CO_2 storage science development and application in Italy

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DIPARTIMENTO
DI SCIENZE DELLA TERRA

Carbon Sequestration Leadership Forum, 16-19 April 2013
Rome , Italy

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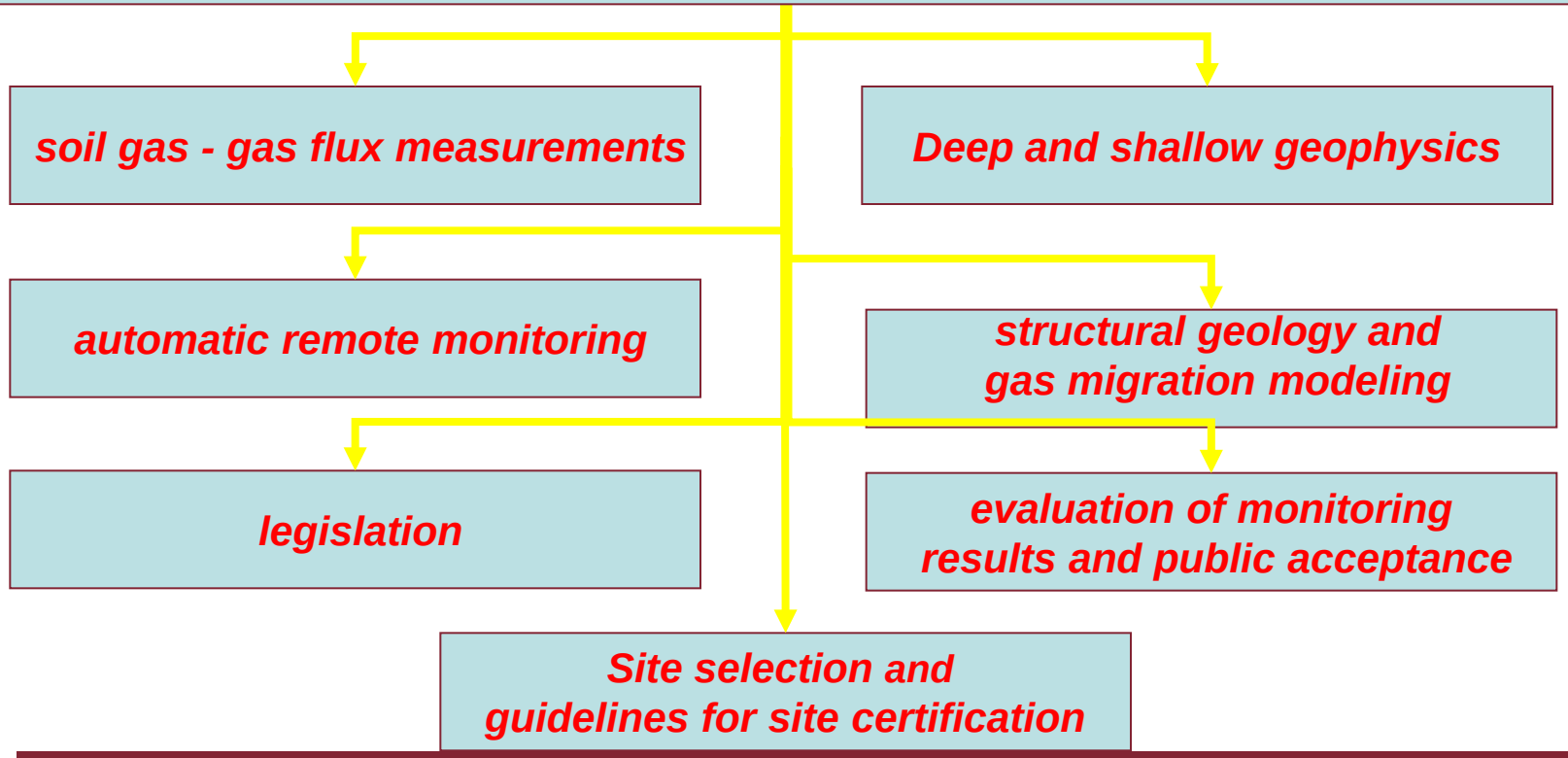
Objectives

- Site selection and characterization
- Acquisition of CO_2 baseline onshore and offshore
- Developing and testing monitoring tools (onshore-offshore)
- Risk assessment
- Public awareness and legislation



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CGS: major organizations in Italy

- **Governmental Authorities**
  - Ministero dello Sviluppo Economico
  - Ministero dell'Ambiente
- **Research Organizations**
  - CNR, ENEA, INGV, **OGS**, RSE
- **Industries**
  - ENEL, ENI
- **Universities**
  - Cagliari University
  - **La Sapienza, Rome University**

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Potential areas for CGS in Italy

