Gyöngyösoroszi as a possible candidate for the site of ET

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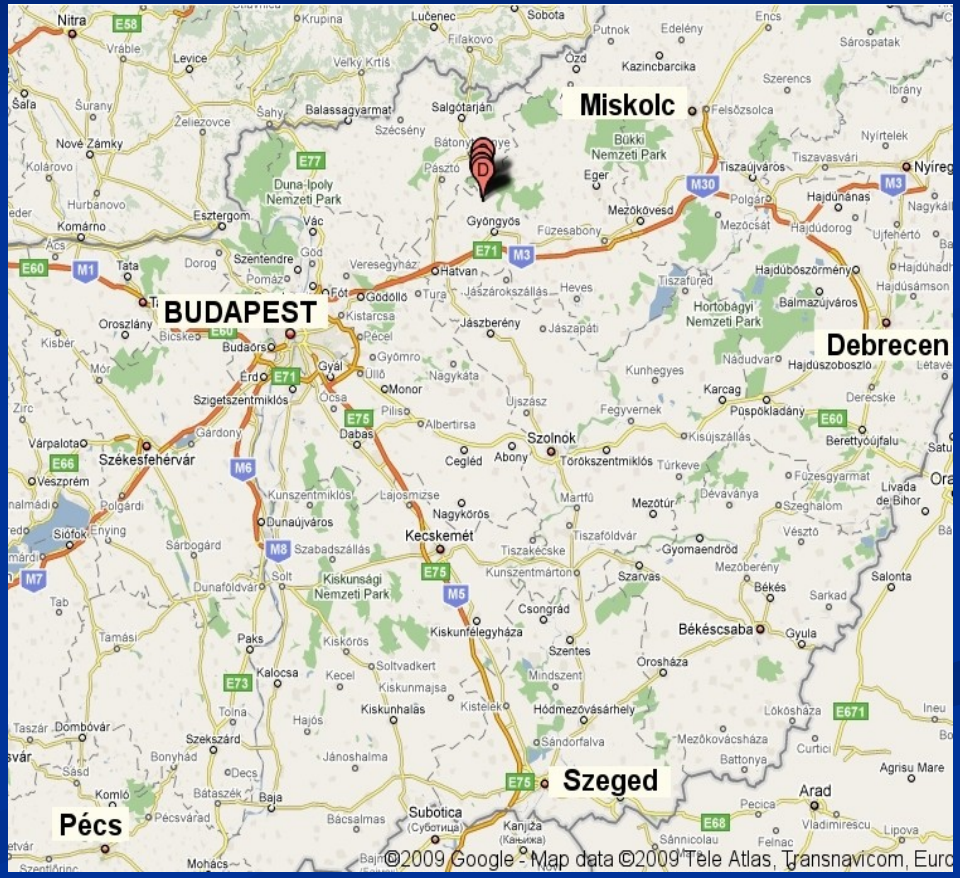
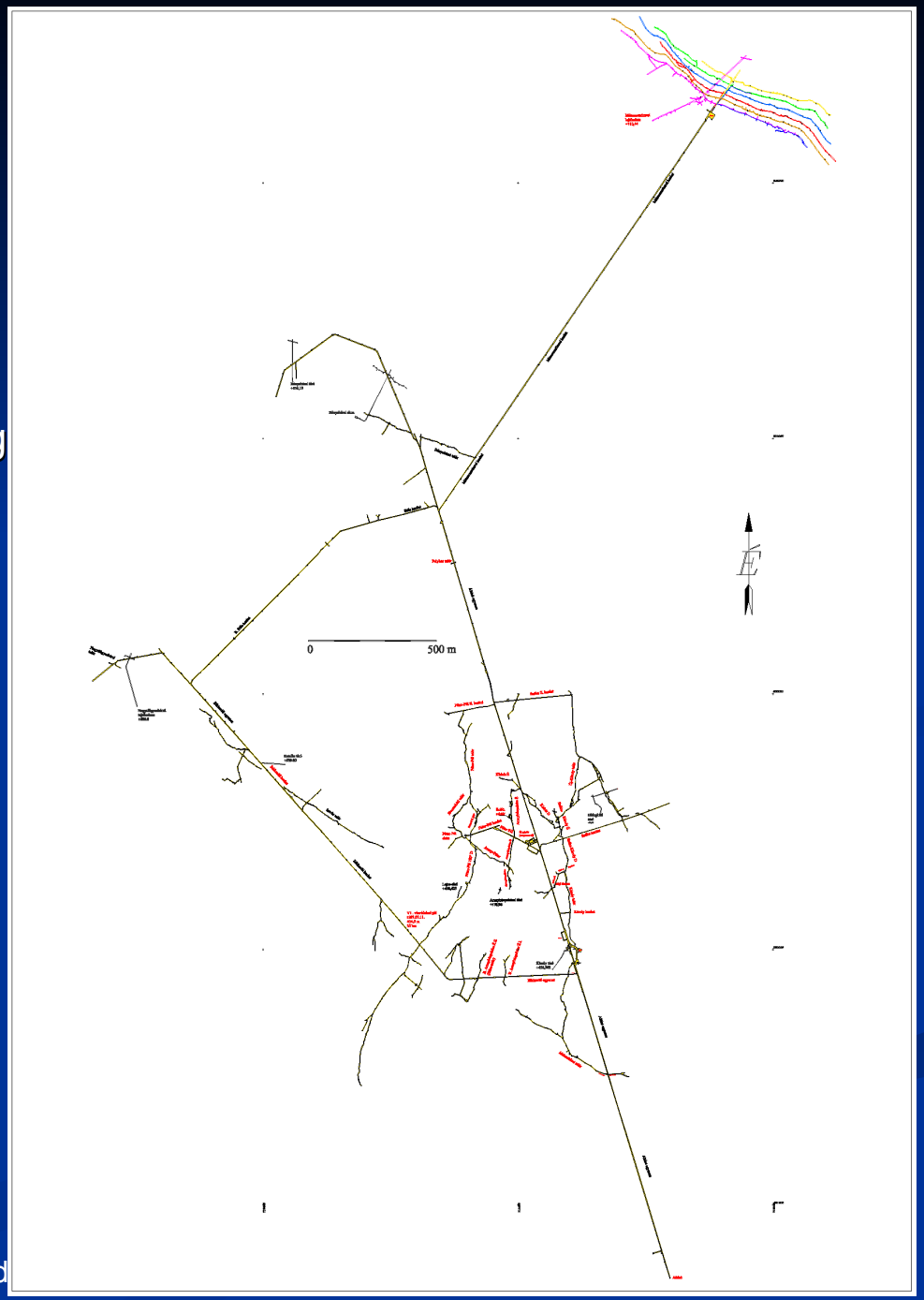
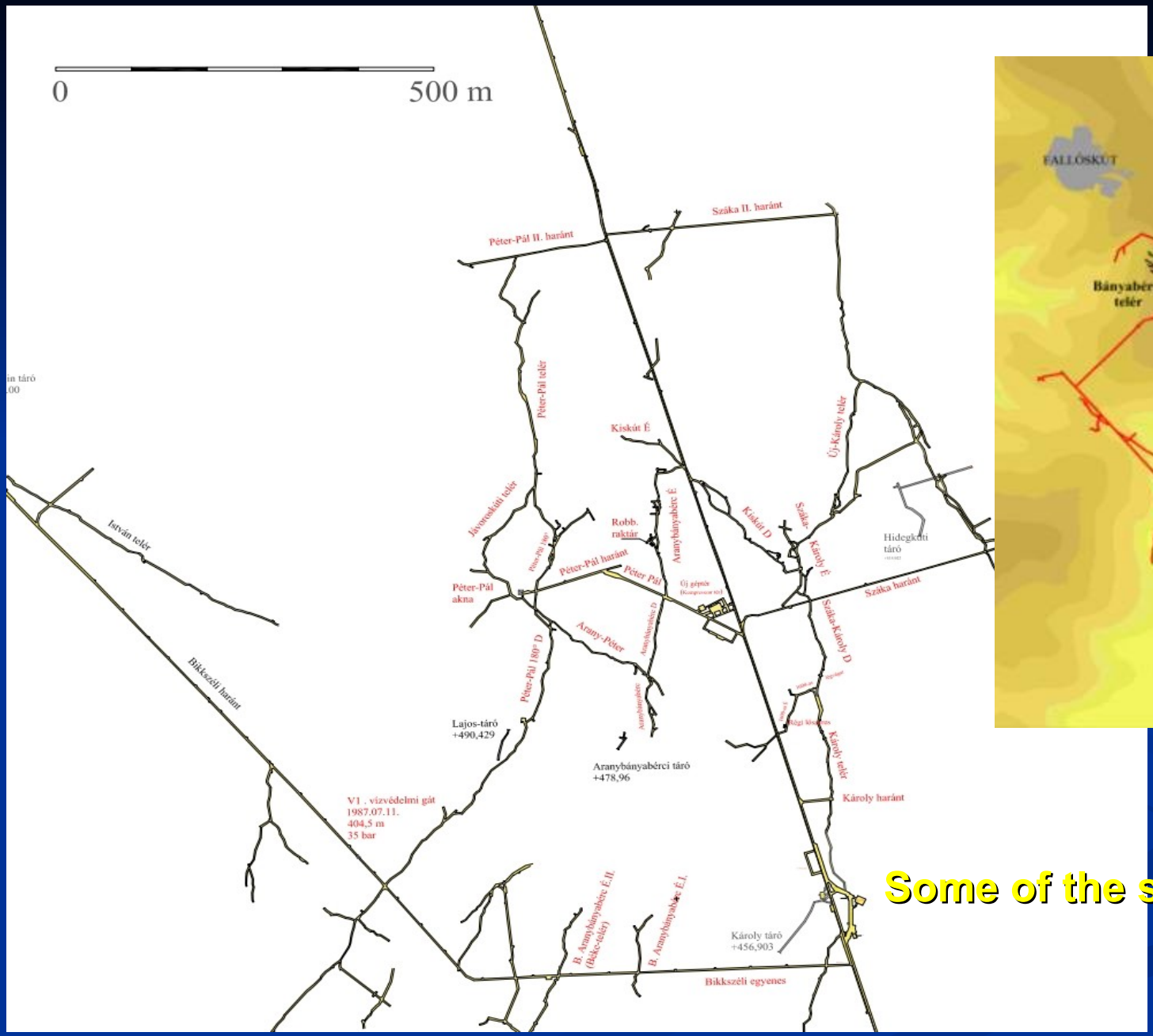
Location

