"Scientific thought is the common heritage of humankind."

Abdus Salam

ICTP founder Abdus Salam

> ICTP is an institution that is run by scientists for scientists to support the best science possible, with special attention paid to the needs of scientists from developing countries

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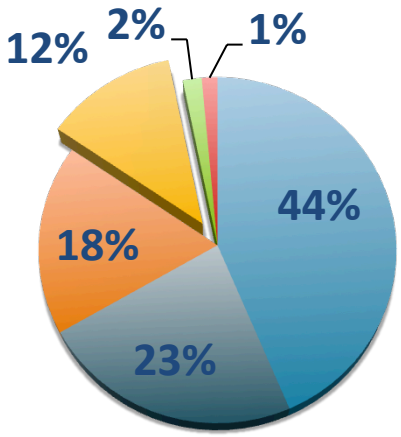
IAEA International Atomic Energy Agency

ICTP financial support, 1996-2010

Share by geographical area for selected countries



- Asia
- Sub-Saharan Africa
- Latin America
- North Africa
- Europe
- Middle East

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IAEA International Atomic Energy Agency

Tunisia at ICTP (since 2001)

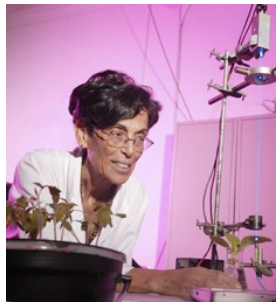
- Scientific visitors
  - 449
  - 29% women
- Tunisian participation in ICTP Programmes
  - 40 Affiliates
    - From 11 Federated Institutes
  - 19 Associate Members (3 female)
  - 7 TRIL Fellows
  - 5 STEP Fellows (2 female)

ICTP in Tunisia

- 1 OEA Network on Lasers and Atomic Physics
  - University of Tunis, (2000)

  - 26 OEA Scientific Meetings
  - 2 OEA Scholars/Consultants

Tunisia at ICTP



Zohra Ben Lakhdar

- ICTP Associate 2001-2006
- ICTP Optics activities 1989-2012
- SPIE Fellow 2009
- L'OREAL-UNESCO Award for Women in Science Laureate in Material Sciences 2005

The ICO/ICTP Gallieno Denardo Award for 2008 was awarded to **Mourad Zghal**, *Ecole Supérieure des Communications de Tunis*, Tunisia "for his original work in the development of numerical modeling techniques for photonic crystal fibers, microstructured optical fibers, polarization and for his active commitment aimed at the diffusion of research in optics in Africa."

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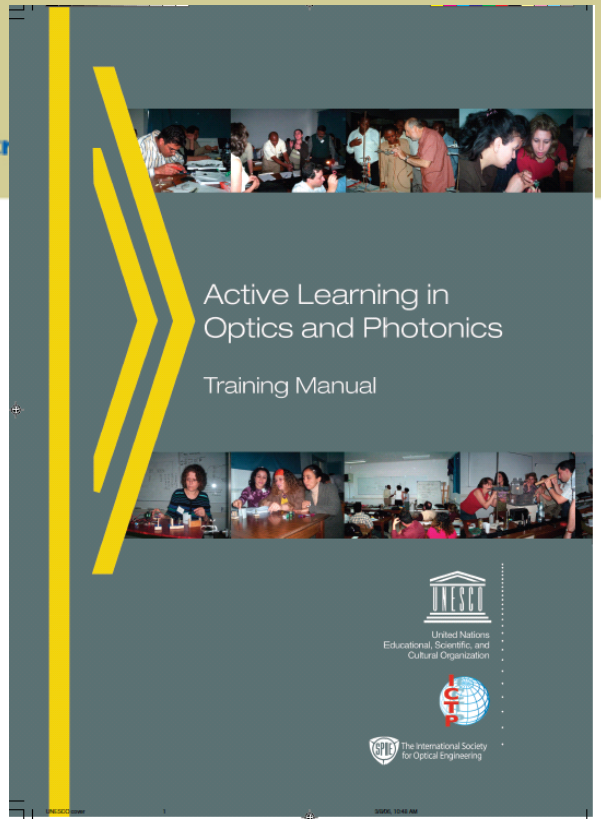

2011
Educator of the Year Award

The team:

Minella Alarcon, UNESCO, France (retired)
Zohra Ben-Lakhdar, University of Tunis, Tunisia
Ivan Culaba, Ateneo de Manila University, Philippines
Vasudevan Lakshminarayanan, University of Waterloo
Joel Maquiling, Ateneo de Manila University, Philippines
Alex Mazzolini, Swinburne University of Technology, Australia
David Sokoloff, University of Oregon, USA.
Joseph Niemela, ICTP (Director of the Programme)

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AFRICAN NETWORK FOR SOLAR ENERGY

Bridging Africans in Capacity Building, Research and Use of Solar Energy

www.ansole.org

Ansole has ~300 members from:

27 African Countries: Algeria, Burkina Faso, Burundi, Cameroon, Chad, Congo-Brazzaville, Democratic Republic of Congo, Cote d´Ivoire, Egypt, Ethiopia, Ghana, Kenya, Malawi, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Togo, Tunisia, Uganda, Zambia, Zimbabwe.

12 non African Countries: Austria, Belgium, China, France, Germany, India, Ireland, Italy, Jordan, Netherlands, Russian Federation and USA

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IAEA International Atomic Energy Agency

Goals

-**Foster training and education in solar energy at various skill levels** (*capacity building*)

-**Foster research activities in the field of solar energy among African scientists and non African scientists who are directly involved in the education of African students and experts** (*research and capacity building*)

-**Promote and encourage the use of solar energy in Africa** (*economy, development and environmental protection*)

The idea to create a network for solar energy was born during the *International Conference on conducting Materials* **ICOCOM (3-7.10 2010) in Sousse, Tunisia.**