CSLF 2013 meeting, 16-19 April 2013, Rome, Italy

Areas suitable for CO2 storage

(~ 12 Gton)

EC Geocapacity and Italian project results

(OGS)

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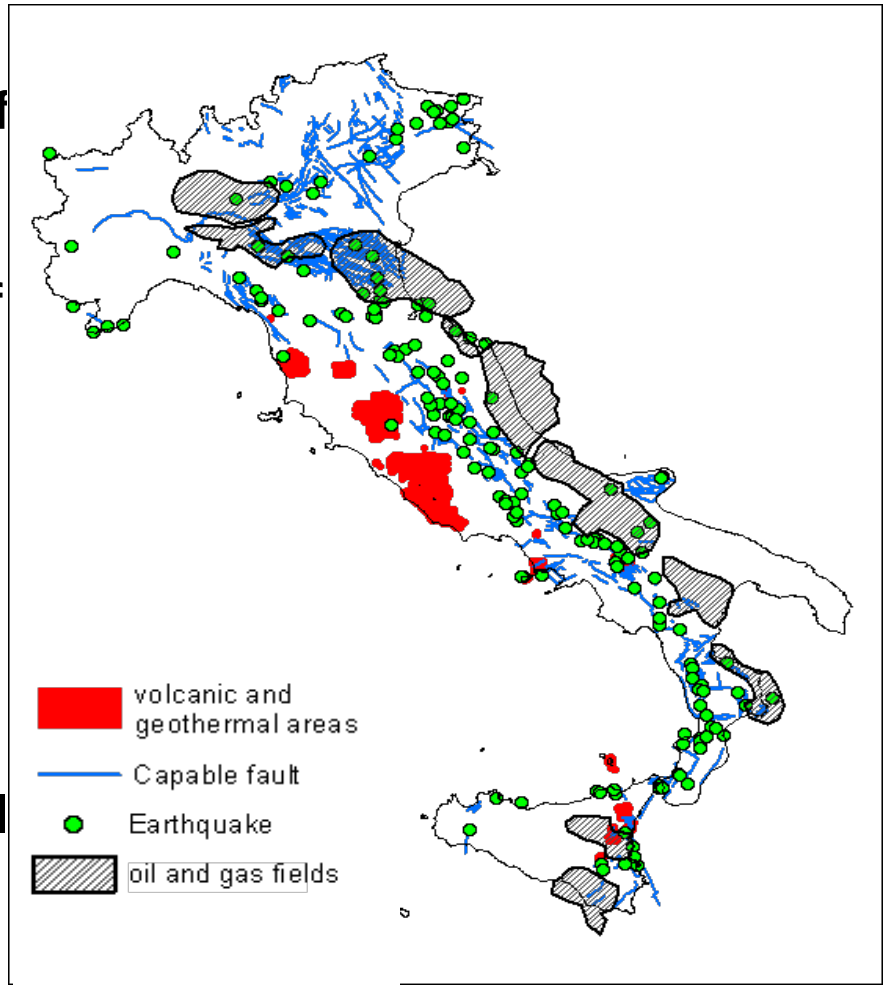
CO_2 baseline in Italy

Studying migration of deep seated gases, researchers of Rome University have performed geochemical surveys over a wide range of geological scenarios :

- **Volcanic areas**
- **Tectonic areas**
- **Adriatic through**

- **As consequence CO2 baseline at regional and local scale have been evaluated**



