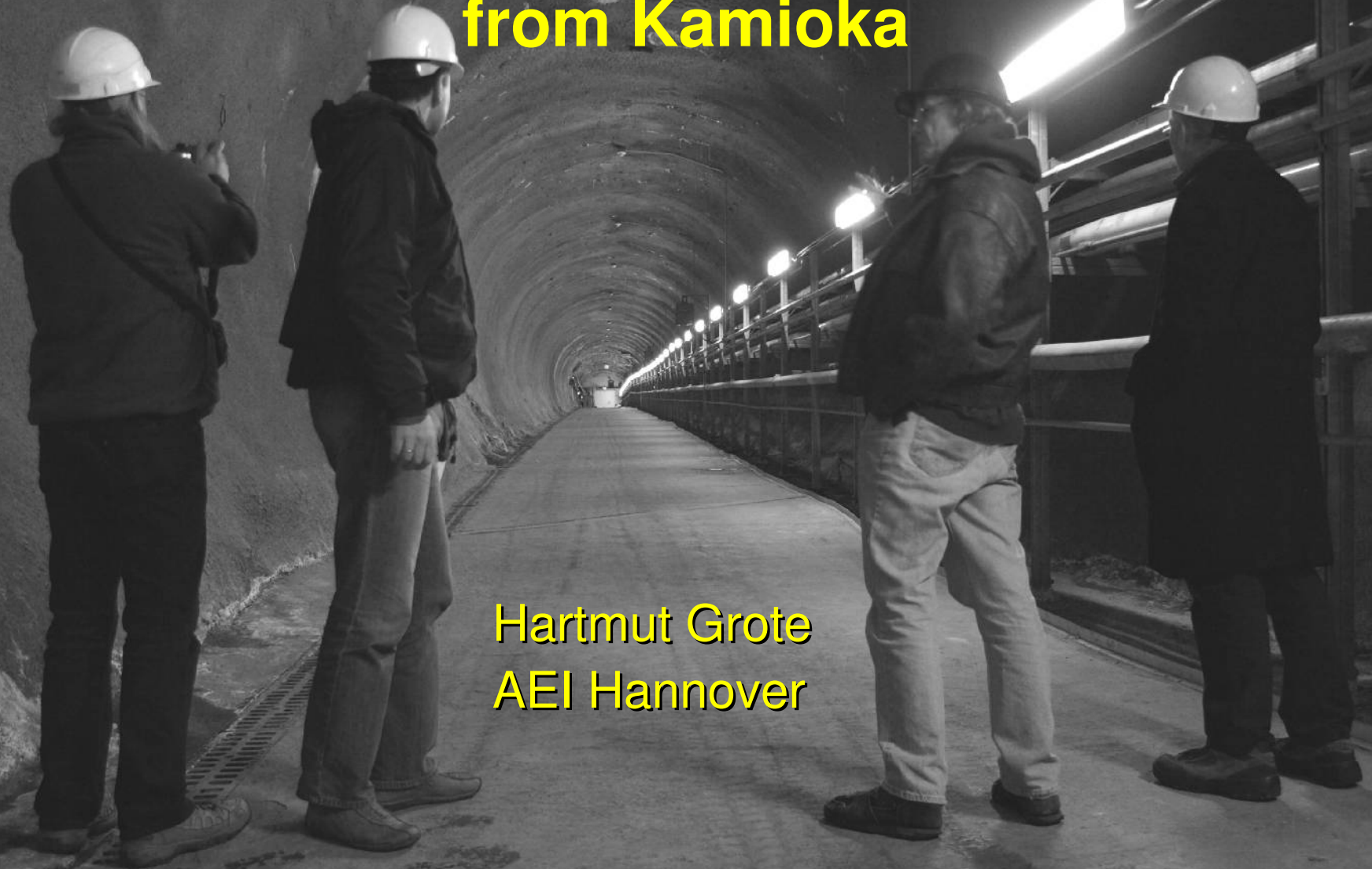


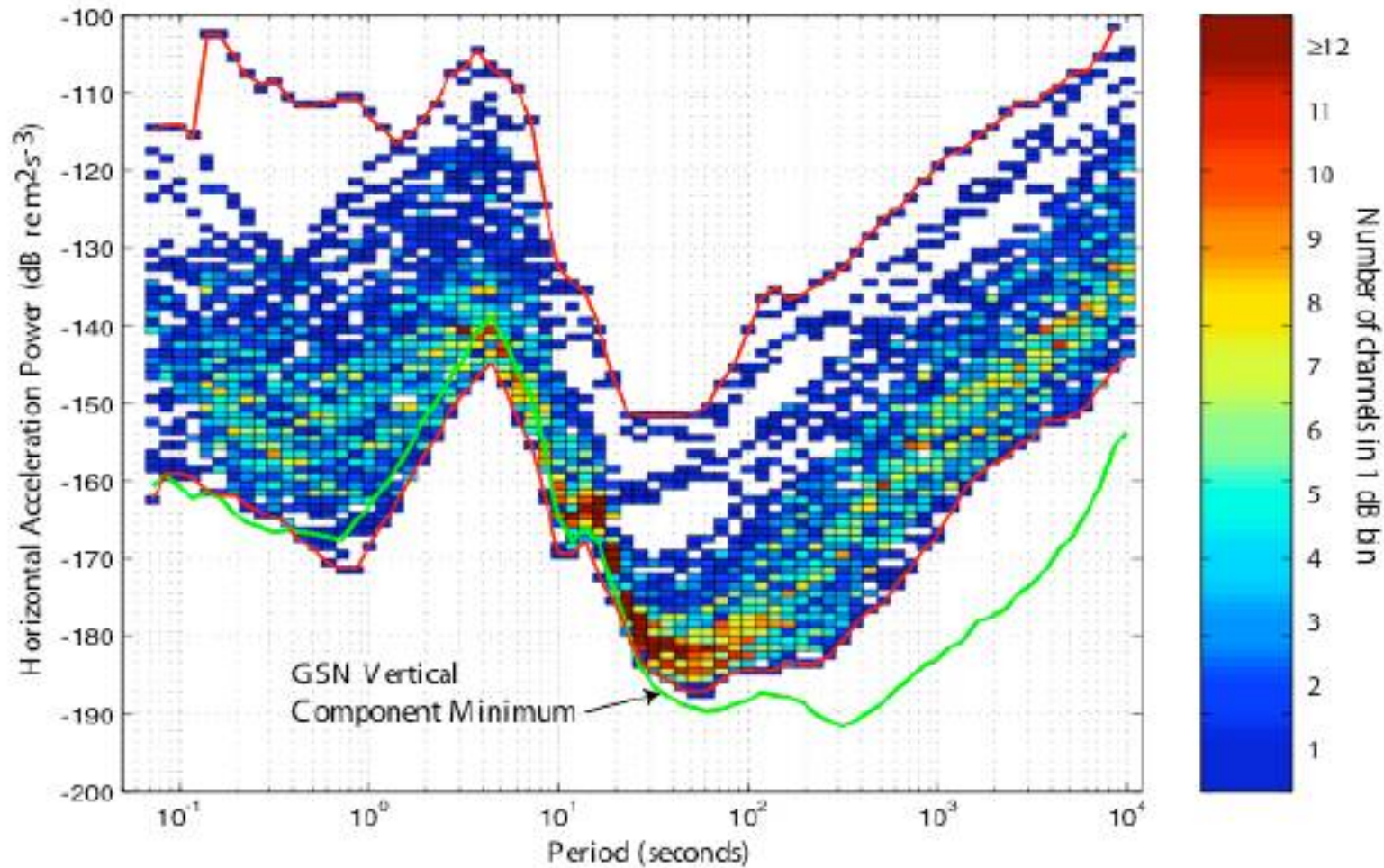
Seismic Data from the Black Forest Underground Station and Experience from Kamioka



