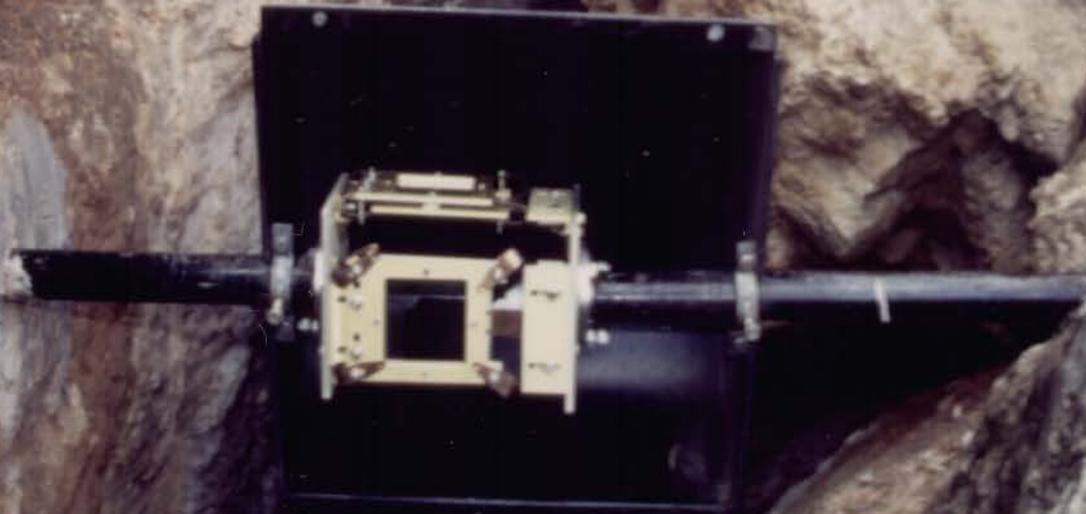


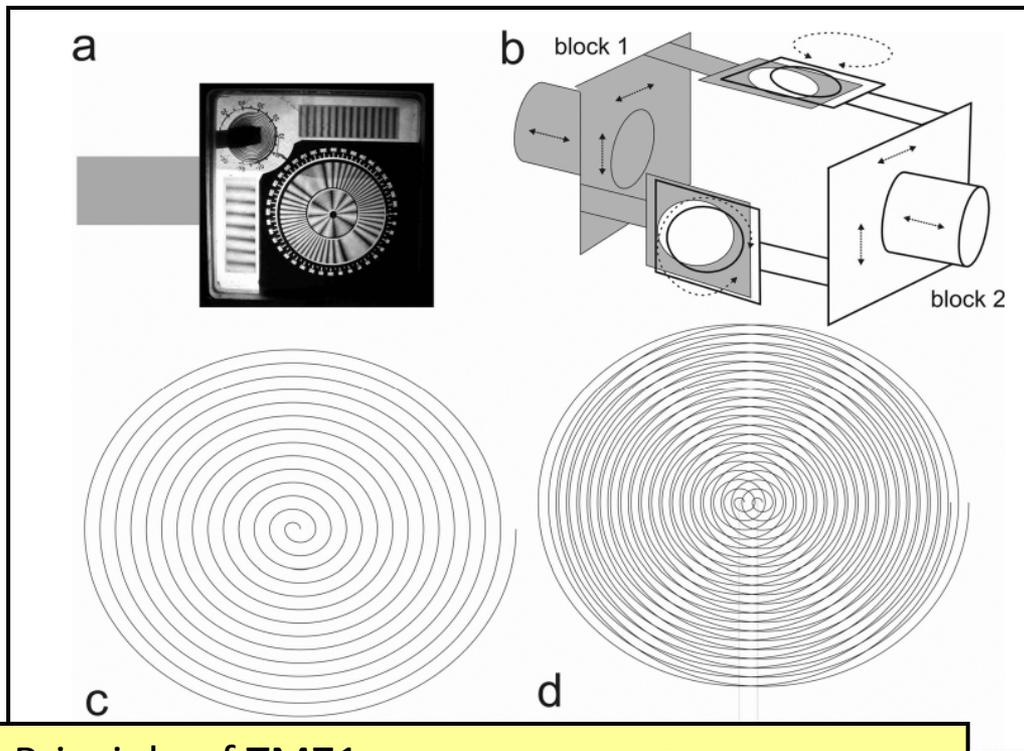


**TecNet – underground natural laboratory of
precise
3-D monitoring of fault slips**

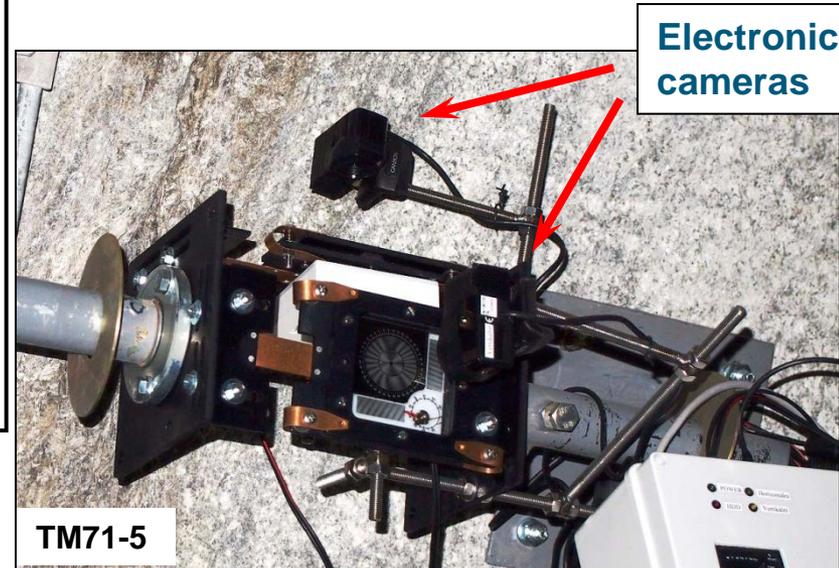
Monitoring of slips between two blocks using a 3-D mechanic-optical extensometer (TM71) with sensitivity in order of 0,0X – 0,00X mm