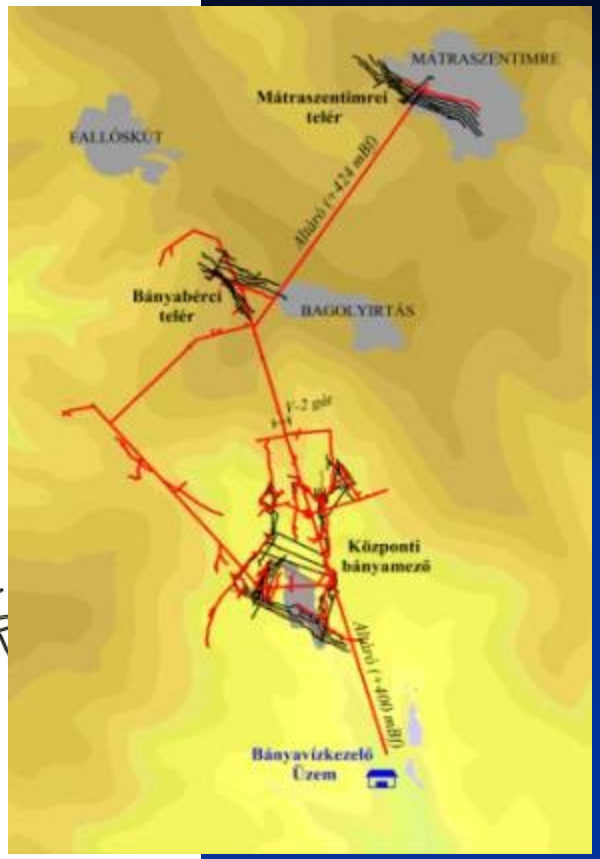
- Gyöngyösoroszi mine is located 107 km North-East from Budapest in the Mátra mountains (hills).



- Gyöngyösoroszi is a lead-zinc mine.
- The country rock is andezit, andezit tufa.
- It is underground with depth ranging from 100m to 350 m at an elevation ~400 m.
- The ground contains split-water yielding infiltration between the rocks with 2-3 m^3/min for the entire of the mine. No danger of having floods.
- The structure of the drifts is shown on the right.
  - The longest strait drift is about 3km long almost horizontal with a negligible tilt (~1m over 3-4 km).
- There is a ~330 m deep and operating shaft at Mátraszentimre providing connection to the ground at ~800m.

