REFLECT

Redefining geothermal fluid properties at extreme conditions to optimise future geothermal energy extraction

Katrin Kieling, GFZ Potsdam

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Objective and concept

The efficiency of geothermal utilisation largely depends on the behaviour of fluids that transfer heat between the geosphere and the engineered components of a power plant.

Often encountered problems are downtime, maintenance costs and even failure of geothermal installations due to chemical and physical properties of the fluid

- Mineral precipitation
- Degassing
- Organic matter and microorganism

Examples of scaling: Top left: Silica Scale, Reykjanes, Iceland; bottom left: sulfide scale, Iceland (both © V.Hardardottir); top right: calicte scale Hungary (© Z.Istfan); bottom right: Fe, Mg scale (Tuzla, Turkey; © A. Baba)

Concept: From react to reflect!

The aim of REFLECT is to avoid the problems related to fluid chemistry rather than treat them.

Objective:

Accurate predictions by thorough knowledge of the physical & chemical properties of geothermal fluids

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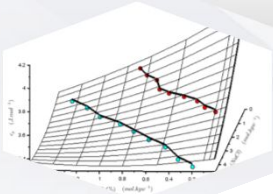
Methodological approach

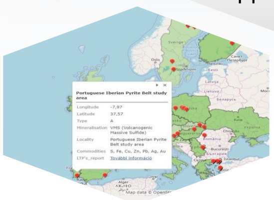
Field observations: **measure fluid properties** in natural fluids

Lab experiments: simulate reactions at well-defined conditions



Modelling: calculate thermodynamic data

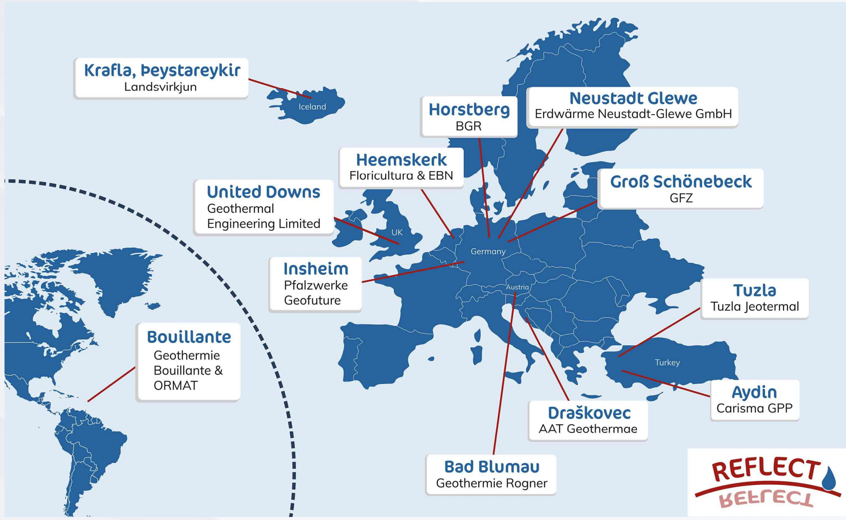
Technology development: investigate **downhole sampling** approaches



Data application: **European Fluid Atlas** and **predictive modelling tools**

Large uncertainties in current model predictions prevail, which will be tackled in REFLECT by **collecting new, high-quality data in critical areas**. These data will be implemented in **a European Geothermal Fluid Atlas and predictive models**, to allow recommendations on how to best operate geothermal systems sustainably.

REFLECT sampling sites



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Goals

1. Extend databases for mineral precipitation to **higher temperatures** and **higher salinities** (lab, modelling)
2. Determine the extent and location of the **degasification** front of geothermal fluids during production (field, lab, and modelling)
3. Determine types of **organic matter and microorganisms** in various geothermal fluids and their effect on scaling and biofilm formation (lab)
4. Determine heat capacity, density, electrical and thermal conductivity, sonic velocity, and viscosity at various p, T, X (lab, modelling)
5. Develop a **downhole sampling** technique suitable to collect fluid at chosen depth in hot and super-hot systems (proof of principle prototype)
6. Verification of the dataset by application in **reactive transport modelling**
7. Set up a **geothermal Fluid Atlas** ← **We are still collecting data for geothermal fluids – if you would like to contribute, please contact us!**

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Thank you for your attention!

www.reflect-h2020.eu

Katrin.Kieling@gfz-potsdam.de

Twitter: **@reflect_h2020**

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