Recent stress (e.g. tectonic stress) is transformed along discontinuities (faults) disrupted rock massif to displacement between blocks which can be detected



Principle of TM71: a) Moiré patterns from grid lines
 b) installation for 3-D measurement; c) single grid line;
 d) interference of two identical grid lines



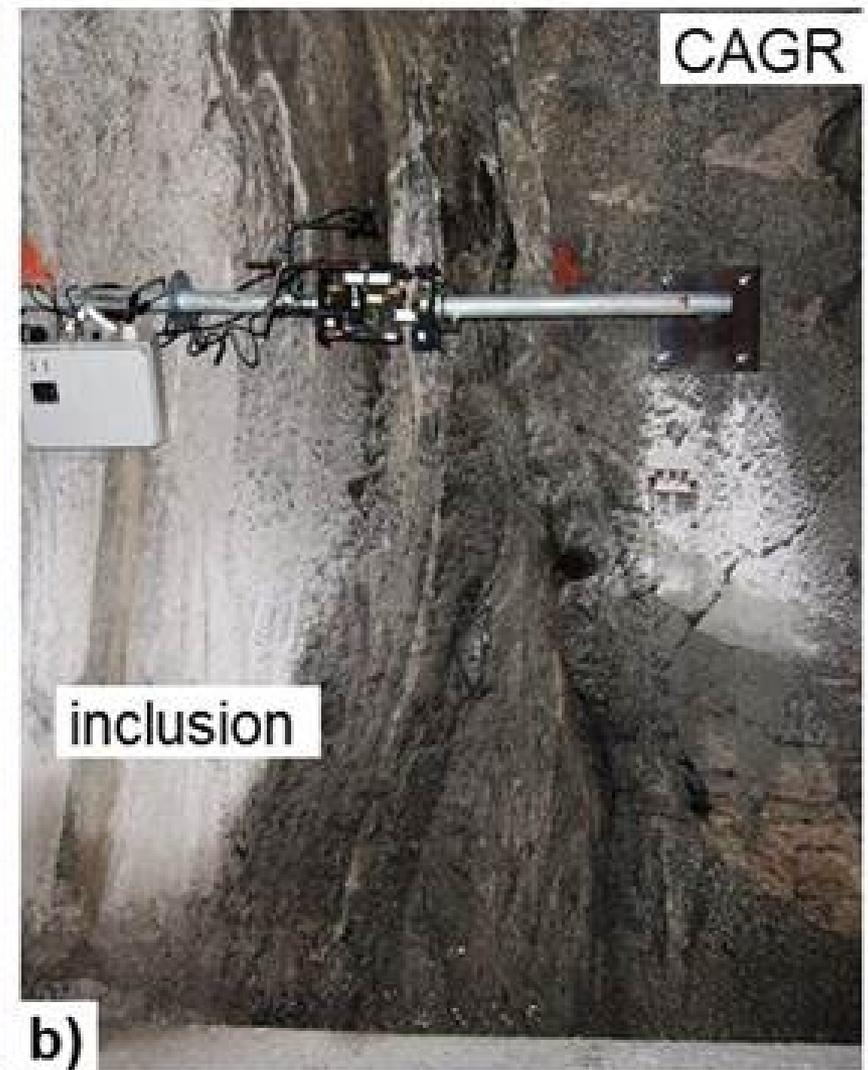
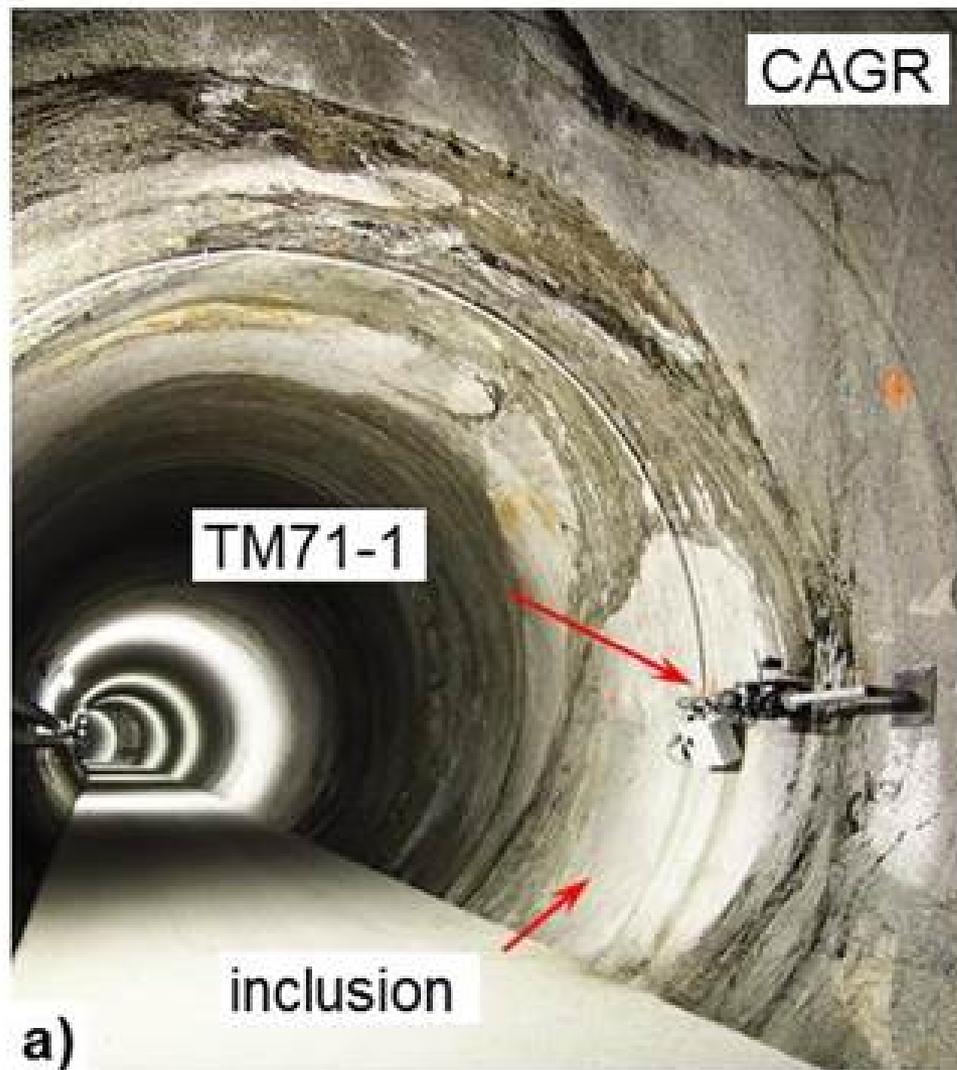
Installation of TM71: drilling about 30 – 40 cm, steel arms fixed by concrete or special glues

