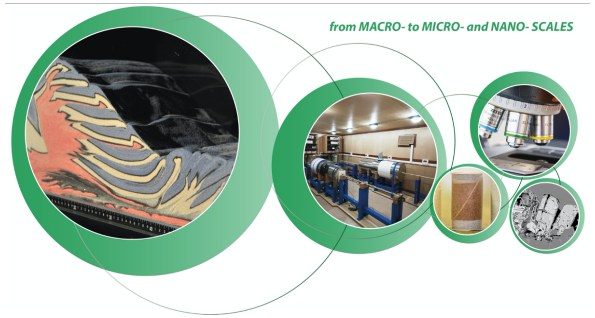
SHARING DATA AND FACILITIES IN THE ANALOGUE COMMUNITY: THE EPOS MULTI-SCALE LABORATORIES THEMATIC CORE SERVICE

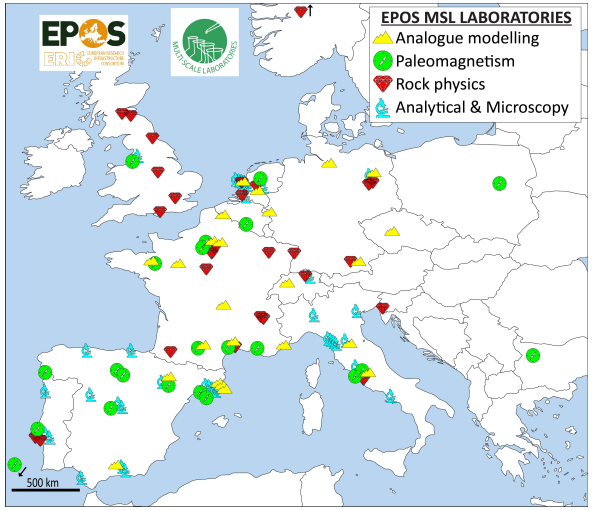
The Analogue Community of the EPOS MSL

The Community

EPOS MULTI-SCALE LABORATORIES

https://www.epos-ip.org/tcs/multi-scale-laboratories





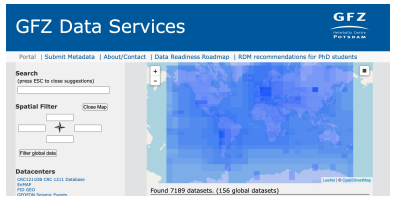
multi-scale-labs@epos-ip.org

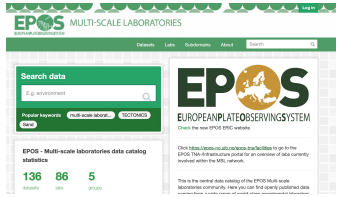
The Services

SHEAR AND ACCESS TO RESEARCH DATA

GFZ Helmholtz Centre Potsdam
Metadata editor

GFZ Helmholtz Centre Potsdam Data Repository

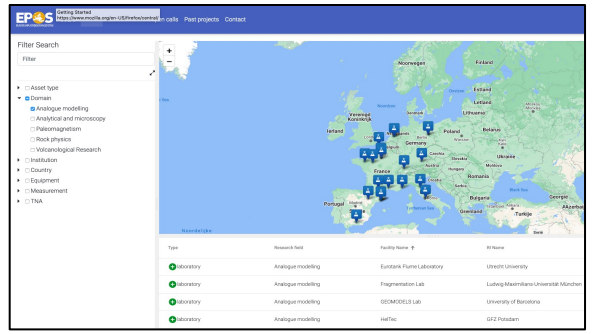




ACCESS TO THE LABS: TRANSNATIONAL ACCESS

Community Activities

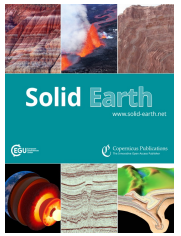
FACILITY INFORMATION



MEETINGS & WEBMINARS

YouTube

EDITORIAL PROJECTS



Special issue
"Analogue modelling of basin inversion"
Eds. Frank Zwaan et al.

Tectbook
"Analogue modelling"

Seismology

Near-Fault Observatories

GNSS Data and Products

Volcano Observations

Satellite Data

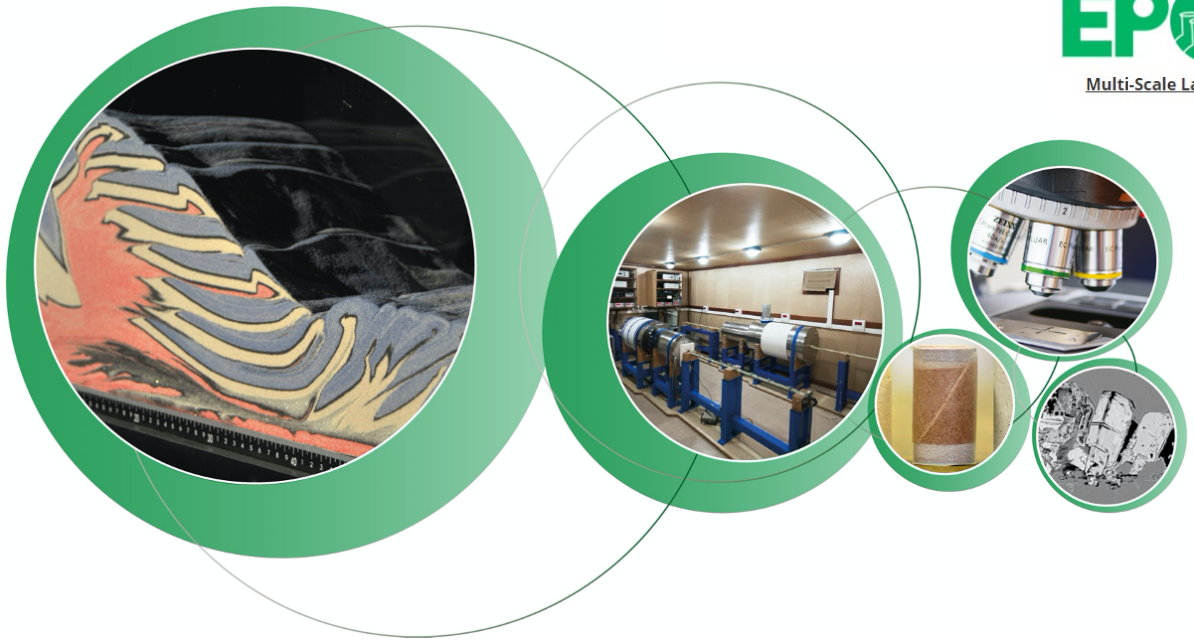
Geomagnetic Observations

Anthropogenic Hazards

Geological Information and Modeling

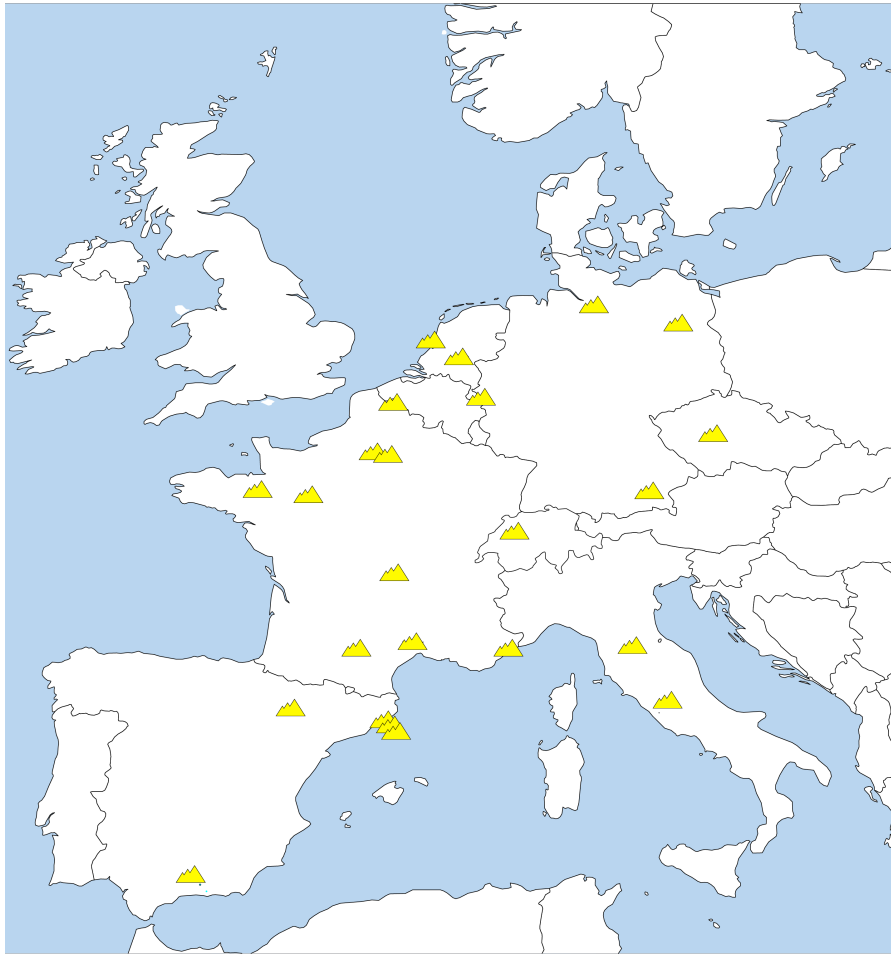
Geo-Energy Test Beds for Low Carbon Energy