Hartmut Grote
AEI Hannover

ET-WP1 meeting, Gran Sasso, 8.Feb 2009

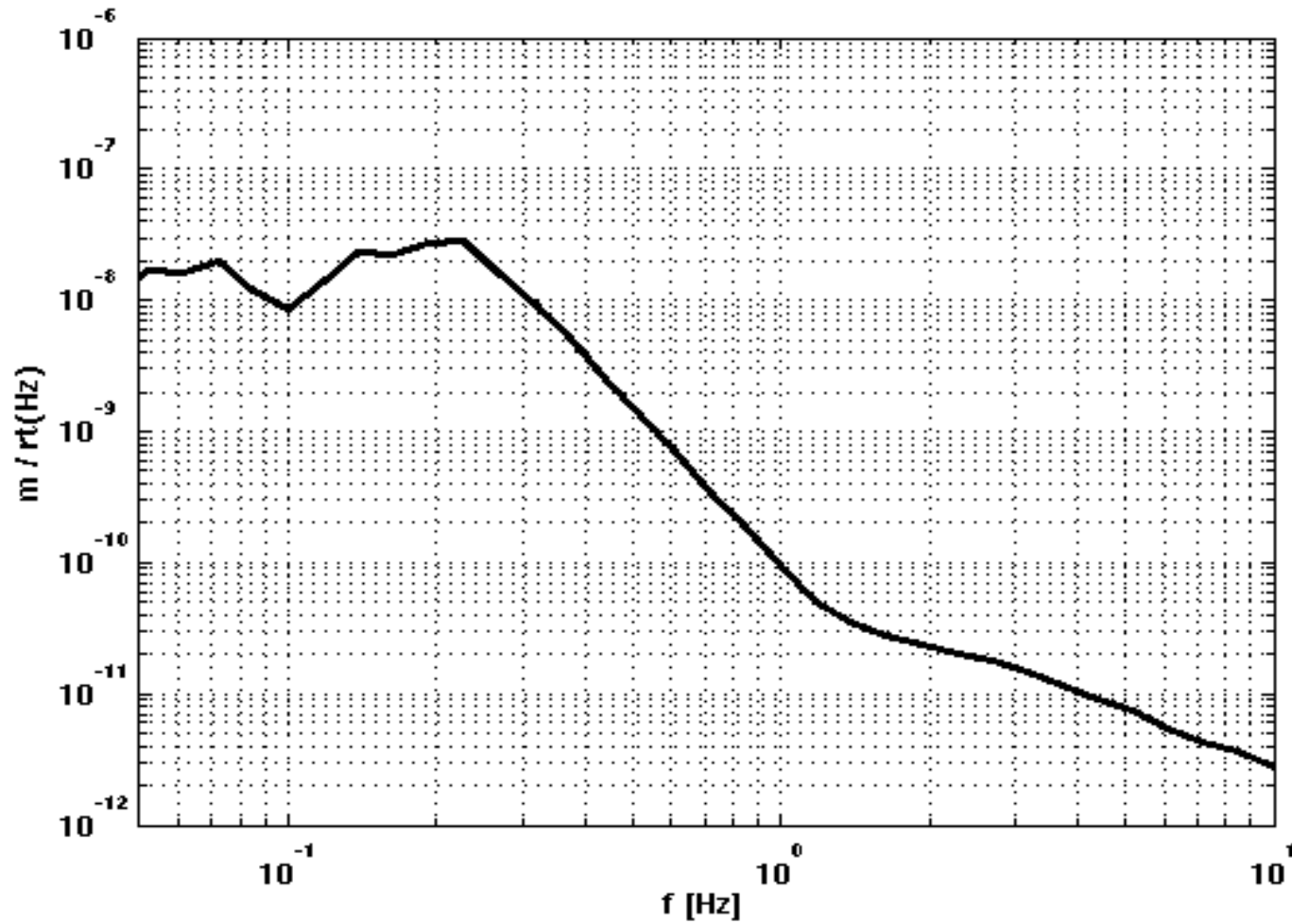
Berger (et al.) “Low Noise Model“ 2004



Berger *et al.*(2004), Ambient Earth Noise:
A survey of the Global Seismographic Network,
JGR 109, B11307

