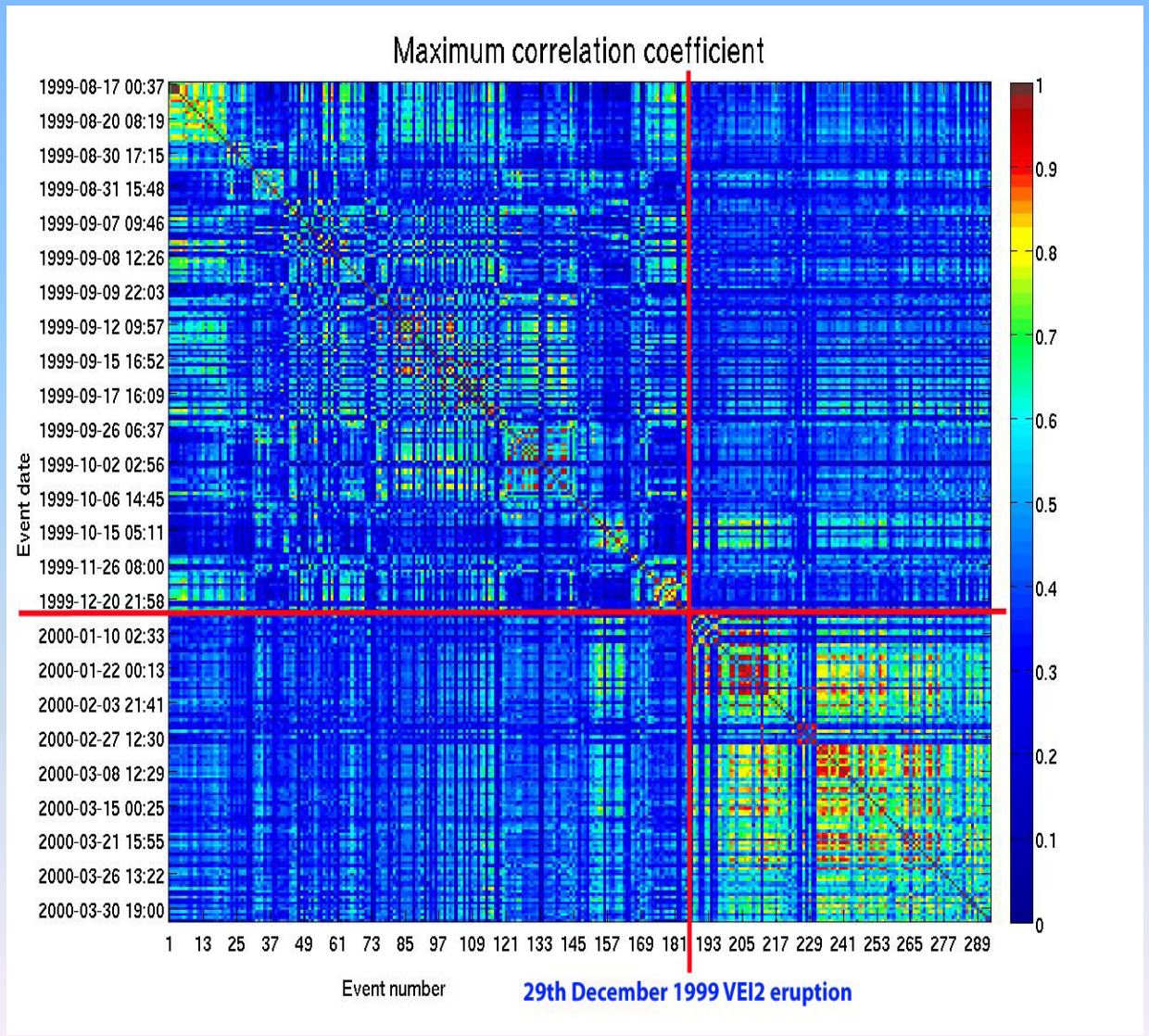
1999 activity

- During May-June 1999 there was a series of explosions and VEI1 eruptions.
- Explosions continued throughout August, October and November 1999.
- Lava lake observed on 19th August 1999.
- VEI2 eruption on 29th December 1999.

