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Latin America, Caribbean and European Union Network on Research and Innovation

CNR-IGG geothermal activities

Dr. Isabella Nardini



**Geothermal Energy Workshop
Salta – 9-11 December 2014**





CNR-IGG: Activities related to geothermal energy

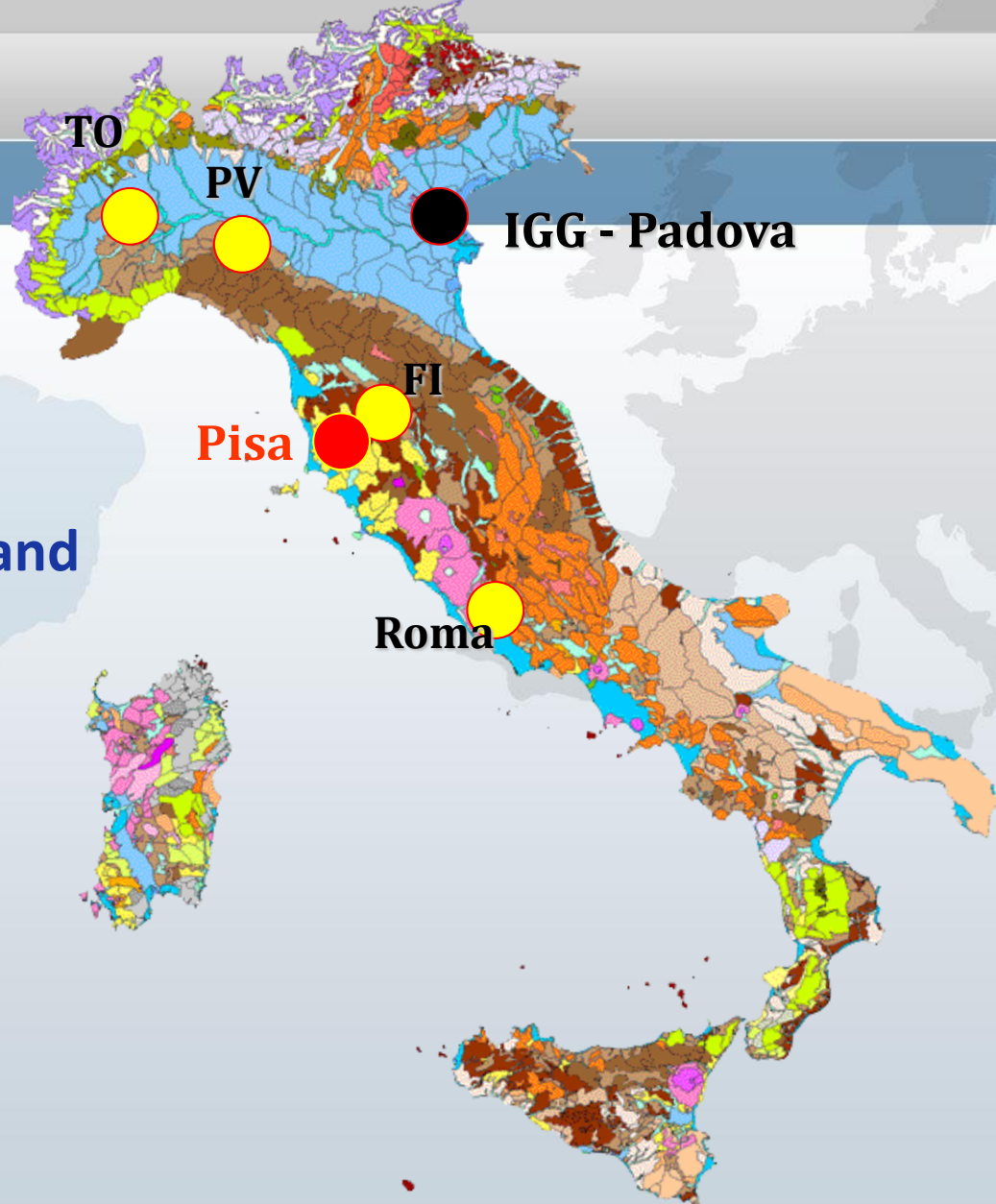
The Istituto di Geoscienze e Georisorse (Institute of Geosciences and Earth Resources, **IGG**) is part of the National Research Council (**CNR**) of Italy.