EPOS Multi-Scale Laboratories



Consortium of 11 members; 97 laboratories from 12 countries

The Analogue Modelling Community



HelTec - Helmholtz Laboratory for Tectonic Modelling , GFZ Potsdam
Fragmentation Lab, Ludwig-Maximilians-University, Munich
Analogue Modelling Laboratory, RWTH Aachen University
UHH-Tec - Universität Hamburg

TecLab - Tectonic Modelling Laboratory, Utrecht University
Kuenen-Escher Geodynamics Laboratory - KEG Lab. Vrije Universiteit Amsterdam

LET, Laboratory of Experimental Tectonics, Università di Roma TRE
Tectonics Modelling Laboratory – Firenze, IGG-CNR

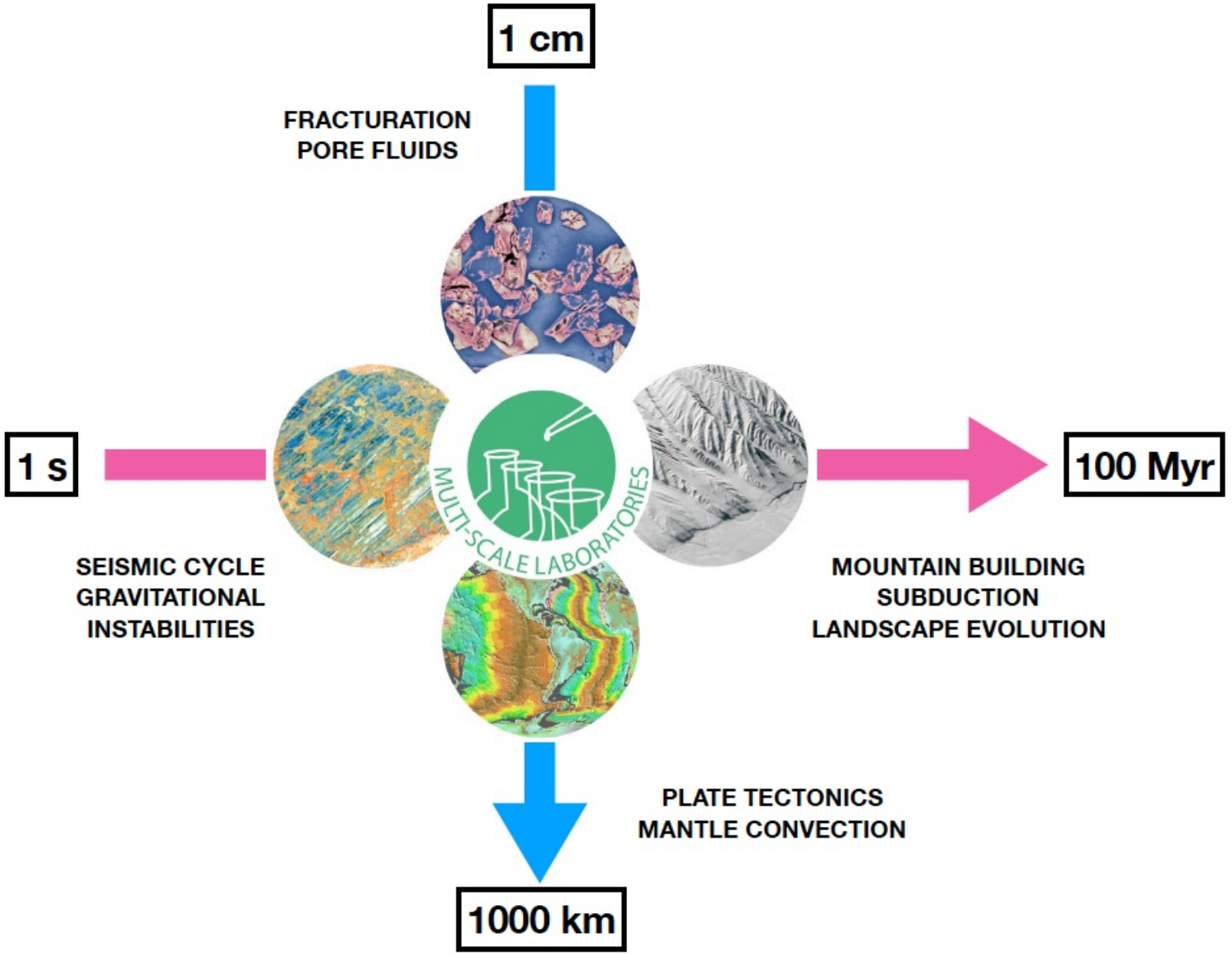
GEOMODELS Lab, Universitat de Barcelona
Laboratorio de Deformació Experimental, Universitat Autònoma de Barcelona
Laboratorio de Modelización Analógica, Universidad de Zaragoza-IGME
Laboratorio de Modelización Analógica de Estructuras Geológicas, Univ. Granada
Magma Chamber Analogue Modelling Laboratory, CSIC-ICTJA, Barcelona

Tectonic Modelling Laboratory, University of Bern

TecMod F - CNRS Network of Tectonic Analogue Modelling Laboratories:
GMmodel Montpellier University; FASTmodel, Paris Sud Orsay University
GECmodel, Cergy-Pontoise University; GEOAZURmodel, Nice Sophia Antipolis University; Geoφlab, Maine University; GETmodel, Toulouse University
Grmodel, Rennes 1 University, LMVmodel; Clermont-Ferrand University
LOGmodel, Lille 1 University

Tectonic modelling laboratory, Institute of Geophysics of the Czech Academy of Science.

What are we doing in our labs?

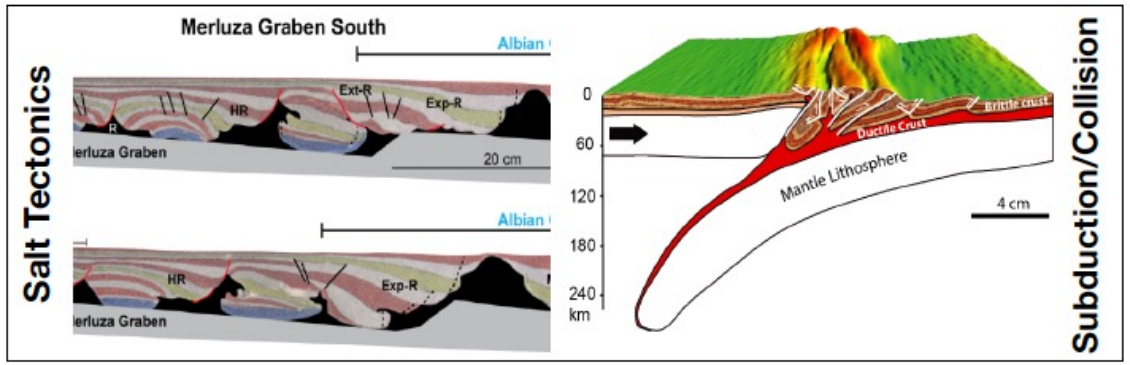


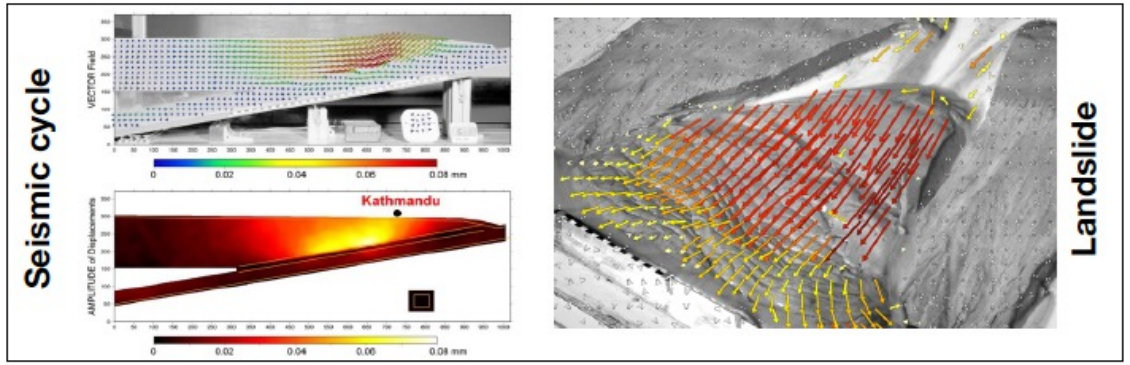
The Analogue Modelling Community of the EPOS Multi-Scale Laboratories cover a wide range of:
- geological processes;
-temporal scales;
- spatial scales.

What are we doing in our labs?