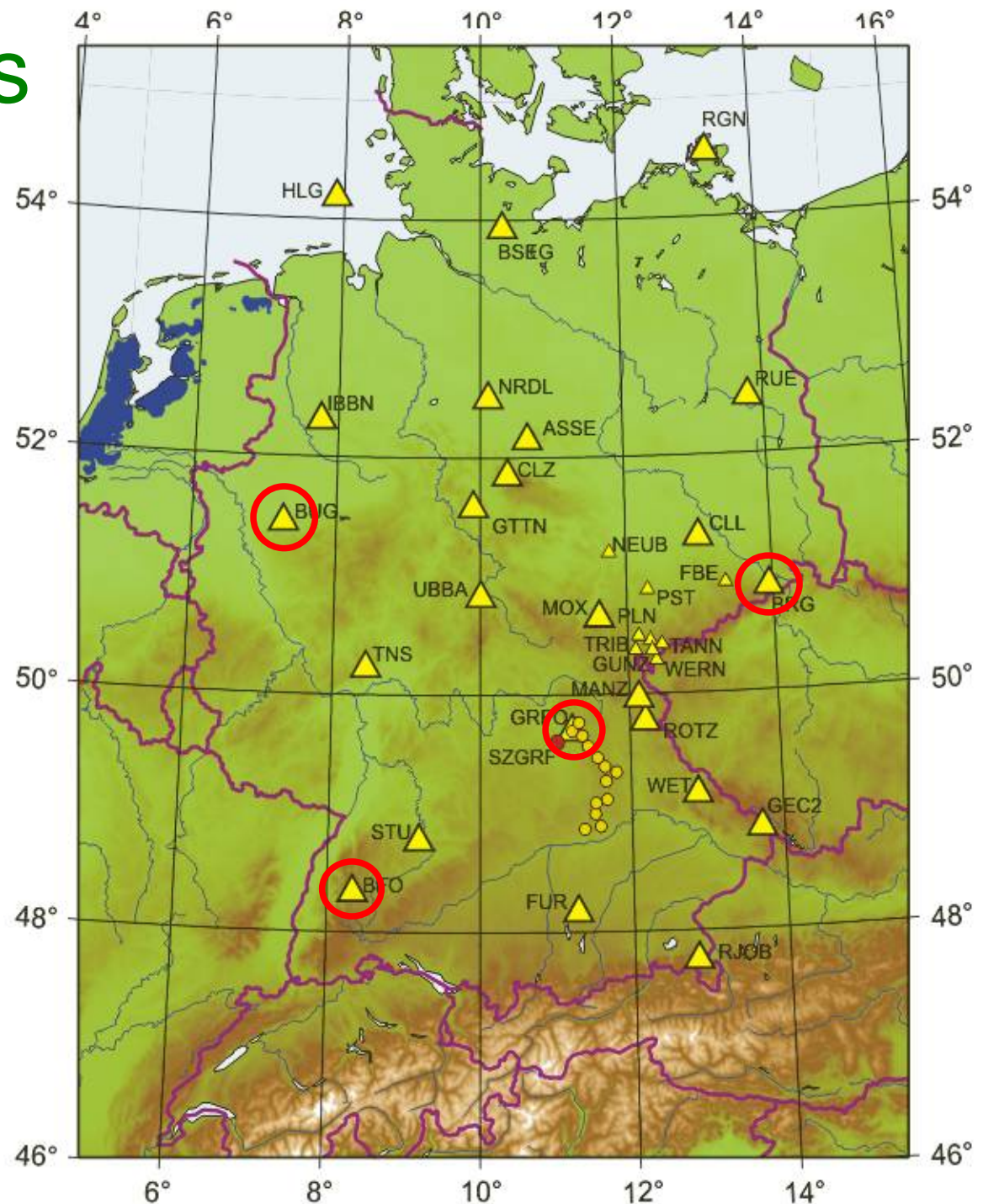
Berger (et al.) “Low Noise Model“ 2004

Translated for Interferometry people...



SZGRF – Stations (BGR)

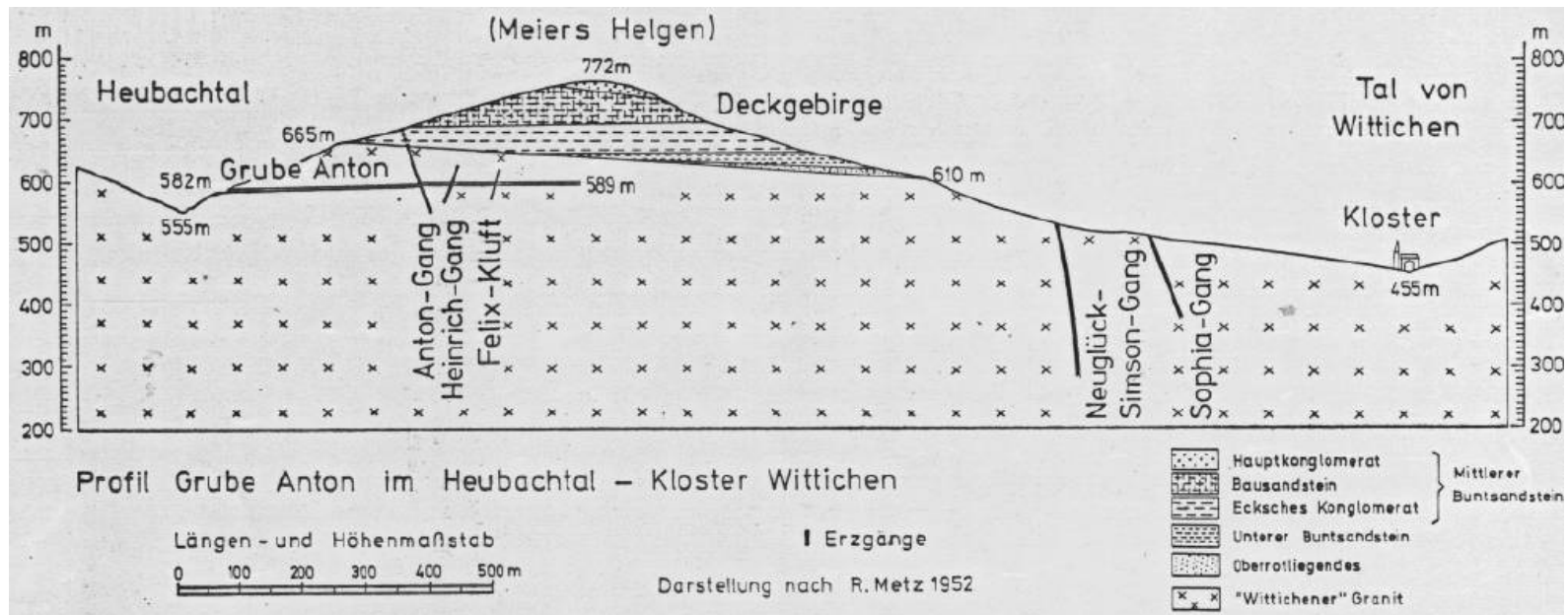
- BFO: 162m bs,
Granite
- BRG: 36m bs, aban. mine
Hornblendeslates
- GRFO: Borehole,
KS36000, 116m bs,
Chalk and dolomite
- BUG: drift of coal mine,
Clastic sediments