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ICTP IN AFRICA

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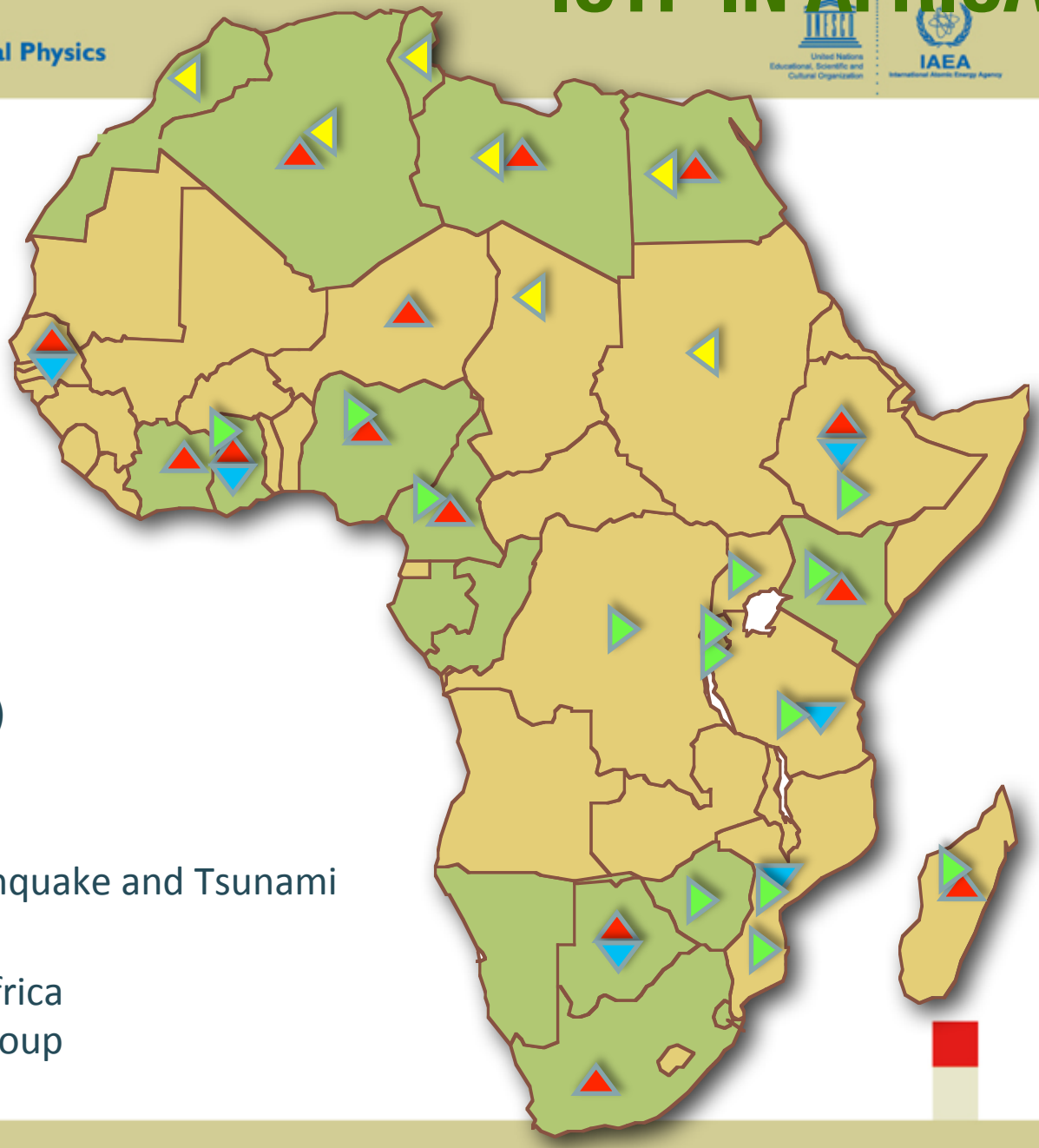
ICTP Earth System Physics Networks (ESP)



- Climate Network
- AfriCARP (FITU) Network
- North African Group for Earthquake and Tsunami studies
- Sub-Saharan Africa Geophysical Group

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United Nations Educational, Scientific and Cultural Organization

IAEA International Atomic Energy Agency

N A G E T

North African Group for Earthquake and Tsunami studies

ICTP Science Network

http://naget.ictp.it/

Six countries
31 NAf institutions
114 members

- Seismologists
- Geologists
- Geophysicists
- Engineers
- Archeologists,
- Architects,
- Historians.

Tunisia: **ENIT (Tunis), ENIS (Sfax), ESC (Tunis), STEG (Tunis), INM (Tunis)**

17 AUGUST 1999, IZMIT (TURKEY)

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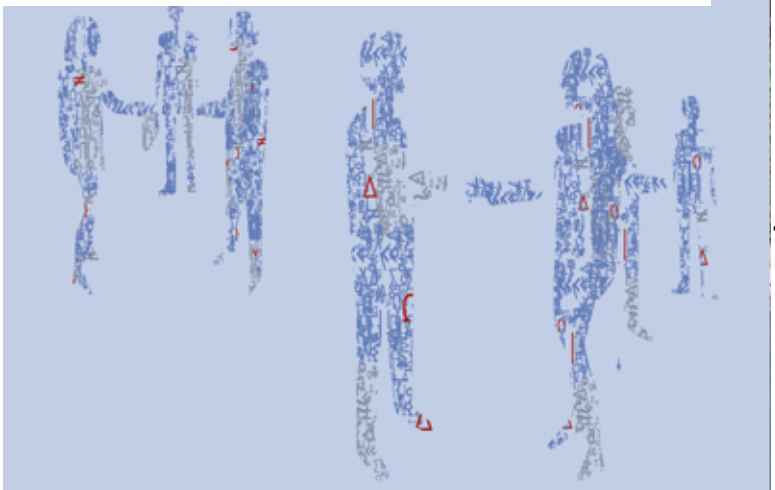
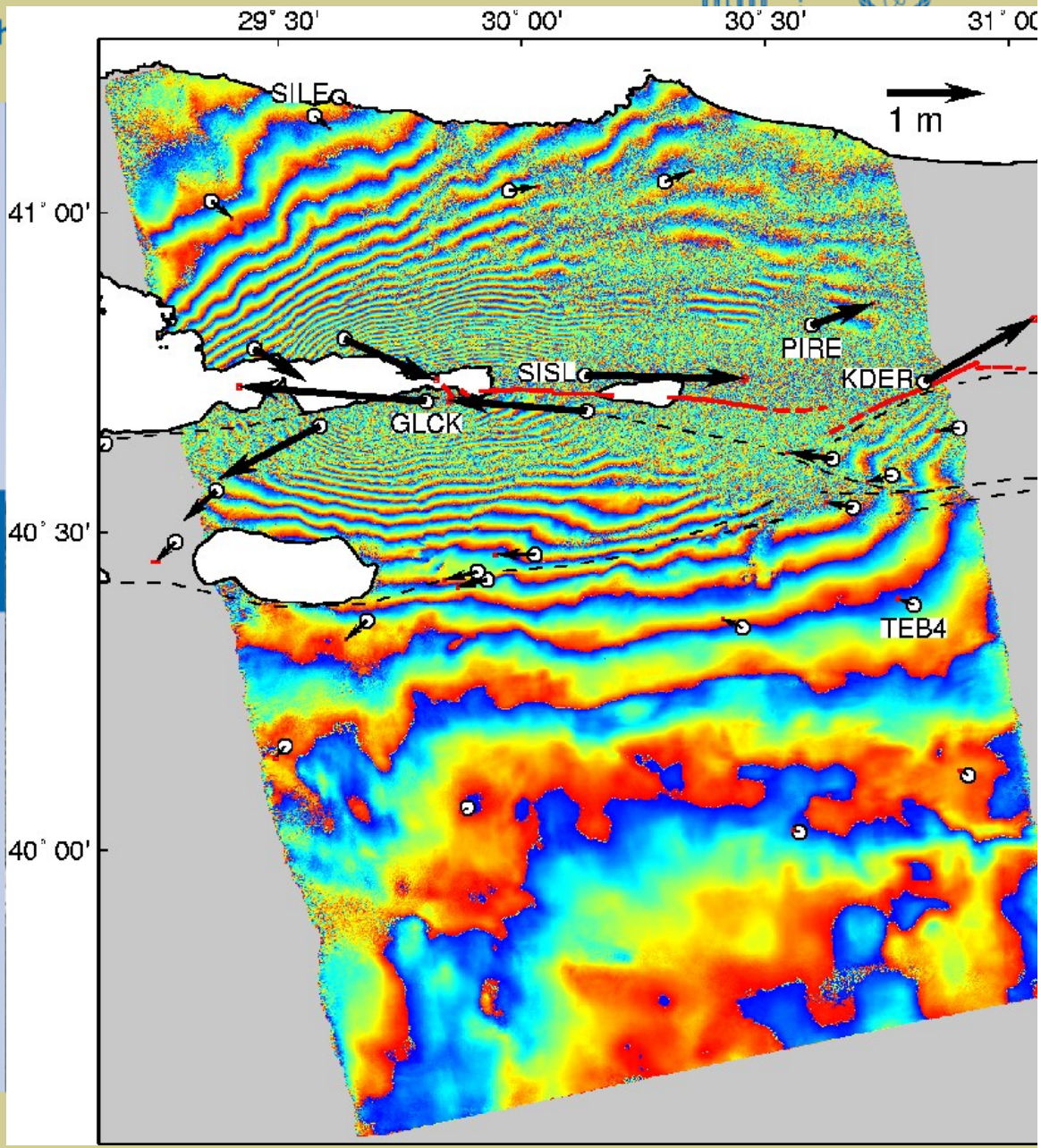
THE IZMIT EARTHQUAKE DISPLACEMENT FIELD