Manually readings: Interferences are scanned once a 2 or 4 weeks using digital camera

Automated readings: Interferences are scanned usually once a day (00:00 CET, 23:00 GMT) or with higher frequency (1 hour – 10 minutes)

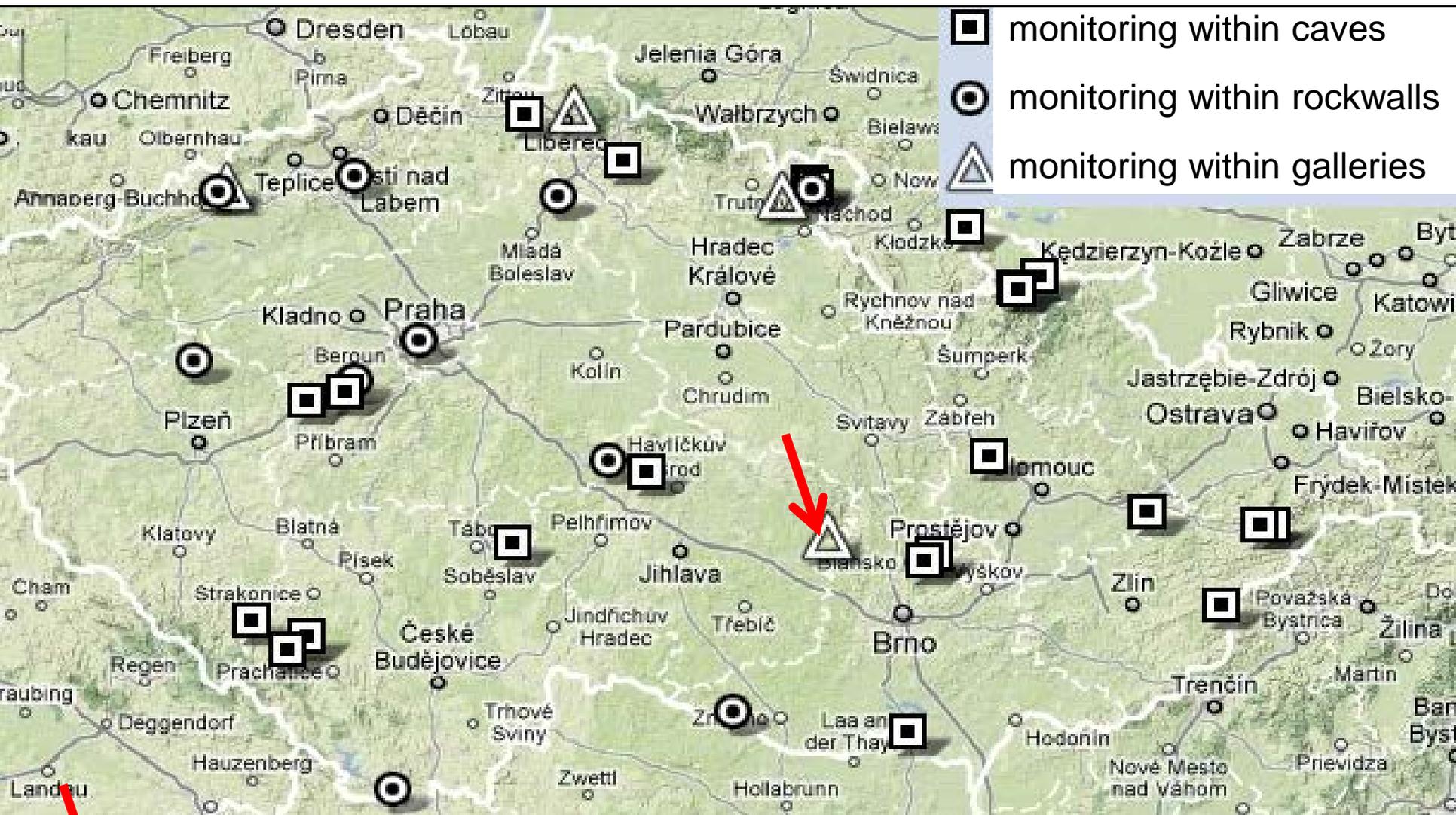
Transfer : via GSM or internet to IRSM for evaluation