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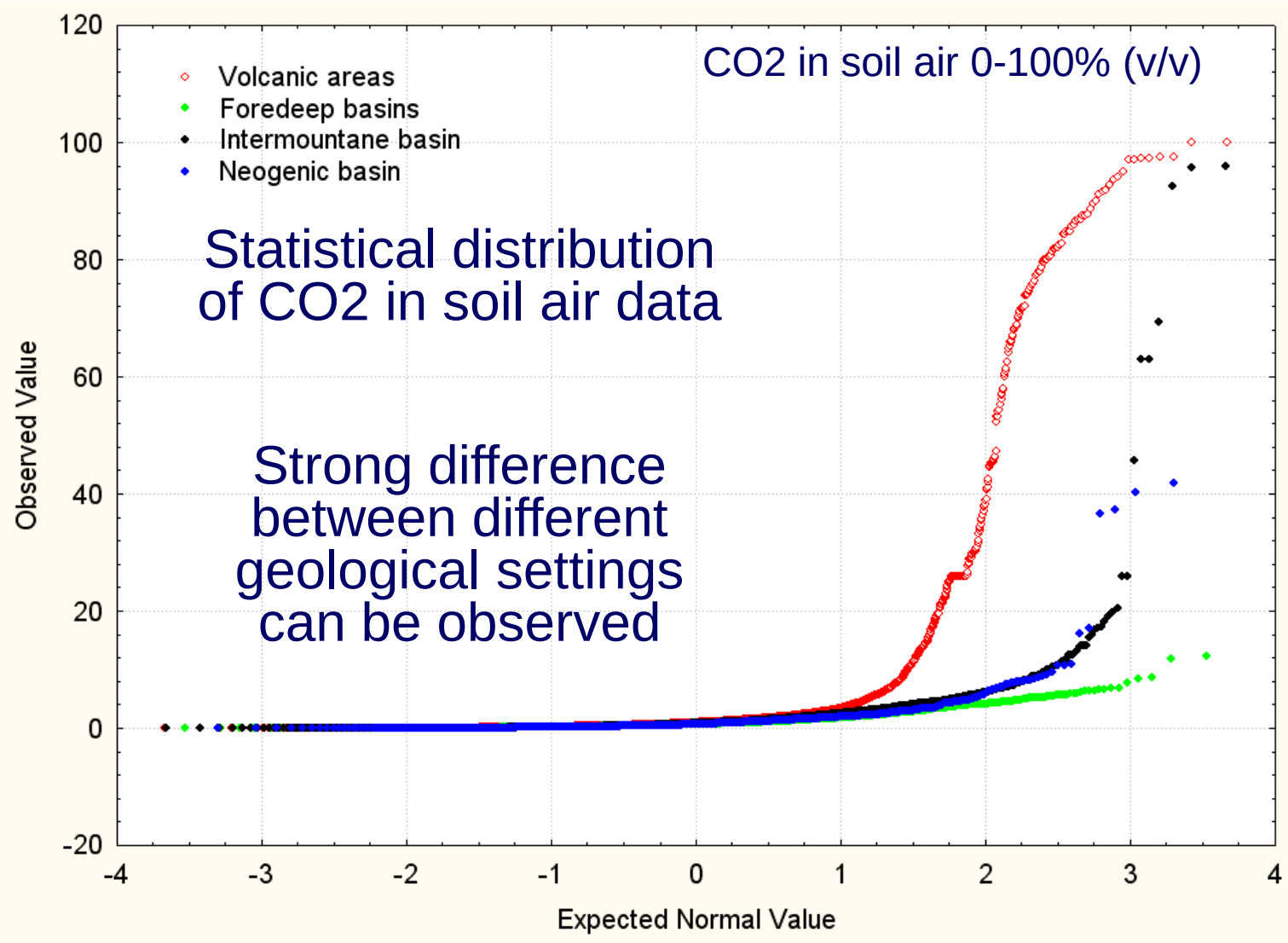
CO_2 baseline in Italy



CO_2 baseline in Italy

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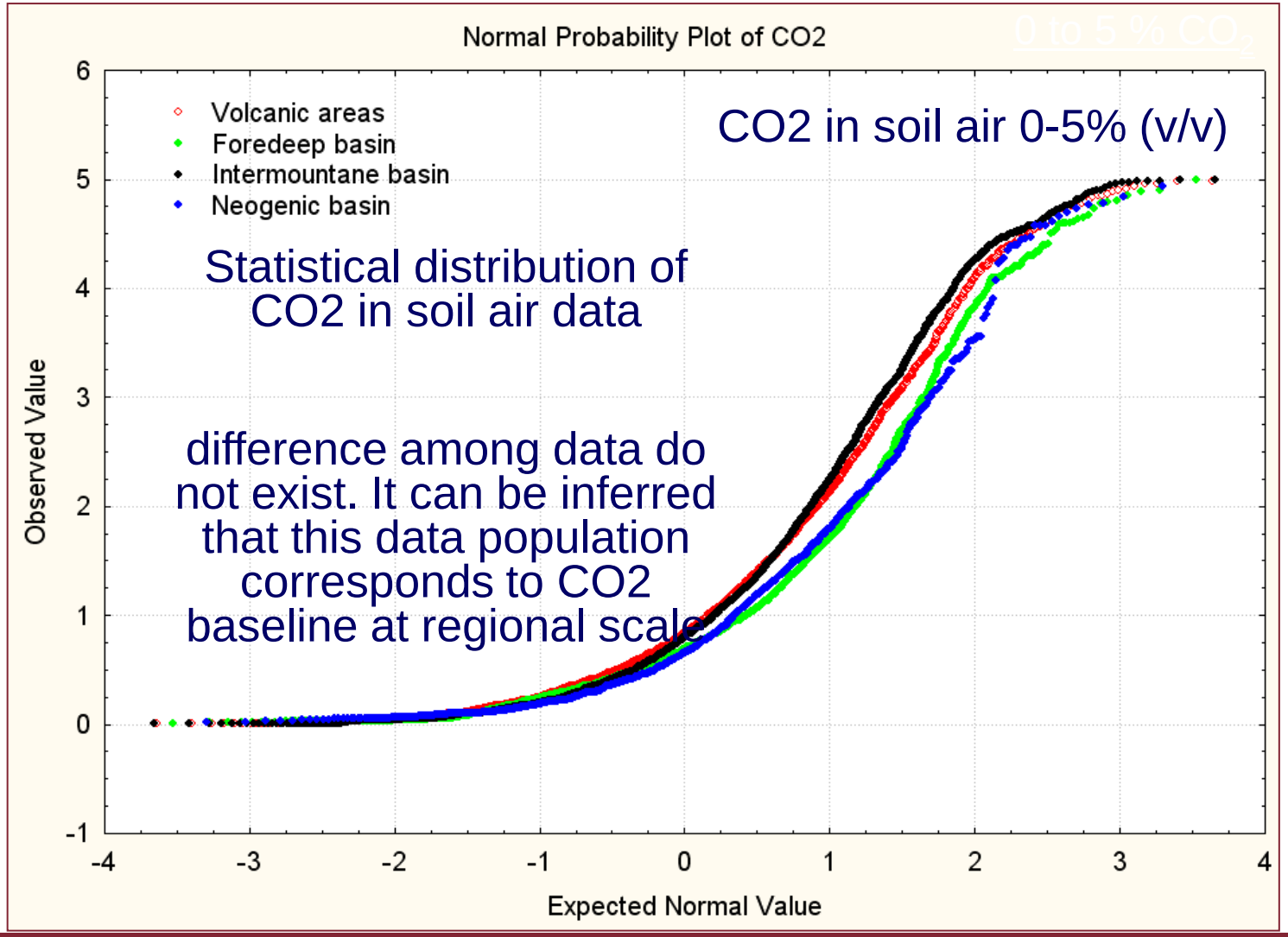