InSAR – how it works

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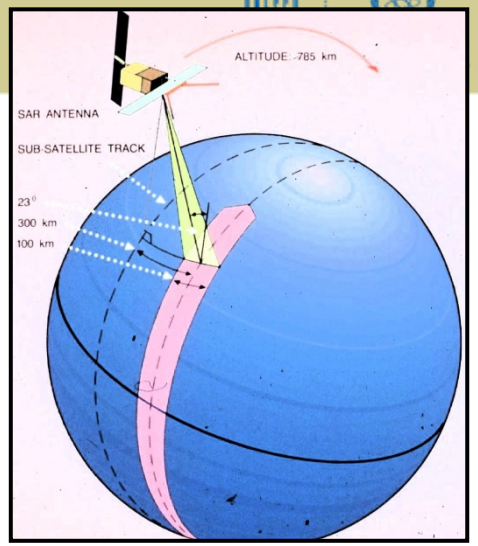
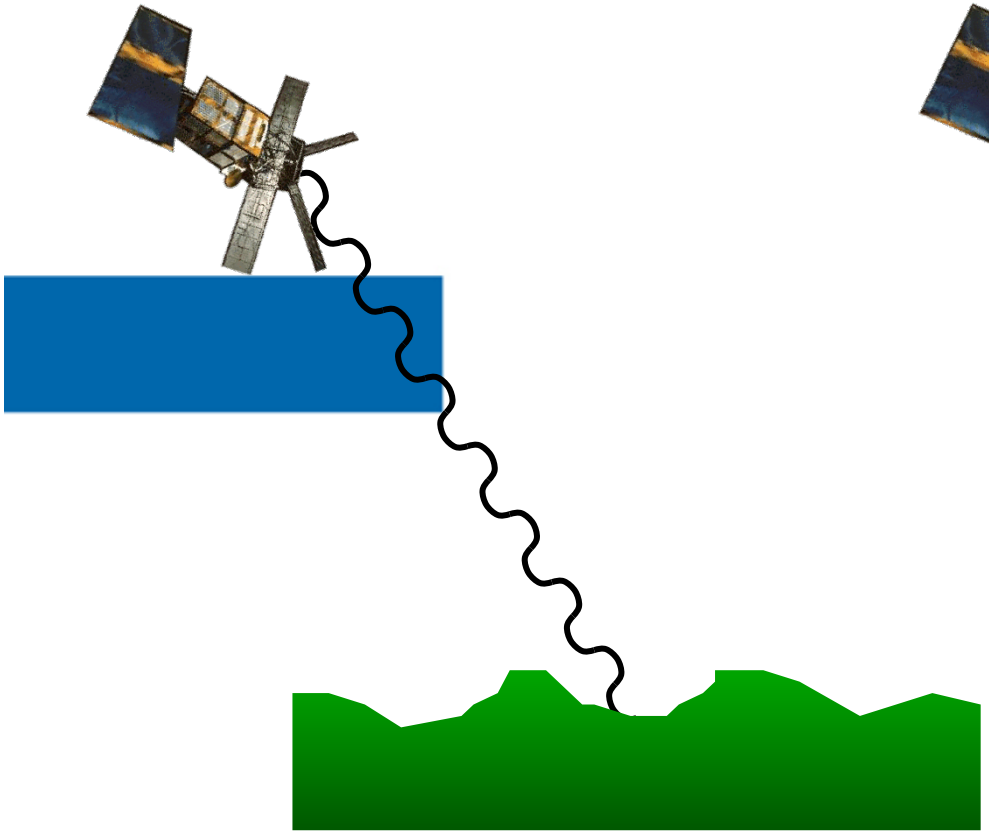
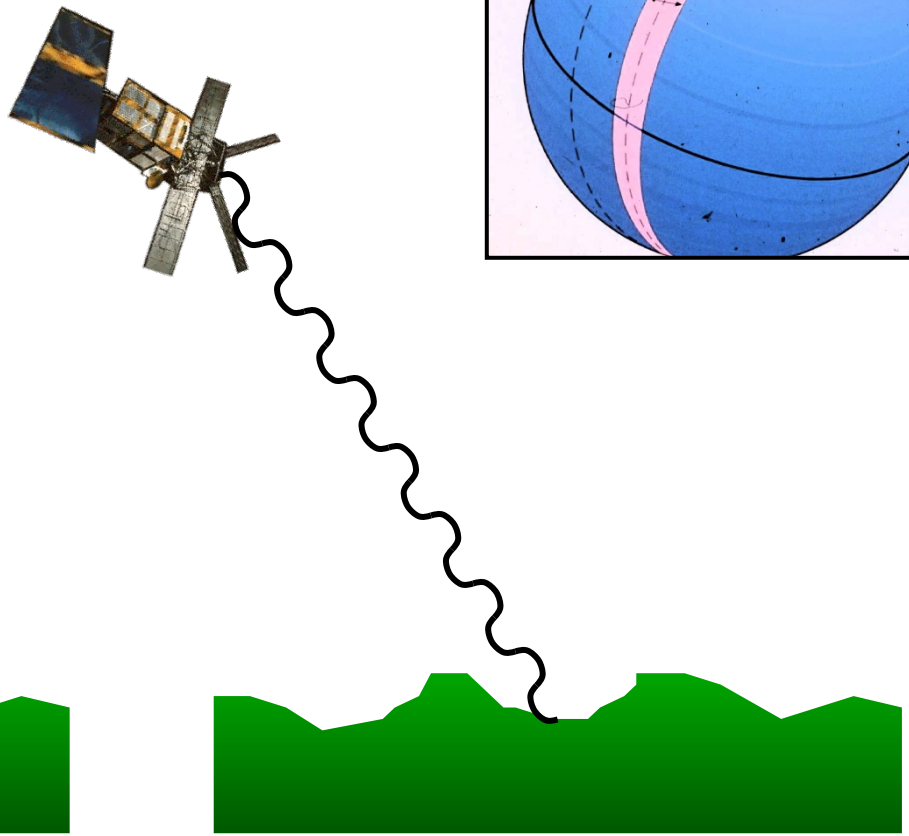
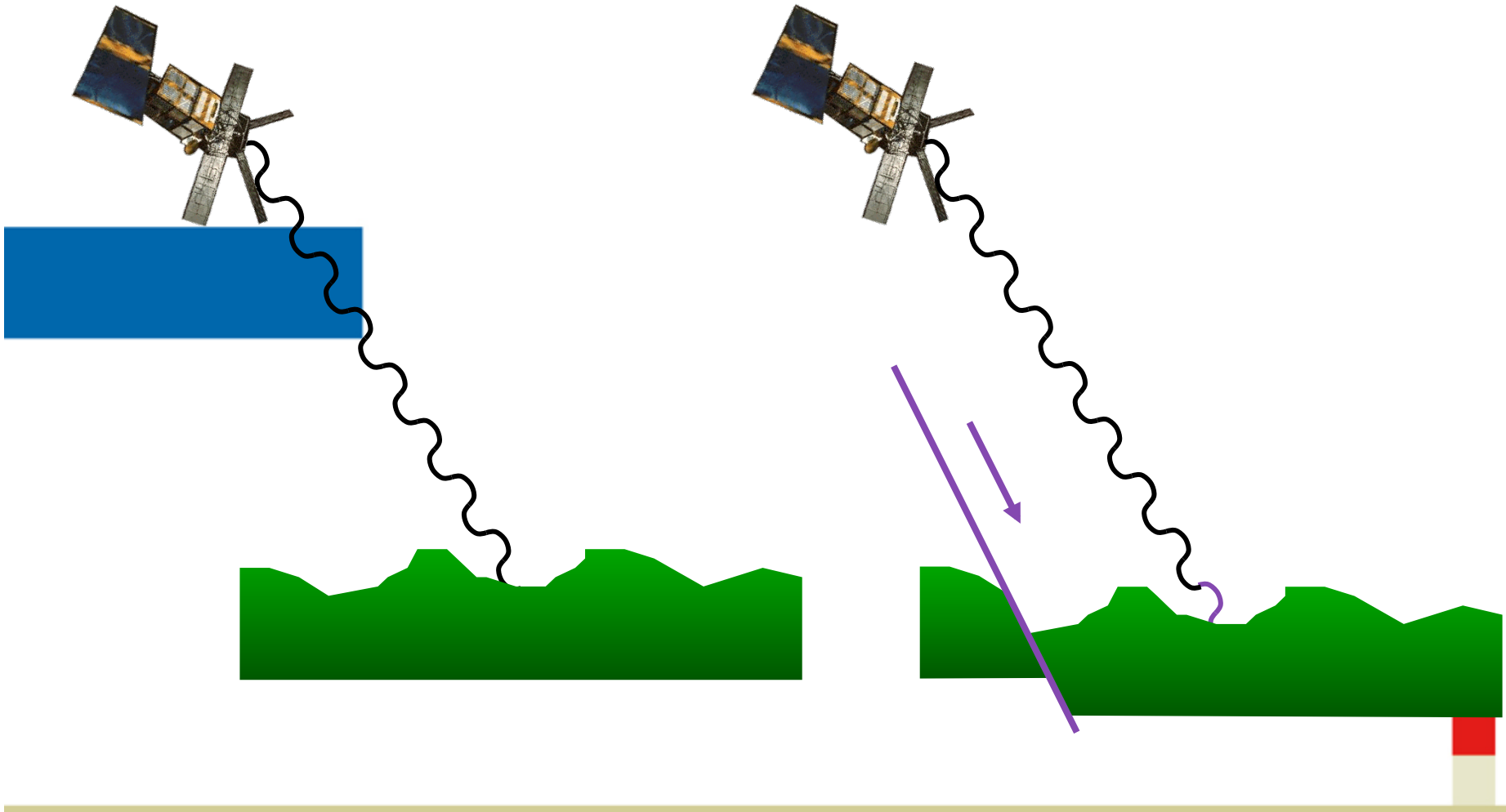