Headquarter in Pisa, local units located at the University Departments of Earth Sciences of Florence, Padua, Pavia, Pisa, Rome, and Turin.

The scientific, technical and administrative staff of IGG consists of 94 people. The scientific staff is also formed by PhD students, post-graduate students, collaborators (about 25), and university professors associated to the research projects of IGG (about 60).



**Institute of Geosciences and
Earth Resources**
Headquarters: Pisa
5 UOS c/o Universities





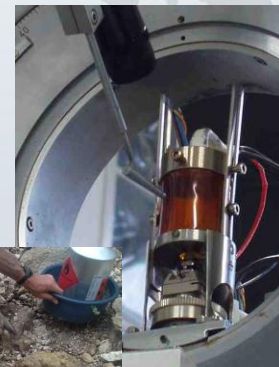
IGG Geothermal Activities

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- Data acquisition;
- Data interpretation;
- Geothermal assessment;
- Monitoring geothermal systems;
- Training and education
- Information and dissemination

Development and improvement of geothermal exploration methods
 IGG counts a variety of high quality, state of the art research facilities and capabilities allowing us to acquire **geological, hydrogeological, geochemical and geophysical data for the characterization of high to low enthalpy systems**, during every phase of geothermal investigation and exploration project.
 Multidisciplinary expertise: our strength



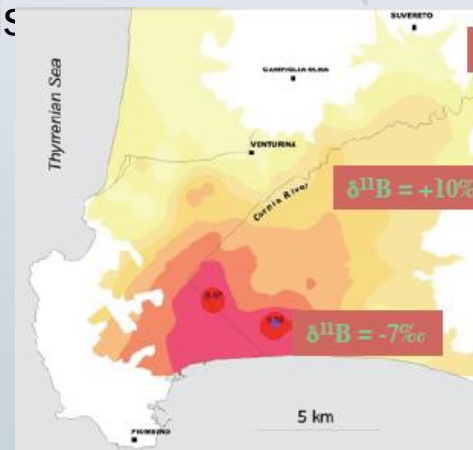
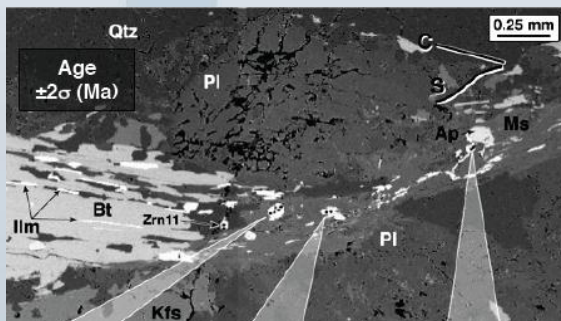


Data acquisition

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- Structural geology
- Hydrogeology
- Electromagnetic geophysical surveys
- Deep well temperature measurements
- Rock physics
- Rock fluid and gas geochemistry (including isotopic)
- Radiometric dating of magmatic and hydrothermal minerals
- Petrographic, mineralogical and fluid inclusion analysis