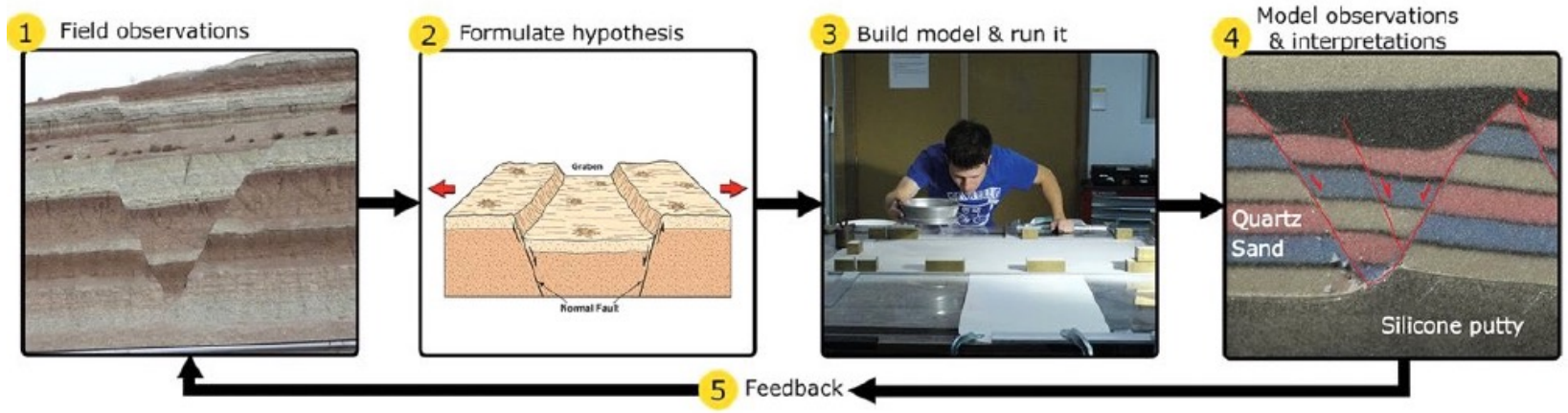
INTEGRATING THE TIME AND SPACE SCALES

TIME SCALES		SPATIAL SCALES
LONG 1-100 of Myr Mountain building Rifting	Salt Tectonics / Subduction/Collision	LARGE 10-100 of Km
INTERMEDIATE 1-100 of Kyr Landform and Relief Evolution	River Dynamics / TES Couplings	LARGE to SMALL <1-100 of Km
SHORT 1s-100 of yr Earthquake Landslide Tsunami	Seismic cycle / Landslide	LARGE to SMALL <1-100 of Km





WORKFLOW FOR ANALOGUE MODELLING

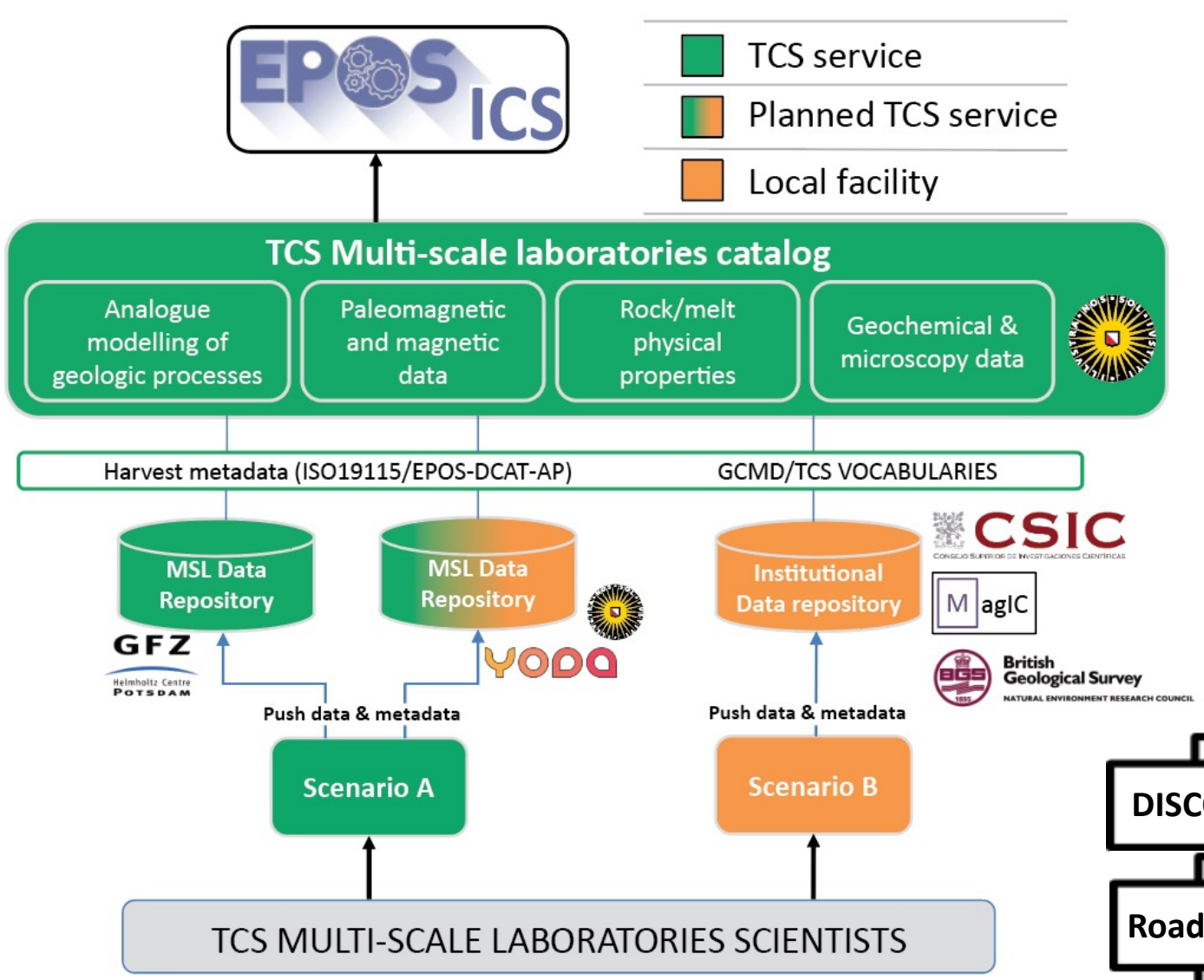


(After TecLab, Utrecht)

REQUIREMENTS

- GEOLOGICAL AND GEOPHYSICAL CONSTRAINTS ON THE STUDIED NATURAL CASE
- RELIABLE MODEL SCALING INTEGRATING THE CONSIDERED TIME AND SPACE SCALES
- APPROPRIATE ANALOGUE MATERIALS AND BOUNDARY CONDITIONS
- ACCURATE AND MULTI-METHODS MONITORING TO QUANTIFY MODEL EVOLUTION

The Services – Shear and access to Research Data



CC BY

The Services – Shear and access to Research Data

The TCS Multi-scale laboratories Data Services aim at the dissemination of scientific results in the form of datasets coming from experimental research, uniquely identifiable through publication with a DOI: citable, trackable, persistent and with metadata and data description for re-use and discovery.

Datasets are described with the EPOS Multi-scale laboratories metadata model, which includes standard vocabularies (ISO19115/INSPIRE, GCMD, DataCite) and new controlled vocabulaires specific for: Analogue models of geologic processes, Paleomagnetic and magnetic data, Rock and melt physical properties, Geochemical and Microscopy data. Metadata includes licensing information.

Datasets can be published in generic, institutional repositories or in dedicated EPOS Multi-scale laboratories repositories.

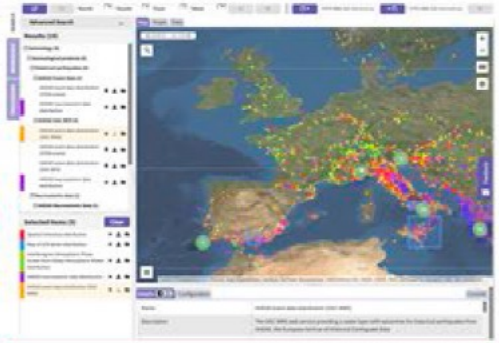
The Services - Access to Research Data

STEP 1
Data are produced in the laboratories and organised in datasets

STEP 2
Dataset description with the MSL metadata model

STEP 3
Datasets are published with a DOI in a MSL domain or institutional repository