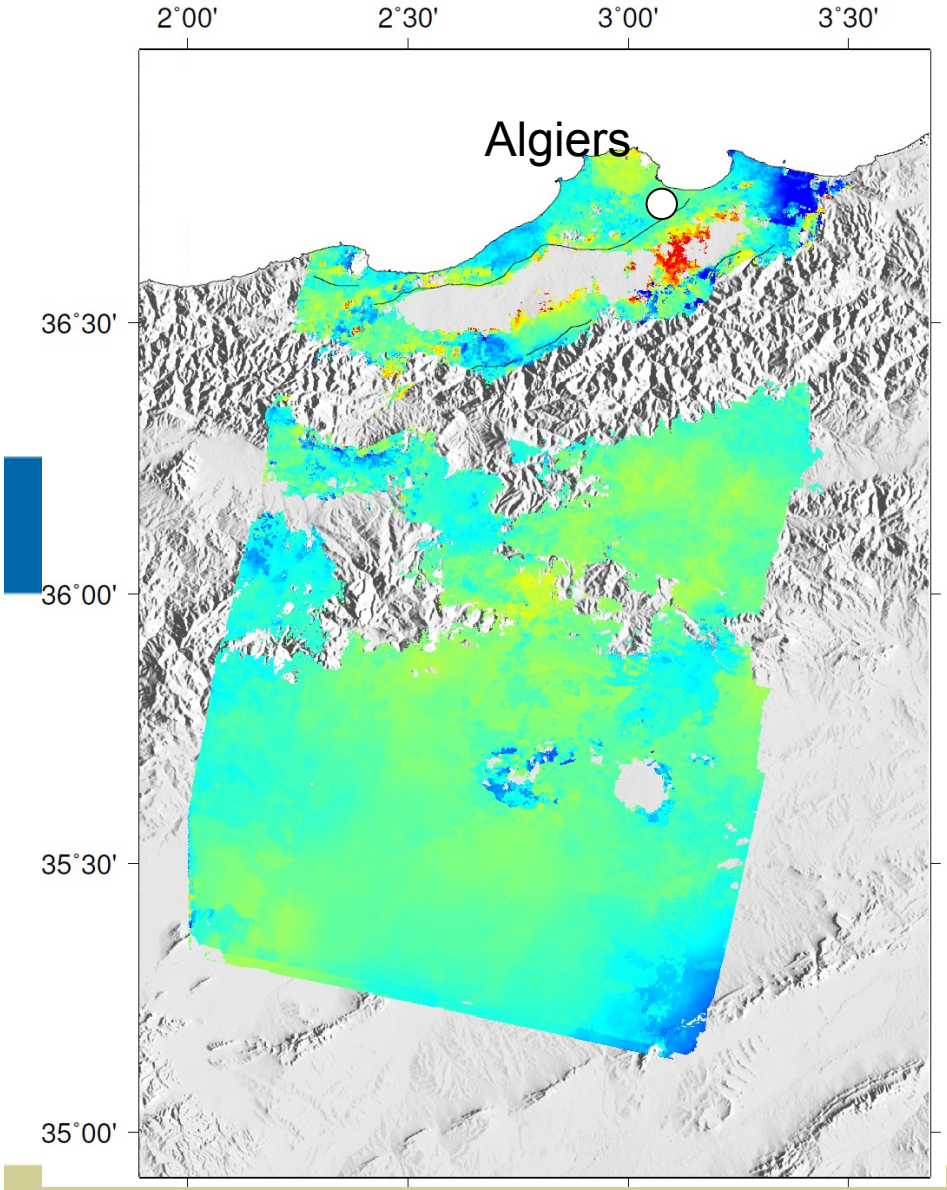


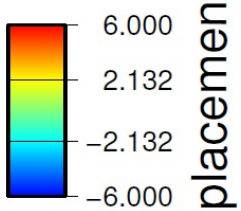


InSAR – how it works



Crustal Deformation across northern Algeria from Satellite Radar Interferometry

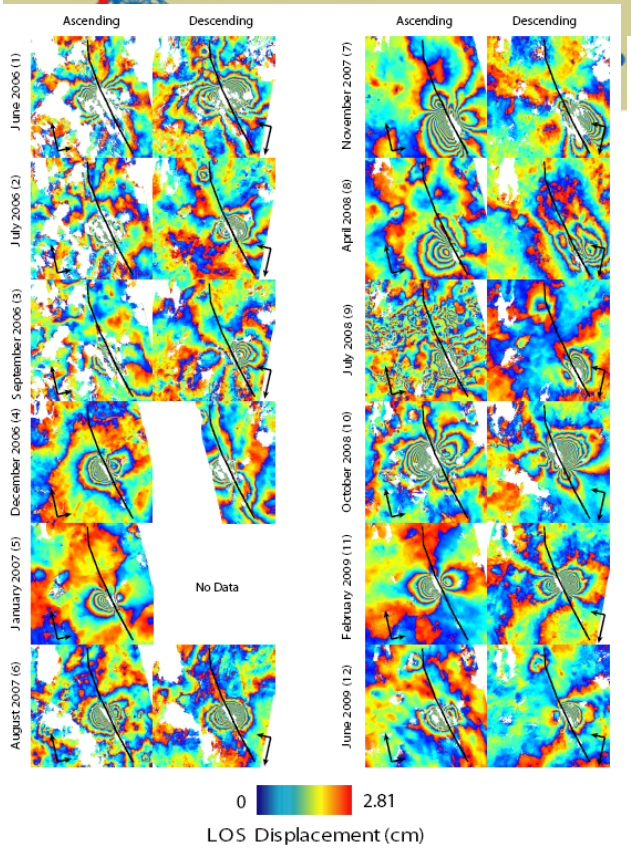




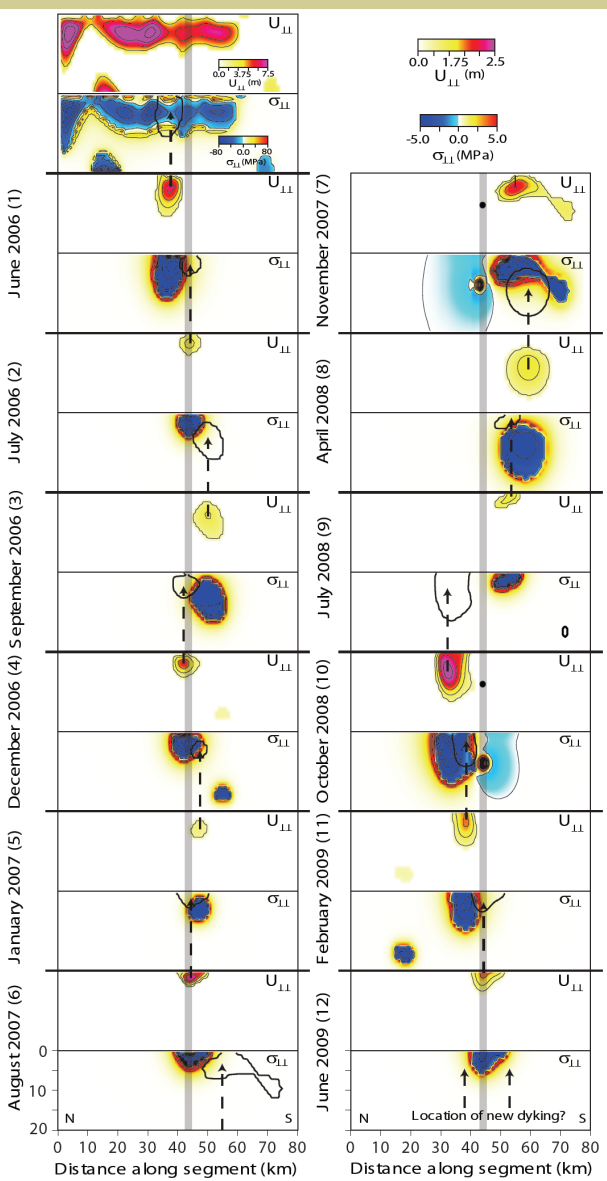
LOS displacement mm/yr

Deformation is concentrated along the Sahel anticline and within the Mitidja basin close to the city of Algiers. In addition, the large displacement rates are observed close to the epicentre of the 2003 Zemmouri earthquake

