Aims of the Thematic Core Service Anthropogenic Hazards - TCS AH

The TCS AH provides an environment and facilities for conducting research on Anthropogenic Hazards, especially related to the exploration and exploitation of geo-resources. This is accomplished by the integration of three main elements:

1. **Episodes**
   - Unique datasets are integrated, describing human induced or triggered geophysical processes, which pose a hazard for populations, infrastructure or the environment.

2. **Applications**
   - Problem-orientated tools are integrated, which have been designed for the analysis of episodes to investigate correlations between technology, geophysical response, environment and hazards.

3. **Research**
   - The platform provides an environment on which research using (1) and (2) can be performed.

AH Currently Implemented Applications

Applications provide advanced methodologies for Anthropogenic Hazard data analysis currently categorized by specified types of analysis which concern:

- **Source Parameter Estimation**
  - Source Localization/Re-localization
  - Earthquake Spectral Analysis
  - Moment Tensor Inversion

- **Collective Properties of Seismicity**
  - Completeness Magnitude Estimation
  - Source-Size Distribution Functions
  - Inter-event Time Distribution

- **Probabilistic Seismic Hazard Analysis - Stationary and Time Dependent**
  - PSHA in Mining Front Study/Planning
  - Autocorrelation Between Seismicity and Technological Parameters
  - Stationarity Testing the Properties of the Data
  - PSHA in Selected Area

- **Stress Field Modeling**
  - Fracture Network Modelling

Applications for Data Format Transformation, Data Filtering, Conversion and Processing:

- Signal and Waveform download tool
- Catalog and other data export
- Seismogram picking tool
- Magnitude conversion
- Downloading data in ASCII format
- Interactive visualization tools

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EPOS IP: 2015-2019

Institute of Geophysics
Polish Academy of Sciences

Integrated 3D visualisation of seismicity in longwall goaf in Robrek Mine, Poland
Anthropogenic Hazard

TCS AH integrates episodes relating to seismicity caused by human activity, including:

- Tremors and rockbursts in mines;
- Induced seismicity from conventional and unconventional oil and gas production;
- Induced seismicity caused by geothermal energy extraction;
- Induced seismicity from underground storage of liquids (e.g., wastewater injection) and gases (e.g., CO₂ sequestration);
- Triggered seismicity from filling surface water reservoirs.
- Experimental data from in-situ laboratories

Countries involved in the WP 14:

Data availability

20 episodes are planned for TCS AH

There are currently 7 already integrated new episodes of the EPOS-IP project into TCS AH, 6 new are in preparation for an imminent publication within 2018 and 7 will follow in 2019.

- Conventional hydrocarbon extraction
  - France
  - Netherlands
  - Italy
  - United States of America

- Geothermal energy production
  - France
  - United States of America
  - Germany

- Reservoir impoundment
  - France
  - Poland
  - Italy
  - Vietnam

- Unconventional hydrocarbon extraction
  - Poland
  - United States of America
  - United Kingdom

- Underground gas storage
  - France

- Underground mining
  - Finland
  - Poland
  - France
  - United Kingdom

- Wastewater injection
  - Italy