STEP 4
Datasets metadata are harvested by the MSL Portal



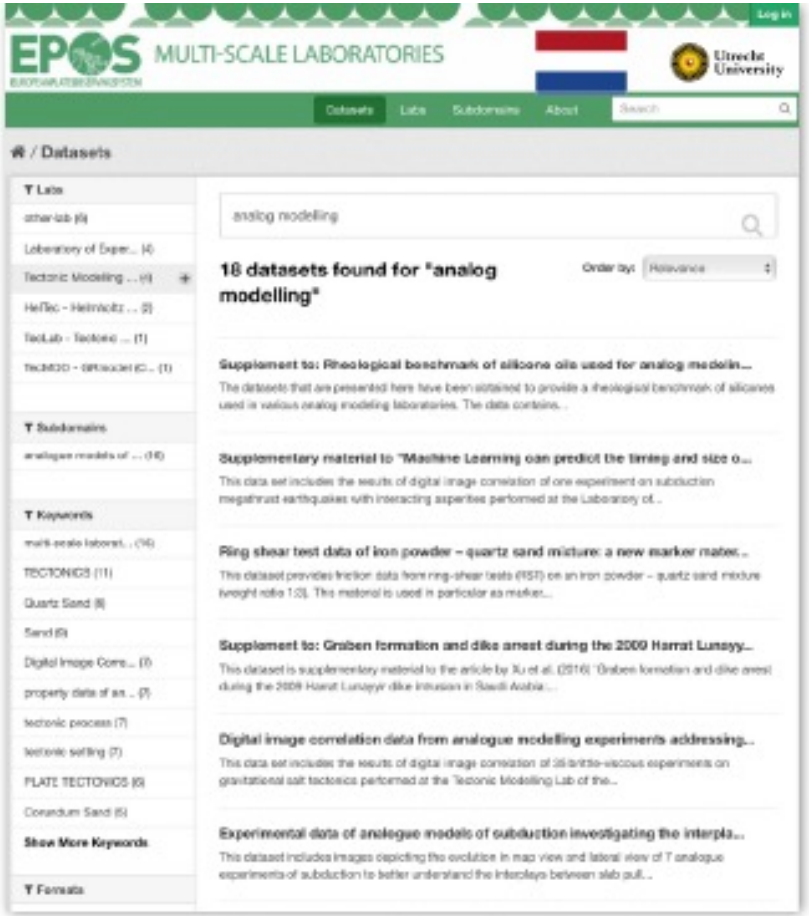
STEP 5
Datasets metadata are harvested by the EPOS Central Portal

Elger et al., 2022

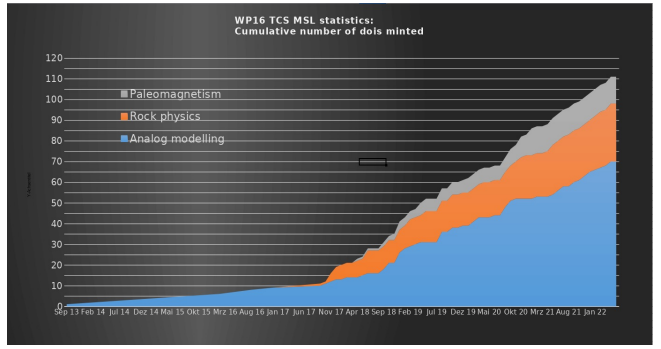
MSL Metadata Cataloque

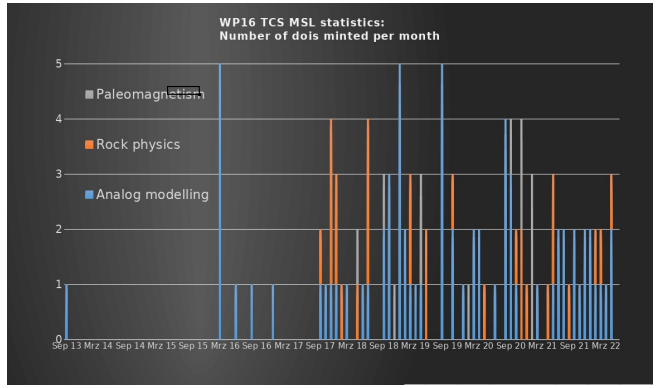
https://dataservices.gfz-potsdam.de/portal/index.html

MSL Dataset Portal



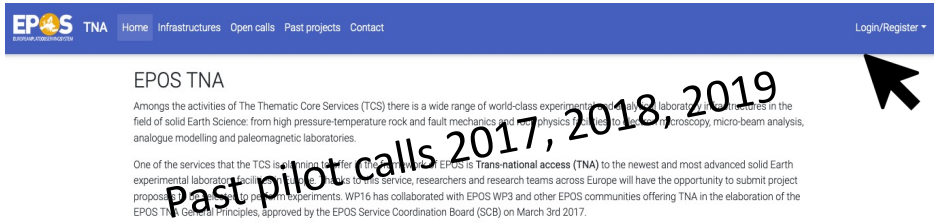
https://epos-msl.uu.nl



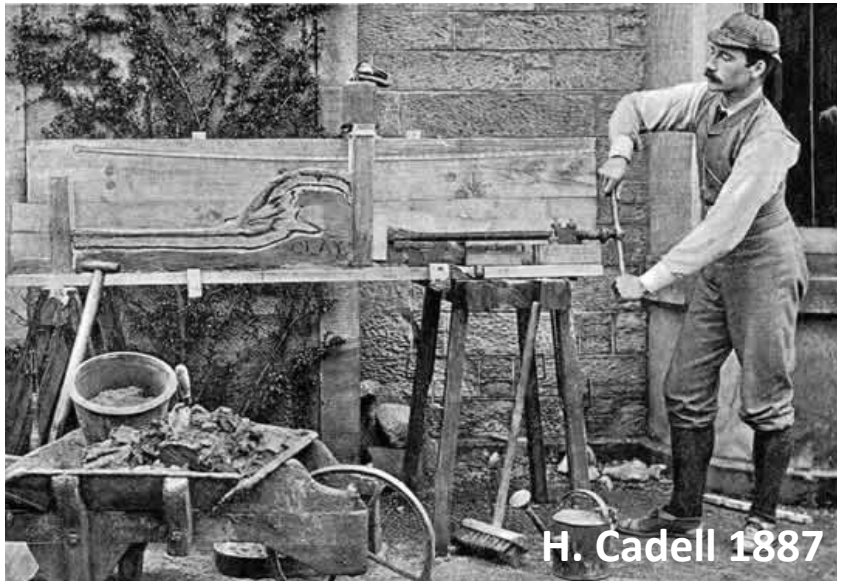


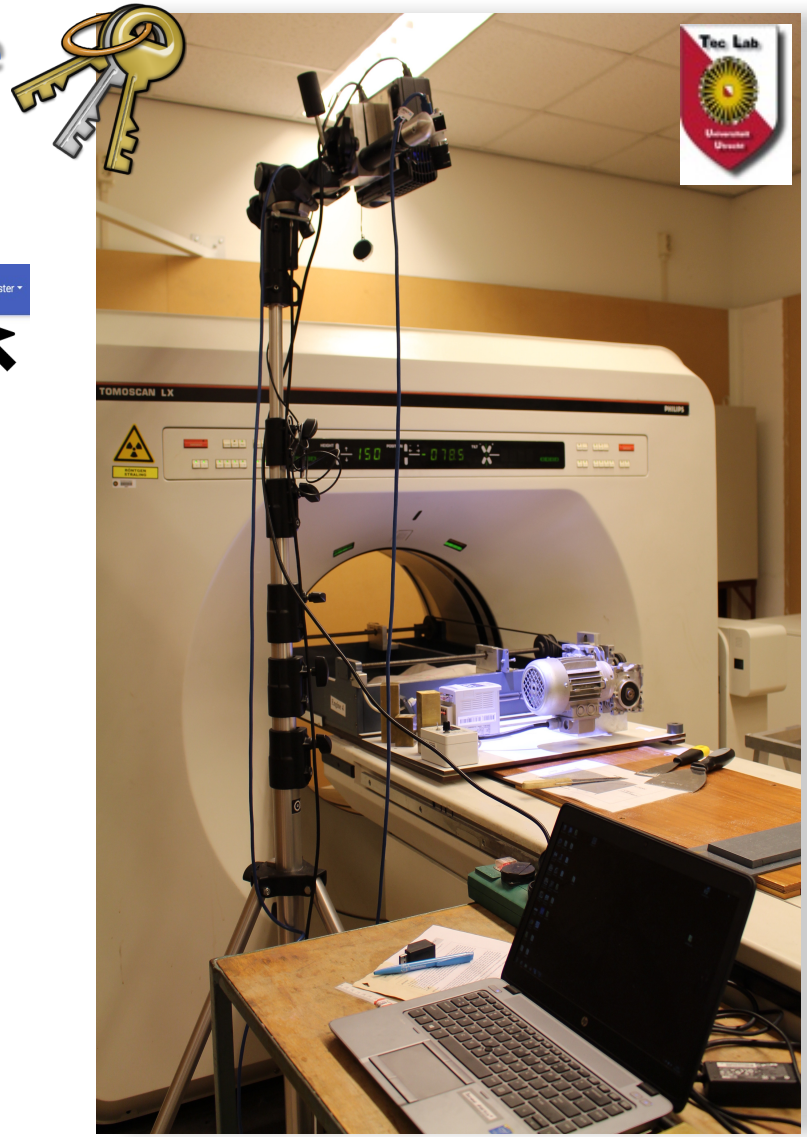
Trans-national Acess (TNA) to state-of-the-art infratsructure