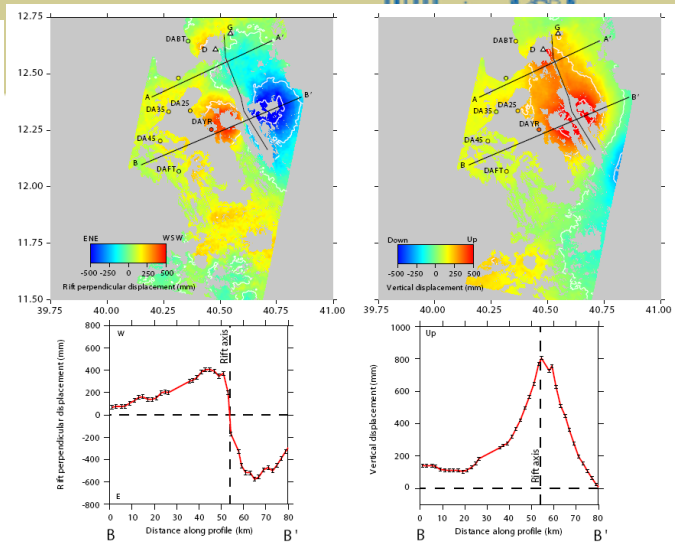
Geodetic observations of dyke intrusions in Afar, Ethiopia.



- InSAR has detected 12 new magmatic intrusions in the remote Afar desert, Ethiopia (top)
- Modelling suggests that the location of new magmatism is controlled by the stress transfer from the previous event providing a method for predicting the location of eruptions (right)



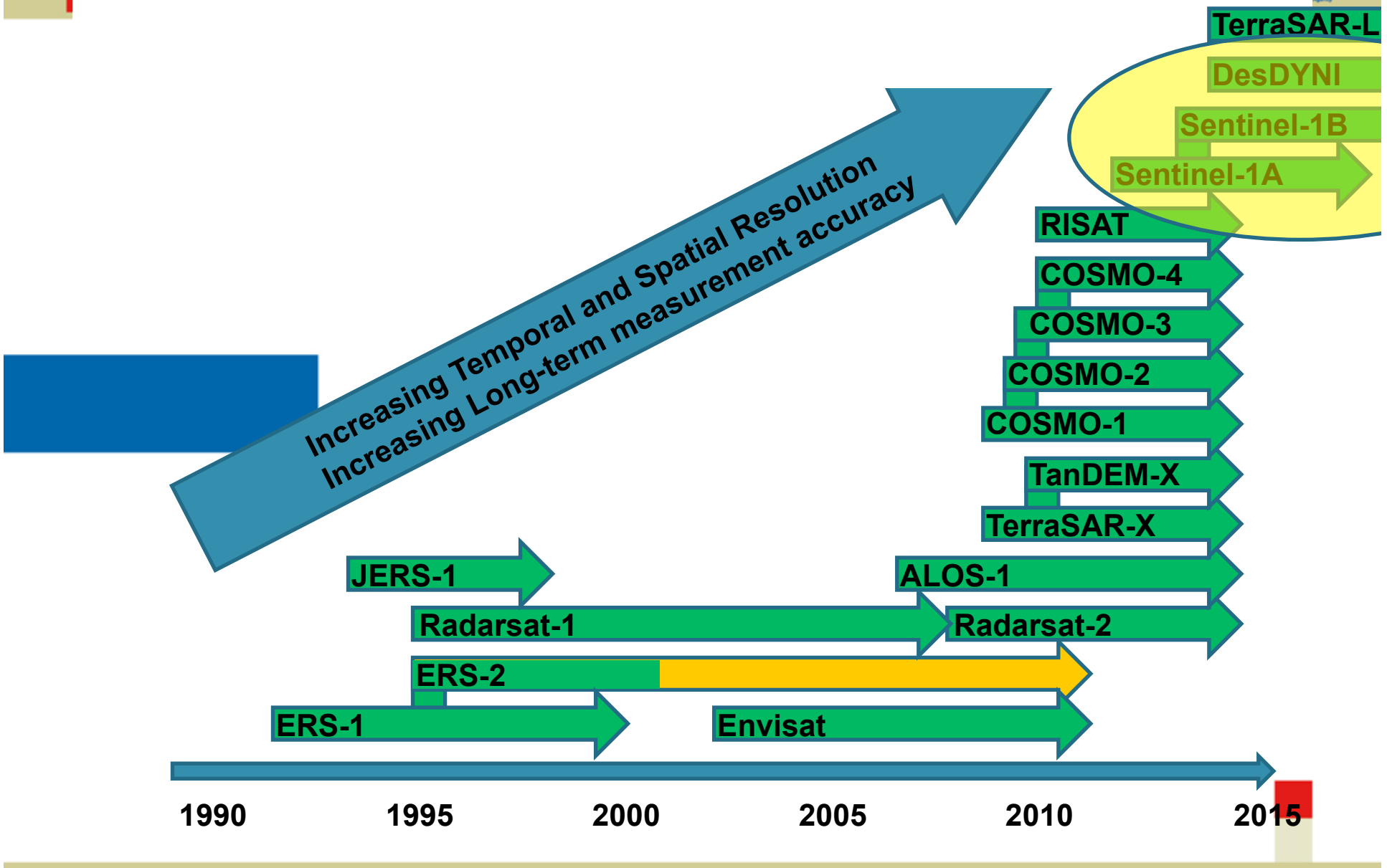
Hamling et al., 2010. Nature Geoscience.