Add information: temperature, humidity, air pressure, Rn, CO2, el-mag emission, GNSS



Type of TM71 installation: Grimsel Test Site (NAGRA, Switzerland), about 350 m under surface, Large Scale MOnitoring project 2014 - 2018

TecNet – Bohemian Massif



The deepest installed extensometer 1200 m under surface

**Cooperating
European Countries:**

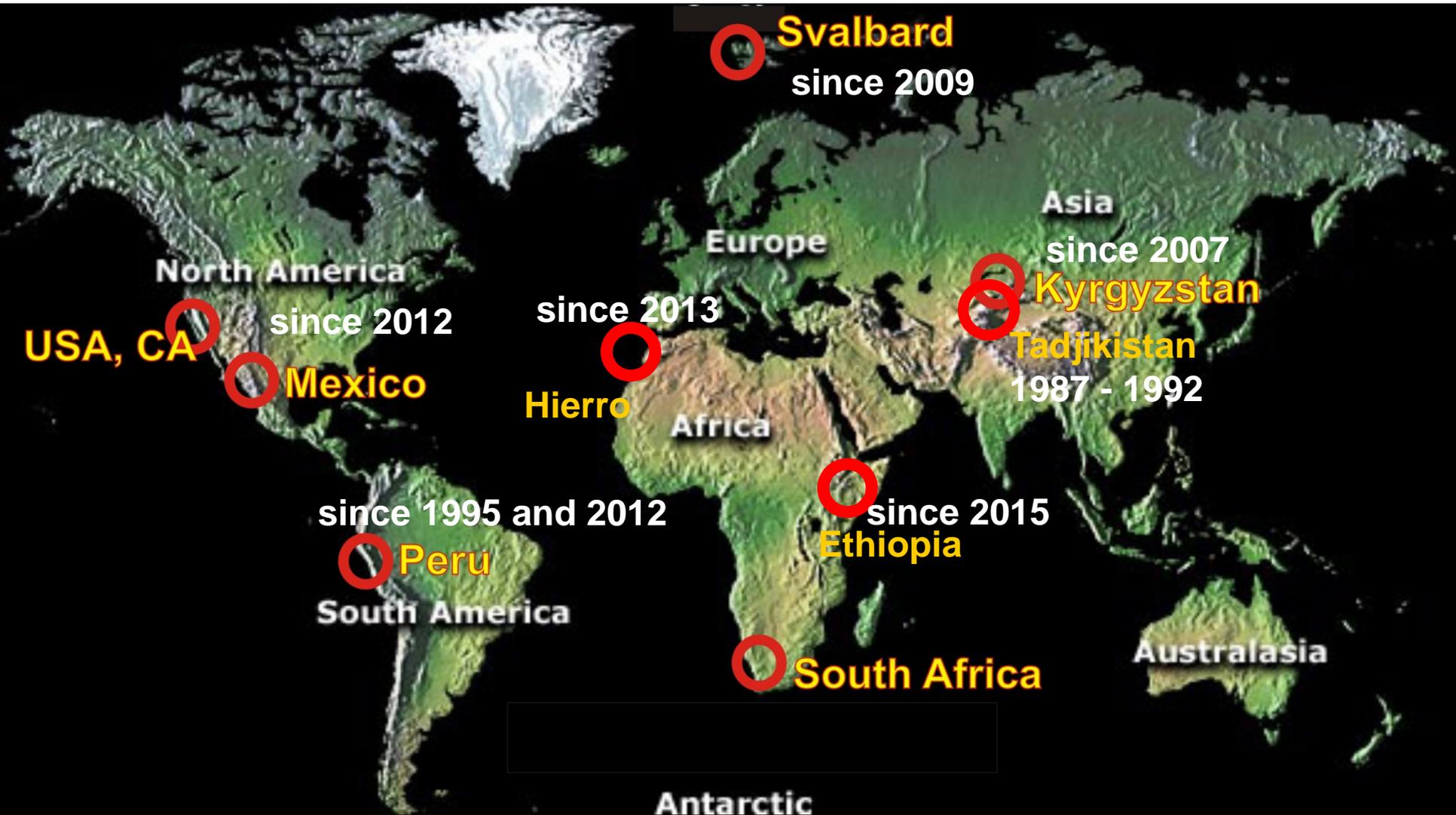
- Poland
- Slovakia
- Germany
- Austria
- Slovenia
- Italy
- Bulgaria
- Greece
- Spain (Canary Isles)
- Norway (Spitsbergen)
- Switzerland
- Belgium