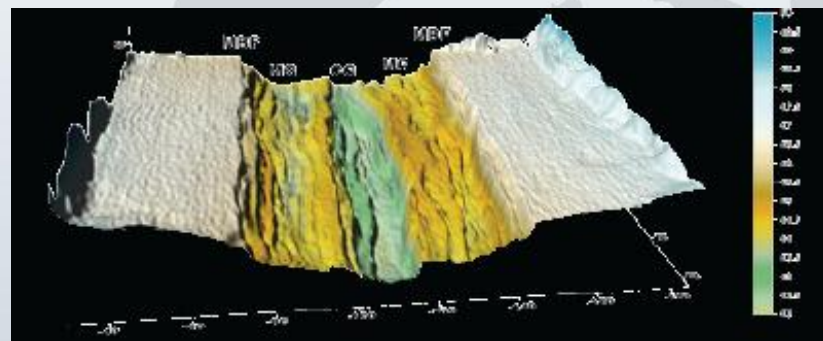
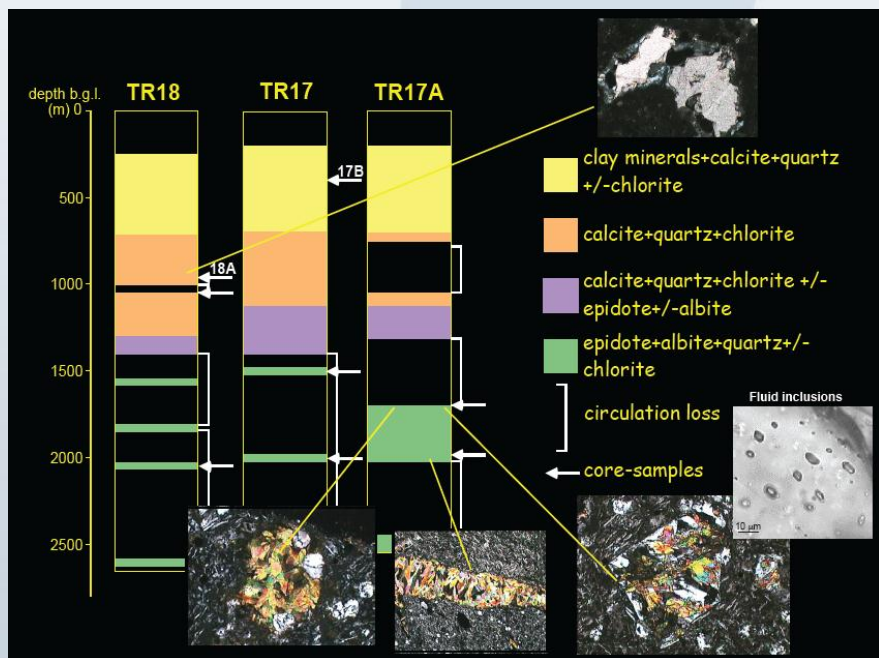


Data interpretation

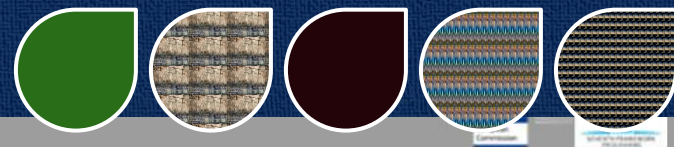
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Innovative techniques to study active and fossil geothermal systems, interpreting collected data and depicting conceptual models of geothermal systems, to understand their spatial and temporal evolution.



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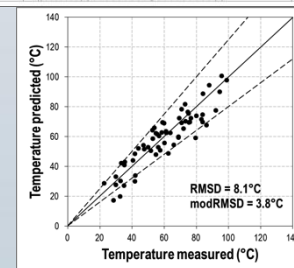
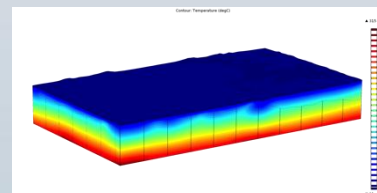
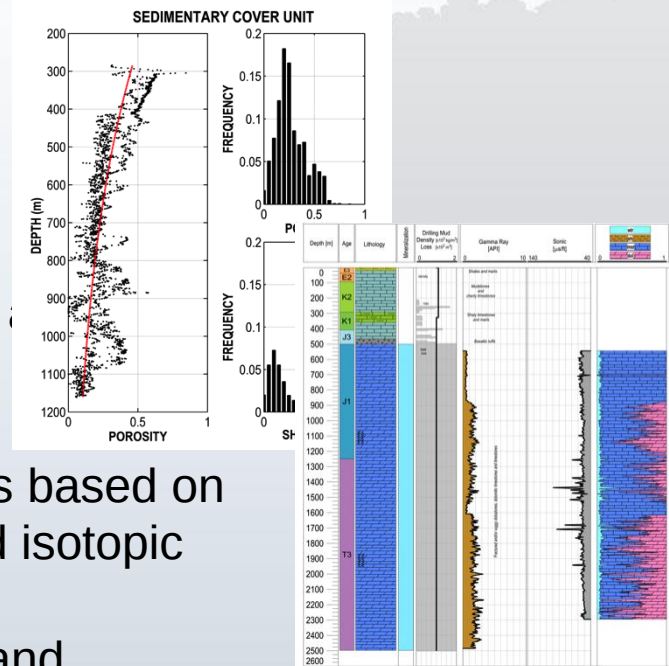
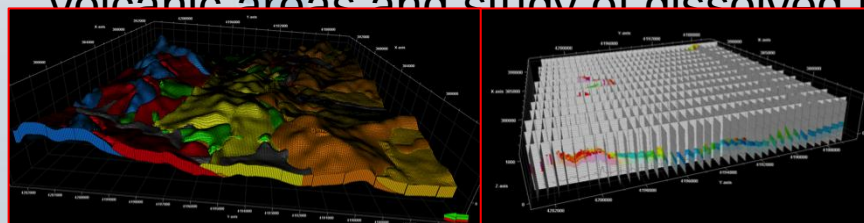




