

Update from the Site-Evaluation Parameters Group

Jan Harms
Gran Sasso Science Institute
INFN - National Laboratory of Gran Sasso



SITE-EVALUATION PARAMETERS (SEP)



WG1: Data storage; code and information sharing

WG2: Sensor-installation guide:
seismometers, microphones, magnetometers

WG3: Site conditions:
geology, (geo)hydrology, accessibility,
radioactivity, (bio)chemical environment and
corrosion

WG4: Environmental-noise estimation:
seismic, Newtonian, magnetic

Members:

Francesco Fidecaro, Massimiliano Razzano,
Laszlo Somlai, Carlo Giunchi

Pisa University Data Center has provided a
virtual machine to be run as web server

- 5 TByte for site data with continuous backup
- Repository for codes
- ...

Members:

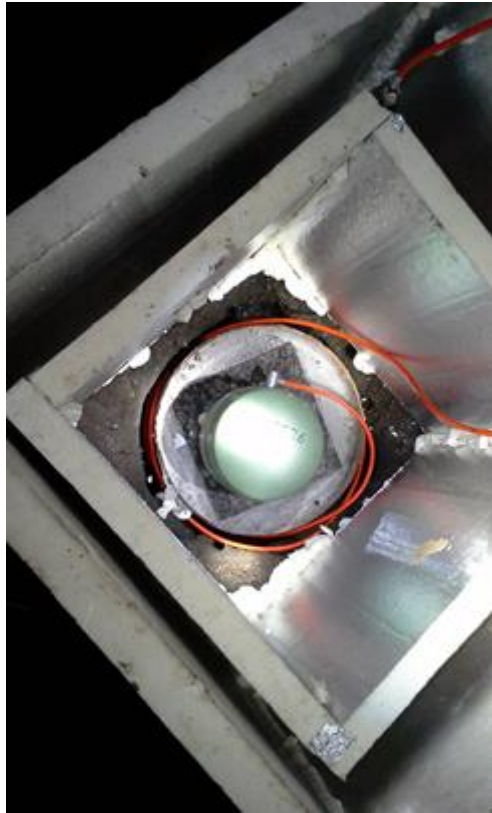
Marco Olivieri (group coordinator), Alicia M Sintes, Vuk Mandic, Edit Fenyvesi, Federico Paoletti, Irene Fiori, Tomek Bulik

Sensor-installation guide

(seismometer, microphone, magnetometer)

- Underground and surface installations
- Instrumentation (models, cost)
- Sensor synchronization
- Data transfer
- Powering
- Best practice
- Array configurations

Homestake underground seismometer installation



Magnetometer installation



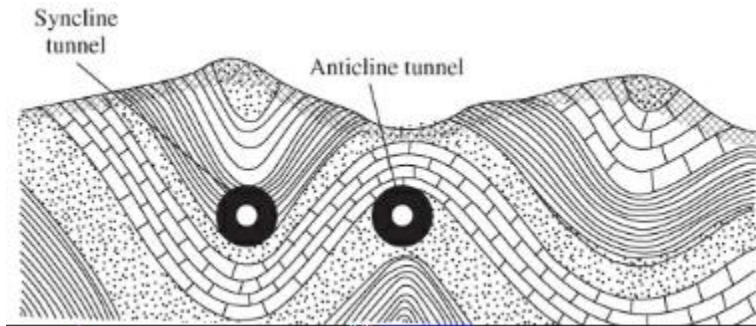
Members:

Aniello Grado (group coordinator), Alain Dassargues, Frédéric Nguyen, Riccardo DeSalvo, Wolfango Plastino, Giovanni Losurdo, Peter Van, Giacomo Oggiano, Stefano Cuccuro, Maria Marsella, Dorota Rosińska