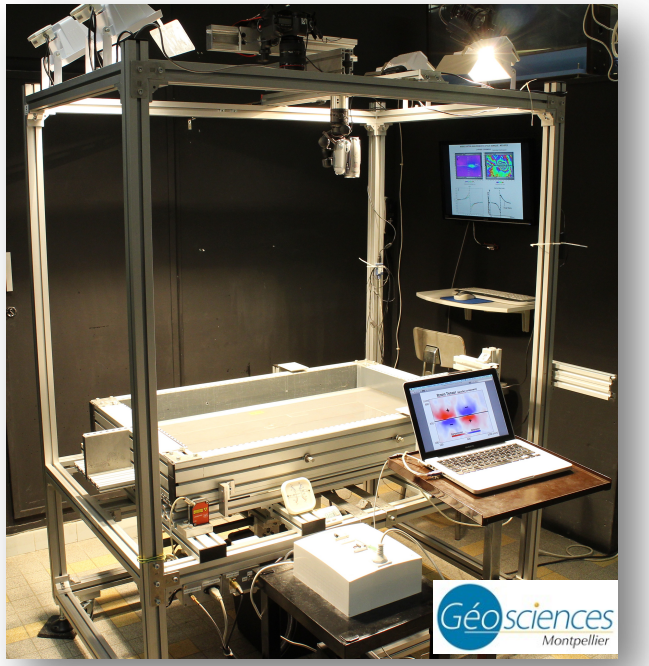
EPOS Portal: information and application

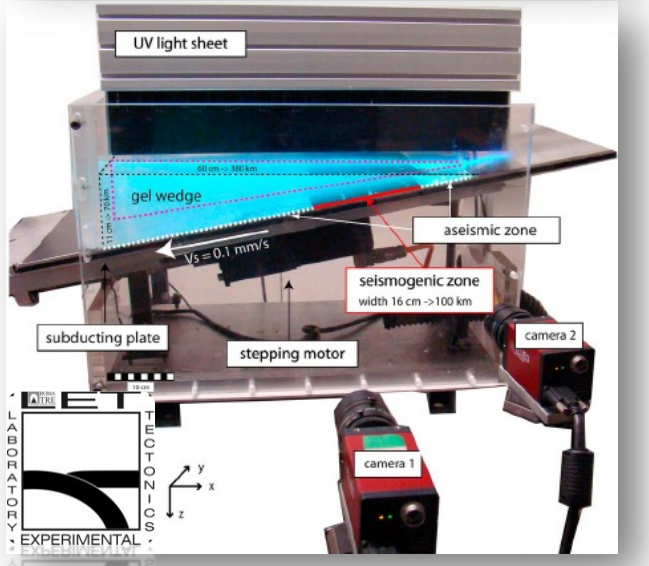


Past pilot calls 2017, 2018, 2019





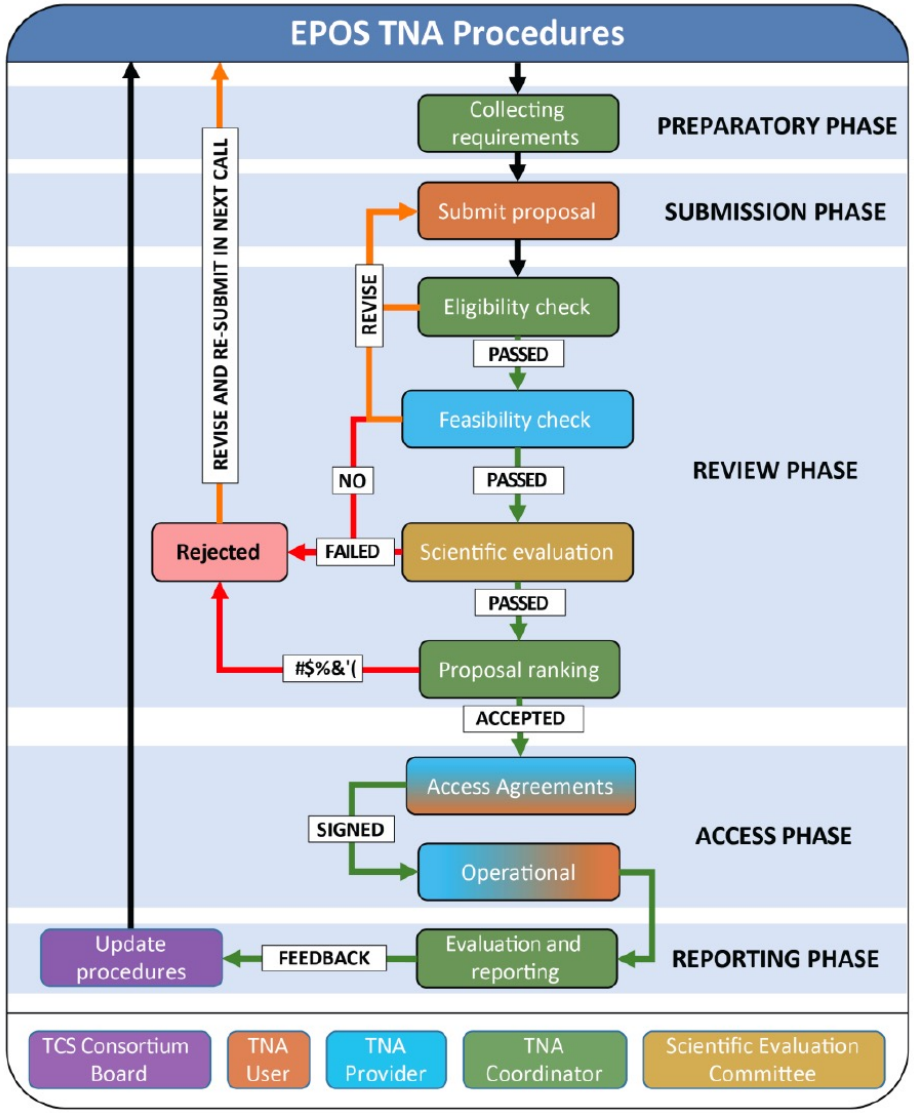




The Services - Access to Research Infrastructure

The TCS Multi-scale laboratories shear their facilitues through Trans National Access procedures.

TransTNA) allows cross-border, short-term and frequently free-of-charge access to 45 world-class research facilities, to foster collaborations and exchanges of experience.



Wessels et al., 2022

We also collect information about the available instruments and types of measurements that you can conduct at these facilities!

EPOS TNA Home Infrastructures Ope Login/Register

Filter Search

Filter

Asset type
- Access to mobile instruments
- Access to Volcano Observatories and Volcano
- laboratory
- Provision of Rock Samples

Domain

Institution

Type

Country

laboratory	Analogue modelling	TecLab Bern

Latitude 46.951311

Longitude 7.428887

Website Link

Services Go to data publications
Retrieve data publicatio
More facility information
More information about TNA possibilities at this lab

(13)
- DIC/PIV - Matlab code
- Digital volume correlation techniques
- MeshLab
- Move (Midland Valley)
- Osirix
- Schlumberger)
- SLR camera
- box - meter scale
- Sandbox - meter scale
- (Agisoft)
- The Kingdom (SMT)
- Time lapse camera
- X-ray computed tomographic scanner (CT-scan)

Measurements (12)

laboratory	Analogue modelling	TecMOD - GEOAZURmodel
laboratory	Analogue modelling	TecMOD - LMVmodel

Equipment specifics

- Sandbox - meter scale
  - Type : Apparatus
  - Group : Modeling_device
  - Name : Sandbox - meter scale
  - Brand : Prototype (developed and constructed by HSR Rapperswil)
  - Quantity : 1.0
  - Website :
  - Specifics & comments : (oblique) shortening, (oblique) extension, strike-slip

Info

URLs

TCS MSL Catalog

Log in

EPOS MULTI-SCALE LABORATORIES

Datasets Labs Subdomains About Search

/ Labs / Tectonic Modelling Laboratory ...

UNIVERSITÄT BERN

Tectonic Modelling Laboratory at the Institute for Geological Sciences (TecLab Bern, Switzerland)

Analogue modelling is a well-established technique to investigate the evolution of tectonic structures in the Earth's crust and lithosphere. Scaled analogue models offer the... read more

Followers 0 Datasets 7

Labs
Tectonic Modelling ... (7)

Subdomains

Datasets About

Search datasets...

7 datasets found Order by: Relevance

4D X-Ray CT data and surface view videos of a systematic comparison of experi...
This data set includes 40 videos (+ 1 image) depicting the surface evolution of 39 experiments on crustal extension, as well as 4D CT imagery (figures and videos) of 6 of these...

GeoMod2008 materials benchmark: The axial test dataset
This dataset provides compaction data from axial testing on natural and artificial granular materials used for experimental simulation by the analogue geodynamic modelling...

GeoMod2008 materials benchmark: The SEM image dataset
This dataset provides images from scanning electron microscope (SEM) photography of natural and artificial granular materials used for experimental simulation by the analogue...

GeoMod2008 materials benchmark: The sieve dataset
This dataset provides sieve data (grain size distributions) on natural and artificial granular materials used for experimental simulation by the analogue geodynamic modelling...

