Geo-INQUIRE Transnational Access, SDL & Training Program

2026-06-11: SeisSol/ExaHyPE User Meeting

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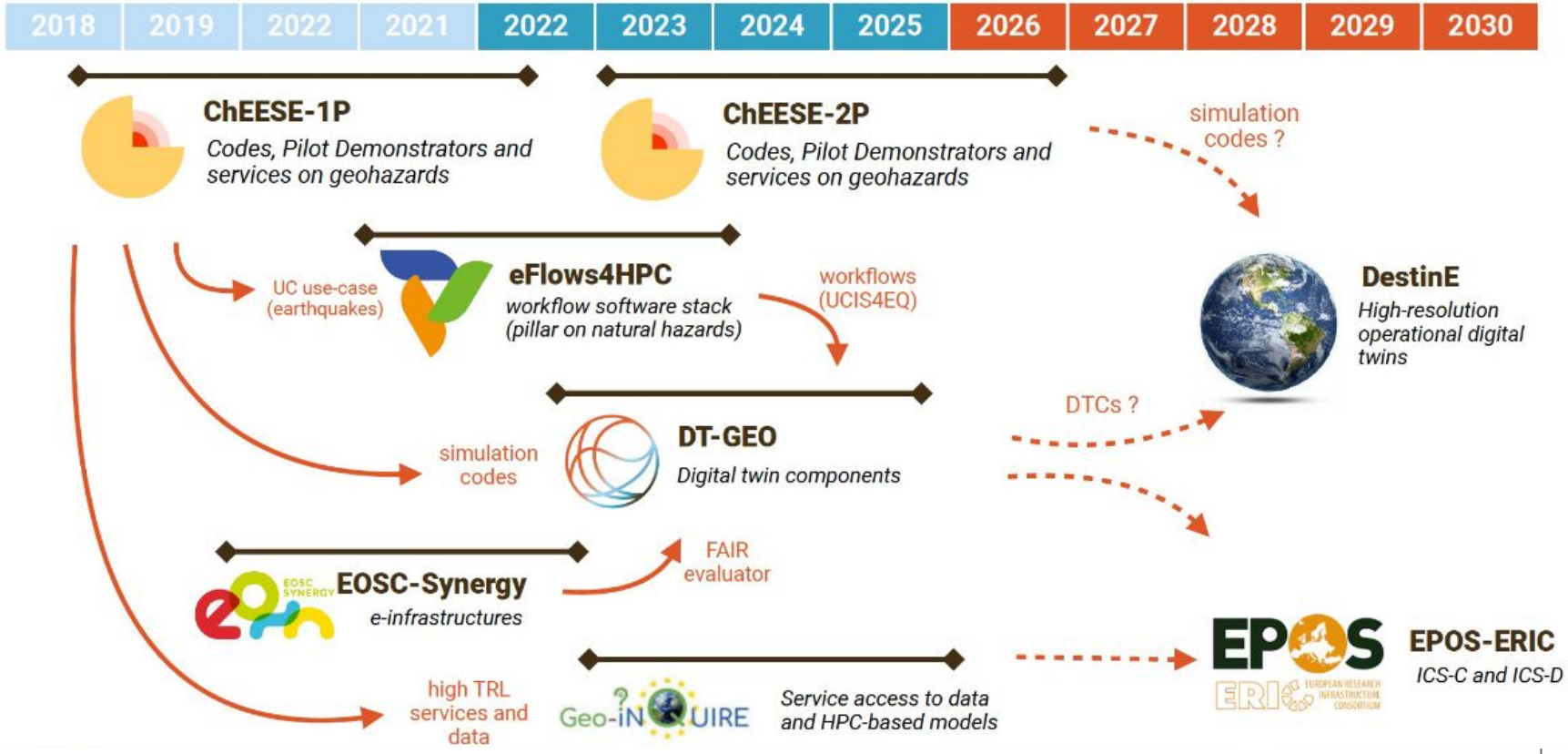
Geo-INQUIRE is Part of the Destination Earth Roadmap