www.tecnet.cz

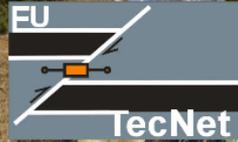
Monitoring activities in the Europe

TecNet Global



Monitoring activities outside of Europe

www.tecnet.cz

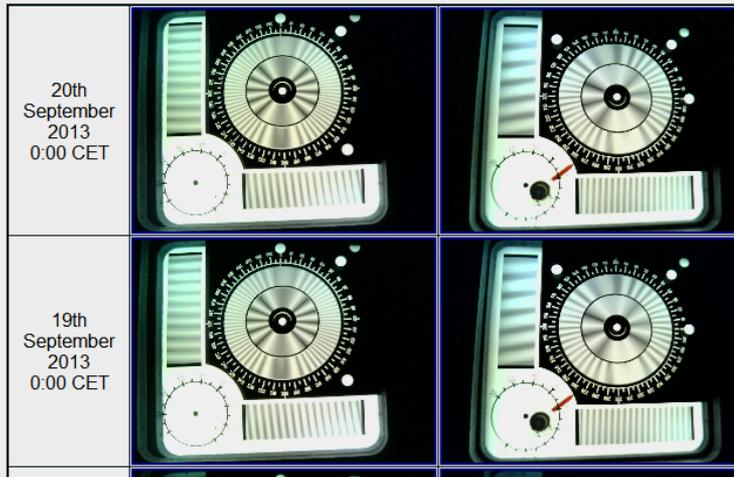


- About Project
- Areas of Research
- List of all Gauges
- Online monitoring
 - Cave 13C (Czech Rep.)
 - Gallery IDA (Czech Rep.)
 - Grimsel 1 (Swiss)
 - Grimsel 2 (Swiss)**
 - Grimsel 3 (Swiss)
 - Grimsel 4 (Swiss)
 - Grimsel 5 (Swiss)

Monitoring network TM-71 Online images over the last 30 days

Grimsel 2 (Swiss)

[More information about Grimsel 2](#)