GeoMod2008 materials benchmark: The ring shear test dataset

https://epos-no.uib.no/epos-tna/facilities

NETHERLANDS → 2 LABORATORIES

EARTH SIMULATION Laboratory (ESL)

Utrecht University

TECTONIC MODELLING LABORATORY (TecLab)

Ernst WILLINGSHOFER

Highlights: Subduction, Lithosphere Rheology and Plate Deformation, …

Utrecht University

FLUME FACILITIES Metronome & Eurotank

Maarten KLEINHANS and Joris EGGENHUISEN

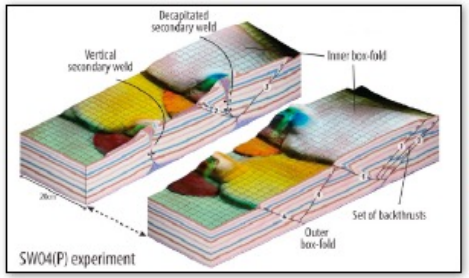
Highlights: Tidal Flow, Sediment Transport, River Estuaries, Deltas…

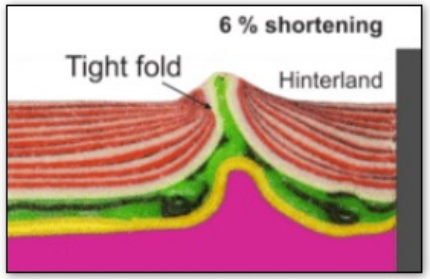
SPAIN → 5 LABORATORIES

UNIVERSITAT DE BARCELONA

GEOMODELS Research Institute

Oriol Ferrer GARCIA and Oscar GRATACOS TORRA





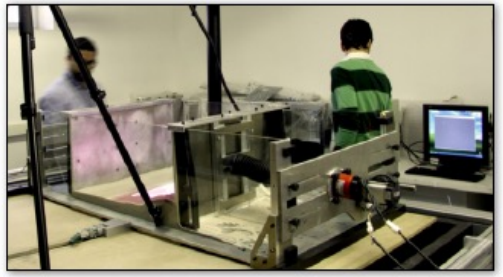
Highlights: Salt Tectonics, Orogenic wedge, Tectonic Inversion, …

CSIC
Consejo Superior de Investigaciones Científicas

GEO3BCN
Geosciences Barcelona - CSIC

GEOSCIENCIES BARCELONA-CSIC
SIMGEO Facilities

Joan Martí MOLIST (CSIC) and Ferran COLOMBO (UB)



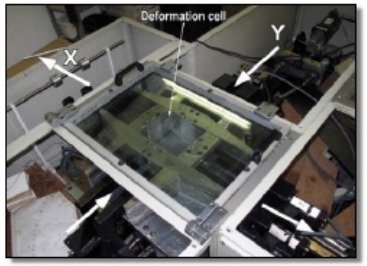
Highlights: Accretionary wedge, Magma Chamber, …

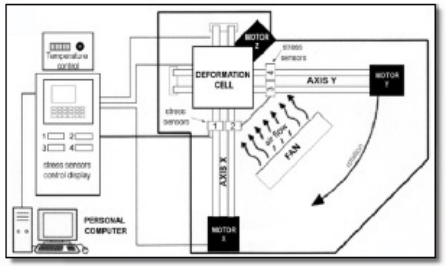
SPAIN

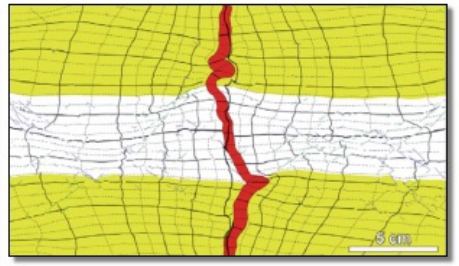
Universitat Autònoma de Barcelona

Laboratorio de Deformació Experimental - MIET

Jordi CARRERAS PLANELLS





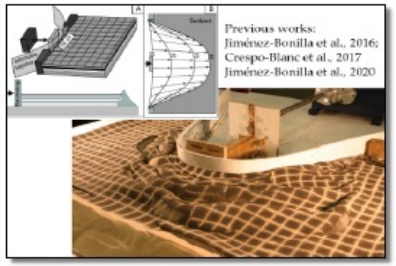


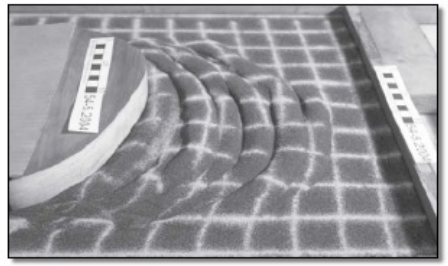
Highlights: Shear Fracture modelling, Ductile deformation, …

UNIVERSIDAD DE GRANADA

Laboratorio de Modelización Analógica de Estructuras Geológicas

Ana CRESPO-BLANC





Highlights: Crustal Extension, Folding, Orogenic wedge, …

SWITZERLAND → 1 LABORATORY

TECTONIC MODELLING LABORATORY BERN

Guido SCHREURS and Frank ZWAAN

UNIVERSITÄT BERN

X-ray computed tomography is used to analyze the 3-D geometry and kinematic evolution of model structures

Highlights: Transpression/Transtension, Salt Tectonics, Basin Inversion, …

EPOS EUROPEAN PLATE OBSERVING SYSTEM
MULTI-SCALE LABORATORIES

cnrs

FRANCE → TEC MOD F

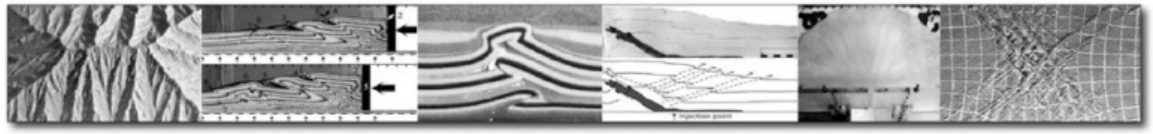
French Tectonic Analog Modeling network

A NETWORK of 10 LABS

S. DOMINGUEZ

GEOSCIENCES Rennes

Géosciences - University Rennes 1

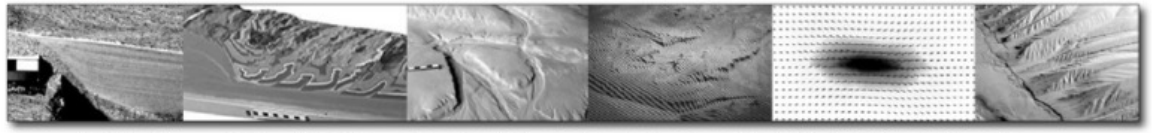


Benjamin GUILLAUME

Lithospheric deformation. Salt tectonics. Fluvial incision. Fluid/deformation interactions

Géosciences Montpellier

Géosciences - University of Montpellier



Stephane DOMINGUEZ

Subduction-collision, Relief dynamics, Fault kinematics, Seismic cycle, Tectonic/Climate interactions

LOG Laboratoire d'Océanologie et de Géosciences

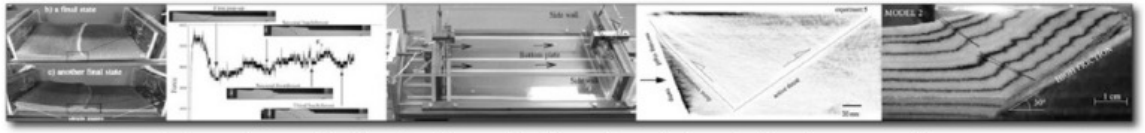
LOG - University Lille 1

Fabien GRAVELEAU

Salt tectonics/fluids, Mountain foreland dynamics, Deformation/Sedimentation interactions

GEC

Géosciences et Environnement - University of Cergy-Pontoise



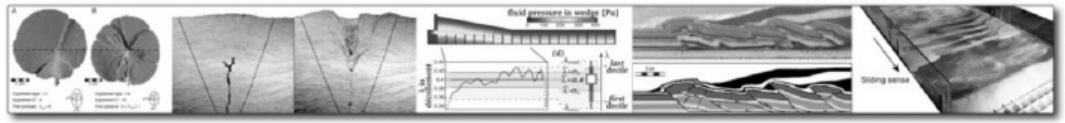
Pauline SOULOUMIAC
Bertrand MAILLOT

Deformation mechanics, Faulting and folding, Numerical modelling, Inverse problem

cnrs **TEC MOD F**
French Tectonic Analog Modeling network

Régis MOURGUES

Université du Maine — **Geoφlab - University of Maine**



Reservoir tectonics, Hydraulic fracturation, Magma/injectite intrusions, Gravitational instability

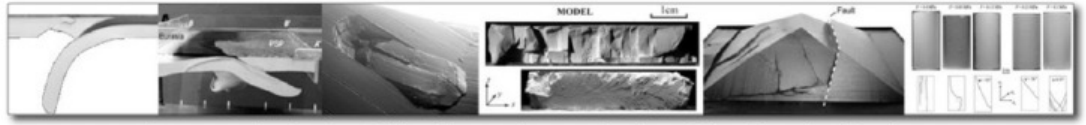
GET GÉOSCIENCES ENVIRONNEMENT TOULOUSE — **Géosciences Environnement - University of Toulouse**