Roadmap of EU Projects: Arnau Folch (CSIC)

Geo-INQUIRE is a Multi-Disciplinary Data Project

In the last 4 years Geo-INQUIRE offered:

- **Virtual Access** (VA) to:
  - Data Services (WP2),
  - Data products for geohazards & risk (WP3),
  - Data products for georesources exploration (WP4),
  - and software & workflows (WP5)
- **Transnational Access** (TA) to:
  - ECCSEL-ERIC (WP4),
  - HPC software & workflows (WP5), and
  - Testbeds (WP8)
- Full **training program** with more than 50 events and nearly 3.000 attendees (WP9)
- A **Simulation Data Lake** (SDL) for Earth sciences
- **FAIR** (WP7) access to data and **metadata** (WP6)

Geo-INQUIRE Graphic by Manuela Dziggel (GFZ)

Transnational Access (TA)

Transnational Access is more than just Compute Time

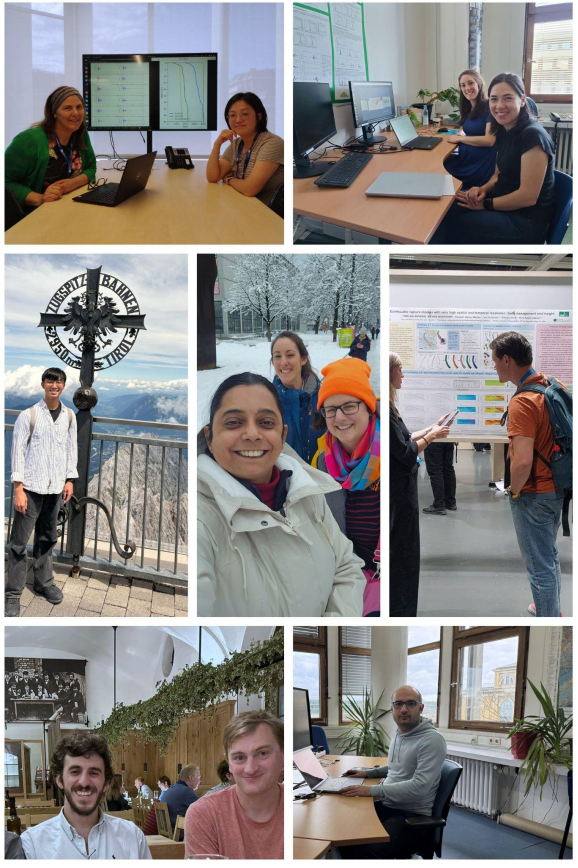
WP5: 11 Installations, ~35 projects

- **CPU budget** on leading European HPC machines (MN5, Leonardo-booster, Galileo100, SuperMUC-NG)
- **HPC Support** (installation of codes, modules, debugging, remote visualization, problem analysis)
- **Software support** (setup & how-to for codes+workflows)

Domain/code/workflow expert's support makes the difference

Usually two-week on-site one-on-one support
plus remote support before and after

Overview of TA reports can be found at:
https://www.geo-inquire.eu/transnational-access/project-reports



haiti-drm
UNITED STATES

Zoe Yin · UC San Diego

M. Marchandon, A. Gabriel, I. Christadler

Using InSAR-derived secondary fault structures to constrain a dynamic rupture model of the 2021 M7.2 Haiti Earthquake

CyberSISZ
ICELAND

Hamed Davari · University of Iceland

C. Abril, I. Christadler, N. Zamora (BSC)

A closer look at CyberShake finite fault rupture modeling for improved near-fault ground motion simulation (up to 1Hz) of strong earthquakes in Southwest Iceland

PhyDRMT
TAIWAN

Neha · National Taiwan University

M. Marchandon, I. Christadler, V. Kurapati & D. Schneller (TUM)

Physics-based Dynamic Rupture Modeling for Taiwan

CapCosC-HPC
UNITED STATES

Betsy Madden · San José State Univ.