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Use of Natural Laboratories for gas migration studies: methods applied at Latera caldera by OGS and URS

- Soil gas and CO_2 flux
- Gas injection tests through faults
- Structural survey
- Gas migration modelling
- Ground Penetrating Radar
- Microgravity
- Magnetometer
- *Seismic data acquisition (deep seismic profile - OGS)*
- Electromagnetic survey
- Geo-electrical survey (resistivity survey)
- Spectral induced polarization
- Self Potential Mapping
- Time Domain EM
- Vertical Electrical Sounding (VES)
- Surface water conductivity survey
- *Remote sensing (OGS, URS)*

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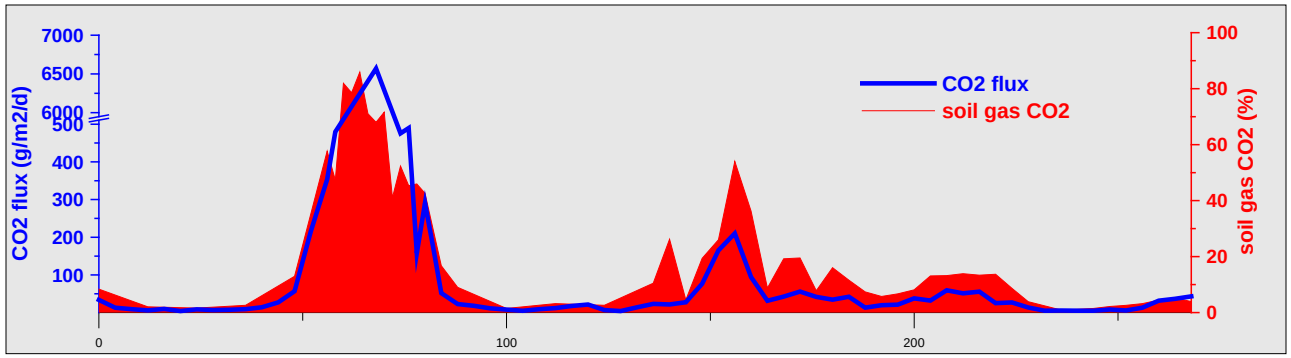
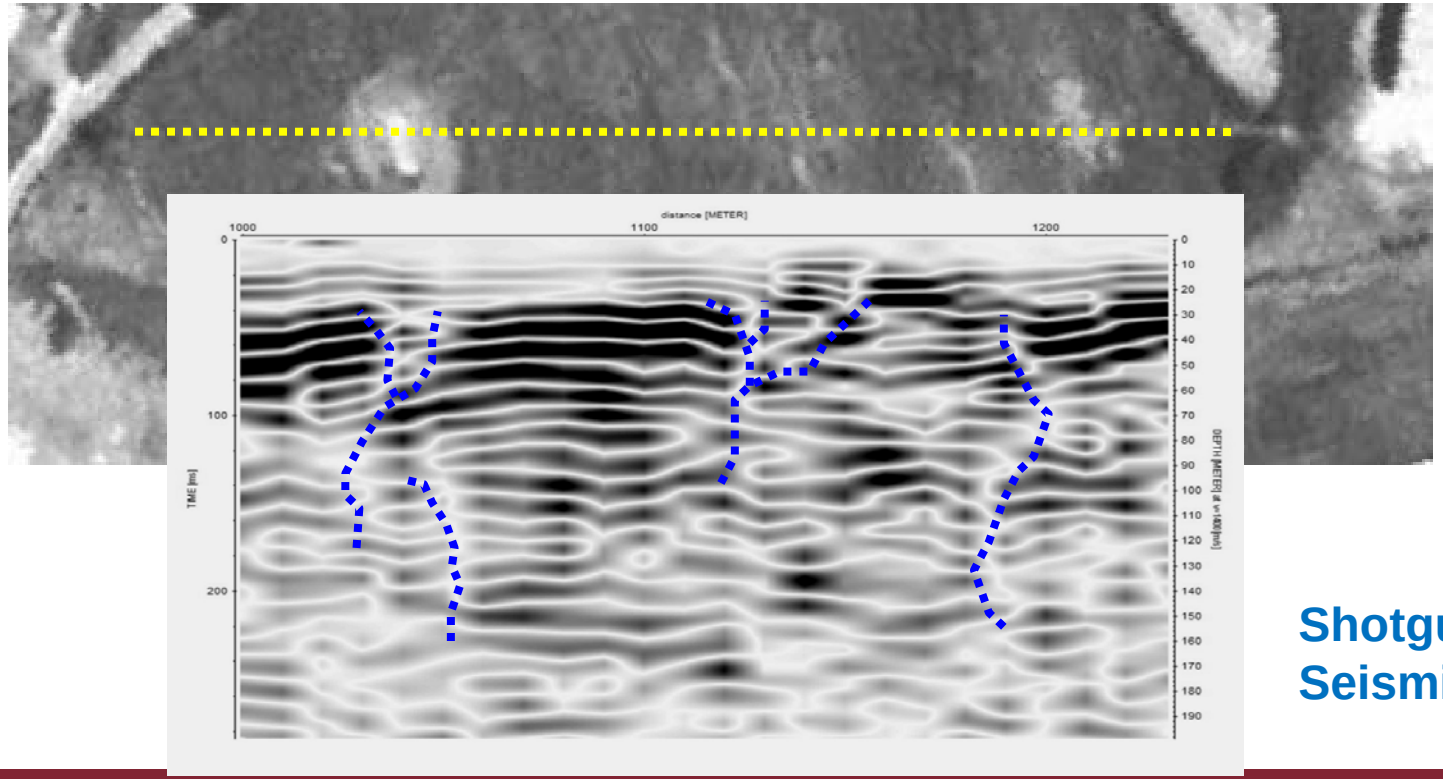
Use of Natural Laboratories for gas migration studies at Latera gas vents



Soil gas survey



Aerial photo

Shotgun Seismic

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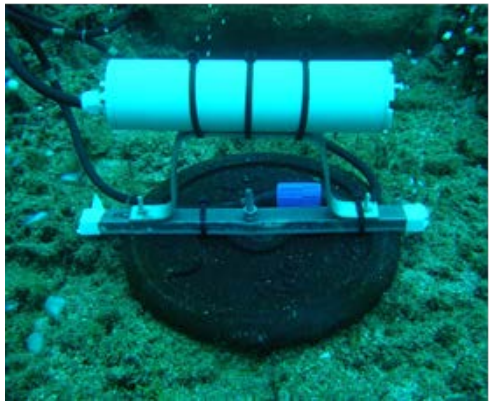
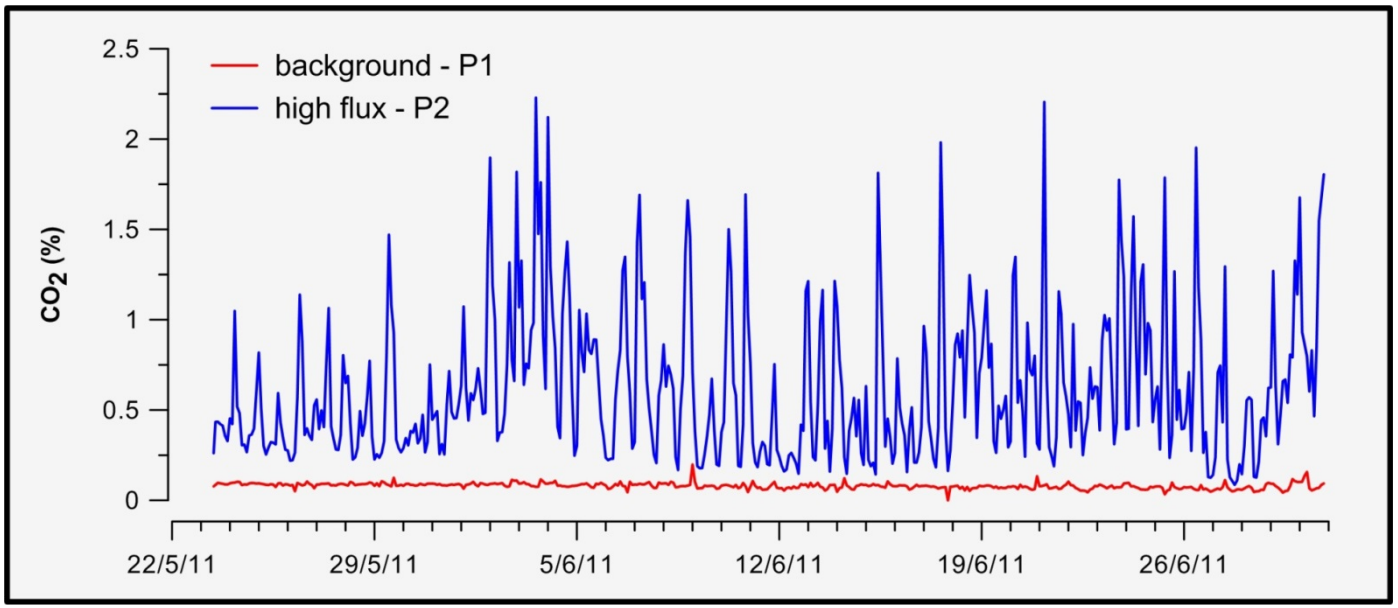
Shallow marine geochemistry: CO_2 marine baseline; developing monitoring tools