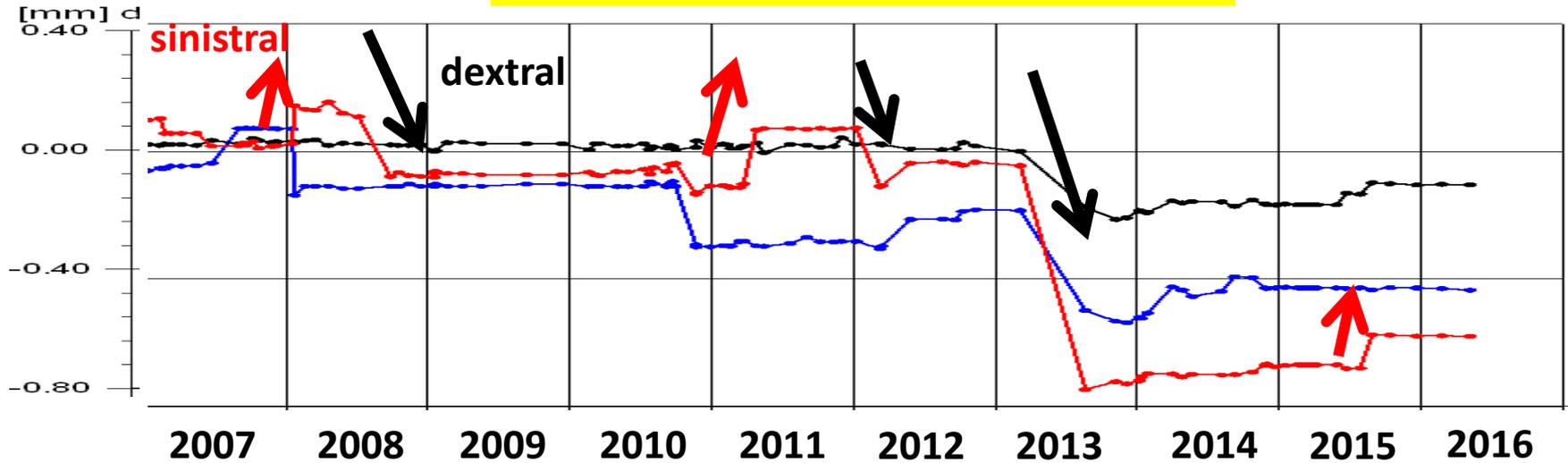


Institute of Rock
Structure and
Mechanics

Department of
Engineering Geology

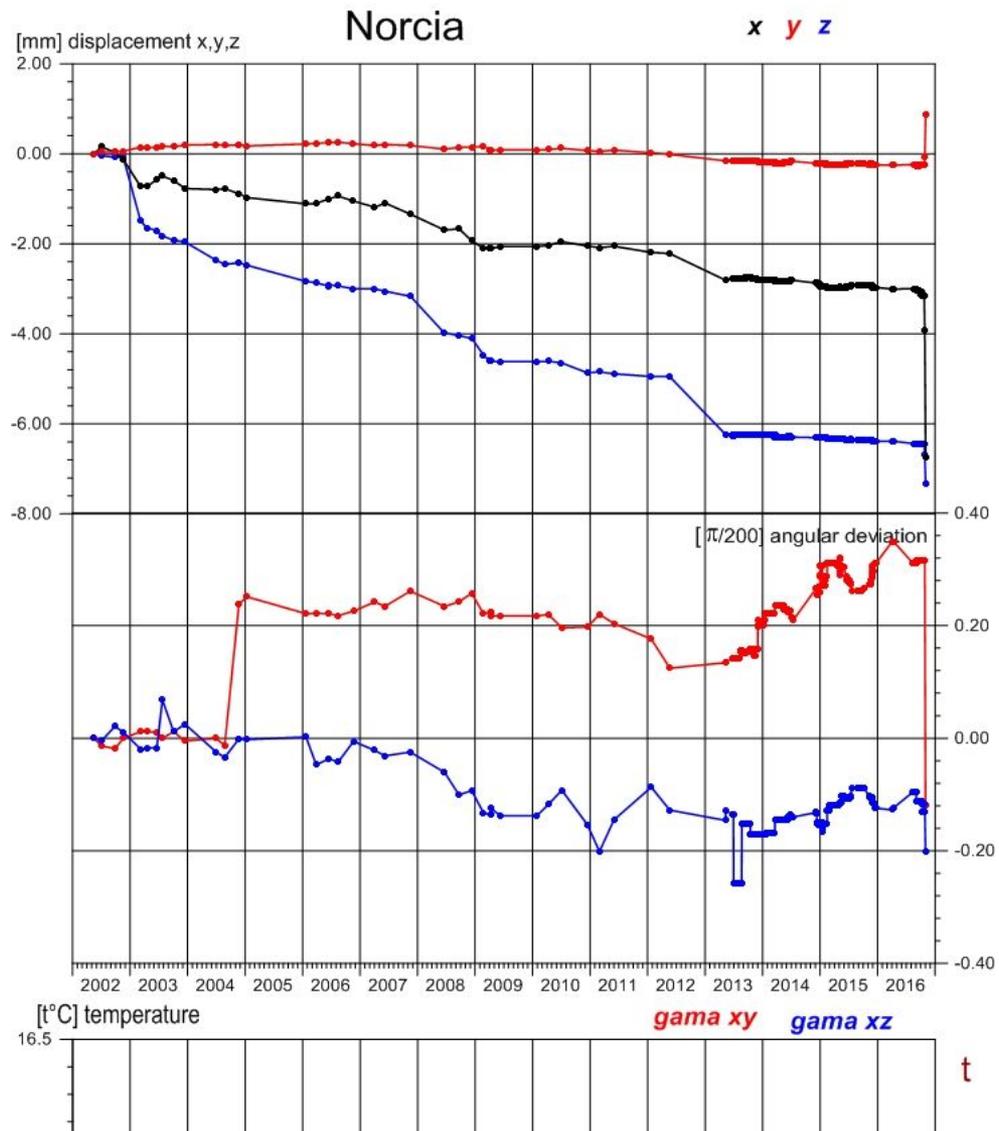
Pustožlebská Zazdřená Cave, about 110 m under surface

Macochoa Fault (220°/80°)



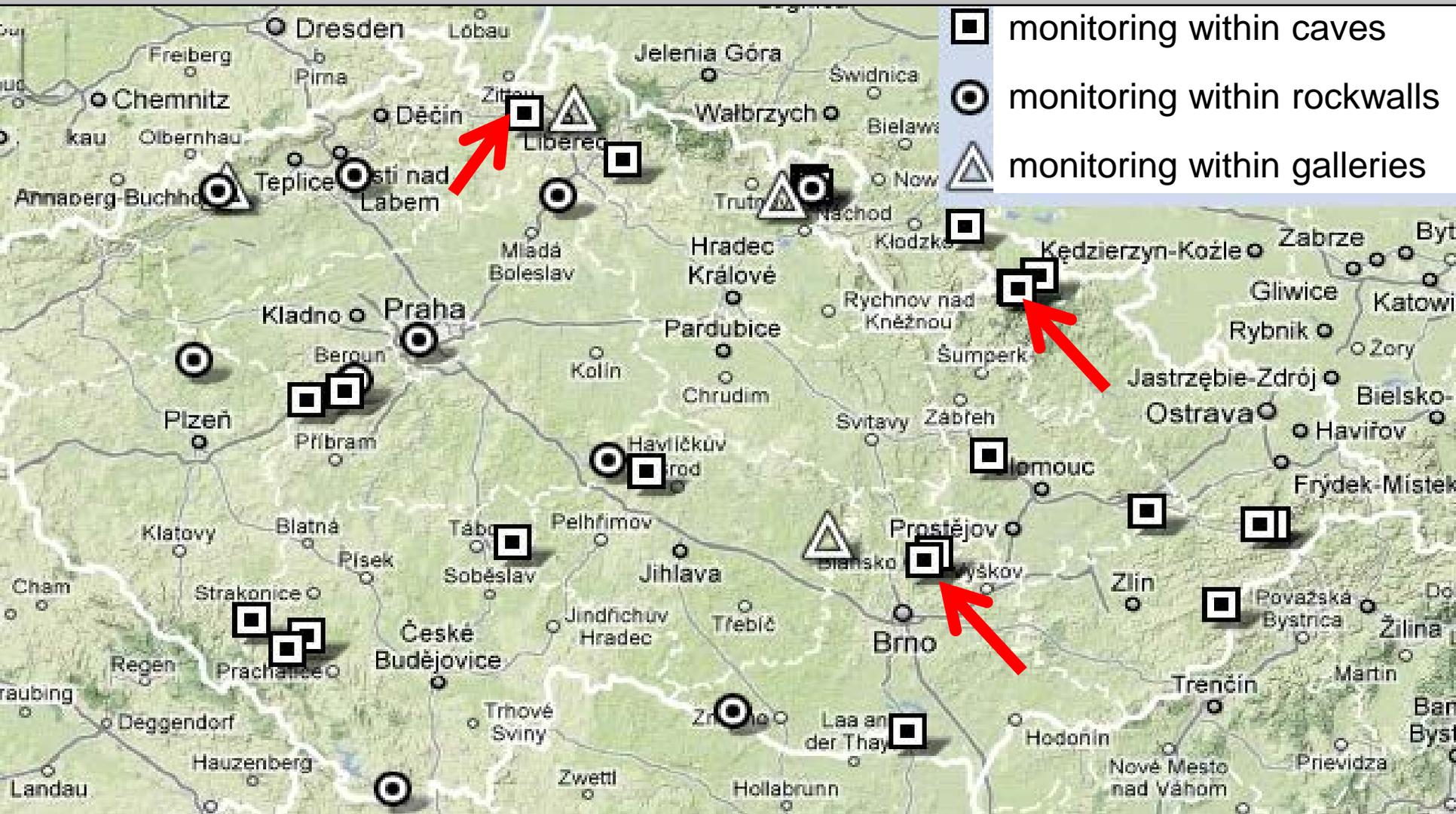
Redline: strike slip component
Blue line: dip slip component
Black line: extension/compression