(Photo courtesy P. La Femina)

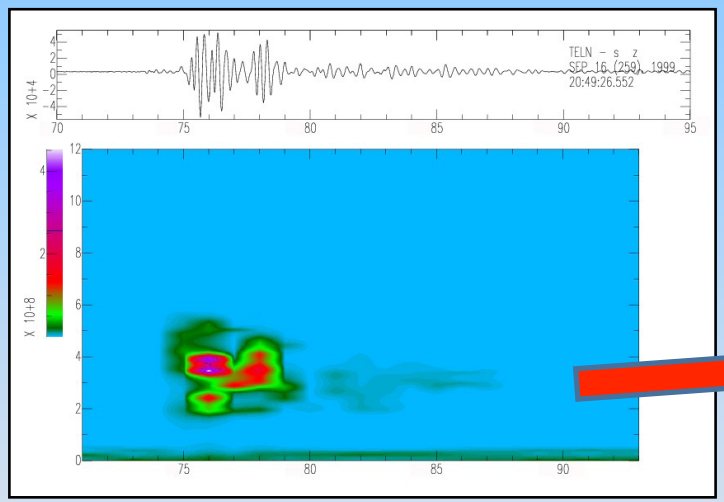
Multiplet analysis of seismicity during 1999 activity

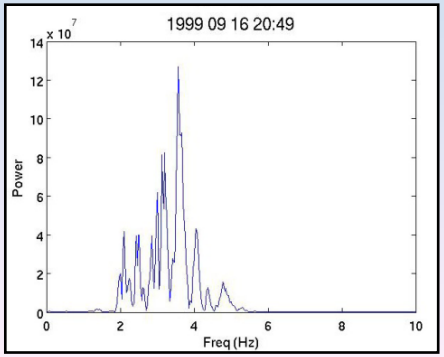
Unique LP families identified using waveform cross correlation

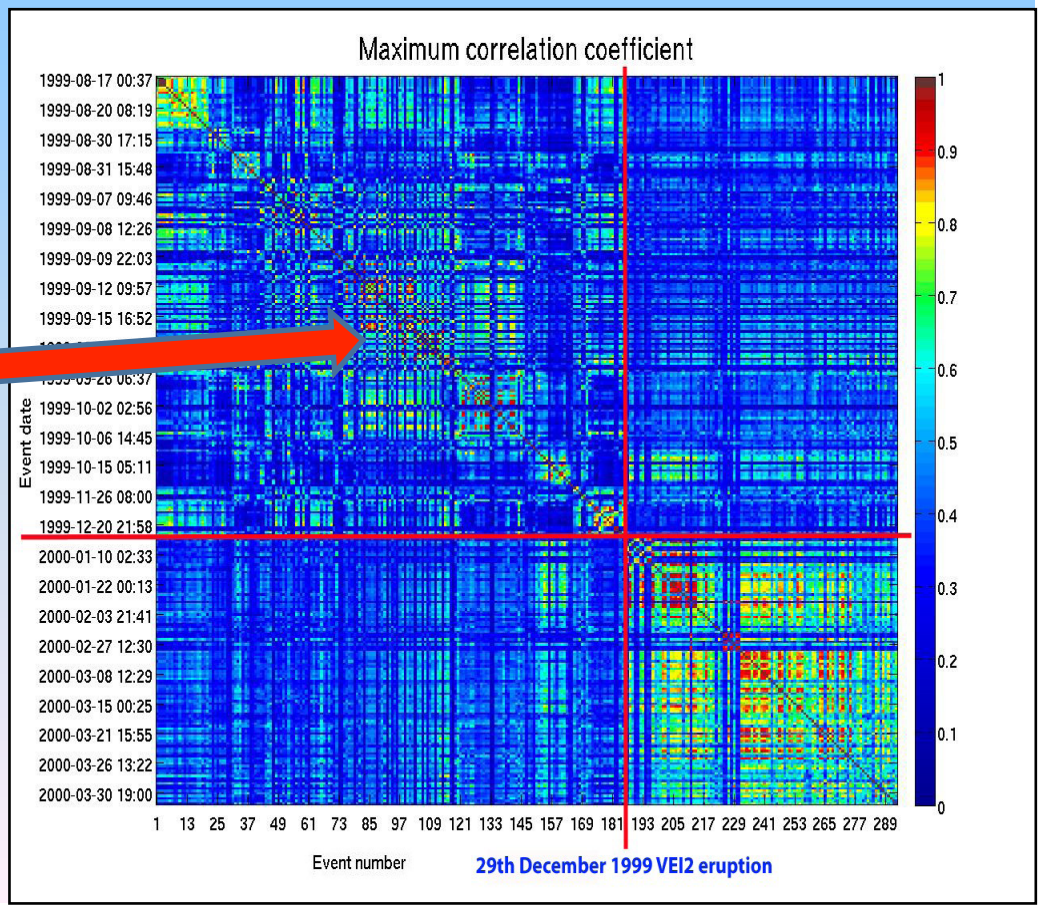


Pre-eruption period: 30th August – 29th December 1999

- LP events are not strongly correlated.
- Large number of individual families, each containing only a few events.
- Generated by non-unique processes. Period of instability?

