The SHEER Approach to Shale Gas Exploration and Exploitation Associated Risks

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EAGE

Introduction — https://www.sheerproject.eu 1

Environmental effects of shale gas exploration and exploitation are extensively studied in the framework of **"Shale Gas Exploration and Exploitation Induced Risks"** project (**SHEER**, H2020-LCE 16-2014-1).

SHale gas Exploration and Exploitation induced Risks (SHEER) project is undertaken in order to set up a probabilistic methodology to assess and mitigate the short and the long term environmental risks resulting from the exploration and exploitation of shale gas such as: groundwater contamination, air pollution and induced seismicity.

One of the main components of this Project is on-site monitoring of the effects of hydrofracturing at Wysin shale-gas play of the Polish Oil and Gas Company in Pomerania, Poland. This includes monitoring of seismicity and water and air quality.

At the beginning of the **SHEER** project in May 2015, one vertical well operated at the site, reaching gas-bearing shale formations at nearly 4km depth. Later on, two horizontal wells, each of about 1.7km length, were drilled (late Autumn 2015) and fracked (June – August, 2016). This schedule provided the opportunity to determine background seismicity and baseline data on water and air quality, and then to record the immediate and delayed effects of hydrofracturing operations. The monitoring was continued for about 1.5 years after the completion of operations at the site.

IS-EPOS

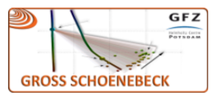
The **SHEER** database is located on
"IS-EPOS Platform for the Research into Anthropogenic Seismicity and other Anthropogenic Hazards"
https://tcs.ah-epos.eu
The data will be fully accessible after 30/04/2018

REGISTER ONLINE

SHEER data within IS-EPOS 2

- Episodes
  - Conventional hydrocarbon extraction
  - Unconventional hydrocarbon extraction
  - Geothermal energy production
- Services
- Social functions

Groningen Field: conventional hydrocarbon production
Conventional hydrocarbon extraction · Netherlands, Groningen · SHEER

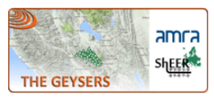


Gross Schoenebeck: geothermal energy production experiment
Geothermal energy production · Germany, Gross Schoenebeck · IS-EPOS, EPOS-IP, SHEER

Lubocino: Shale gas
Unconventional hydrocarbon extraction · Poland, Pomerania · SHEER

Oklahoma: conventional and unconventional hydrocarbon extraction and wastewater injection
Conventional hydrocarbon extraction, Unconventional hydrocarbon extraction, Wastewater injection · United States of America, Oklahoma · EPOS-IP, SHEER

Preese Hall: Shale Gas
Unconventional hydrocarbon extraction · United Kingdom, Lancashire · EPOS-IP, SHEER

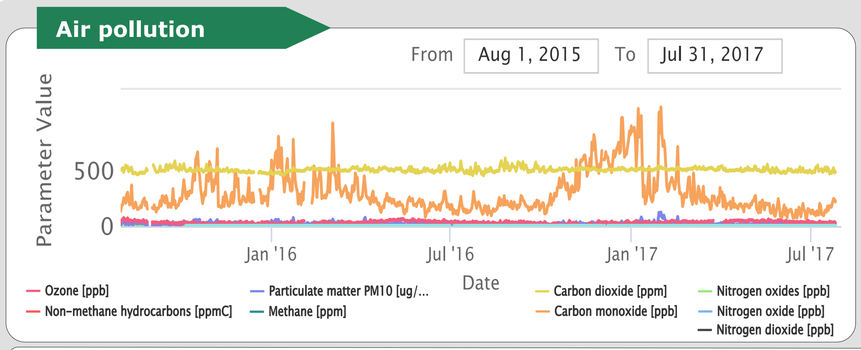


The Geysers: geothermal energy production
Geothermal energy production · United States of America, Geysers · SHEER

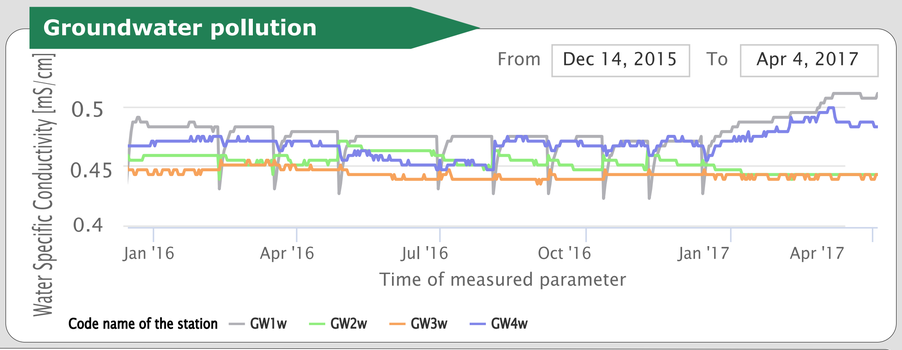
Wysin: Shale Gas
Unconventional hydrocarbon extraction · Poland, Pomerania · SHEER