Data interpretation

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- Wire-line log interpretation
- 2D- and 3D- geological modelling
- Analogue modelling
- Fracture characterization
- Integrated modelling (geological, geophysical and geochemical data)
- Hydrogeological modeling
- T and P condition estimation of deep systems based on interpretation and elaboration of chemical and isotopic data
- Mapping of CO₂ diffuse fluxes in geothermal and volcanic areas and study of dissolved pCO₂ in



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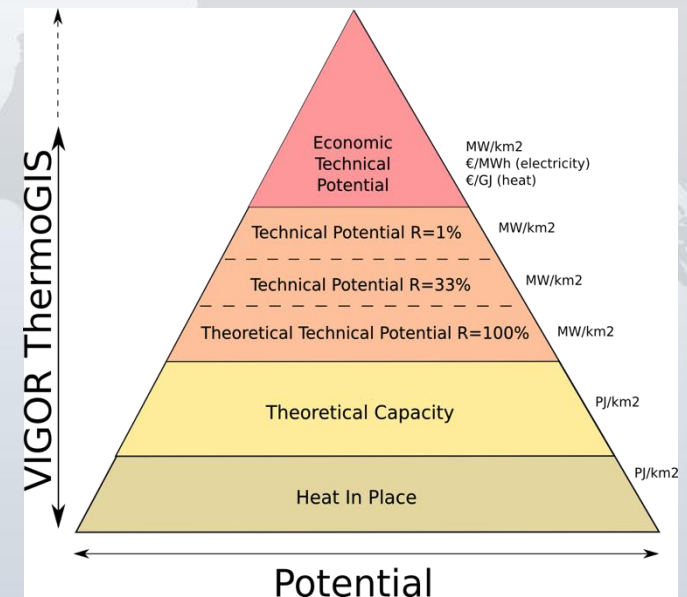
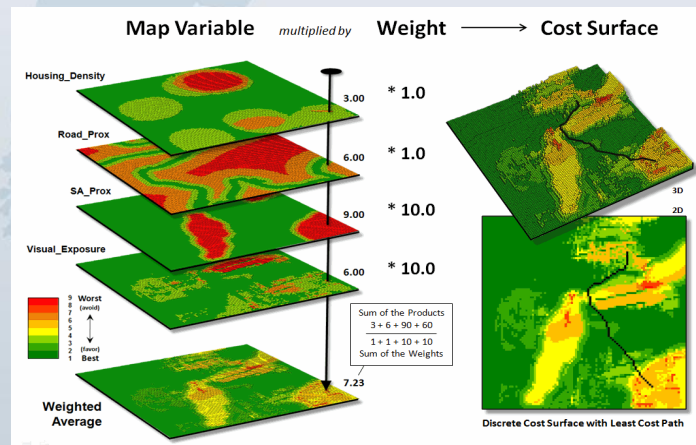


Geothermal assessment

Evaluation of conventional (hydrothermal) and unconventional (EGS, supercritical, geopressurized) geothermal systems for a sustainable development.