Stations of the GRF-Array: circles, orange with black border

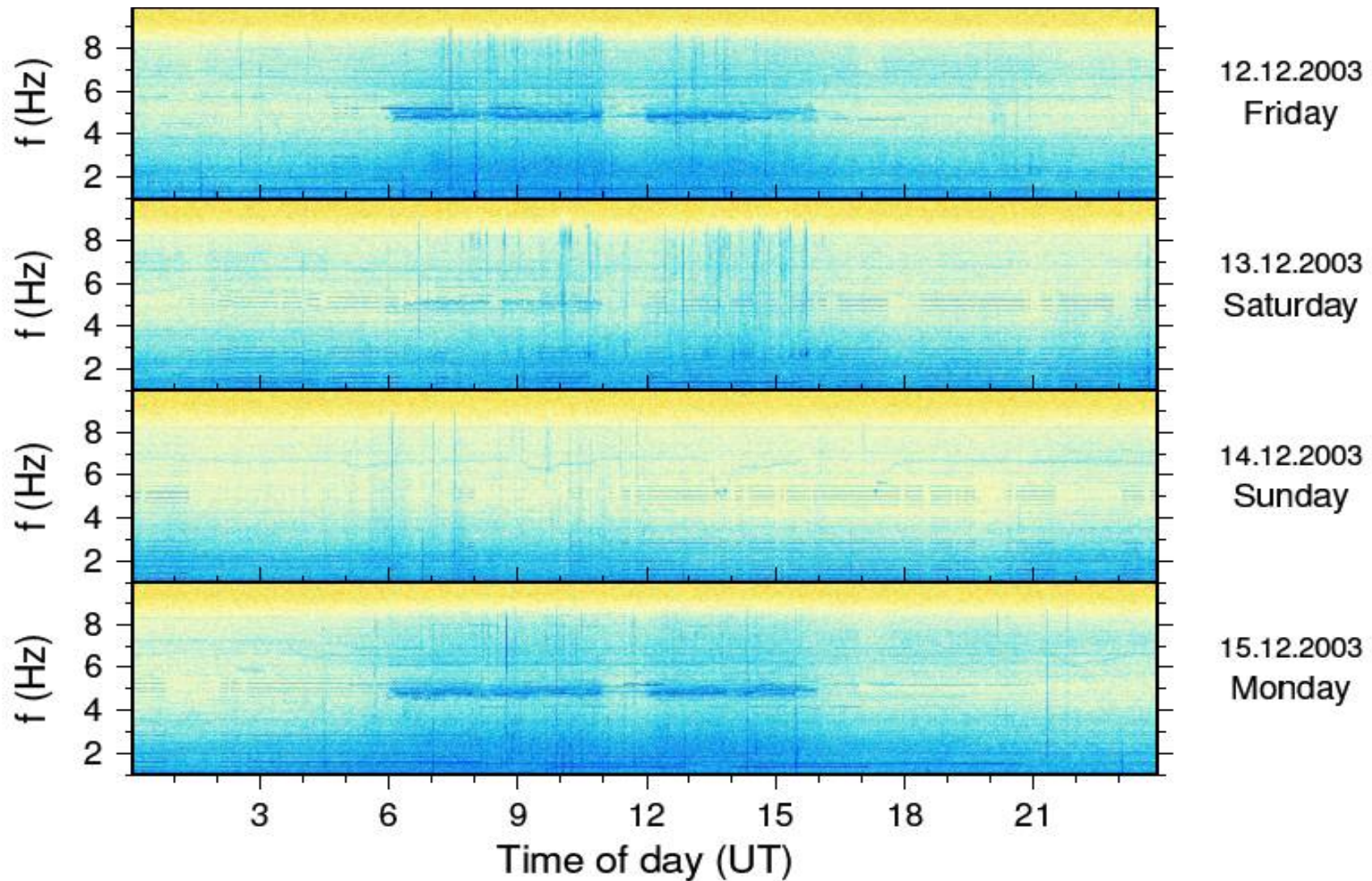
Stations of the GRSN and associated stations: triangles, yellow with black border