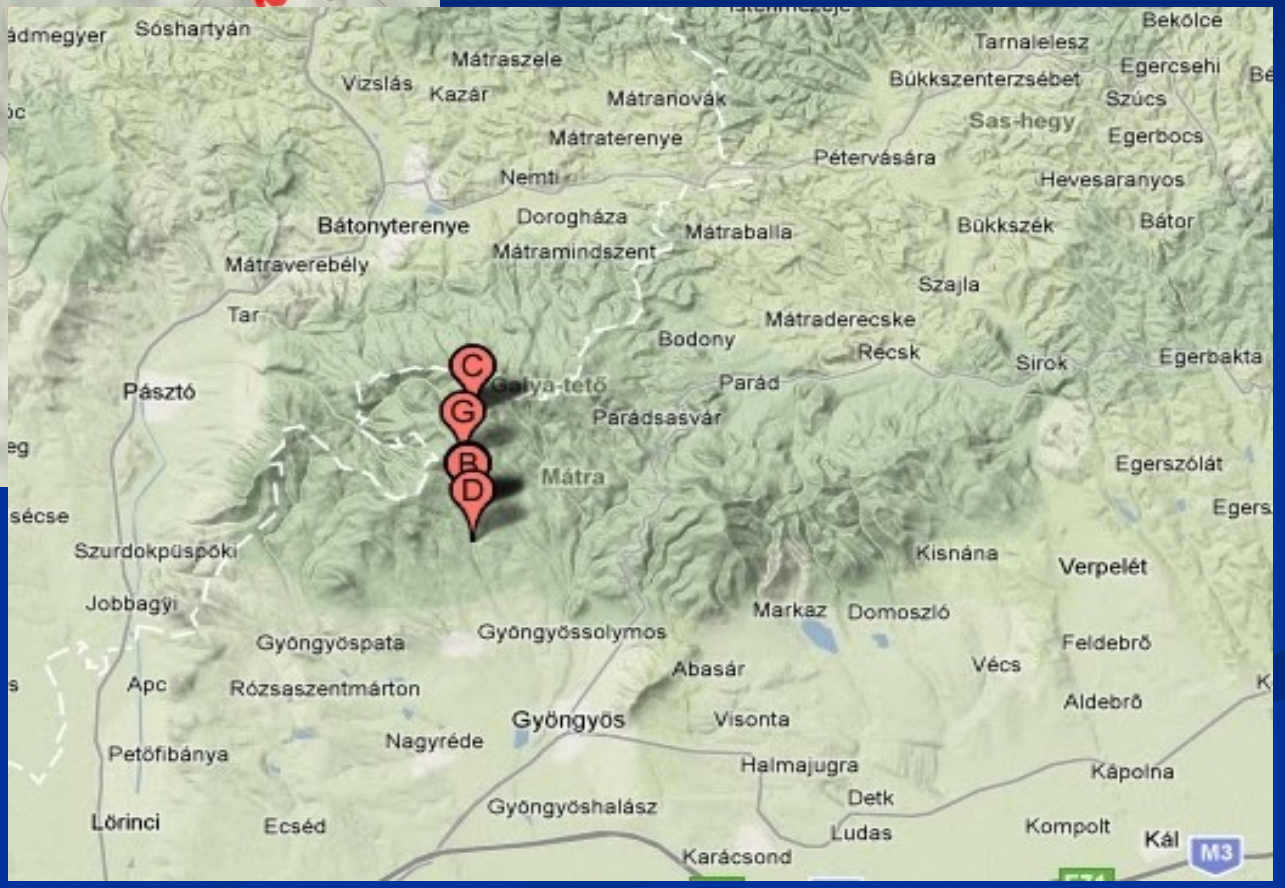






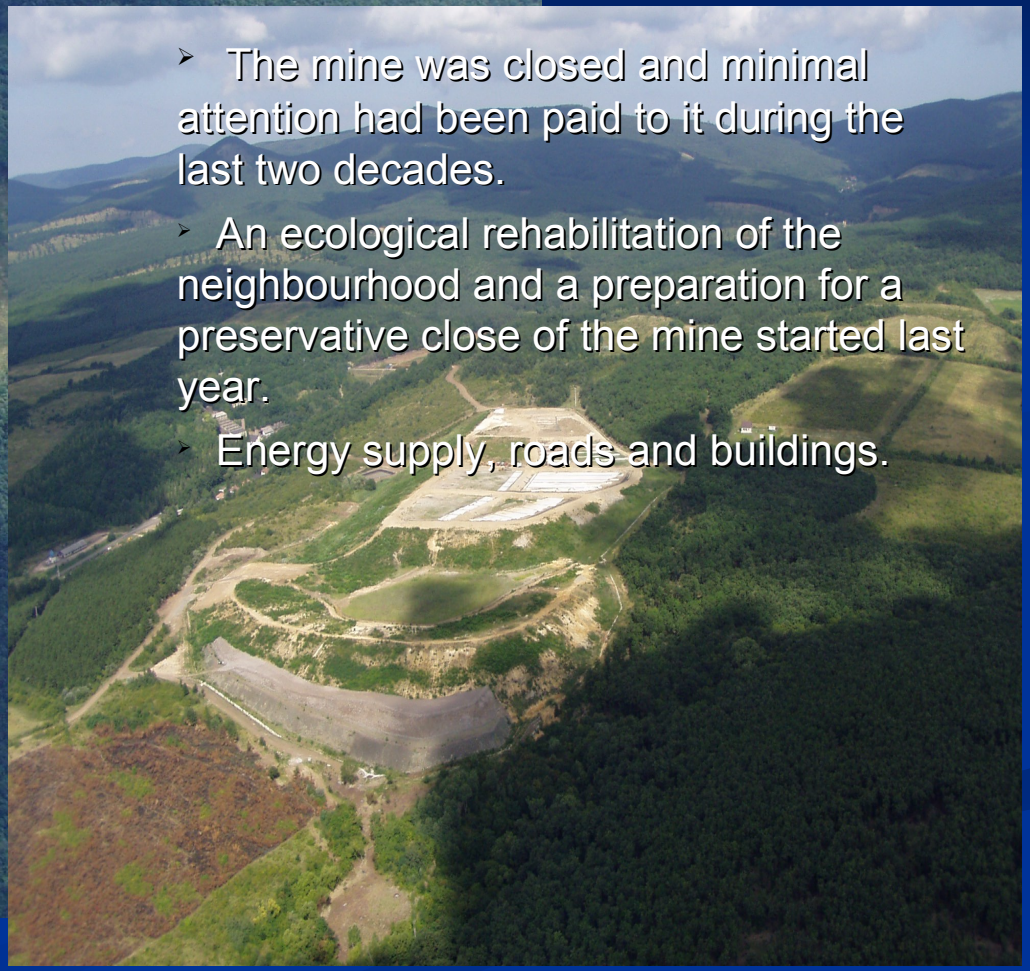
Some of the straight drifts


Galya-tető
Galyatető
Mátraszentimre
Fallóskút
Bagolyirtás
Károlytáró
600m
800m


Sóshartyán
Mátraszele
Vizslás
Kazár
Mátranovák
Mátraterenye
Nemti
Pétervására
Bükkszenterzsébet
Tarnalelesz
Egercsehi
Szúcs
Sas-hegy
Egerbocs
Hevesaranyos
Bátor
Bükkszék
Mátraballa
Dorogháza
Bátonyterenye
Mátramindszent
Mátraverebély
Tar
Szajla
Mátraderecske
Bodony
Récsk
Sirok
Egerbakta
Pásztó
Galya-tető
Parád
Parádsasvár
C
G
B
D
Mátra
Egerszólát
Szurdokpüspöki
Kisnána
Verpelét
Jobbagyi
Markaz
Domoszló
Gyöngyöspata
Gyöngyössolymos
Feldebrő
Apc
Rózsaszentmárton
Abasár
Vécs
Aldebrő
Gyöngyös
Visonta
Petőfibánya
Nagyréde
Halmajugra
Kápolna
Detk
Gyöngyöshalász
Lőrinci
Ecséd
Ludas
Kompolt
Karácsond
Kál
M3