Environmental monitoring 3

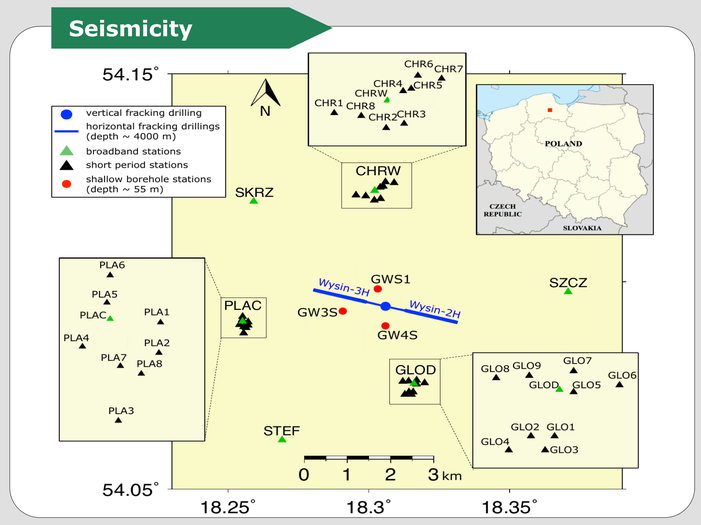
Air pollution



Groundwater pollution

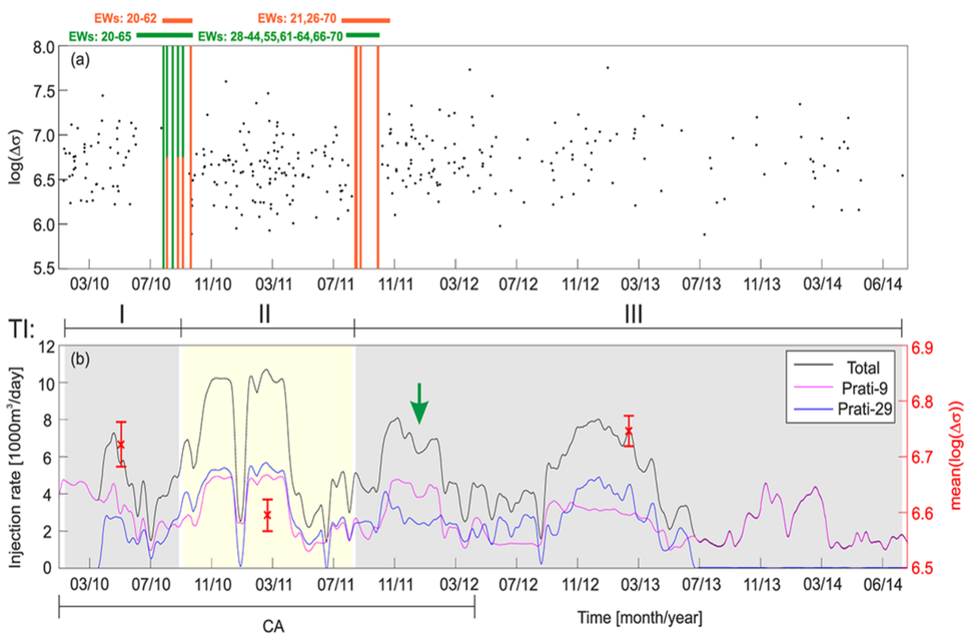


Seismicity



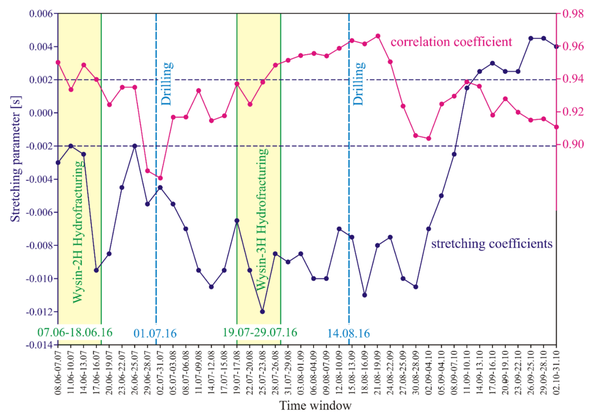
Scientific results 4

Static stress drop Δσ of induced events

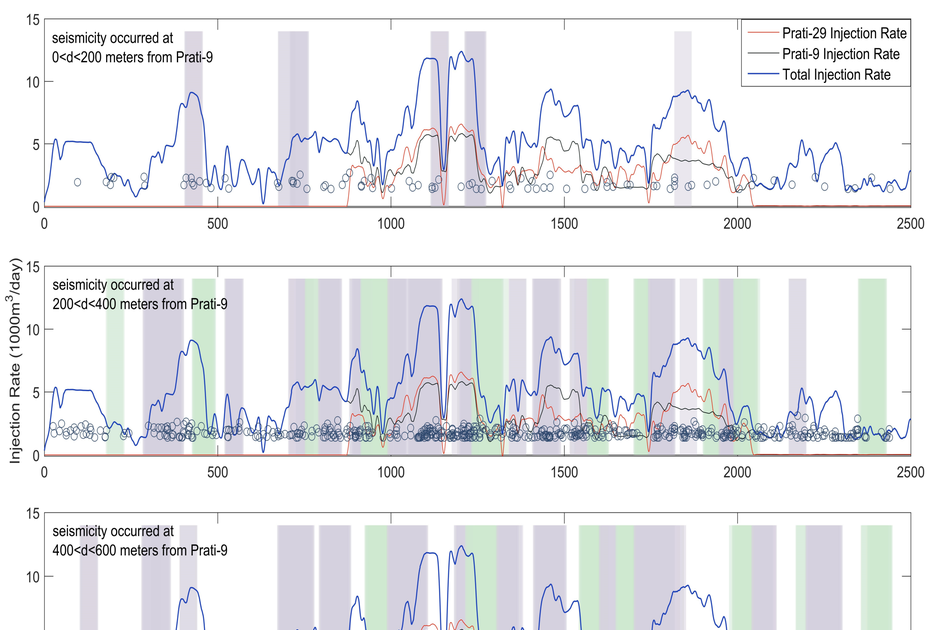


Response to injection of:

Rockmass properties (Seismic interferometry)



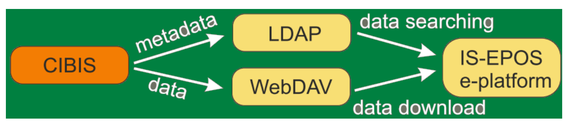
Seismicity rates



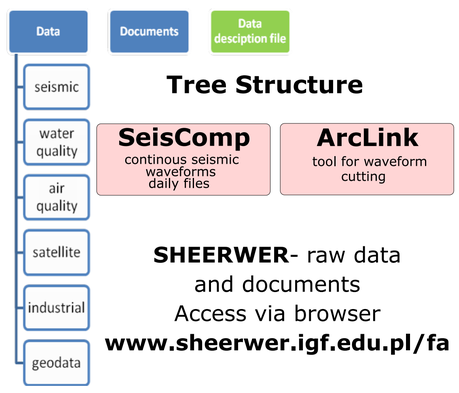
Database 5

CIBIS- past case studies and integrated **Wysin data** (data harmonized and homogenized)

(1) Collects and manages data associated with induced seismicity from external users.
(2) Administrates the resources and users.