Black Forest Observatory

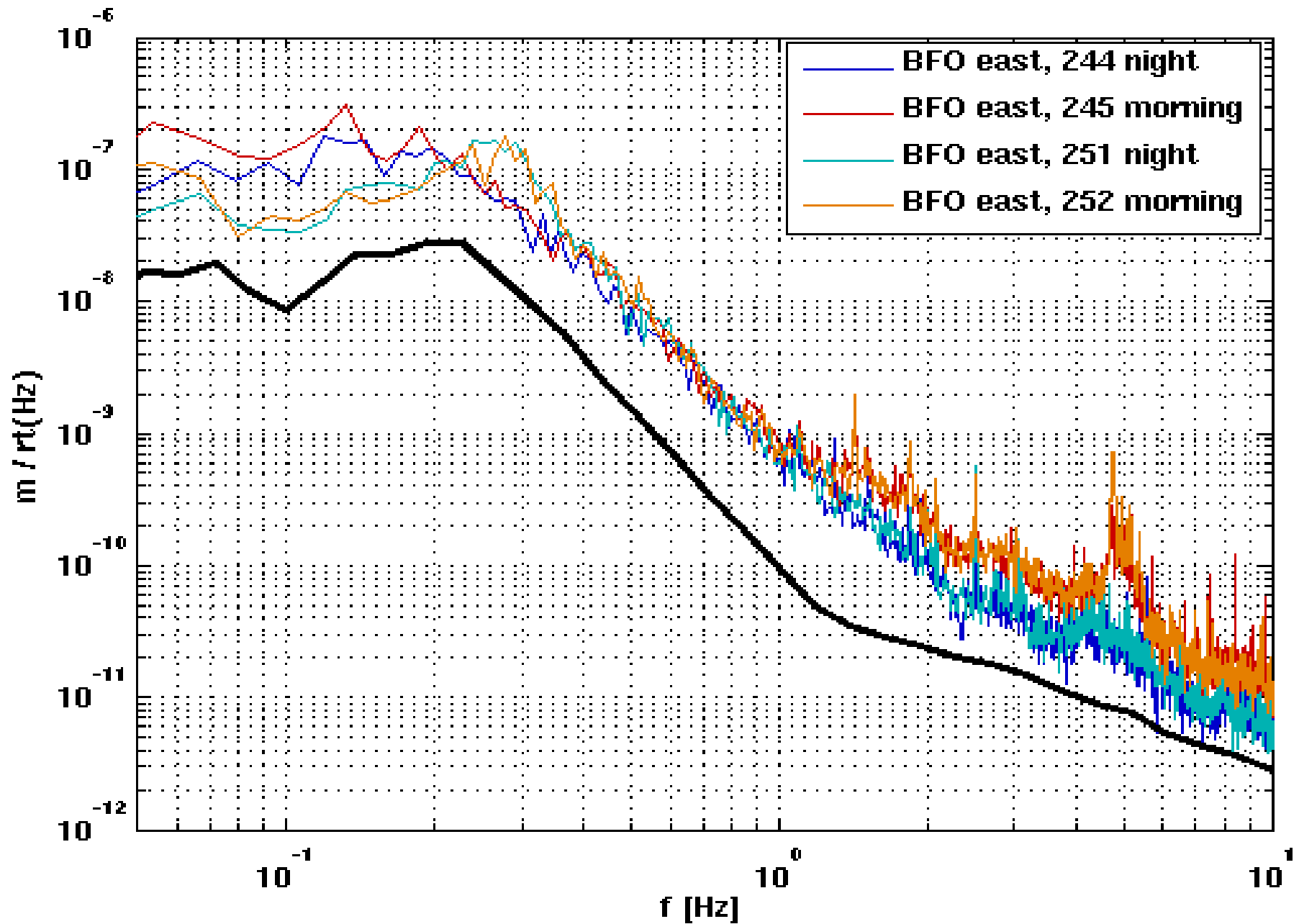


- Geophysical Observatory since 1972, operated by Universities of Karlsruhe and Stuttgart
- Granite base-rock, covered by sediments
- Approx. 150m below surface level