Status and availability

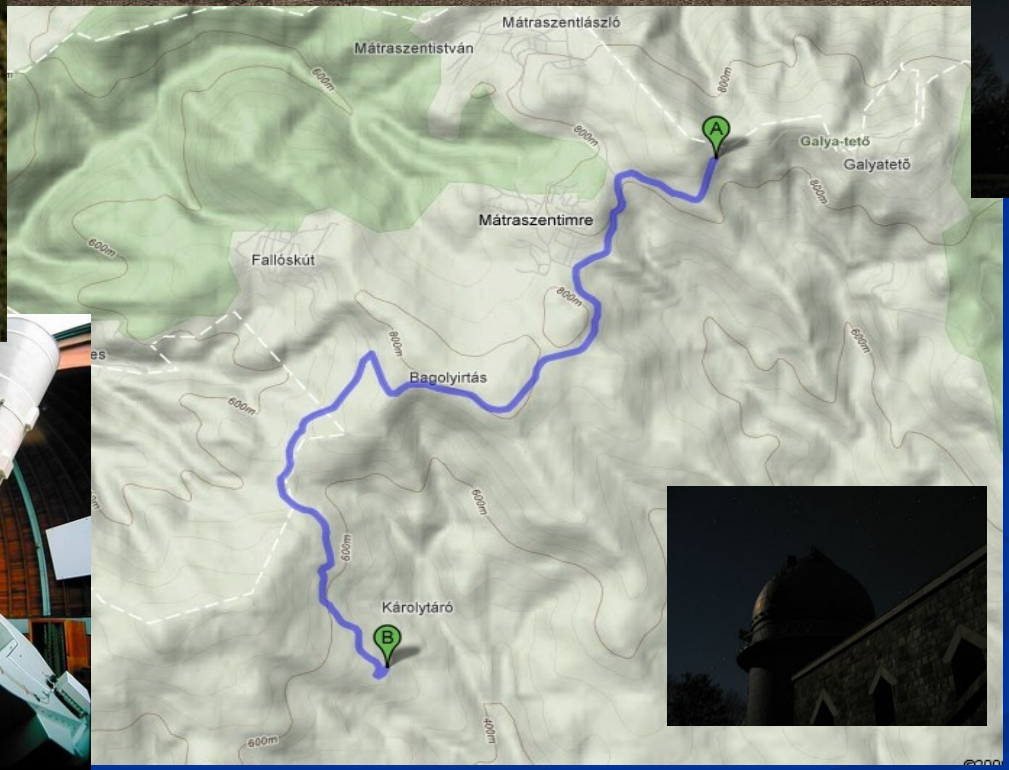
During the mid 80's mining became not rewarding so it had been given up in 1988 at Gyöngyösoroszi.

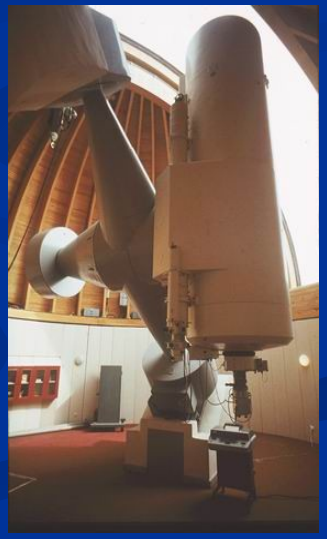


- The mine was closed and minimal attention had been paid to it during the last two decades.
- An ecological rehabilitation of the neighbourhood and a preparation for a preservative close of the mine started last year.
- Energy supply, roads and buildings.

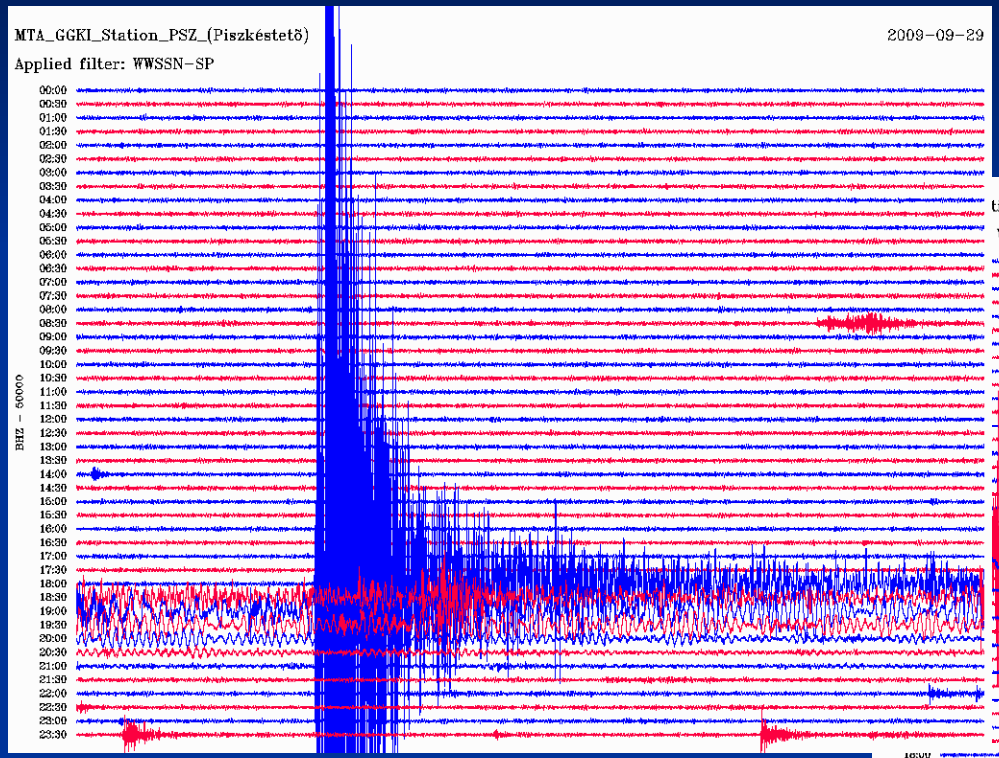
- The area of the cross section of the drifts is about 25m$_2$.
- An underground rail-road, called “népes”, survived and it is still used in the rehabilitation works in the long straight drift.
- Some, not too serious, damages had happened during the last two decades.
- There were landslips and mouldering at some points in the side drifts. Water was trapped by them but no flood occured.

There is a permanent Seismological Observatory of the Hungarian Academy of Sciences at Piszkéstető on the site of the Konkoly Thege Astronomical Observatory. It is about 4-8 km far from the mine so the data is completely characteristic and it is available for a long period.