- Use of continuous monitoring probes for CO_2 at natural leaking marine site near Panarea (sea bottom). Note difference between non-leaking and leaking areas

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Industrial initiatives

- Porto Tolle (ENEL)
- Coalbed methane and enhanced coalbed methane recovery and CO2 geological storage performance assessment in the Sulcis basin (Carbosulcis-ENEA-Sotacarbo)
  - Partners:
    - **BRGM** – Bureau de Recherches Geologiques et Minières, (France)
    - **IFPEN** – Energie Nouvelles, (France)
    - **IMPERIAL** – Imperial College, (UK)
    - **OGS** - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (Italy)
    - **TNO** - Netherlands Institute of Applied Scientific Research, (Netherland)
    - **URS** – CE.RI. – Centro di Ricerca « Previsione, Prevenzione e Controllo dei Rischi Geologici, “La Sapienza” Università di Roma, (Italy)

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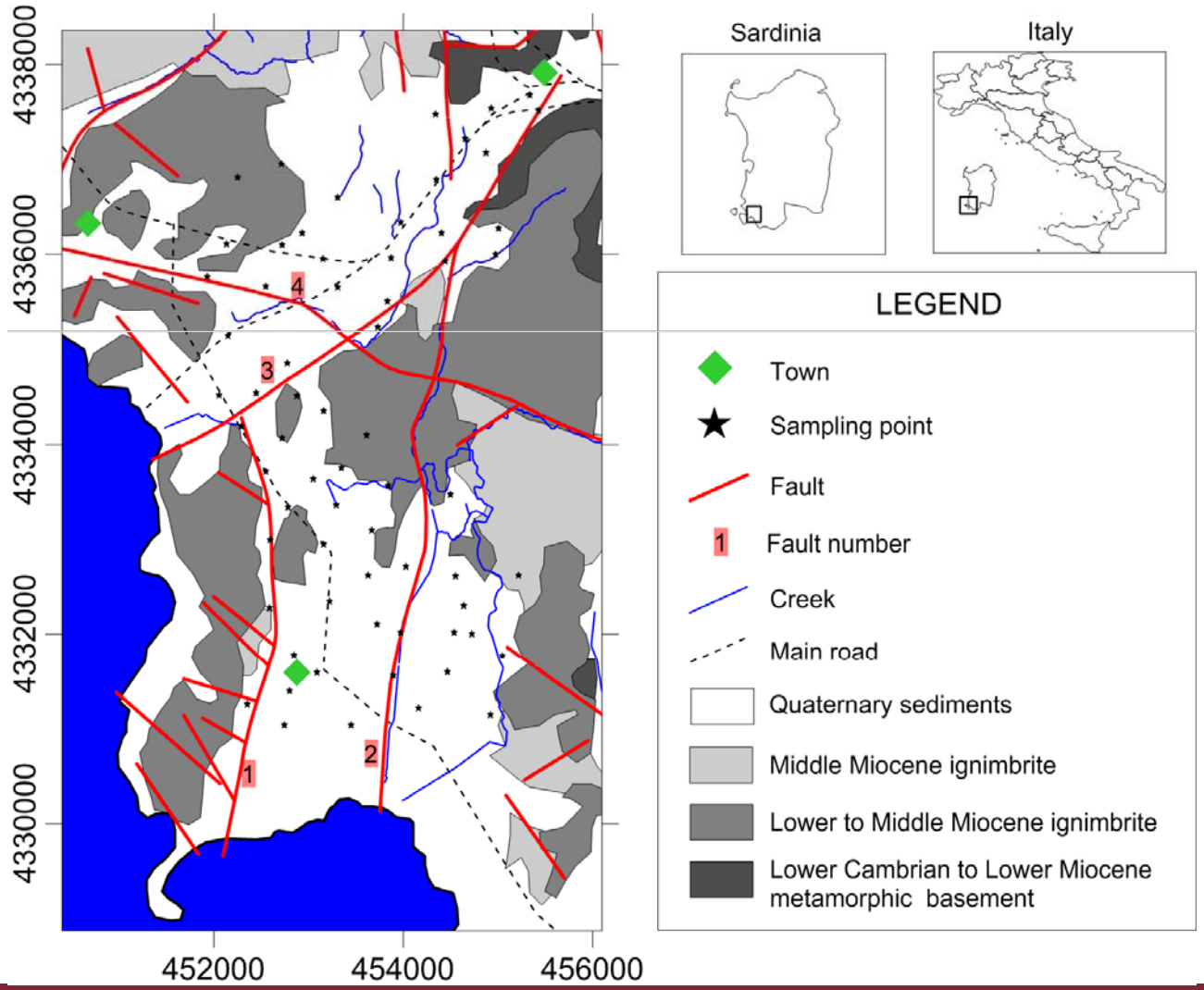
Geological scketch map of Sulcis area