Stephane BONNET

Continental and coastal geomorphology, Tectonics, Relief Dynamics, Piedmont, Erosion

EPOS EUROPEAN PLATE OBSERVING SYSTEM
MULTI-SCALE LABORATORIES

GeoAzur TERRE - OCÉAN - ESPACE — **GeoAzur - University of Nice Sophia Antipolis**



Alexandre CHEMENDA

Rupture mechanics, Landslides, Fractured reservoirs, Oceanic/continental subduction

FAST Fluides, Automatique et Systèmes Thermiques — **FAST - University of Paris Sud Orsay**

Anne DAVAILLE

NEW

Joseph MARTINOD
Virginie PINEL

Mantle dynamics, Mantle diapirs, Multi-scale convection, Instabilities, waves and turbulence, heat flow

Olivier ROCHE

Laboratoire Magmas & Volcans — **Magmas et Volcans - University of Clermont-Ferrand**

Volcanology, plumbing systems, Instabilities, Pyroclastic density current, Debris flows

ISTerre — **ISTerre Chambéry - Université de Savoie Mont-Blanc**

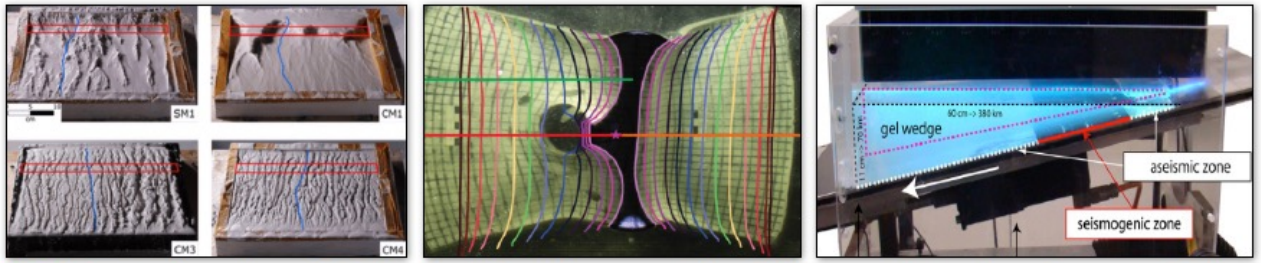
Volcanology, Subduction zone, Fracture, Fluid injection

ITALY → 2 LABORATORIES

ROMA TRE
UNIVERSITÀ DEGLI STUDI

LABORATORY OF EXPERIMENTAL TECTONICS (LET)

Francesca FUNICIELLO and Claudio FACCENNA



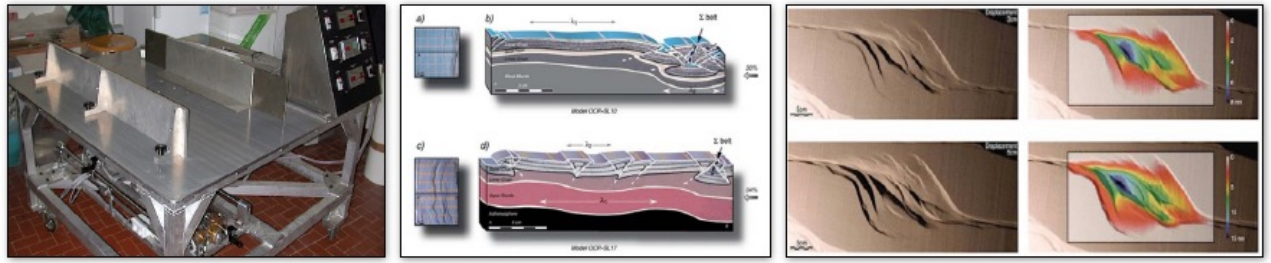
Highlights: Earthquakes, Subduction/Mantle convection, Volcano-Tectonics, Geomorphology, …

igg Istituto di Geoscienze e Georisorse

Consiglio Nazionale delle Ricerche

TECTONIC MODELLING Lab. - IGG Florence

Marco BONINI, Giacomo CORTI and Domenico MONTANARI



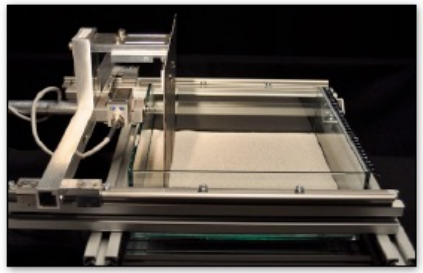
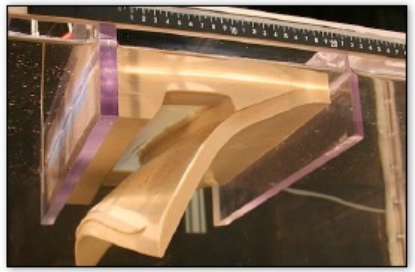
Highlights: Continental Extension, Orogeny, Volcano-Tectonics, Geomorphology…

GERMANY → 4 LABORATORIES

GFZ Helmholtz Centre Potsdam

HelTec - HELMHOLTZ Lab. for TECTONIC MODELLING

Matthias ROSENAU, Onno Oncken and Claudio FACCENNA

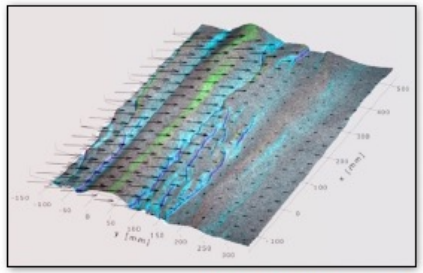
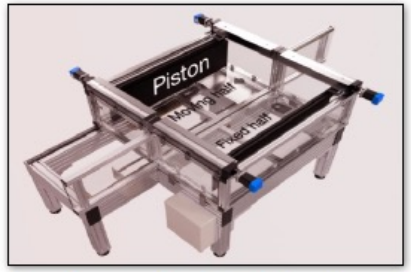



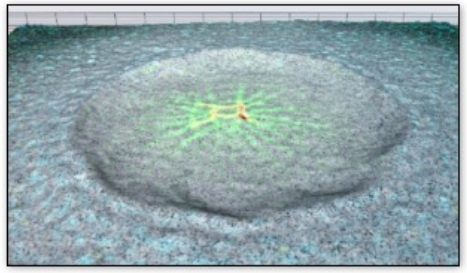
Highlights: Mantle dynamics, Subduction, Seismic cycle, …

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

UHH-Tec - EXPERIMENTAL TECTONICS LABORATORY

Ulrich RILLER and Jan Oliver EISERMANN

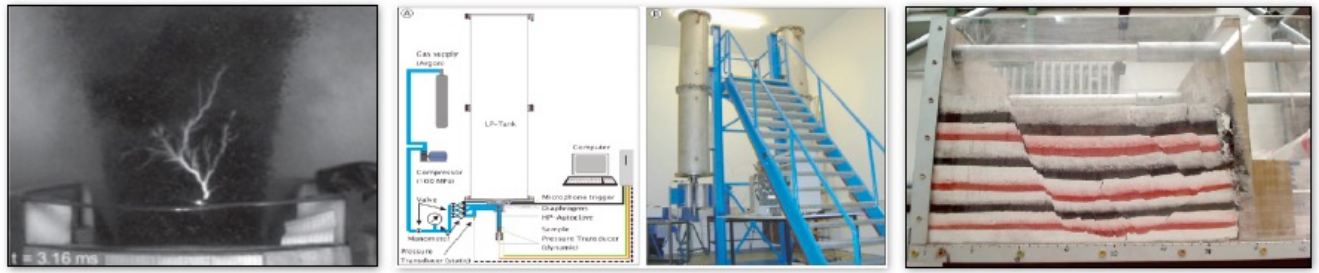


Highlights: Mantle dynamics, Subduction, Orogenic wedge, …

GERMANY

LMU - FRAGMENTATION LAB and ANALOG MODELLING LAB.

Corrado CIMARELLI and Don DINGWELL, Sara CARENA



Highlights: Volcanic processes, Pyroclastic flow, Magma Analog / Rifting, Normal Faulting, …

RWTH-AACHEN ANALOG MODELLING LAB.