T. Ulrich, I. Christadler, D. Schneller (TUM)

Capturing co-seismic stress changes with HPC enabled dynamic rupture models of megathrust earthquakes

Geo-INQUIRE TA@LMU

TA2-531-1 SeisSol-ExaHyPE (3 projects)

Earthquake simulation, wave simulation & hyperbolic PDE systems

TA2-541-9 Cyber-PSHA (2 projects)

Probabilistic Seismic Hazard Analysis with Cybershake

TA2-541-11 MP-PSHA (2 projects)

Towards Physics-based Probabilistic Seismic Hazard Analysis with SeisSol+UM-Bridge

SHARE
NEW ZEALAND

Duo Li · GNS Science, New Zealand

I. Christadler, N. Zamora (BSC)

Seismic HAzards from multi-fault Ruptures of crustal and subduction Earthquakes

FFM-Tohoku
UNITED STATES

Jeremy Wong · UC San Diego

Z. Niu, V. Kurapati (TUM), I. Christadler

Towards physics-based seismic hazard assessment: validating finite-fault models of the 2011 Tohoku-Oki earthquake with ensembles of dynamic rupture simulations

Overview of TA reports
https://www.geo-inquire.eu/transnational-access/project-reports

RADIATE
ITALY

Francesco Mosconi · La Sapienza, Rome

T. Ulrich, A.-A. Gabriel, I. Christadler, G. Armati (CINECA)

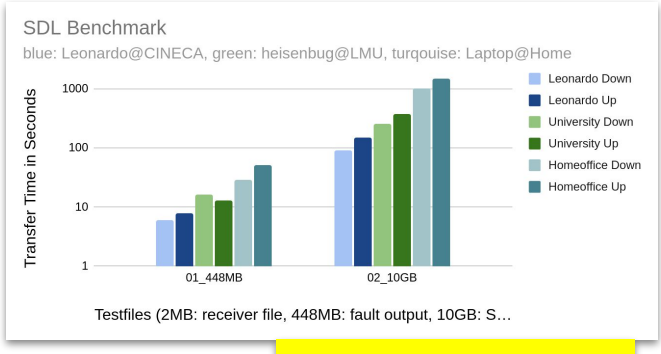
Rupture dynAmics unveileD with fAulT roughnEss: large ensemble earthquake simulations

Simulation Data Lake (SDL)

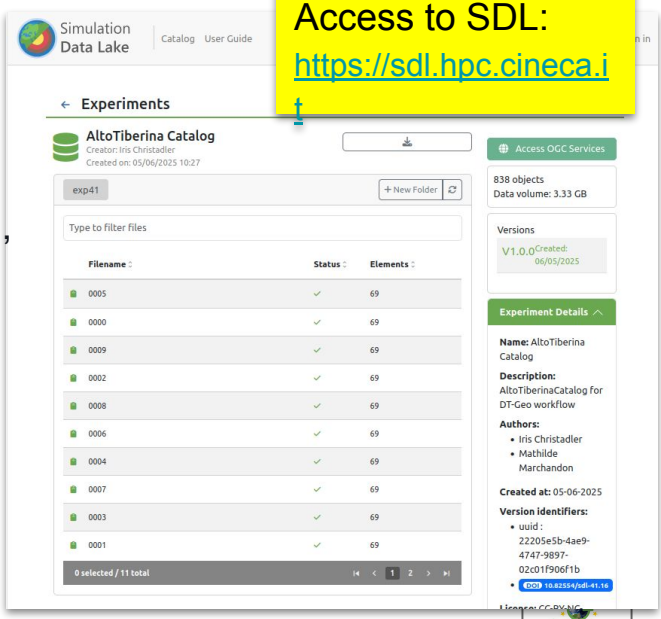
The Geo-INQUIRE Simulation Data Lake

- **Easy access:**
  - Get account and store data,
  - Webinterface, CLI, python package and API
  - Webinterface makes it easy to search or up-/download data
- **Fast access:** Upload GB in minutes
- **Metadata**:
  - Per dataset (file), simulation run (folder), experiment
  - Complete set (incl. DOI), all datacite metadata can be added,
  - Metadata defined to extend it for certain datasets
- **Long-term storage**