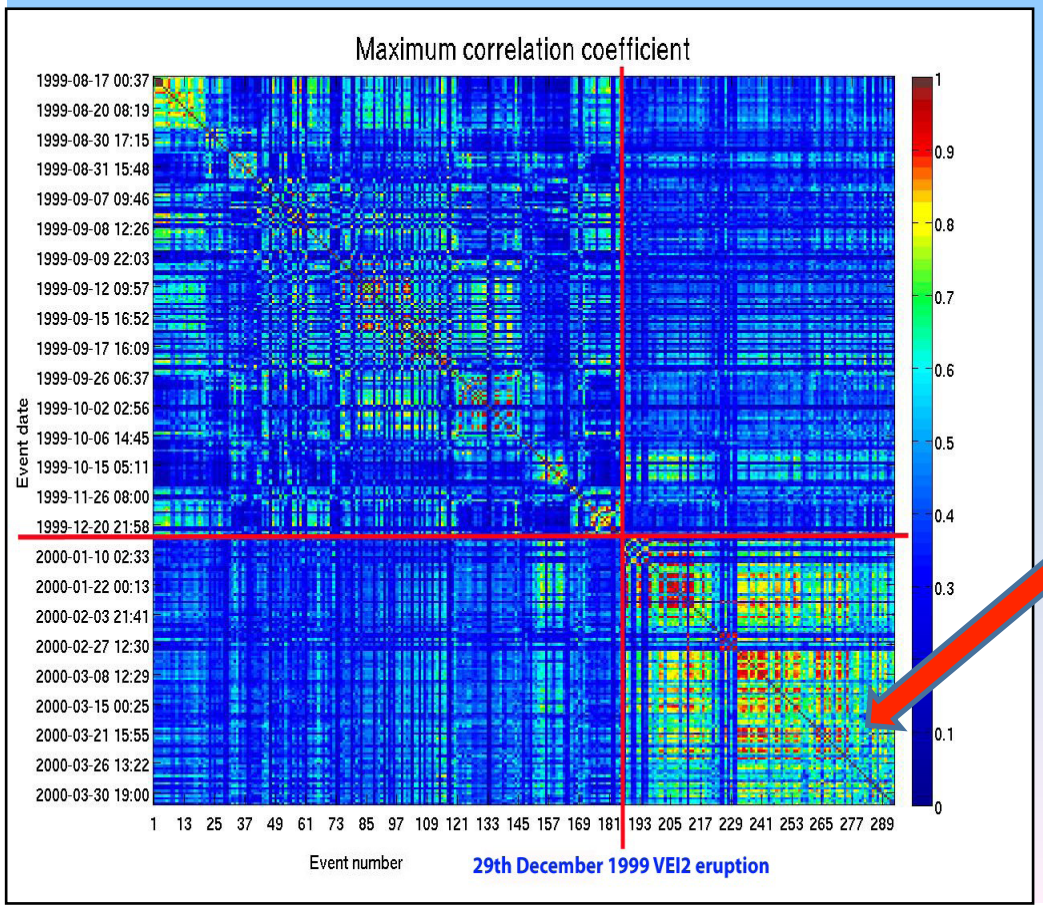


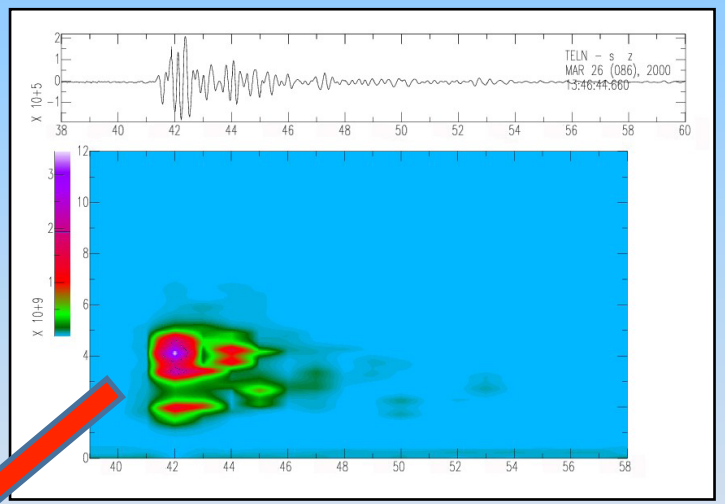


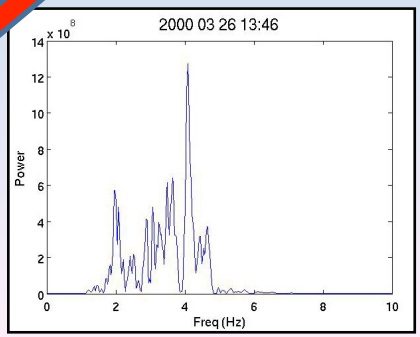


Post-eruption period: January – March 2000

- LP events are more closely correlated.
- Fewer individual families but a larger number of events per family.
- Generated by repeating source. System resuming stable, non-destructive activity?



