PERBAS

Permanent sequestration of gigatons of CO_2 in continental margin basalt deposits

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Aims of PERBAS

Provide technical and analytical knowledge promoting an alternate CO_2 storage technology to foster the acceptance of CCS

- Sites within sandstone environment - carbon will remain as mobile cloud for decades and longer
- Conflicts of interest can limit access to storage reservoirs (e.g. wind farms, ground water, etc.).

Marine basalt complexes:

- Provide alternate storage sites away from urban areas and conflicts of usage
- Injected Carbon will be precipiated as solid within years (two years at CarbFix)
- Precipitation ensures safe storage for gigatons of CO_2 at geological time scales

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- Characterize appropriate basalt complexes
- Develop earth models for basalt complexes
- Analyze the limits of remote geophysical monitoring
- Provide an appraisal, injection and monitoring strategy for basaltic storage sites
- Promote CCS acceptance and foster industrial/stakeholder interest

GEOMAR TEEC Geophysics IFE THE ARCTIC UNIVERSITY OF NORWAY UIT BERKELEY LAB SCHOOL OF MINES 1874 COLORADO

Objectives of PERBAS

CO_2

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CO2 flow and reservoir characterization

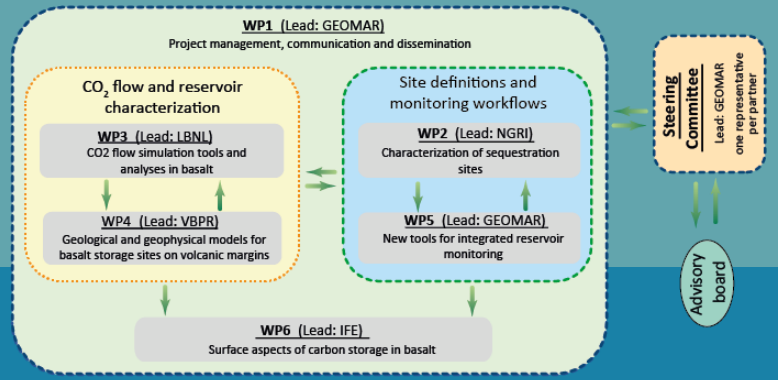
- *Flow simulation tools and analyses in basalt (samples from Norway and India)*
  - Reactive transport experiments – provide digital analogues
  - Numerical reactive-flow-geomechanical model – update geological models
  - Dynamic reservoir simulations and geophysical response (seismic & CSEM)

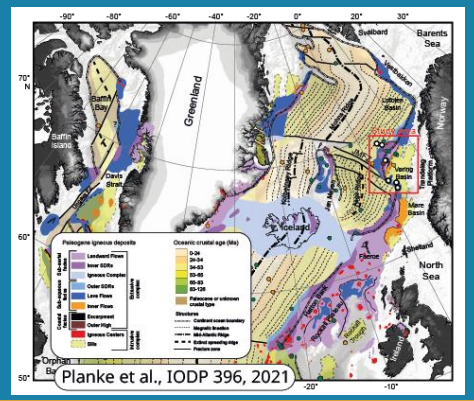
- *Geological and geophysical models of basalt storage sites on volcanic margins*
  - Model building methodologies – assign unique geophysical properties to each unit
  - Volcanological earth models – mapping seismically resolvable facies with AI support
  - Baseline synthetic seismic and EM data – test survey layouts and train Joint Inversion
  - Time-lapse synthetic seismic and EM data – simulate storage and test monitoring

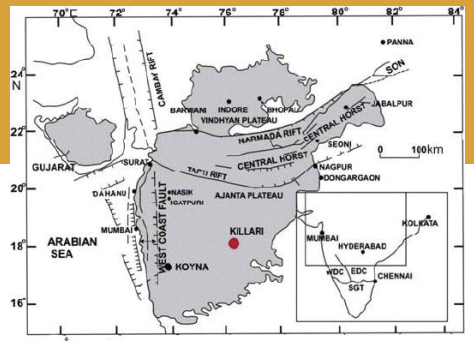
Site definitions and monitoring workflows

- *Characterization of sequestration sites*
  - Seismic, EM and borehole database – reference data to different basalt facies
  - Identifcation of basalt reservoirs – ranking of identified storage sequences
  - Characterization of fluid connectivity in basalt sequences – sealing properties
  - New baseline geophysical survey – provide HR joined data & 4D capabilities

- *New tools for integrated reservoir monitoring*
  - Development of new geophysical instruments – compact nodes avoiding ROV ops
  - Improvement of geophysical monitoring methods – target oriented E-FWI with AI







Expected impact of PERBAS

Data-driven recommendations for carbon storage operations in basalt

- *Appraisal, injection and monitoring strategy for basaltic storage sites*
  - Recommendations on best practice
  - Workflows for optimizing well placement, design and injection rates
  - Constrains for realistic controlling parameters and boundary conditions (predict pressure build-up and plume migration)
- *Dissemination and outreach*
  - Inform public on the needs of CCS and this alternate technology
  - Inform stakeholders on basalt storage technology
  - Invite for dedicated sessions during annual meetings and conferences

Provide adequate informations and tools for stakeholders and policy makers to better assess possibilities and risks for the economic evalutaion of CO2 storage in (marine) basalt reservoirs.

Pave the way for a test application of CO2 storage in marine basalt complexes in the field.

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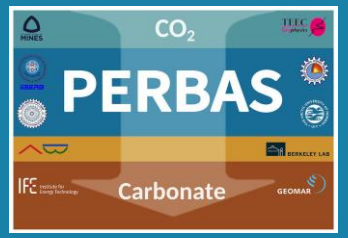

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