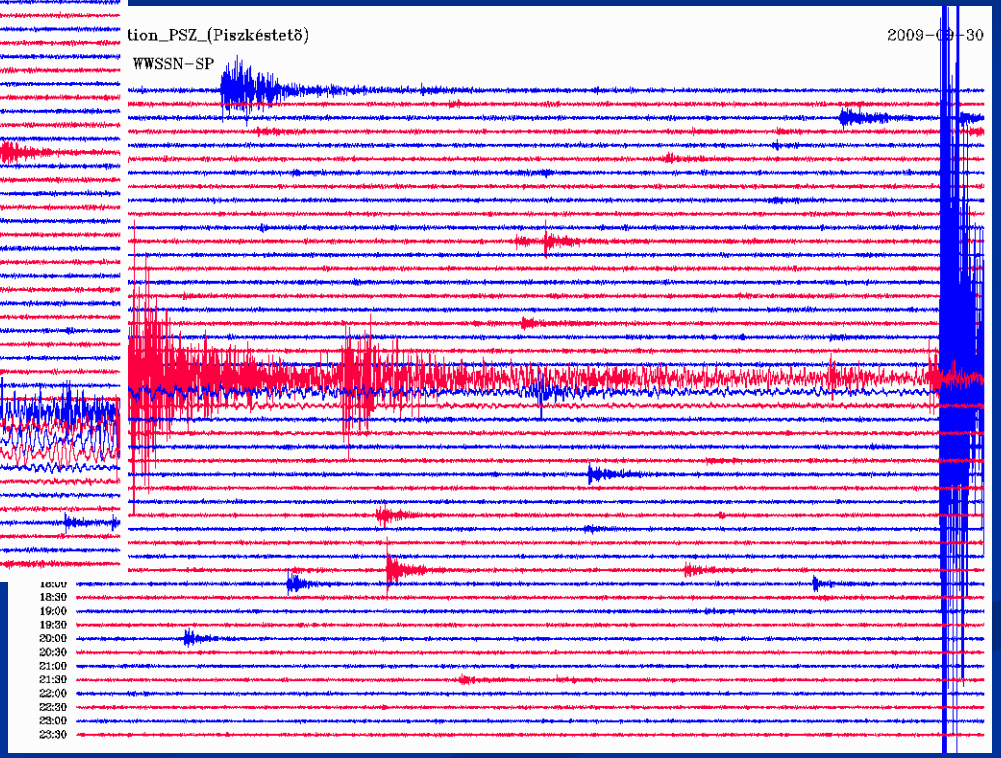


The Piszkéstető Observatory – its code and the coordinates are PSZ and (47.917236N,19.894351E) – is a member of the Global Seismographic Network (GSN). Its online data is monitored at http://fir.seismology.hu/foldrenges/allomasok/psz.html
Three hours after two of the largest recent earthquakes Piszkéstető, in seismic sense, was as calm as before.

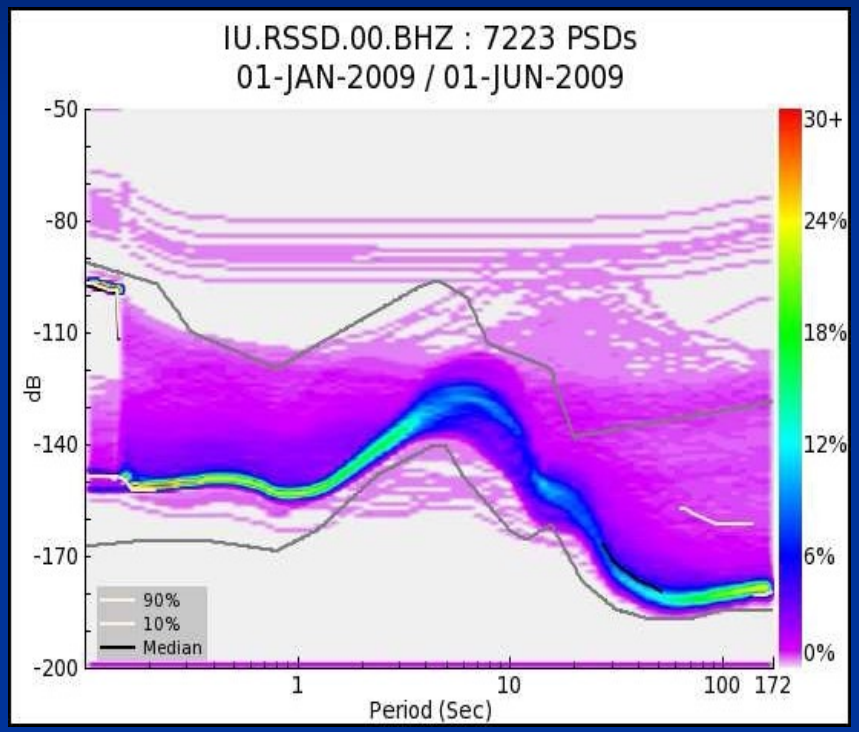


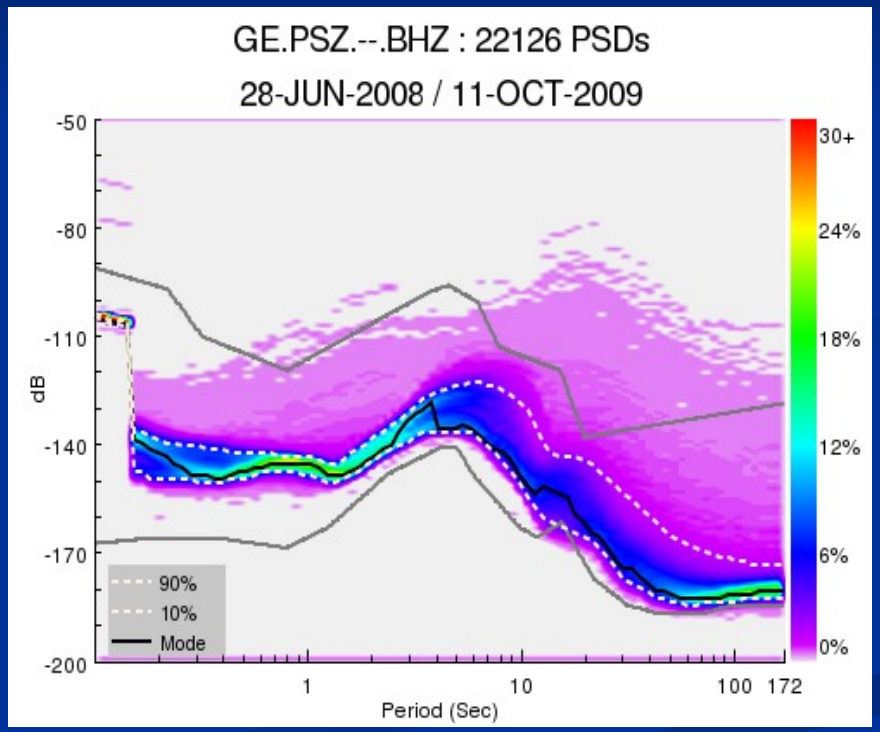
Magnitude 8.0 – Samoa Islands region,
2009 September 29 17:48:10 UTC