Modelling of visco-elastic relaxation

- Invert for the rift perpendicular and vertical displacements (above).
- Using simple visco-elastic models we are able to determine rheological properties for a region of incipient sea-floor spreading

Launched and Planned Radar Satellites



The Future

Sentinel-1 (ESA, GMES)

- Funded, Launch 2013

The Future

NASA:

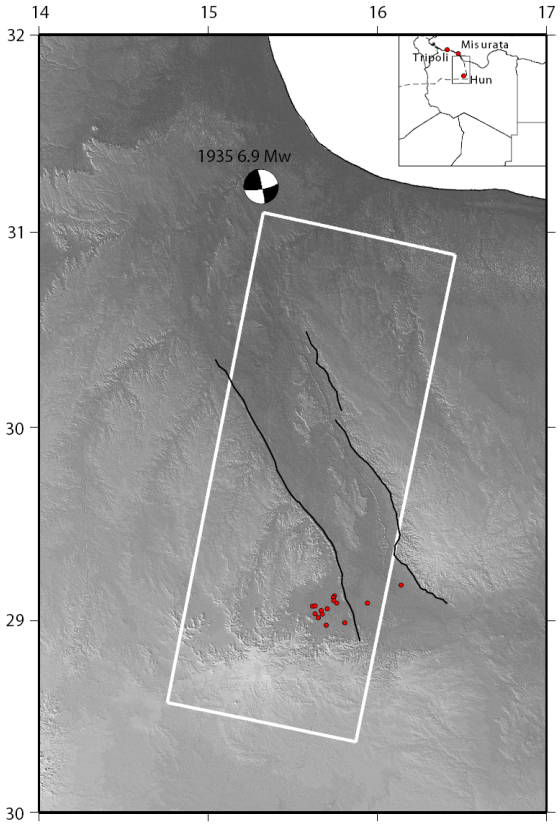
- Funding not yet confirmed
- Proposed launch 2013

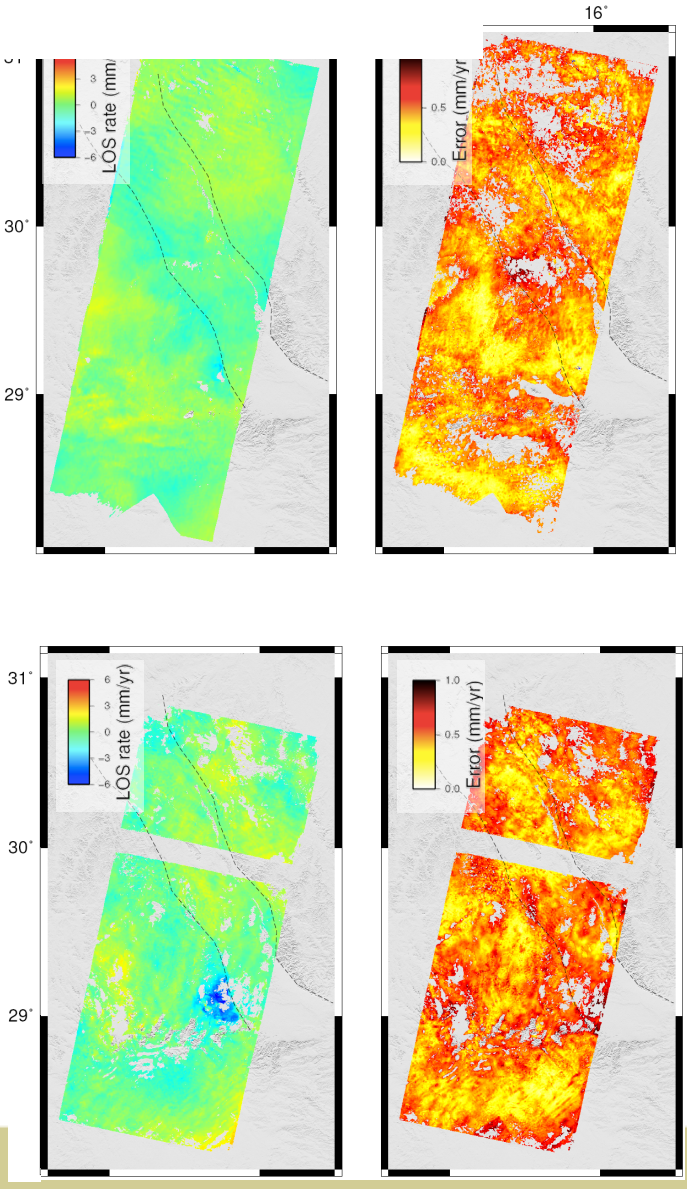
The Future

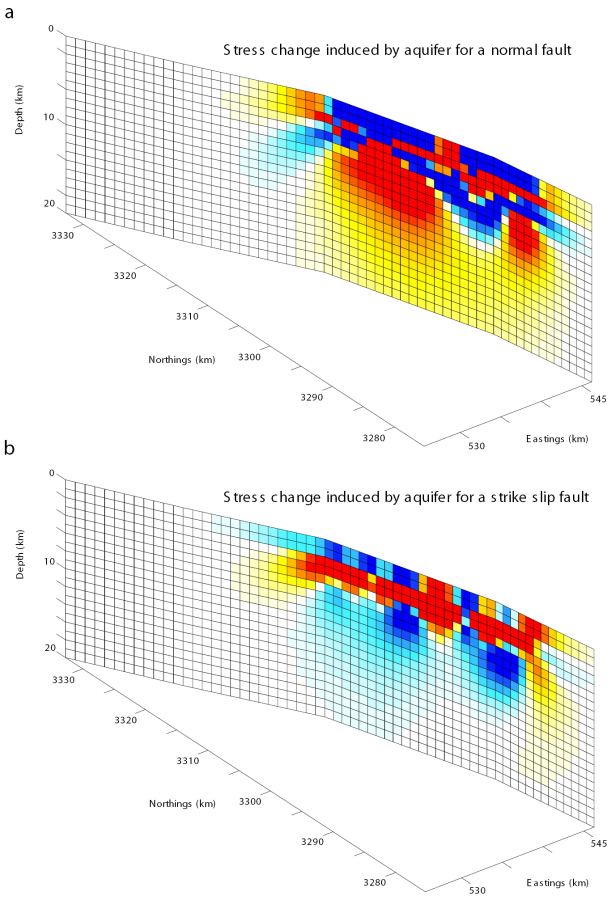
"InSAR everywhere, all the time"