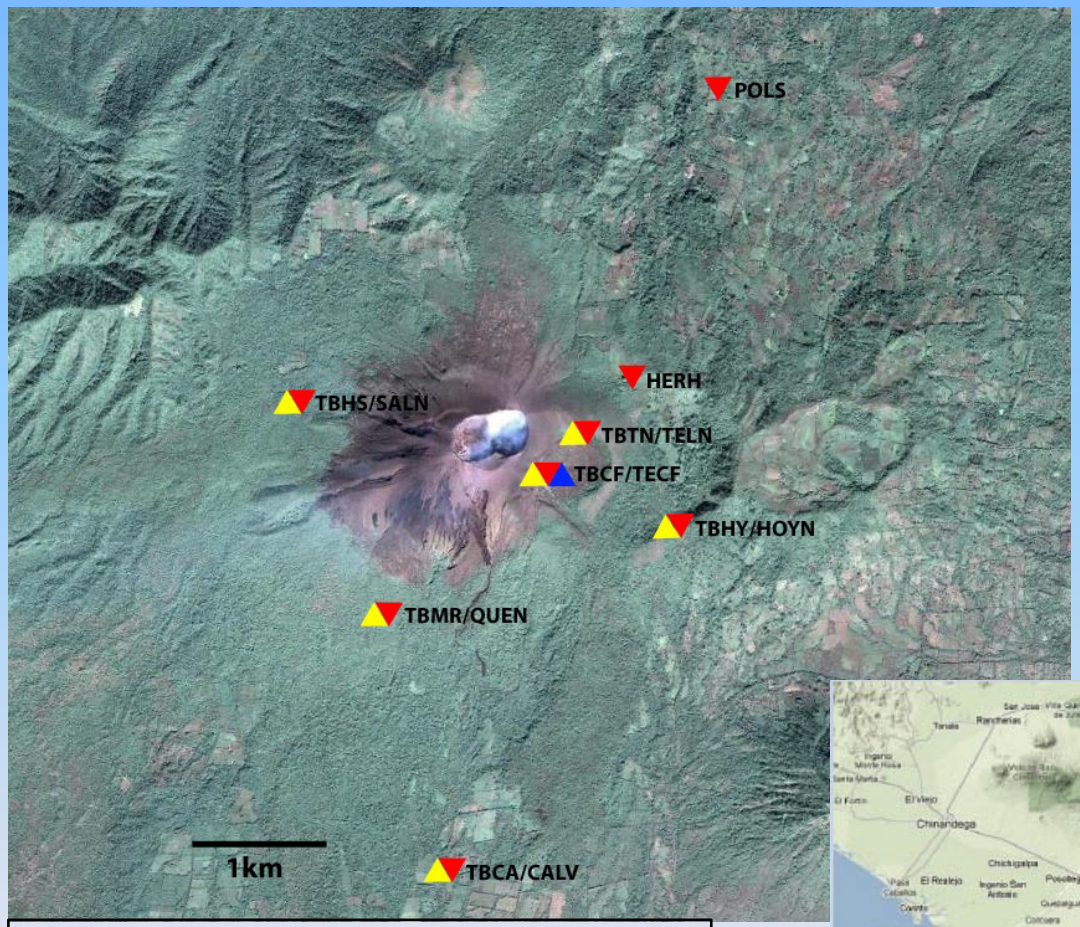




TESAND Network
– TElica Seismic And Deformation Network

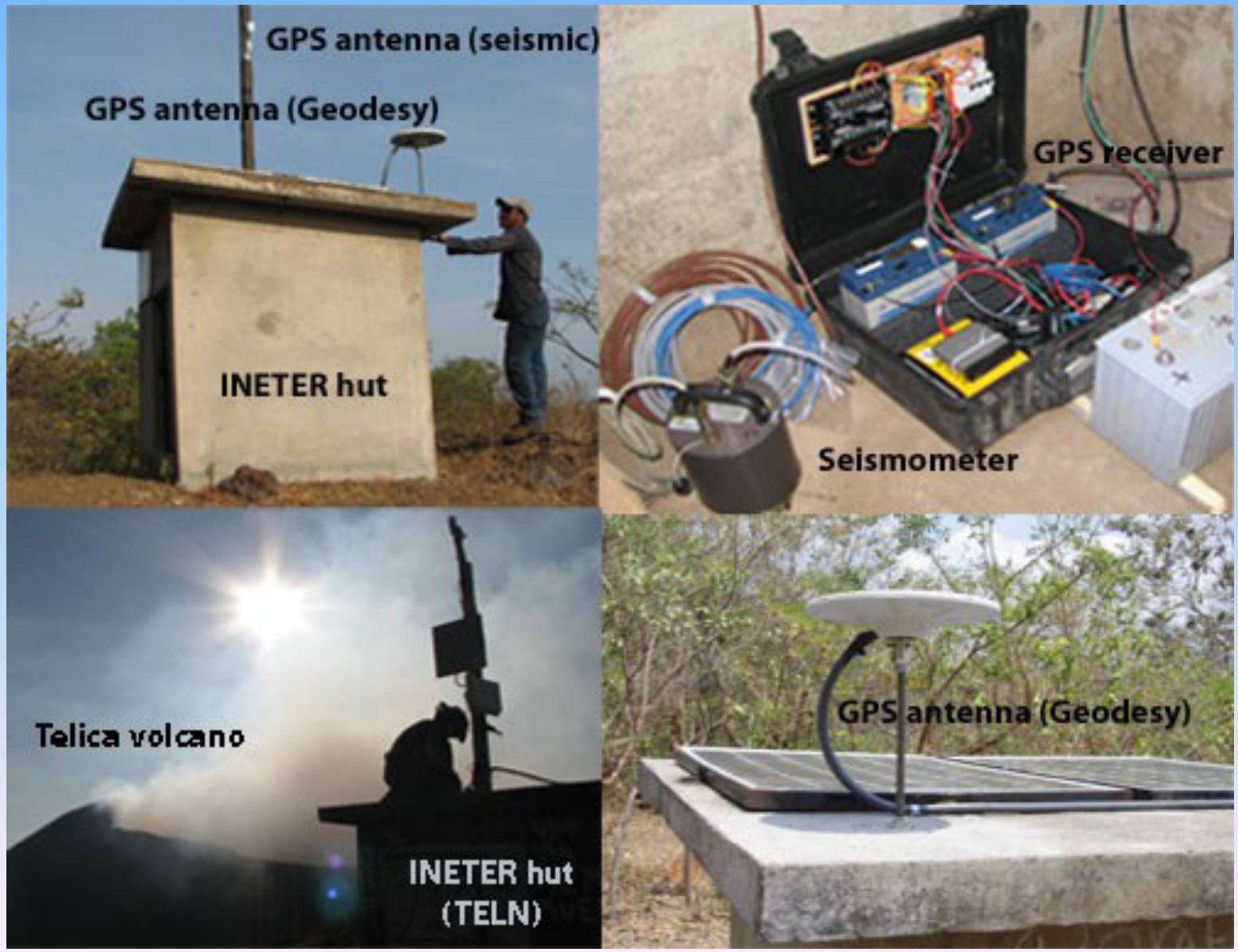
- Collaboration between University of South Florida (USA), Pennsylvania State University (USA) and INETER (Nicaragua).
- Spatially dense network:
  - six broadband seismometers
  - ten high rate CGPS
  - pressure sensor
  - weather station
- Deployment completed in March 2010 and scheduled to run continuously until 2013.