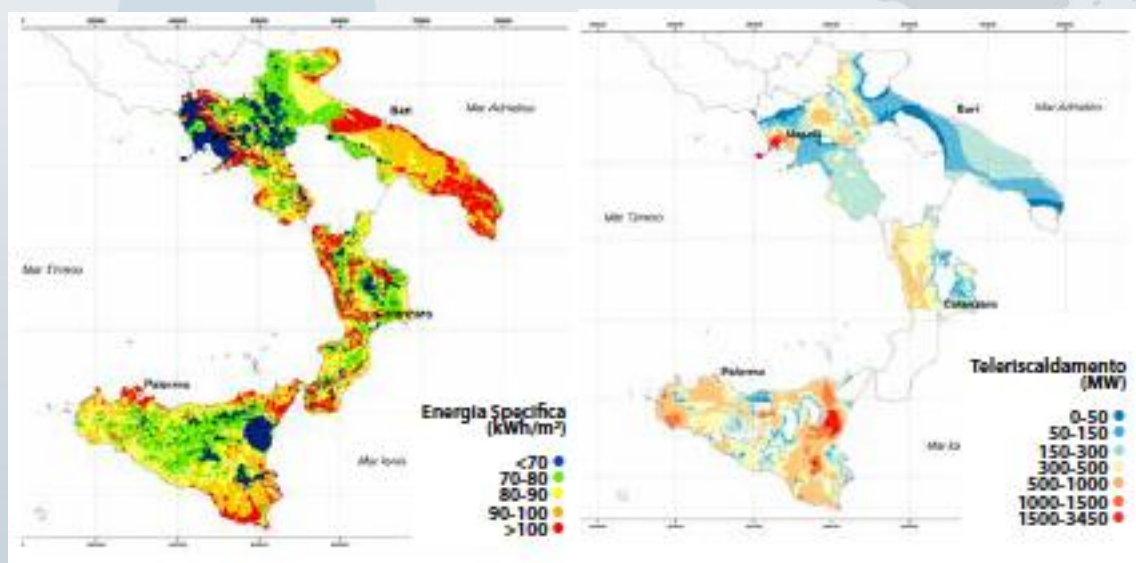
Geothermal potential assessment.

Identification of areas suitable for geothermal deployment.



Geothermal assessment

- Thermal-hydrodynamic-chemical (THC) modelling
- Volumetric approach and Monte Carlo simulation
- Mapping of key performance indicators
- Planning of geothermal application at regional and national scale
- Construction of favourability maps at different scale



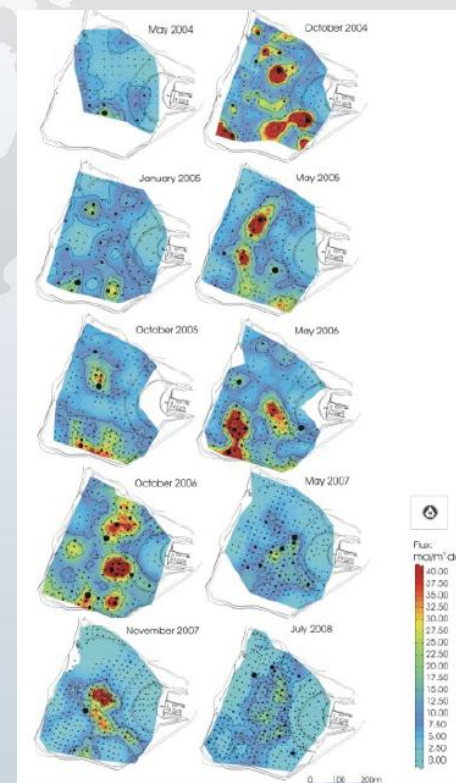


Monitoring

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Air, water, soil in areas surrounding geothermal natural manifestations or plants are monitored to investigate the **variation** of indicative parameters with time. The developed methodologies (mainly chemical and geochemical) allow also to control the potential **environmental impact** of plants, and to propose a **sustainable production planning** by using abatement technologies.



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Outreach and training activities at international level, ranging from the training program of the "*International School of Geothermal Energy*" (closed at the moment) to other opportunities and education forms (*short courses, schools, master*) in cooperation with the United Nations Centers (ICS, ICTP), the Cooperation Agency of the Italian Ministry of Foreign Affairs, several universities in Italy and around the world.

The most recent activities comprise the coordination of the geothermal university course (Diplomado in Geothermia) in El Salvador, The International Geothermal Schools of ICS-ICTP with the support of UNESCO in Italy, a training course in Uruguay.





Information and Dissemination

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We promote geothermal energy by **organizing and disseminating related information**.

Our production includes:

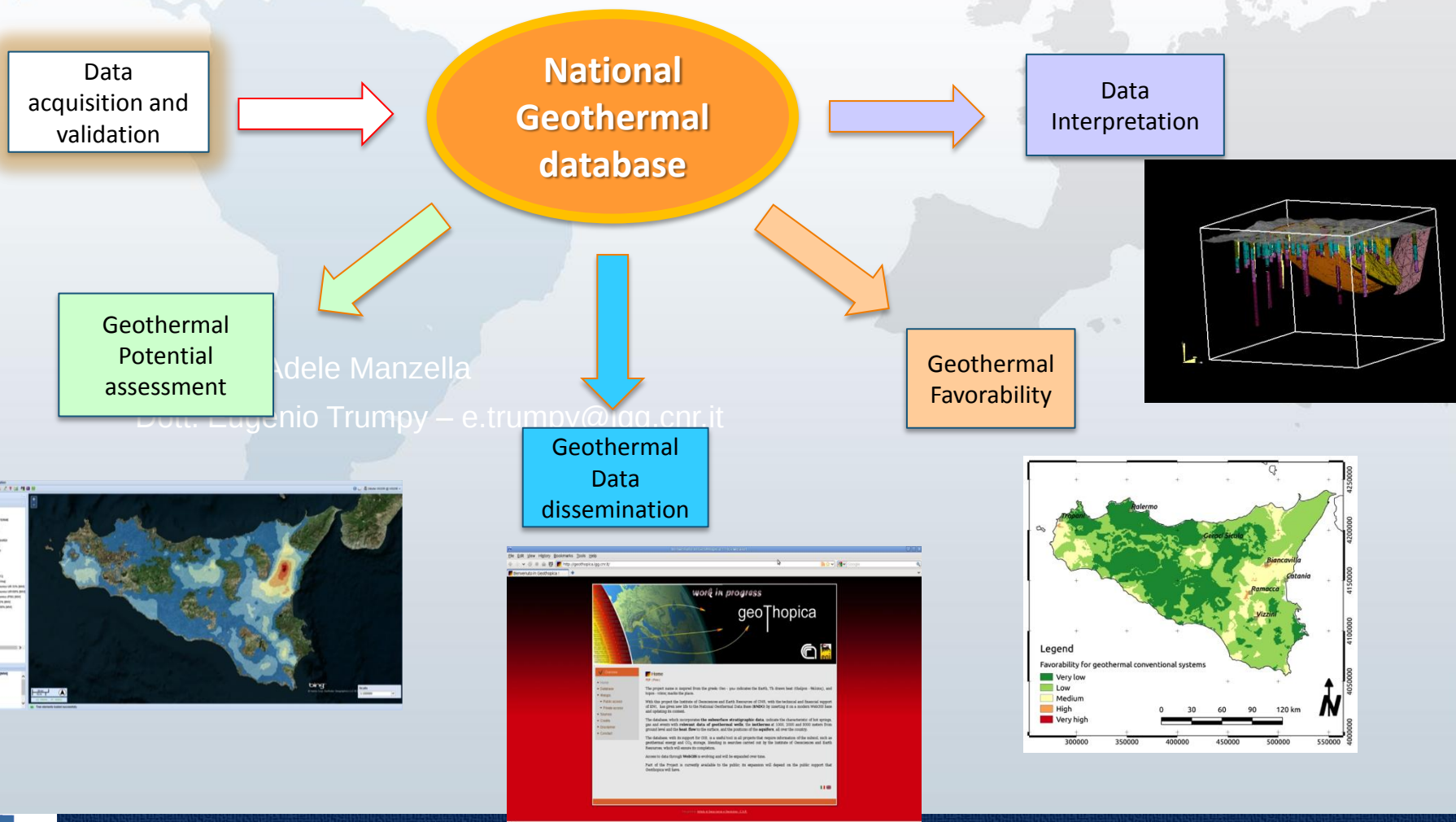
- the *national geothermal database* and the International Geothermal Association (*IGA*) geothermal production platform
- Scientific books, papers, seminars, courses, produced during research activity and in the frame of national and international projects (i.e., the running *IMAGE project*)
- Informative booklets, webpages, brochures
- Maps and diagrams of geothermal resources and its potential production, as for *VIGOR and Geothermal Atlas projects* that we coordinate
- Data collection, information and public reports, as for the contribution to *GEOELEC and Geo-ERA-NET projects*





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Geothermal data management



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CNR-IGG and geothermal energy: an effective partnership

IGG may count on **the multidisciplinary approach and skills** of the Institute in geosciences, and the experience gained by **participating and coordinating many geothermal projects**, which broadened the knowledge also to other aspects of geothermal energy: social, economic, regulamentary and technical aspects of geothermal plants.

An experience unique in Italy and rare in the world.



IGG proposal

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- Bilateral Sino-Italy projects
- Summer school in geothermal energy
- Exchange of researchers
- Networking and cooperation at International level

For more information

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visit: **www.alcuenet.eu**

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