The alternative to satellite monitoring

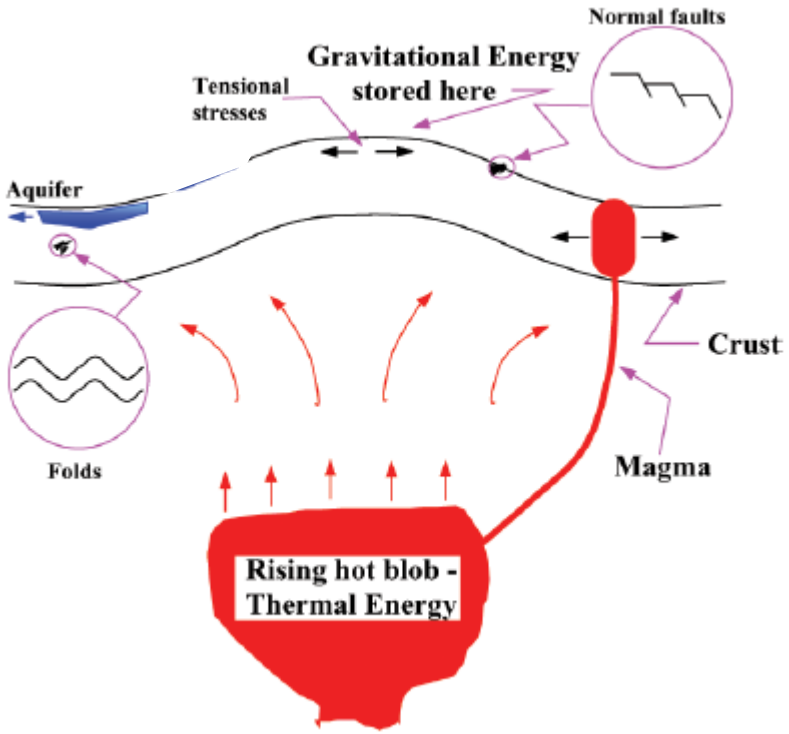
Interaction between the North-West Sahara Aquifer and the Hun Graben Fault system, (Libya). The Hun Graben stands above a thermal anomaly



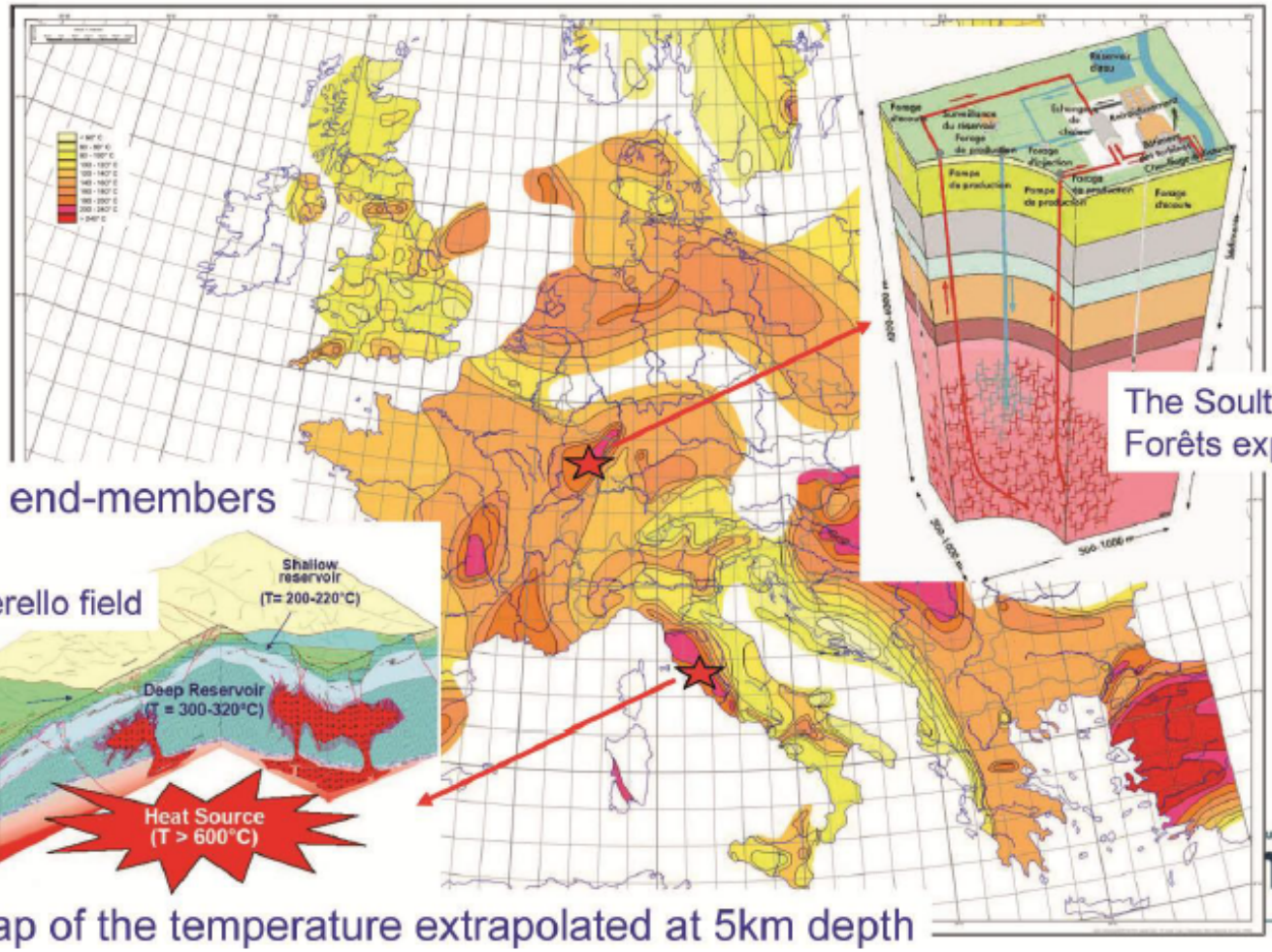




Dynamics of the Hun Grabben



The Enhanced Geothermal System concept, a perspective for continuous base load-power generation in 20/30 years ?