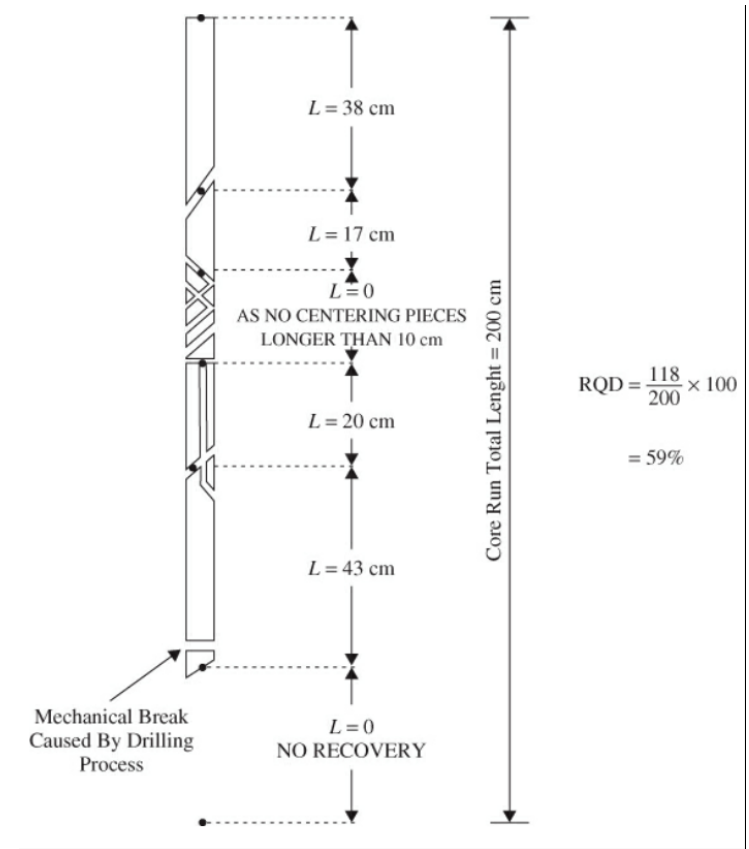
Site conditions

- Geohydrology
- Geology
- Radioactivity
- (Bio)chemical environment and corrosion
- Site accessibility

- Geohydrology (rock porosity, cracks, rock-layer structure, water table, climate)

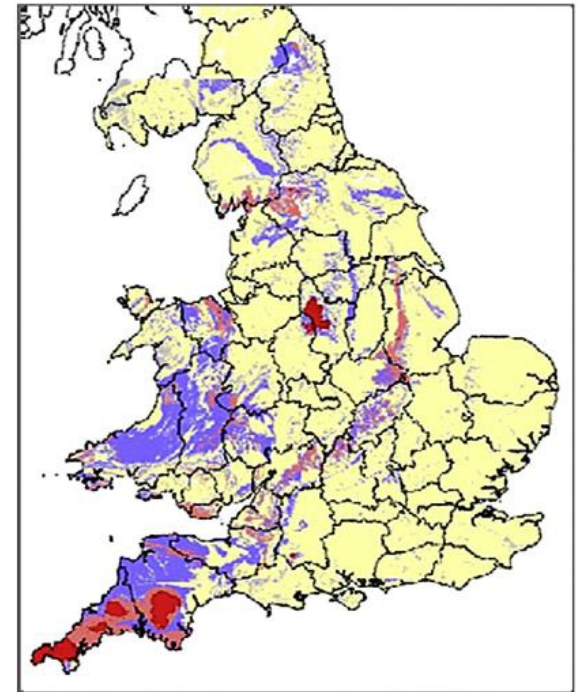


- Geology (rock quality, rock type, shear zones/ faults/joints, bedding)



- ^{226}Ra is abundant in soils and rocks
- Radium decays to ^{222}Rn , which is a gas that can be inhaled and it is damaging due to a short half-life
- Inside rock, Radon can move with air or water depending on rock permeability/porosity
- Concrete contains Radium
- Ventilation in underground environments

Natural Radon levels in the UK



- Presence of chloride leads to accelerated corrosion of stainless steel
- Microbiologically Influenced Corrosion (MIC): Sulfate reducing bacteria
- Corrosion can be accelerated by large factors (e.g., 100)

Genus or Species	pH	Temperature T	Oxygen Requirement	Metals Affected	Metabolic Process
<u>Desulfovibrio</u>	4-8	10°C - 45°C	Anaerobic	Iron and steel, stainless steels, <u>aluminum</u> , zinc, copper alloys	Use hydrogen in reducing SO_4^{2-} to S^{2-} and H_2S ; promote formation of <u>sulfide films</u>
<u>Desulfotomaculum</u>	6-8	10°C - 45°C (some at 45°C - 75°C)	Anaerobic	Iron and steel, stainless steels	Reduce SO_4^{2-} to S^{2-} and H_2S

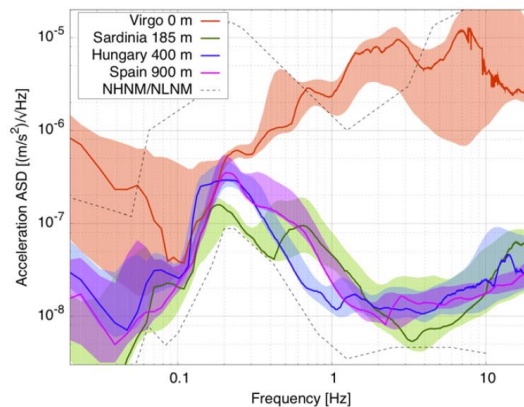
Members:

Fabio Bonsignorio, Wolfango Plastino, Andrea Chincarini, Rosario DeRosa, Henk Jan Bulten, Vuk Mandic, Enrico Calloni, Matyas Vasuth, Laszlo Somlai, Zoltan Zimboras, Gilberto Saccorotti, Carlo Giunchi, Davide Piccinini, Patrick Meyers, Tomek Bulik, Jan Harms