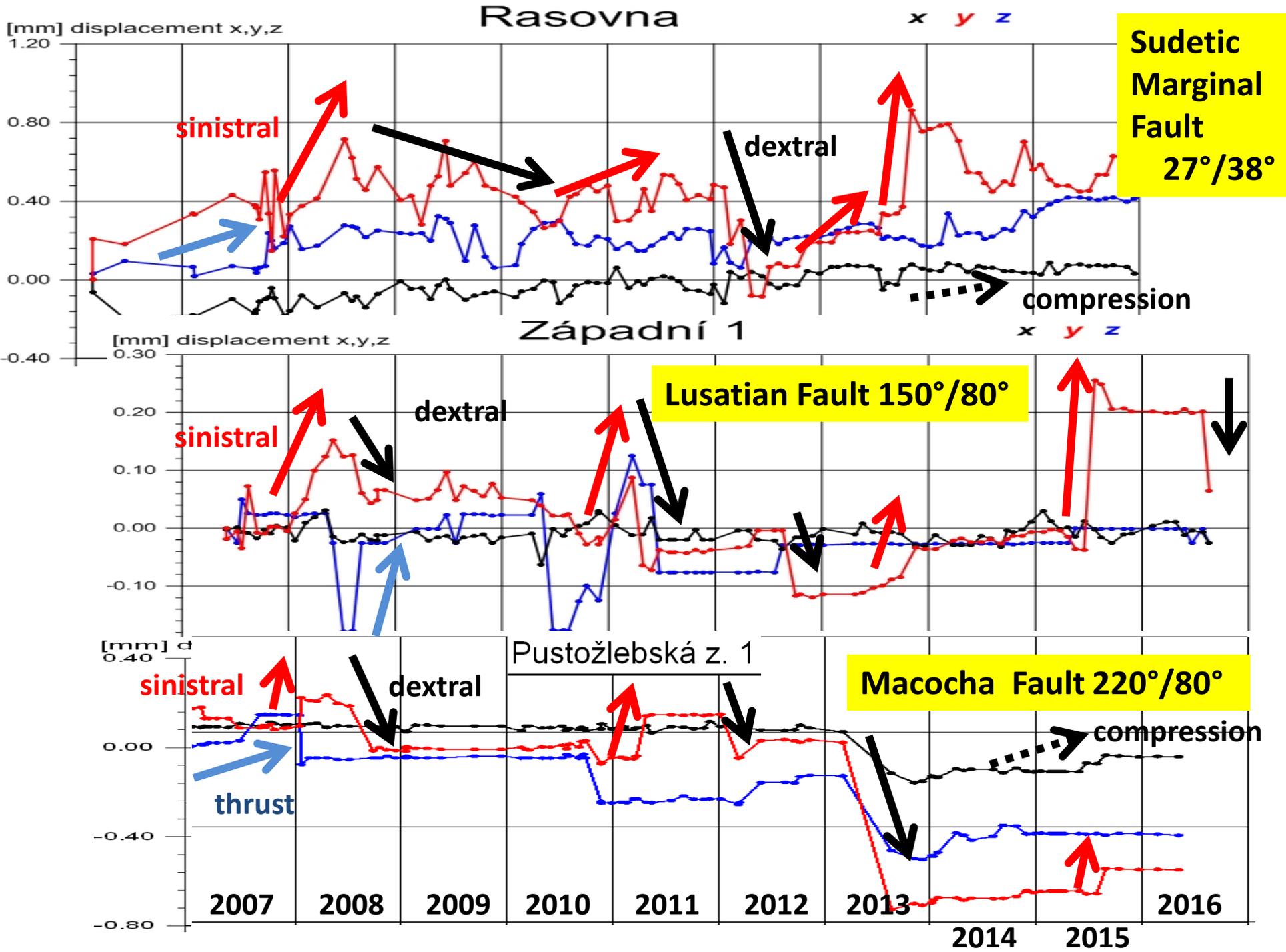
Cumulative curve of fault slip recorded across Macocha Fault in Moravský Kras
- example of so call pulse displacements