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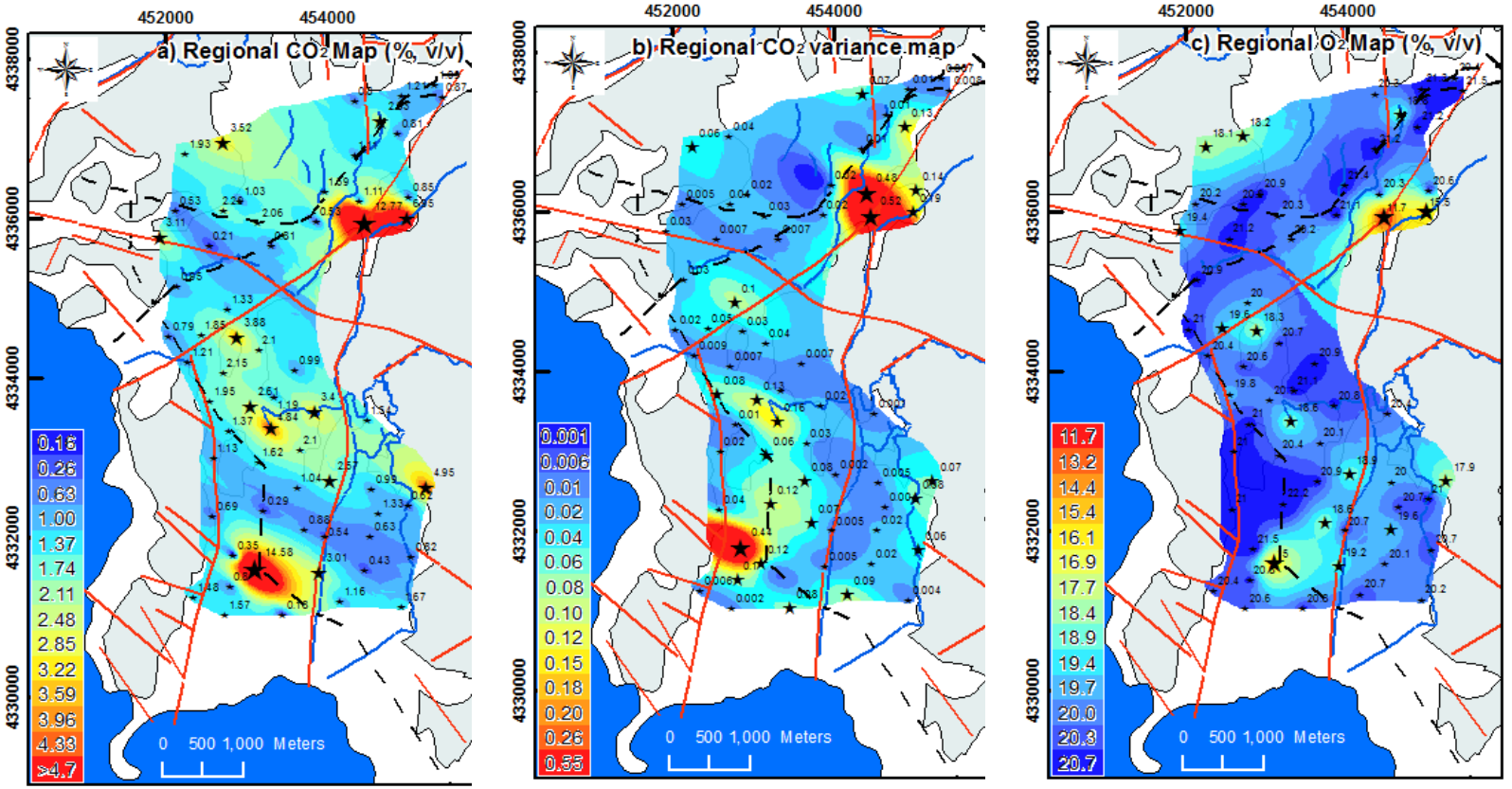
Gas migration at Sulcis area