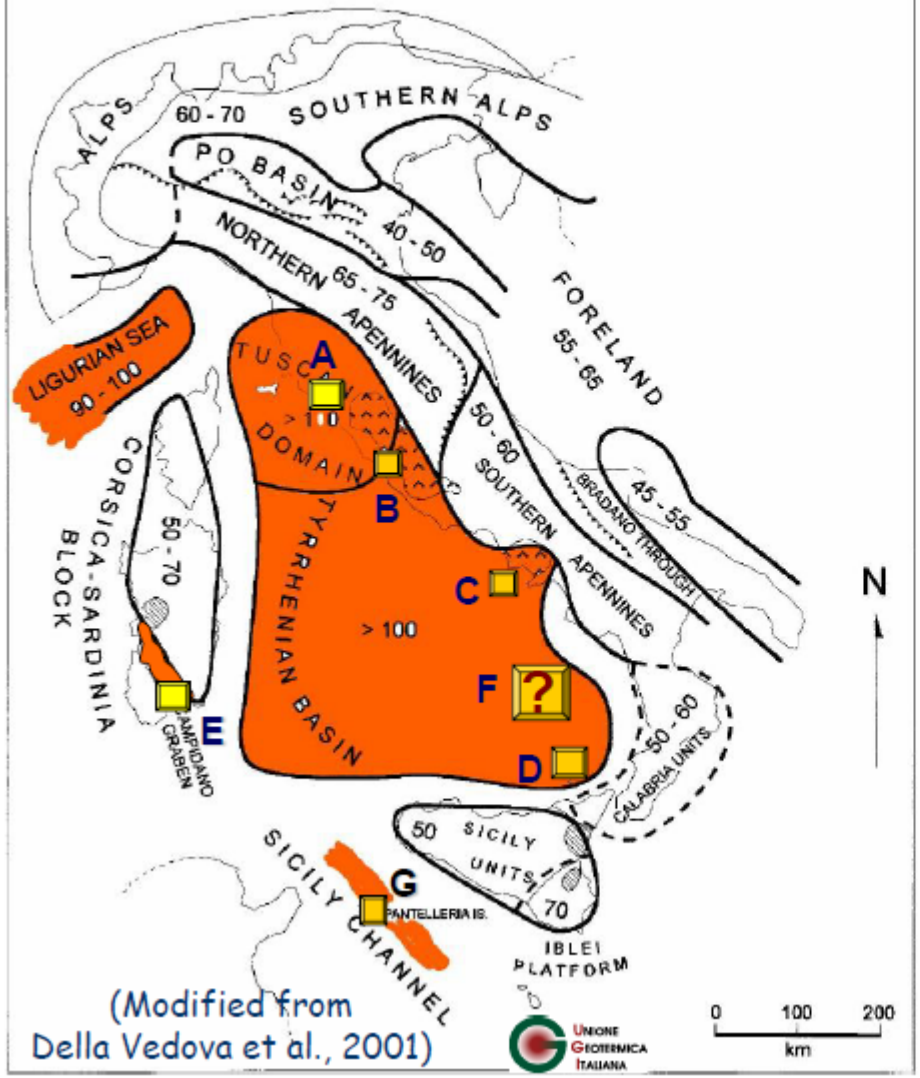
The Soultz-sous-Forêts experiment

Two end-members

Map of the temperature extrapolated at 5km depth

(after Genter, Huenges, 2006)

Offshore, Islands and Coastal Areas Potential



A.) Coastal areas of Toscany
T≥ 150 °C at ~ 2 km

B.) Latium Province
T≥ 150 °C at ~ 2 km

C.) Flegrean Province
T≥ 200 °C at ~ 2 km

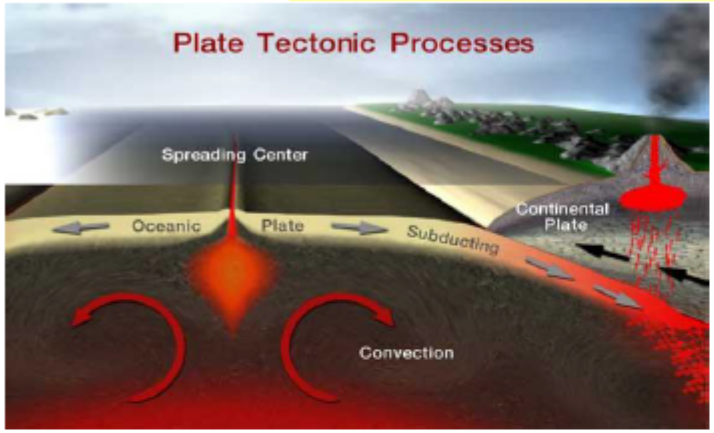
D.) Eolian Is.
T≥ 200 °C at ~ 2 km

E.) Sardinia (Campidano Graben)
T≥ 150 °C at ~ 2 km

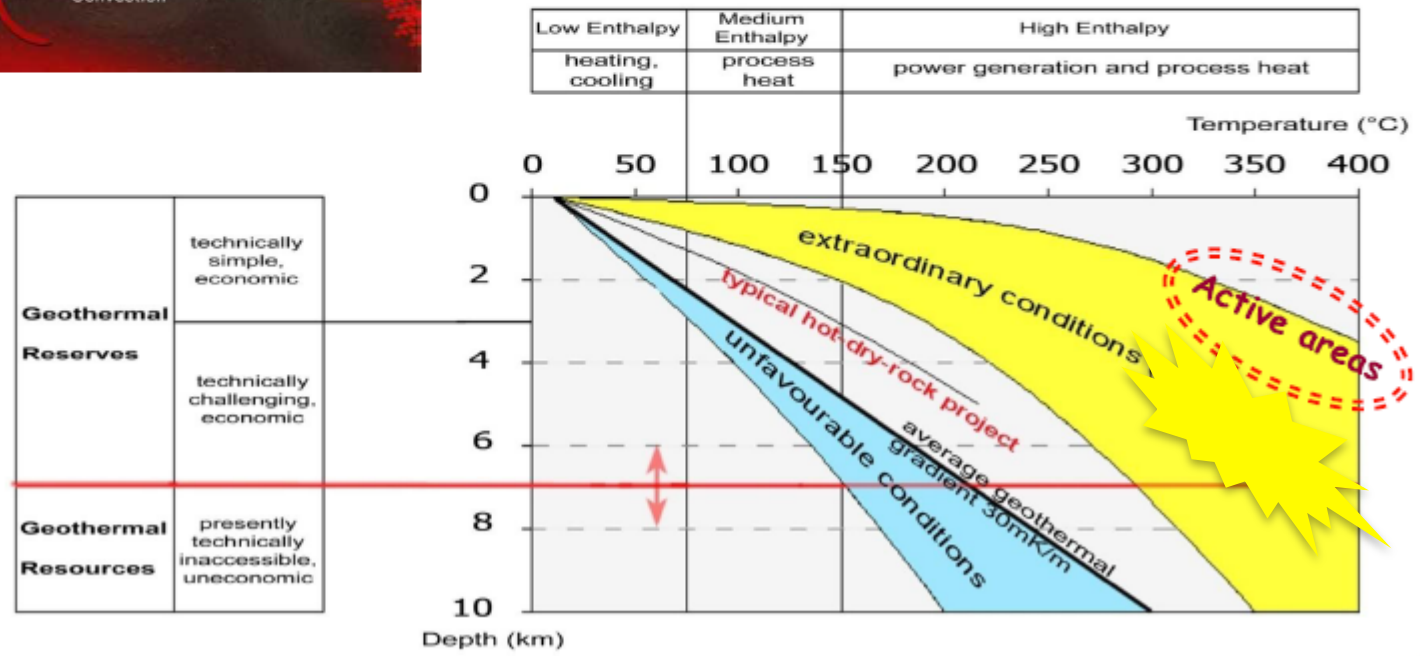
F.) Submarine volcanoes Palinuro, Marsili
T≥ 200 °C at ~ 1,5-2 km below sea floor

G.) Sicily Channel (Pantelleria Is.)
T≥ 250 °C at ~ 2 km

Geothermal Resources & Reserves



- Heat potential is enormous
- Present at shallow depth in active areas
- Better resources Atlas needed



(Modified after B. Cociancig)