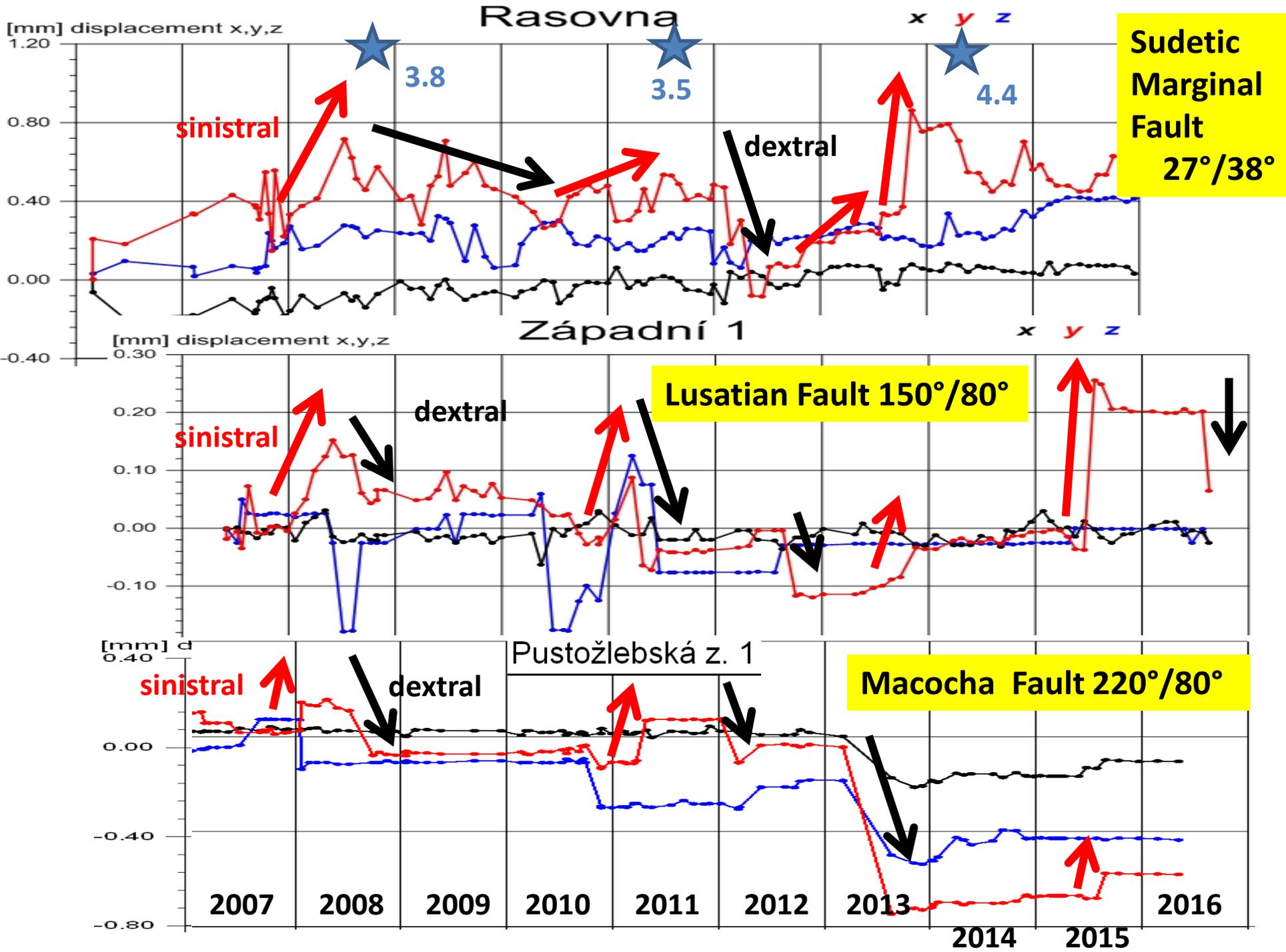


Cumulative curve of fault slip recorded across Norcia Fault in Central Appenines
- example of creep displacement with periods of acceleration

TecNet – Bohemian Massif







Main activities during 2016

New installed extensometers:

- V Podhradí Cave (CZ), 2 manual extensometers, zone of the Sudetic Marginal Fault
- Biserna Cave (BG), 3 automated extensometers
- Postojna Cave (SLO), 2 automated extensometers
- Josef Gallery (CZ), 3 automated extensometers, central Bohemia, collaboration with project RINGEN
- Grimsel Test Site (CH), 3 automated extensometers, collaboration with ETH Zurich (hydro-fracturing test planned during January 2017)

New automated extensometers:

Loretto Tunnel in Freiburg (D)
Hornsund 3 (Spitsbergen)

Collaboration with other projects:

LASMO (CH – NAGRA, University of Bern, University of Strathclyde, 2014 - 2018)
CaveTec (A – Naturhistorisches Museum Wien, 2014 - 2016)
RINGEN (CZ – Faculty of Science Charles University, 2016 - 2019)
GACR project: Mega-slides at Canary Isles, Hierro (2016 – 2018)
TACR project: Automated evaluation of optical interferences (2015 – 2017)

Main activities planned for 2017

- Hydro-fracturing test within GTS (CH) managed by ETH Zurich
- Collaboration with SÚRAO: installation of extensometers within new underground laboratory Bukov – about 600 m under surface
- Collaboration with infrastructural project RINGEN, possibly DEGREE?

TM 71 gauge mechano-optical system (moiré)