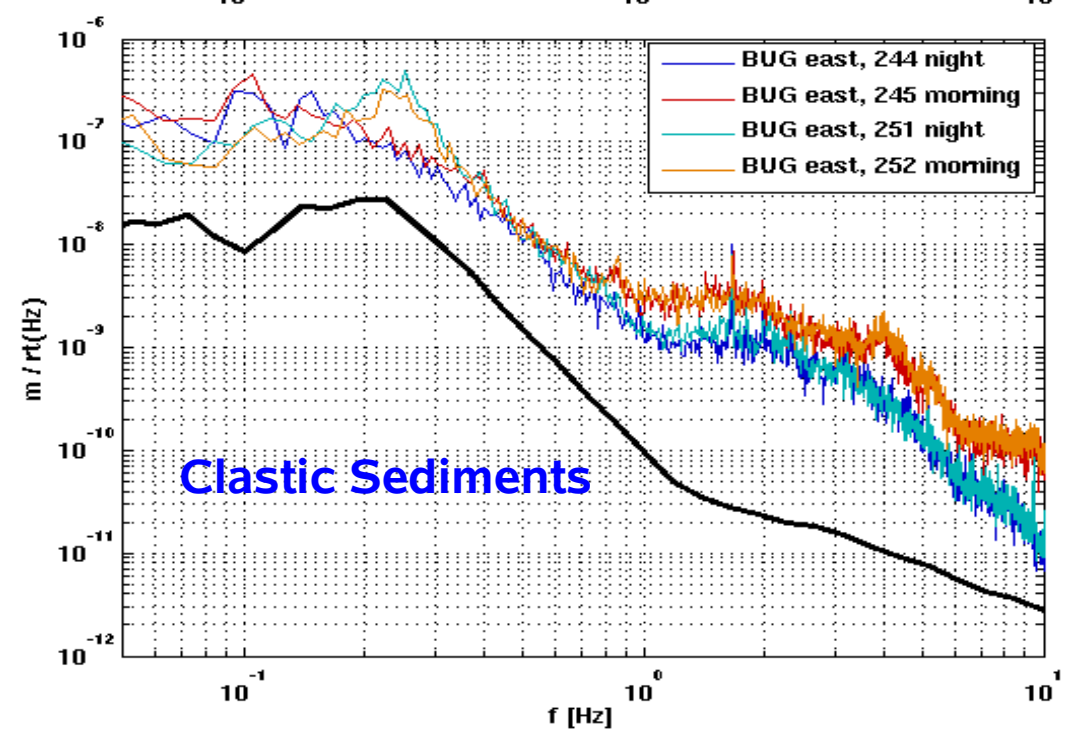
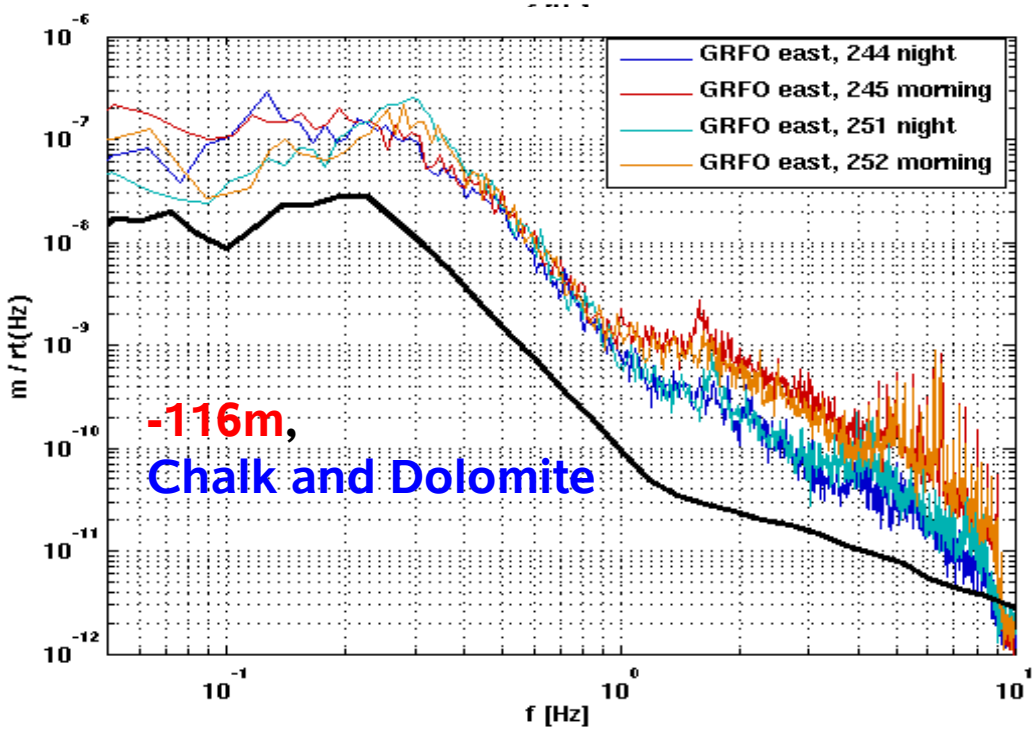
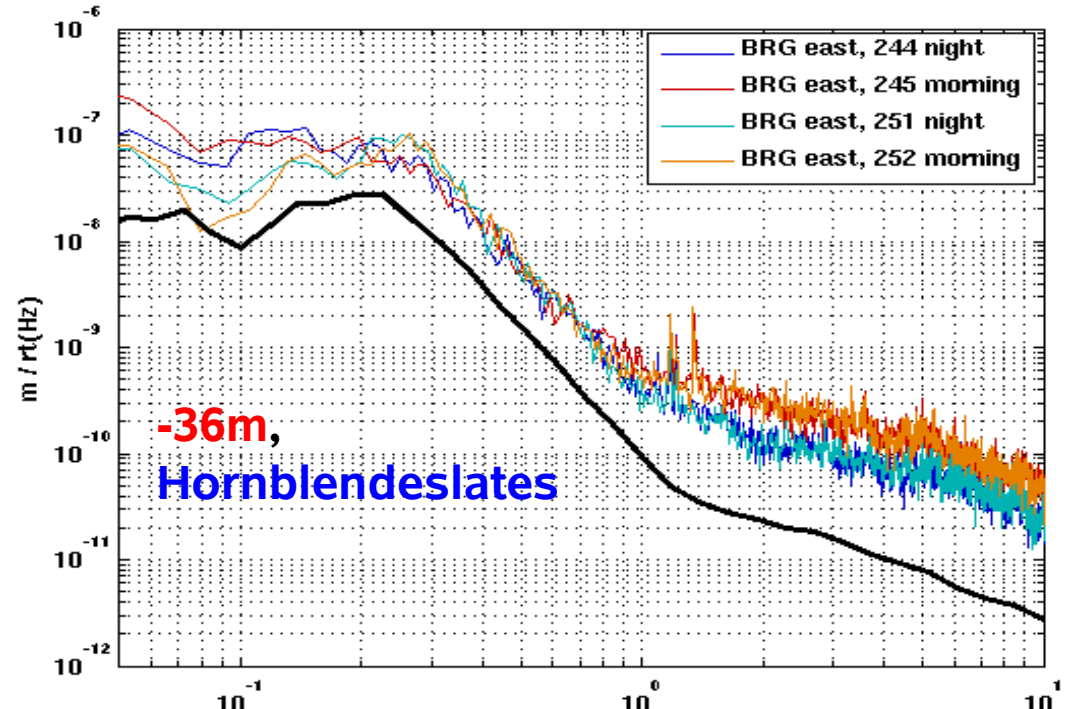
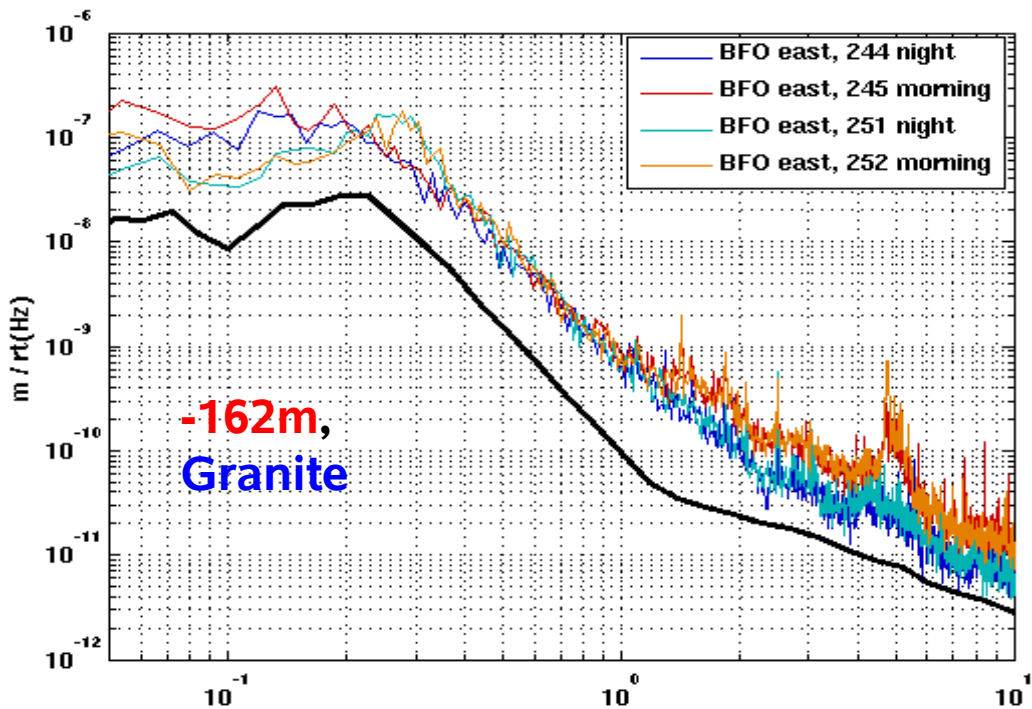
Anthropogenic Noise at BFO (STS2 vertical)