(3) Shares the system remotely with TCS AH.



Episode:



Tree Structure

SeisComp continous seismic waveforms daily files

ArcLink tool for waveform cutting

SHEERWER- raw data and documents
Access via browser
www.sheerwer.igf.edu.pl/fa

Project Consortium 6

SHEER project consortium includes partners from Italy, United Kingdom, Poland, Germany, Netherlands and USA:

(4) amra

(1) Institute of Geophysics Polish Academy of Sciences

GFZ Helmholtz-Zentrum POTSDAM (2)

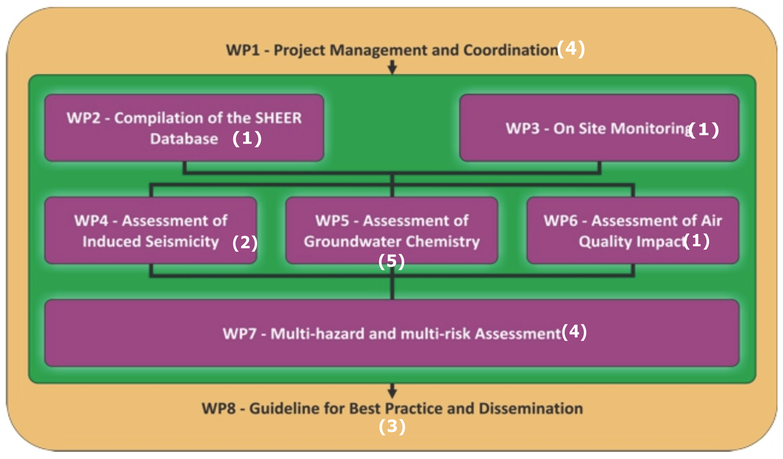
Keele University (3)

Koninklijk Nederlands Meteorologisch Instituut *Ministerie van Infrastructuur en Milieu*

RSKW (5)

University of Glasgow

University of Wyoming



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