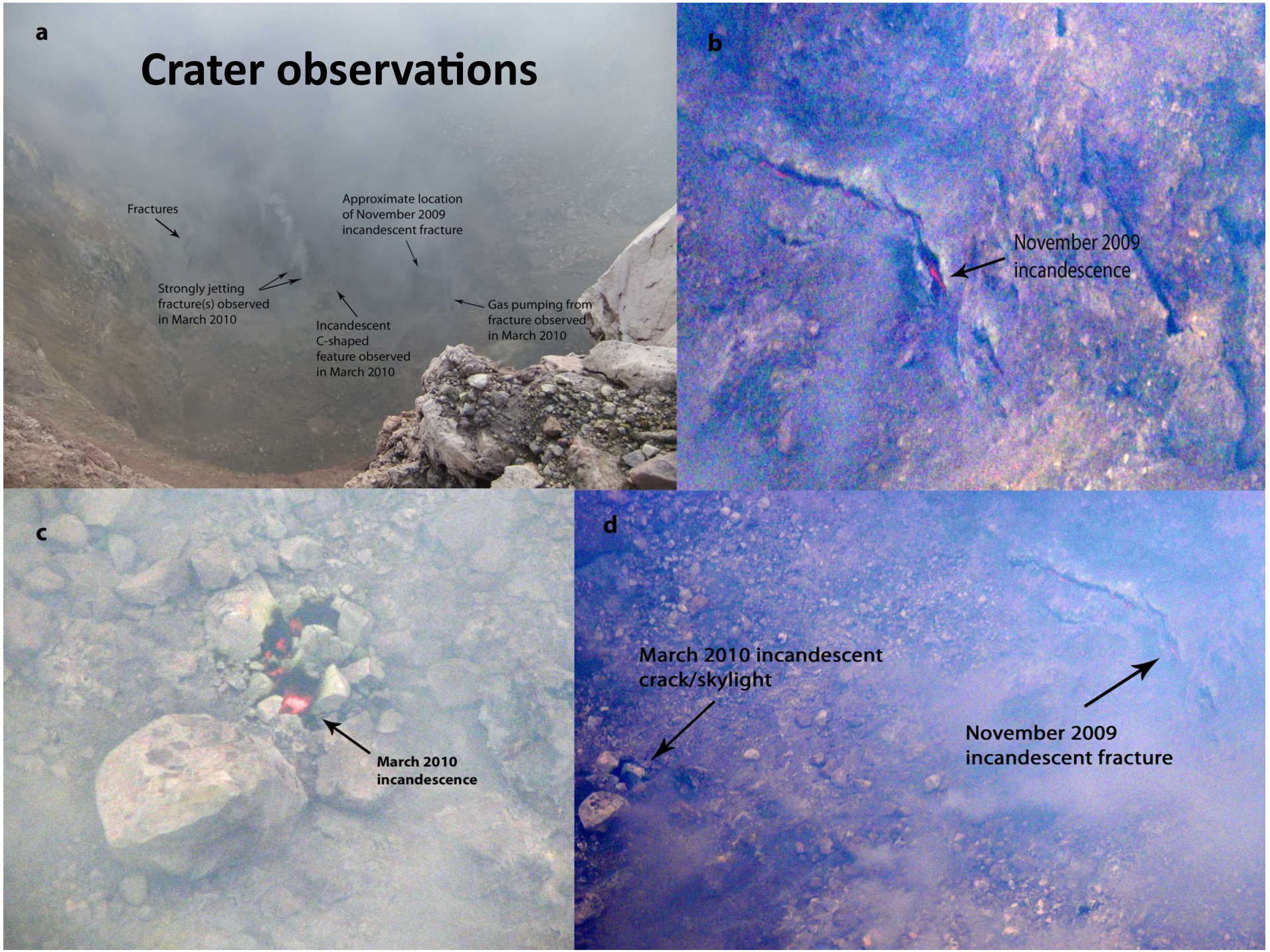
Network deployment



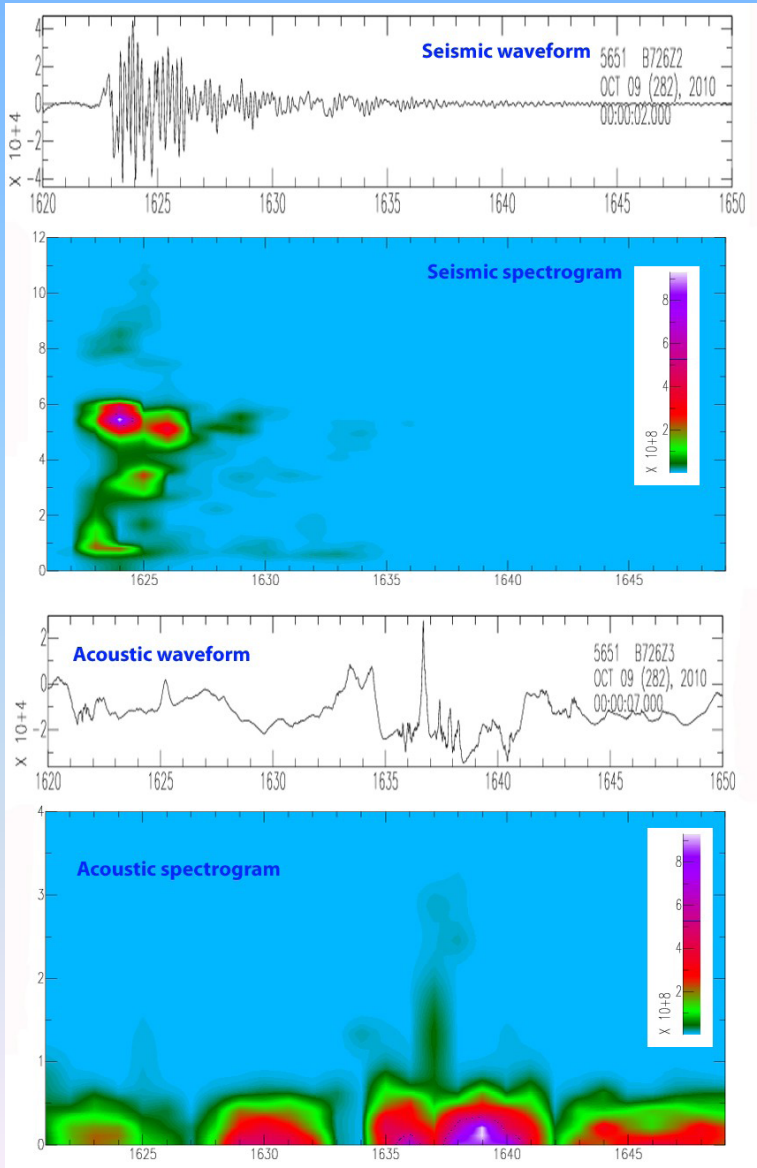
Yellow triangles - seismic stations
Red triangles - CGPS stations
Blue triangle - pressure sensor

Network deployment

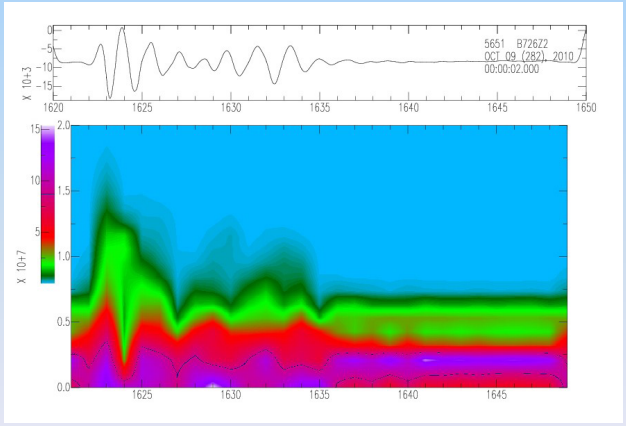



a
Crater observations
Fractures
Approximate location of November 2009 incandescent fracture
Strongly jetting fracture(s) observed in March 2010
Incandescent C-shaped feature observed in March 2010
Gas pumping from fracture observed in March 2010
b
November 2009 incandescence
c
March 2010 incandescence
d
March 2010 incandescent crack/skylight
November 2009 incandescent fracture