Susanne BUITERS and Nicolas MOLNAR

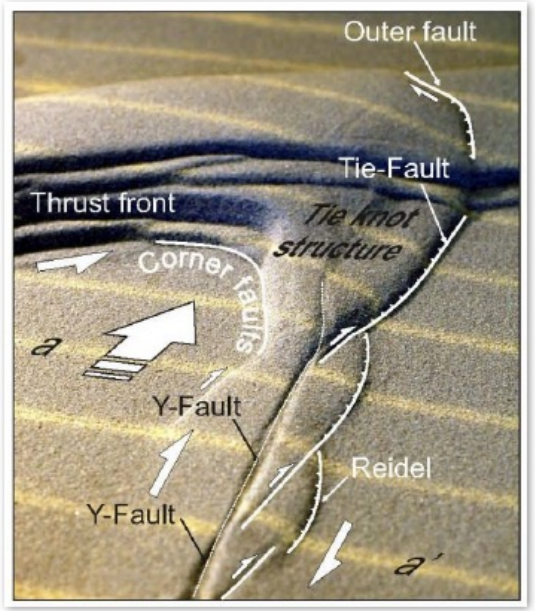
Highlights: Crustal Extension, Fracturation, Ductile Deformation, …

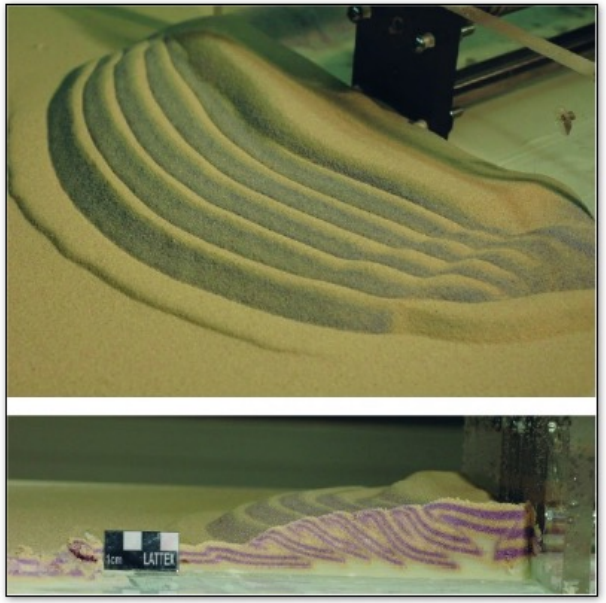
PORTUGAL → 1 LABORATORY

U LISBOA | UNIVERSIDADE DE LISBOA

TECTONIC ANALOGUE MODELLING - ULISBOA

Joao DUARTE and Filipe ROSAS





Highlights: Continental Tectonics, Ductile deformation, …

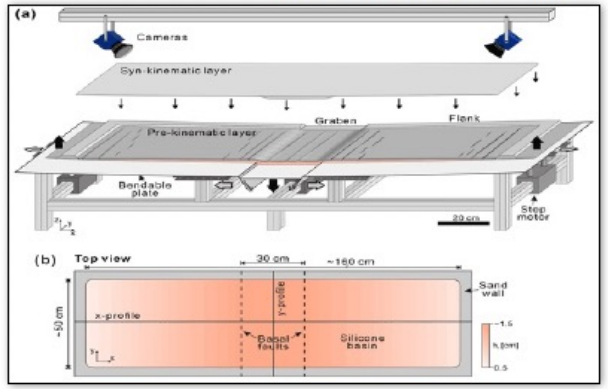
NEW ENTRIES!

CZECH

INSTITUTE OF GEOPHYSICS
OF THE CZECH ACADEMY OF SCIENCES

ANALOG MODELLING LAB.

Michael WARSITZKA



SPAIN

UNIVERSIDAD DE GRANADA

LABORATORIO DE MODELIZACIÓN ANALÓGICA DE ESTRUCTURAS GEOLÓGICAS

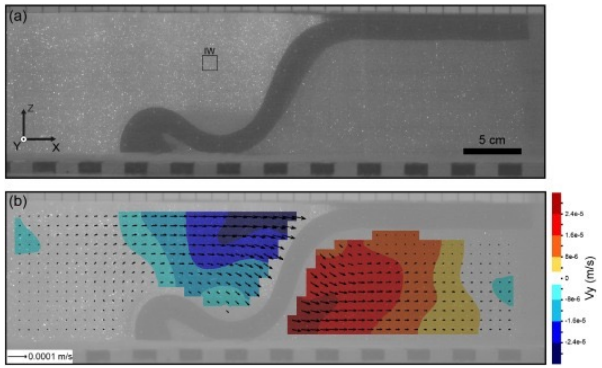
Ana CRESPO BLANC

NETHERLANDS

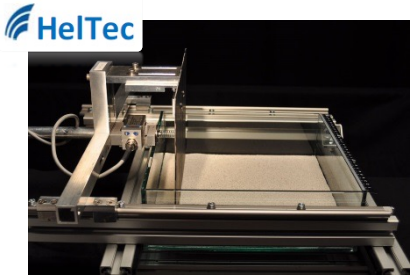
VU VRIJE UNIVERSITEIT AMSTERDAM

KUENEN-ESCHER GEODYNAMICS LABORATORY

Wouter P. SCHELLART



Selection of Equipment



Sandbox “rheometry”

Centrifuge

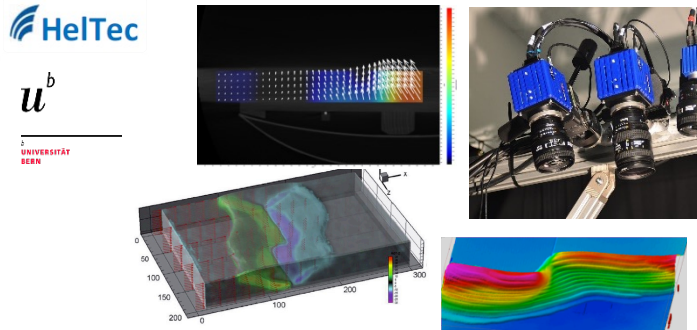
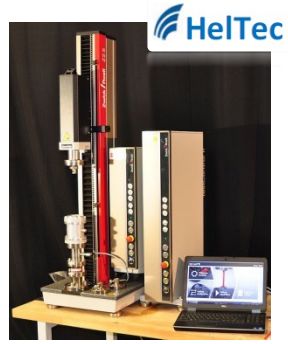


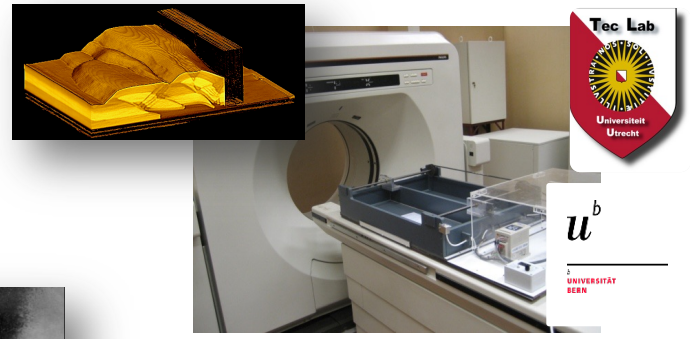
Image correlation



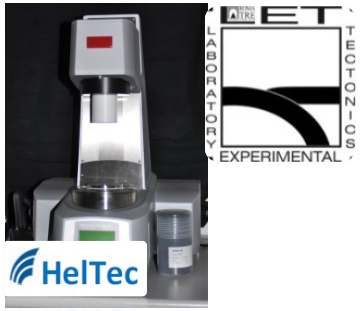
Axial testing

Shock-tube

Multilayer setup

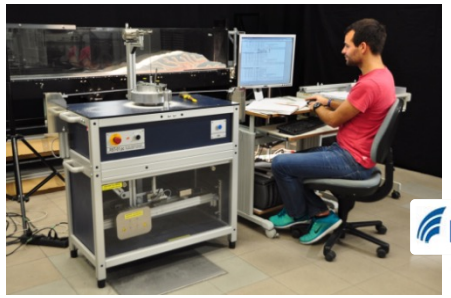


CT scanning



Rheometry

High speed imaging



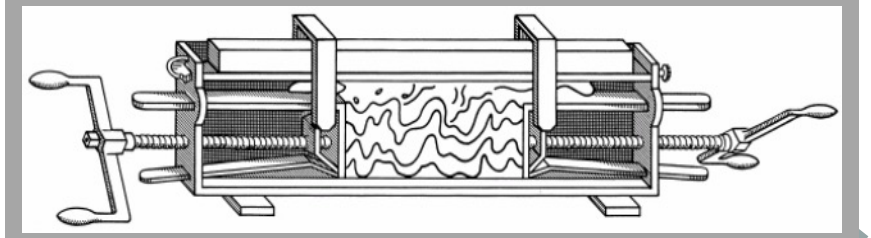
Ring-shear testing

COMMUNITY PLATFORM

(in development)

How does it work?

Share your experince!

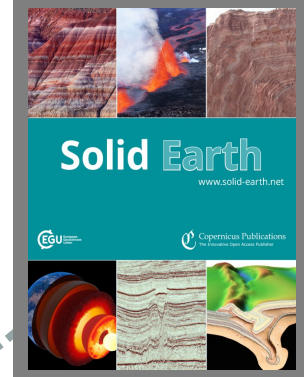


Experiment by Sir James Hall (1815)

For our YouTube channel press:

YouTube

UPCOMING SPECIAL ISSUE



Analogue modelling of basin inversion

Editors:

F. Zwaan, M. Rudolf, R. Reitano, S. Buiter, E. Willingshofer, G. Schreurs

Call opens: 1st of October 2021

COMMUNITY ACTIVITIES

multi-scale-labs@epos-ip.org

www.epos-ip.org/tcs/multi-scale-laboratories

Community meetings

Analogue Modelling Book

THE EPOS ANALOGUE COMMUNITY IS WAITING FOR YOU!

multi-scale-labs@epos-ip.org

www.epos-ip.org/tcs/multi-scale-laboratories