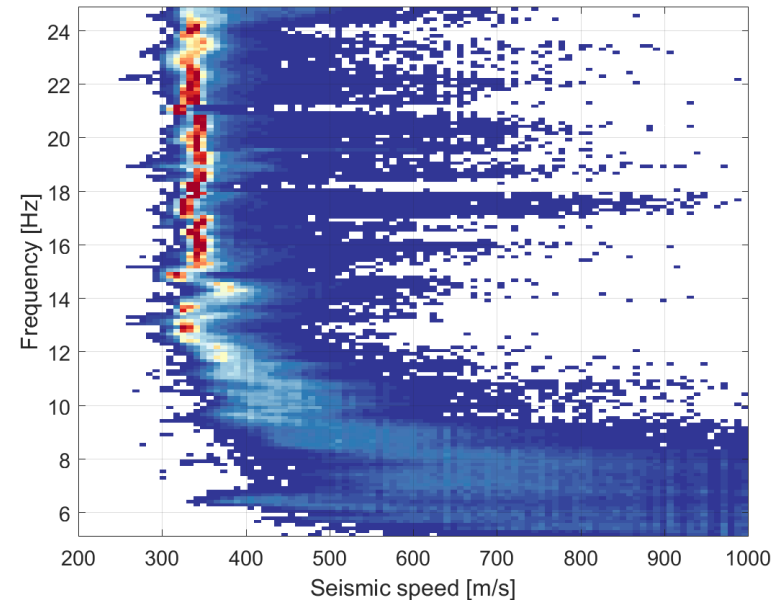
Analysis codes

- Analyses of environmental-sensor data
- Array analyses
- ET environmental noise simulator (seismic, Newtonian, magnetic)

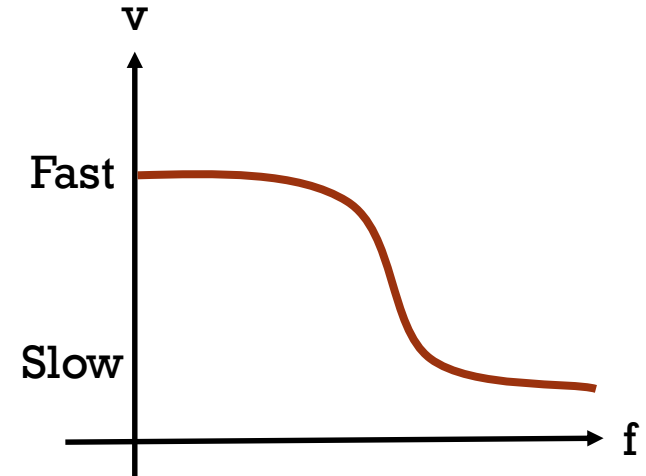
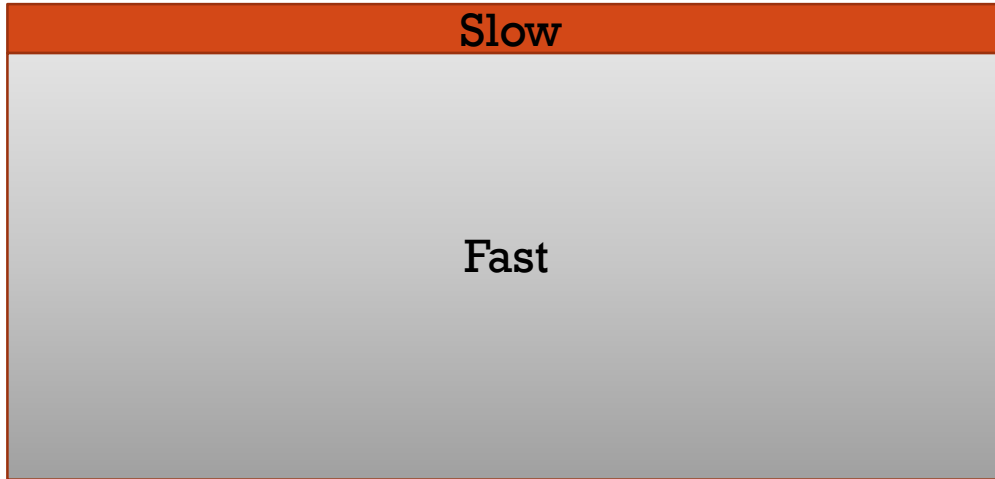
- Playground data sets
Homestake (surface and underground array),
Matra (underground stations),
Sardinia (Polgraw: surface and underground
array; INGV: active studies)
- Codes
spectral analyses,
array analyses, Wiener
filtering, active studies



Rayleigh dispersion



STRATIGRAPHY AND NN



- Dispersion curves are required for Rayleigh NN calculations in underground detectors.
- Dispersion curves can be measured with surface arrays (no borehole information needed)
- Seismic waves produced by point-like sources at the surface are trapped in surface layer (point-like means much smaller than thickness of surface layer)

End of May: First complete draft of WG products shared with SEP teams

End of June: Share products with ET collaboration

In the meantime, site teams can of course already look at available SEP materials