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Network of continuous monitoring stations at Sulcis area

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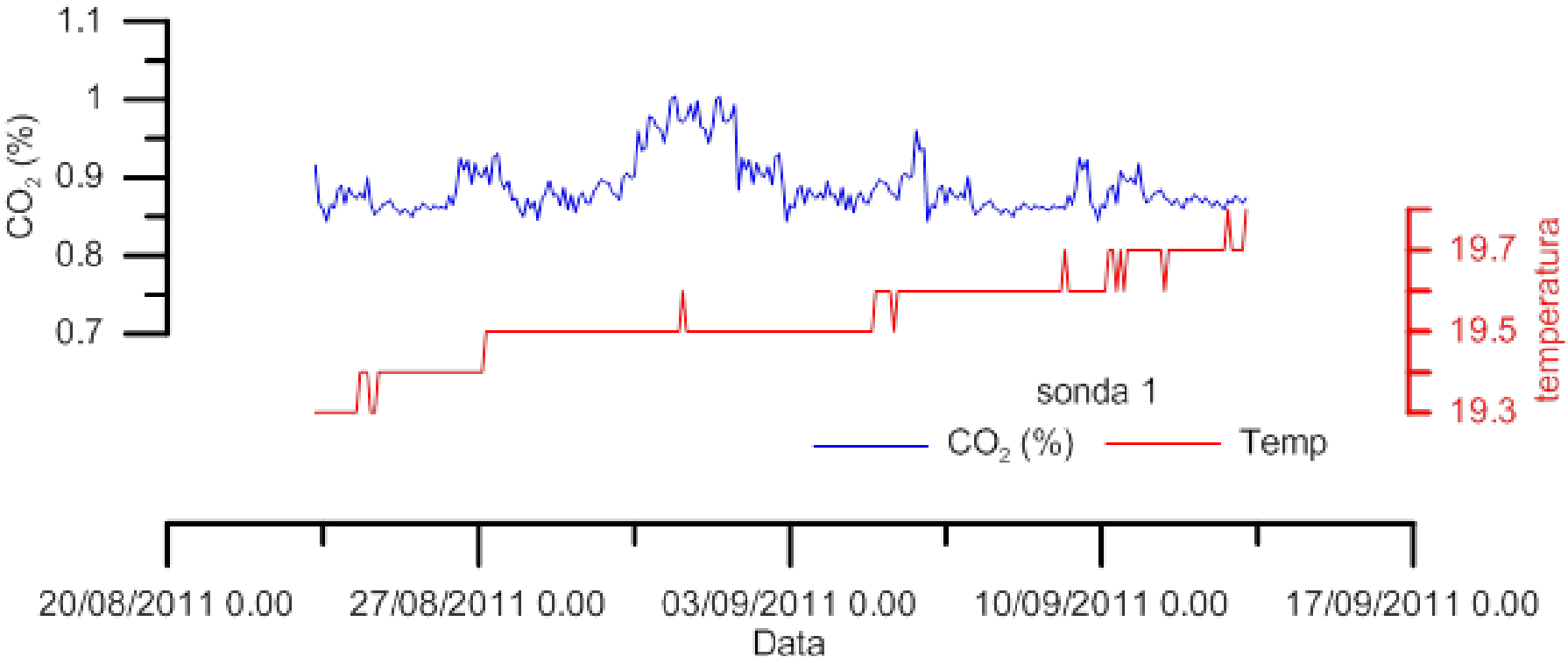
Network of continuous monitoring stations at Sulcis area

Sensor at -5 m from surface



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General Conclusions

- Several areas suitable for CGS have been selected in Italy (capacity about 12Gton)
- No significant gas leakage has been found in the areas suitable for CGS in Italy;
- CO2 baseline at local and regional scales have been acquired in central and south Italy (based on over 20.000 CO_2 measurements in soil air)
- CO_2 continuous monitoring stations have been installed in Italy both inland and offshore
- Some industrial initiatives already exist in Italy