… a **Research Data Management (RDM) solution for SeisSol**: defined workflows to save SeisSol input data, meshes and outputs in a uniform way to ensure AI-readiness



Access to SDL: https://sdl.hpc.cineca.it



Simulation Data Lake: Alto-Tiberina Catalog

Observation data & physics

Multi-data constraints from Near-Fault Observatory **TABOO**

-Fault geometry
-Stress orientation
-Frictional properties
-Medium properties

NEAR-FAULT OBSERVATORIES

Access data available within **min to hours** after the eventa

Moderate to **large event** occurrence

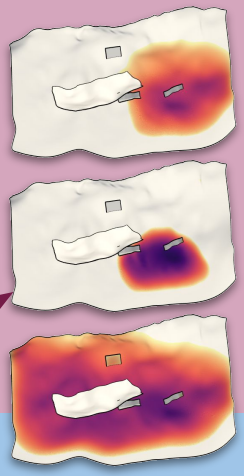
Simulation Workflow

SeisSol

3D dynamic rupture & seismic wave propagation

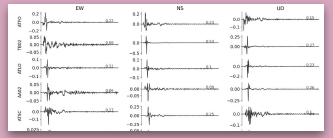
Varying nucleation location and values of unconstrained parameters

Catalog of **physic-based rupture scenarios…**

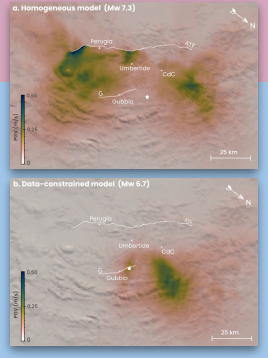


Search the catalog & output the best fitting scenario(s) (by comparing observations and synthetics)

… with associated **synthetic data** (ground motion, static displacement, etc)...