Magnitude 7.6 – Southern Sumatra, Indonesia
2009 September 30 10:16:09 UTC

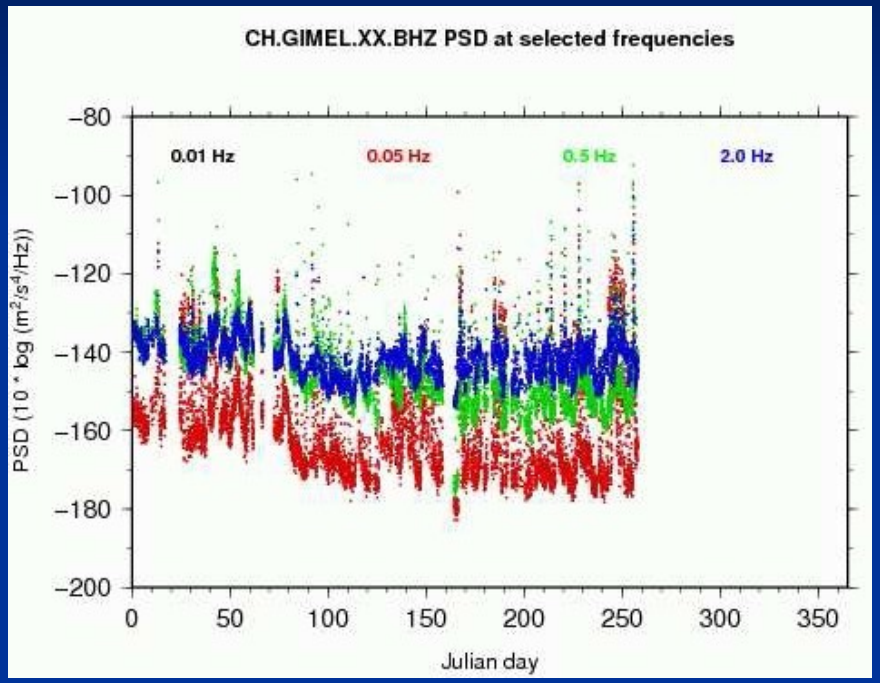


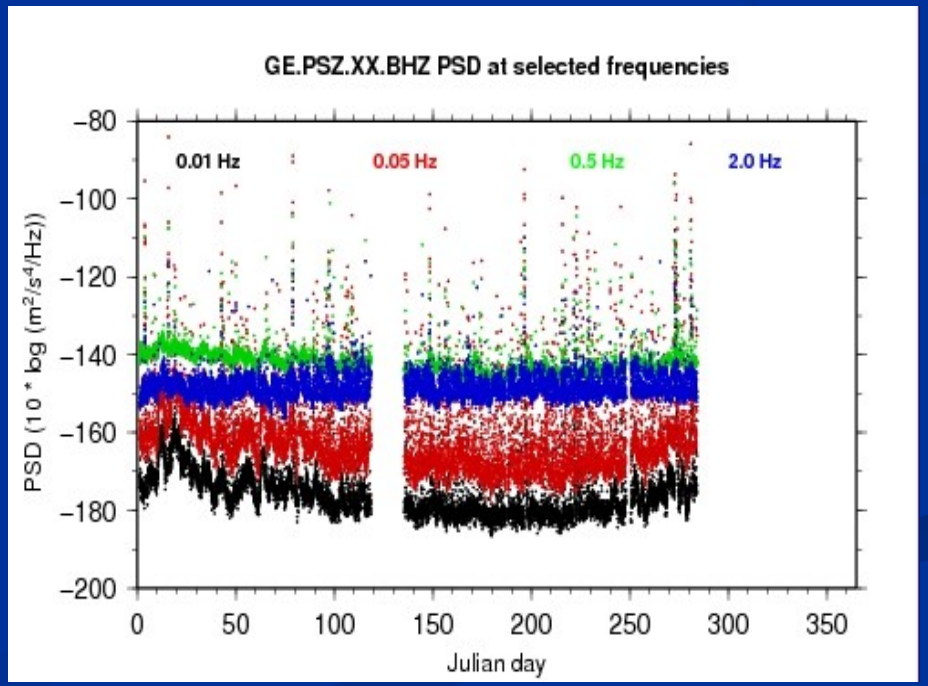
Comparison of the power spectral density noise data from the RSSD seismic station in the Black Hills area south Dakota, USA and that of Piszkéstető. The sensor for RSSD is in a bore-hole at a depth of 110 m whereas on Piskéstétő it is on the top of the hill at a depth of 2m.