9th October 2010 Seismic Event

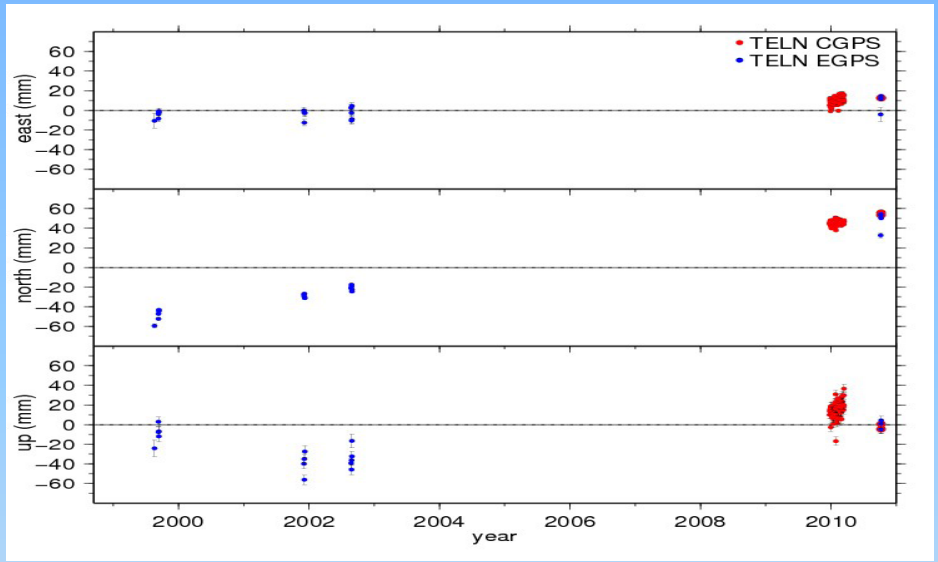


- Unconfirmed report of an explosion at Telica's summit.
- Currently we only have recording of this event from station TBCF (broadband seismometer and pressure sensor)
- Dominant seismic energy at 5.5Hz

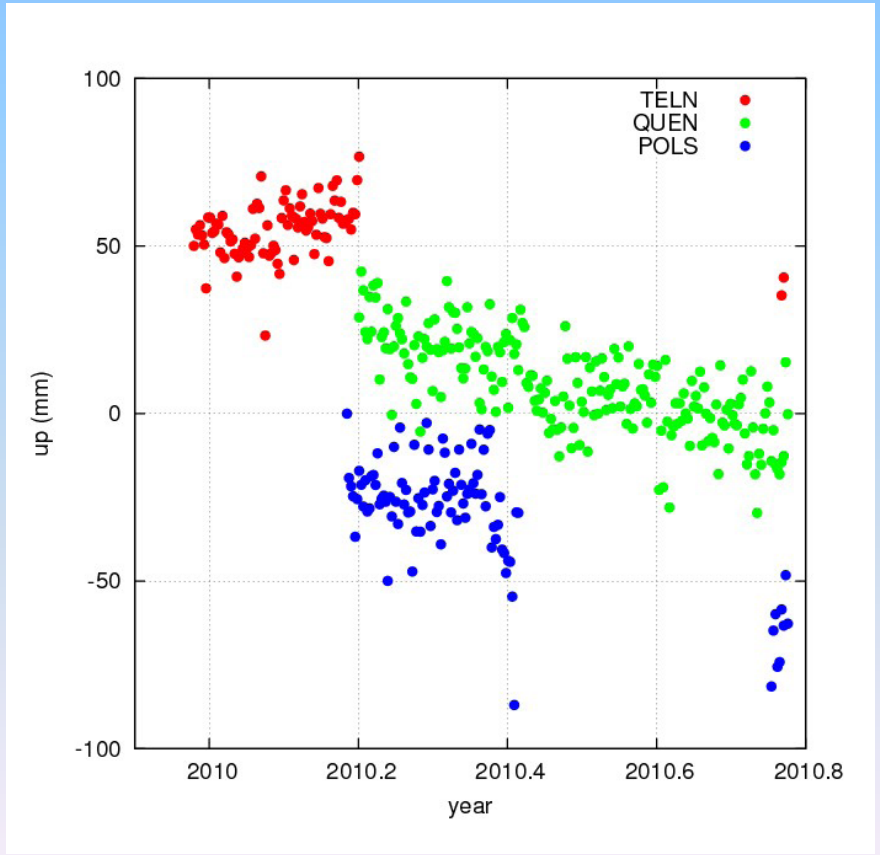


- VLP energy seen in waveform below 1Hz

GPS observations



- Subsidence is observed following the 1999 eruption
- New CGPS stations in the TESAND network indicate ongoing subsidence



(Figures from H.Giersson)


Questions?