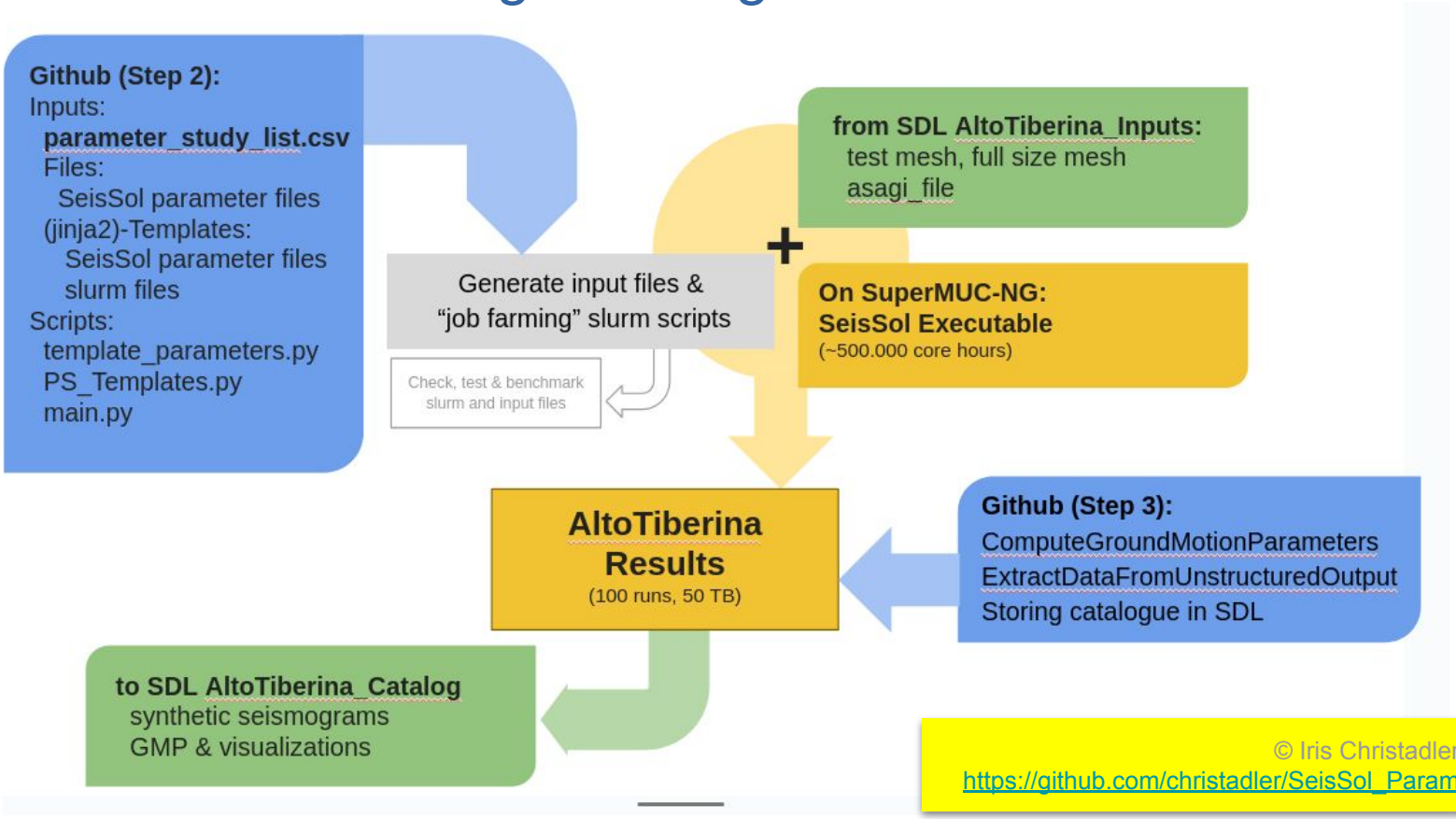


… and associated **shake maps**

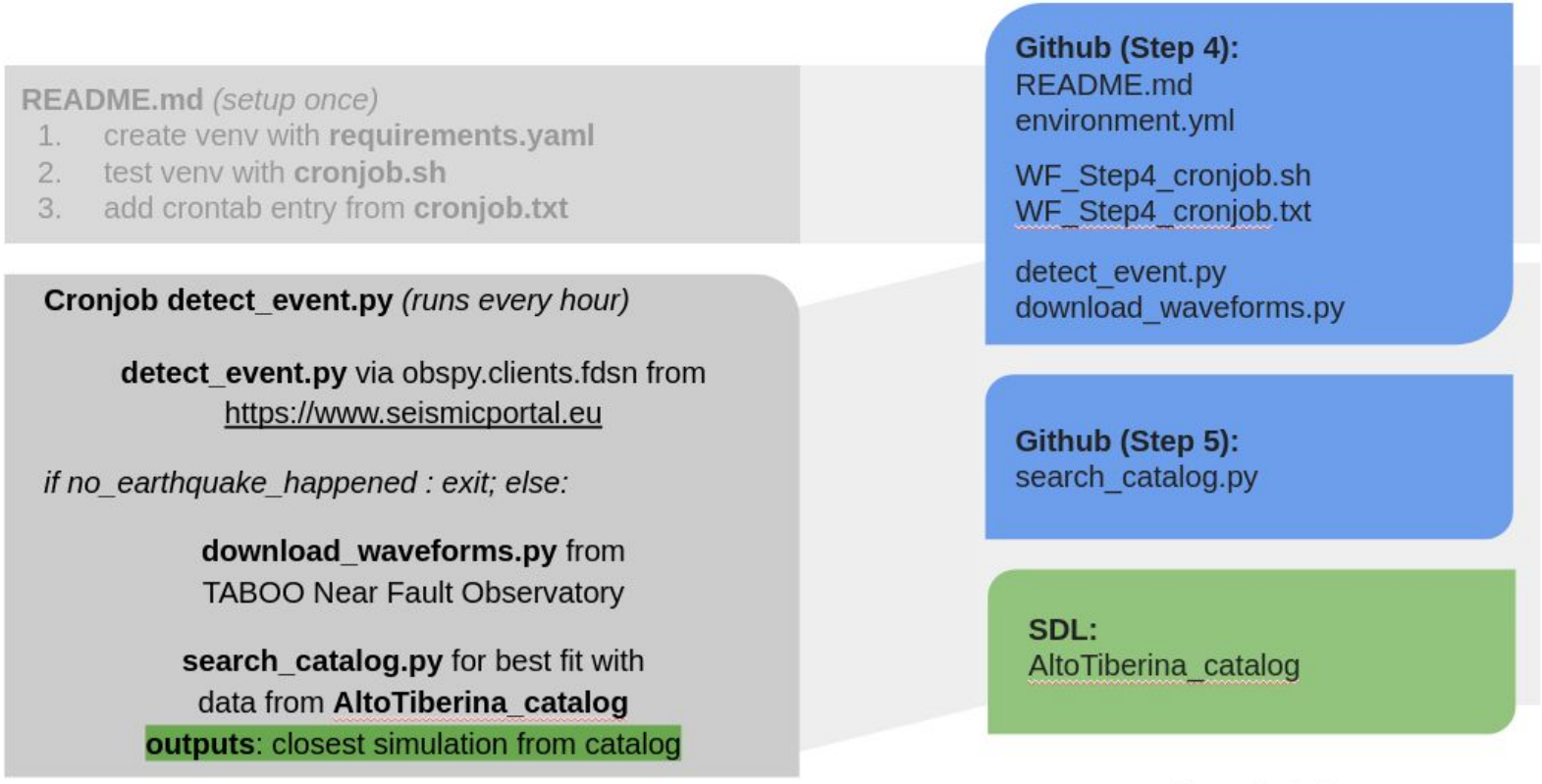


FAIR Data for follow-on research

Alto-Tiberina Catalog: Catalog-Creation Workflow



Alto-Tiberina Catalog: Rapid-Response Workflow



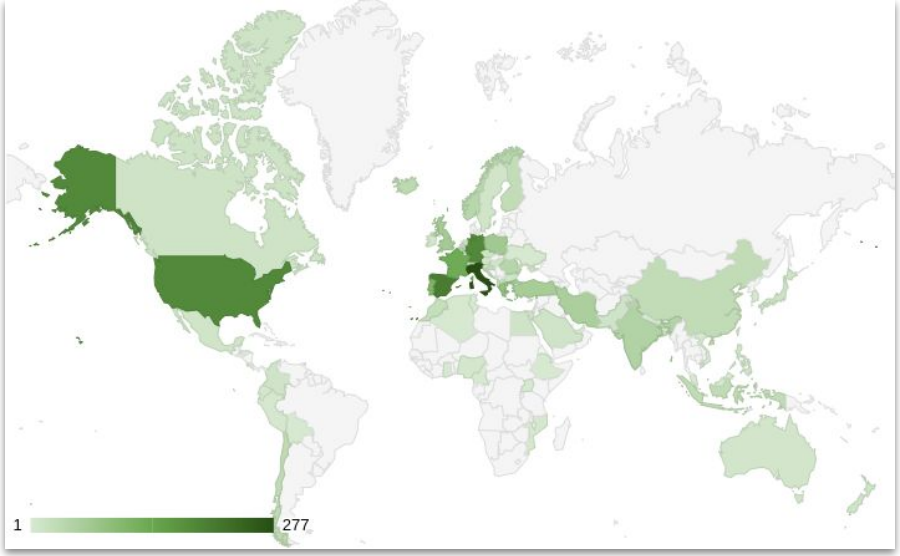
Trainings, Workshops & Schools

The Geo-INQUIRE Training Program: a Highlight of the Project

- 30+ Online Trainings (incl. FAIR Training Series),
- 15 Workshops (incl. Geohazard WS Series),
- Summer Schools in Corinth & Catania,
- and 15+ Seminars

attracted:

- ~2.800 actual attendees
- from ~90 countries,
- 40+% female attendees,
- ~15-20% non-European attendees



Visit www.geo-inquire.eu
for recordings, presentation material, and MOOCs


Thank you for your attention!