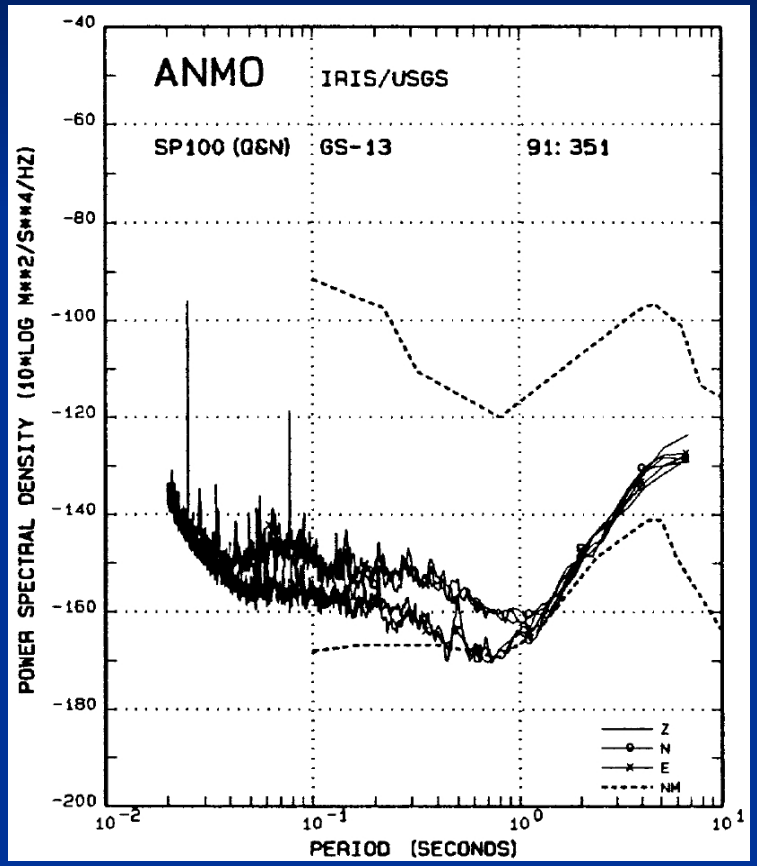


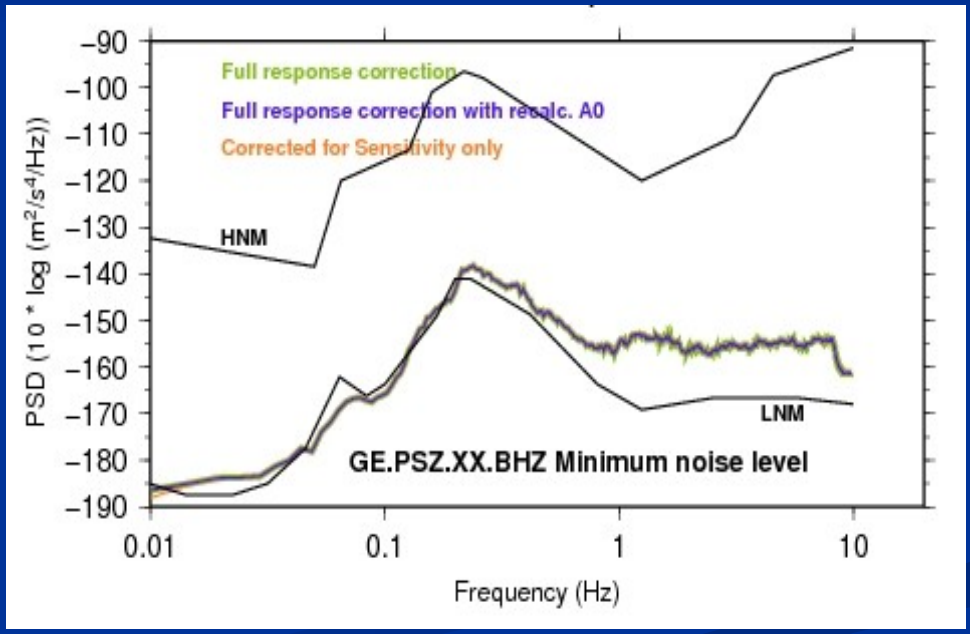
Comparison of the PSDs at selected frequencies for two hard rock based observatories, for CH.GIMEL in Switzerland and for Piszkéstető. The latter can be seen to be less noisy and significantly more stable.



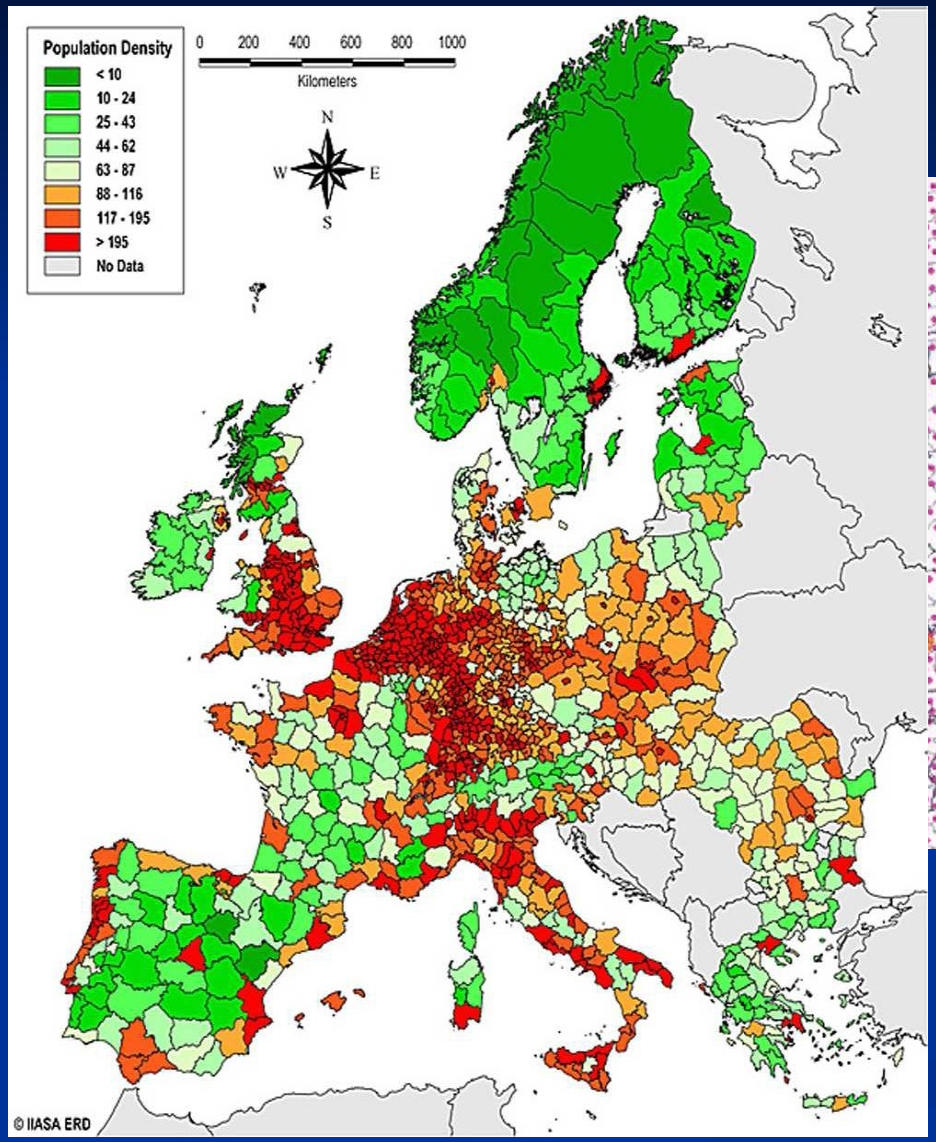


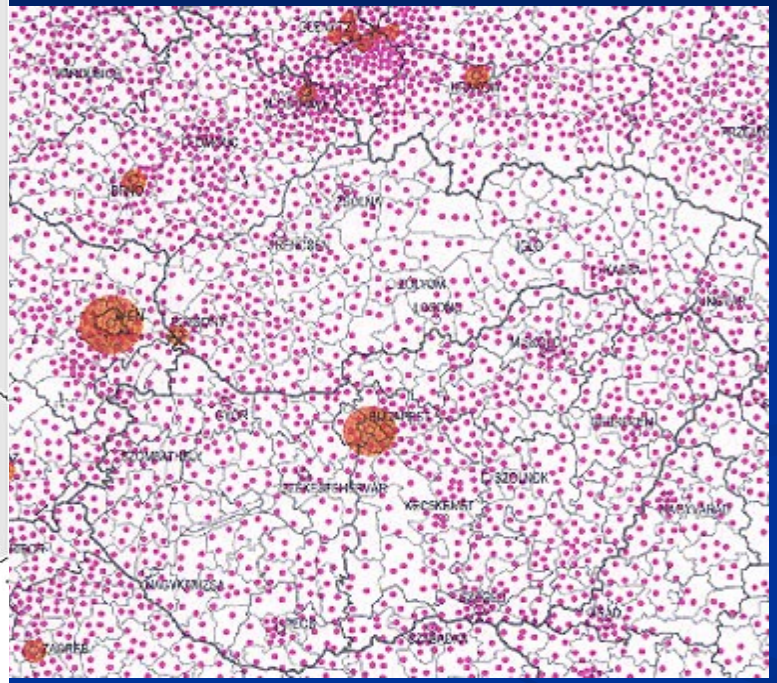
Comparison of the minimum noise level for ANMO in USA and Piszkéstető. ANMO is located in New Mexico and it is considered to be one of the two lowest noise sites in the USA. The sensor of ANMO is at a depth of 100 m (not at 2 m).