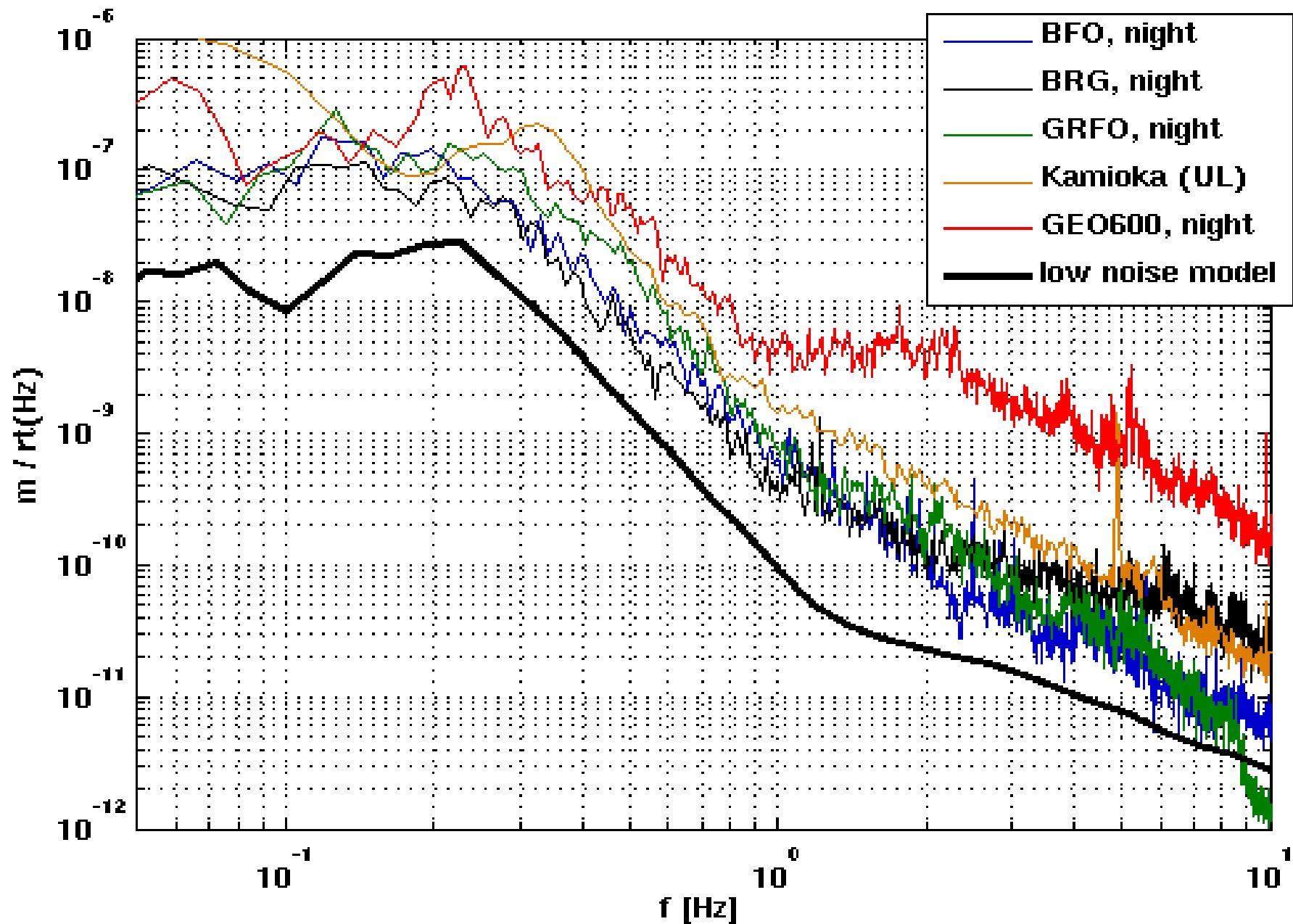
Black Forest Observatory



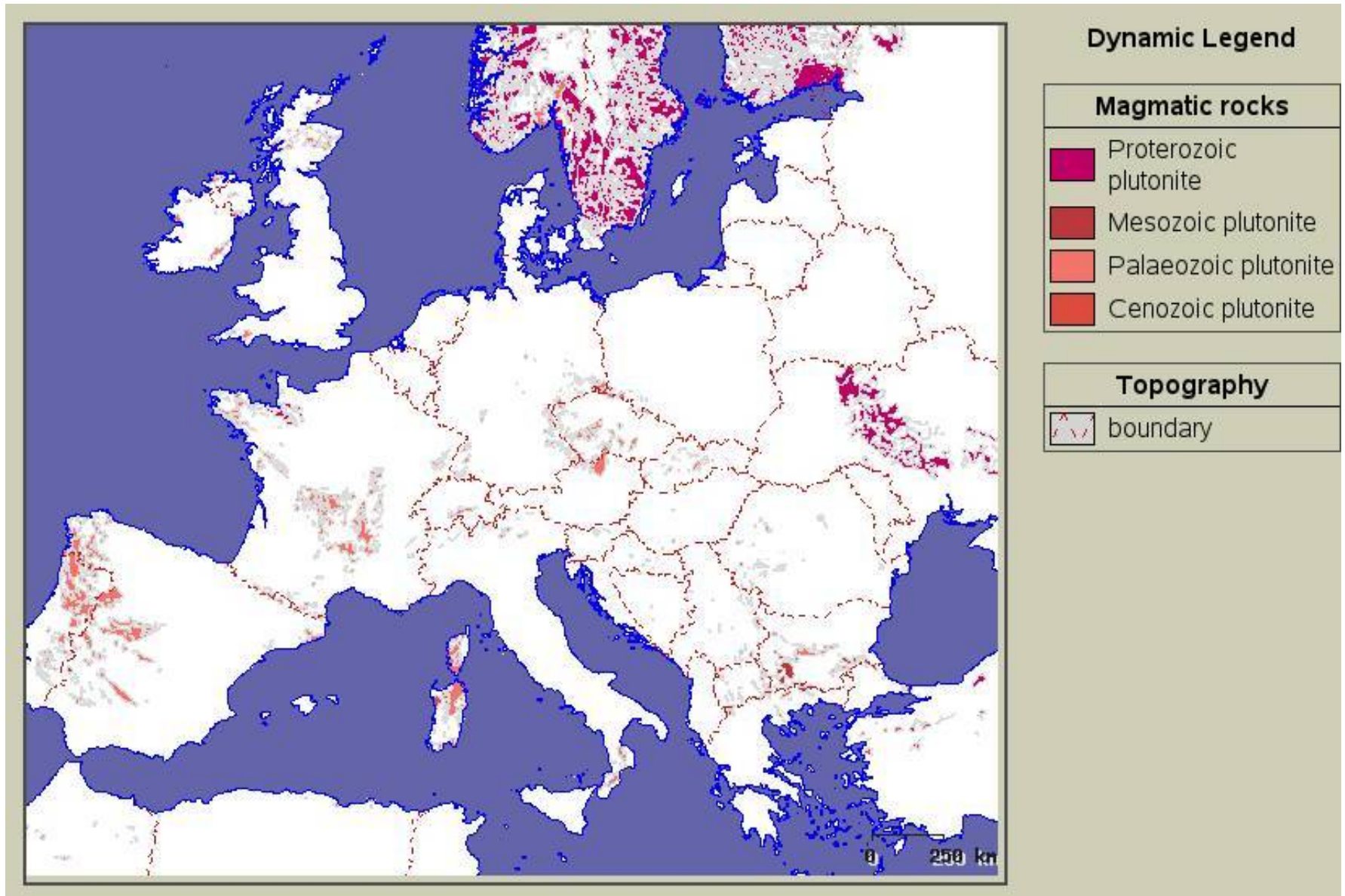
Comparison of 4 sites



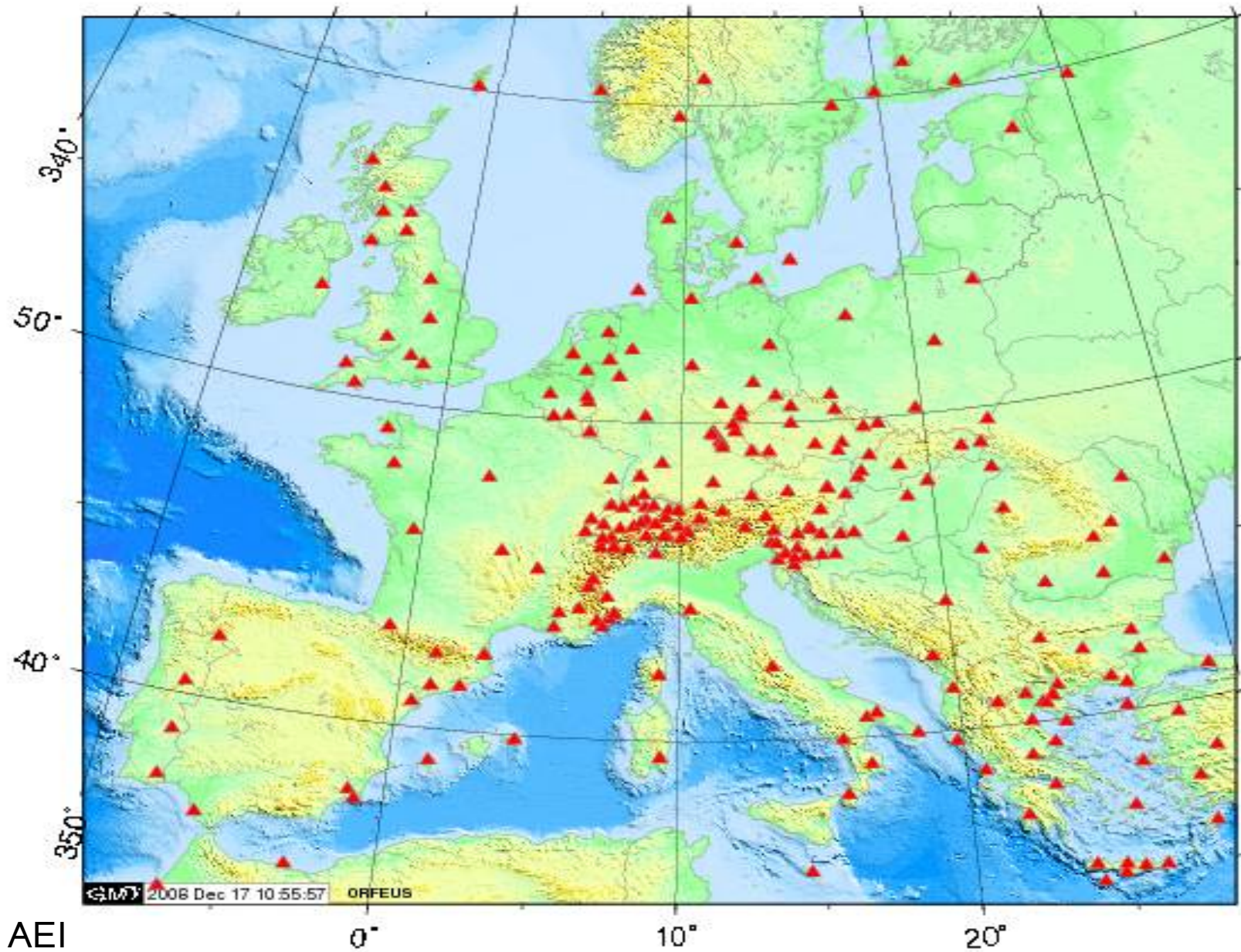
...and More sites...



Magmatic Rock in Europe



Station map of the virtual European Broadband Seismograph Network (VEBSN)















Experience from Kamioka I

Dr. Shinji Miyoki, University of Tokyo

- Humidity ~100% in the mine
 - Mold growth (Hard to see on green painted walls...)
 - Air de-humifiers in place, but too noisy (vibration)
 - For LCGT: Plan to supply dried air from separate chamber
- Cryo-cooler: Pulse tube refrigerators make ~1Hz vibration + high-frequency sound (need protection)
- Heat problem of control room: needed ventilation system
- Dust in (access) tunnels: E.g. laser power quickly degrading, would need separate air lock for main chamber access
- Horizontal access very convenient, also safety relevant
- Working time 8am-5pm, just recently later shifts on request

Experience from Kamioka II

- What should be accounted for in general:
 - Clean, dry, and cool air generation far away from the interferometer
 - Air lock room between tunnel and Lab areas
 - Wall between dusty arms and clean Lab area