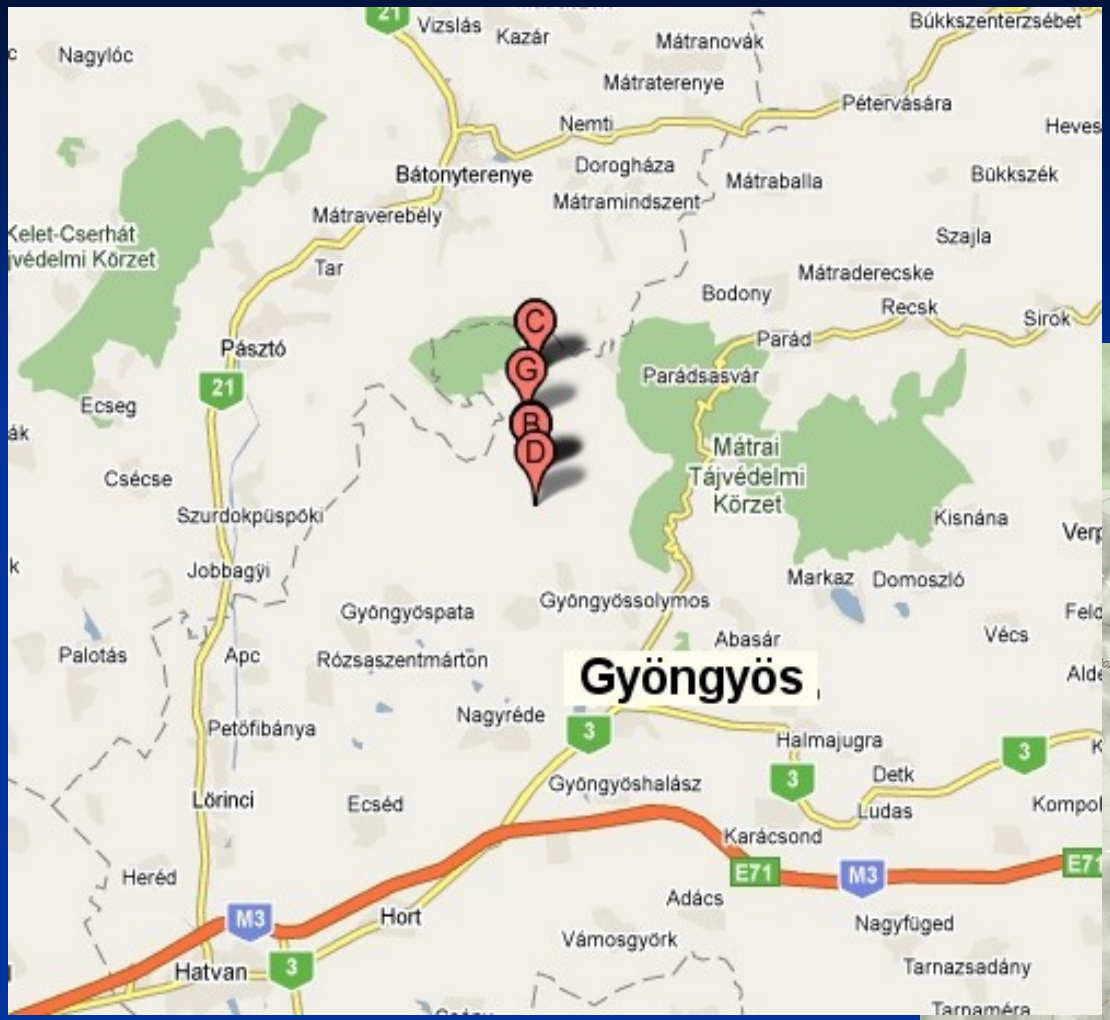


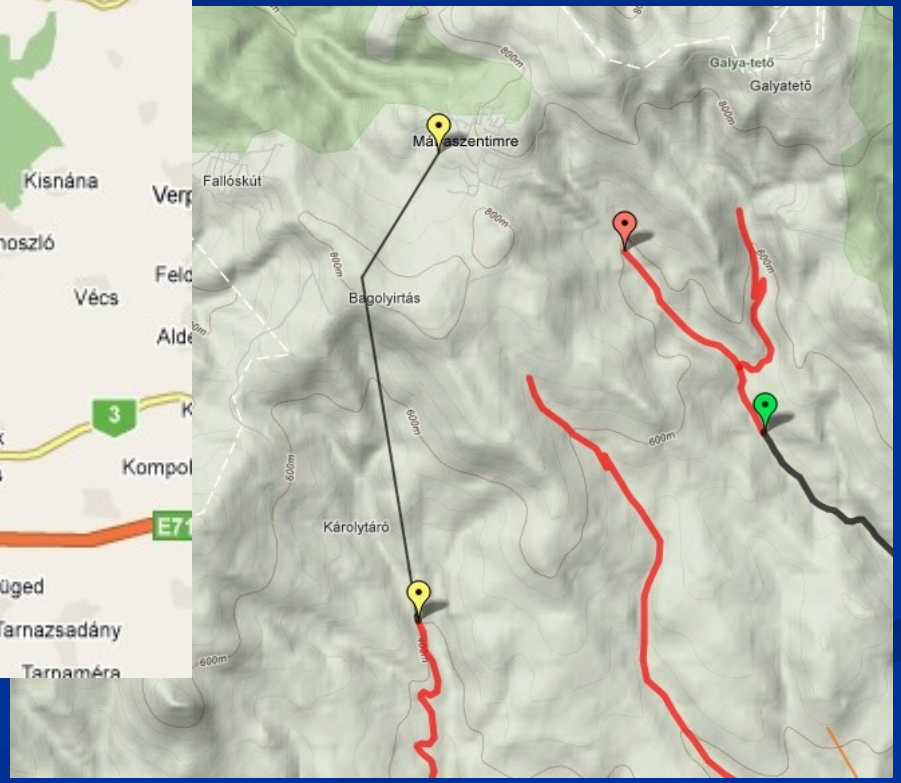
Some indications of the possible cultural noise sources
Population density





Some indications of the possible cultural noise sources (2)





One of the nearby accommodations

- A **** hotel at Galyatető 11km (~18 min) from the mine (~70Euro/night)

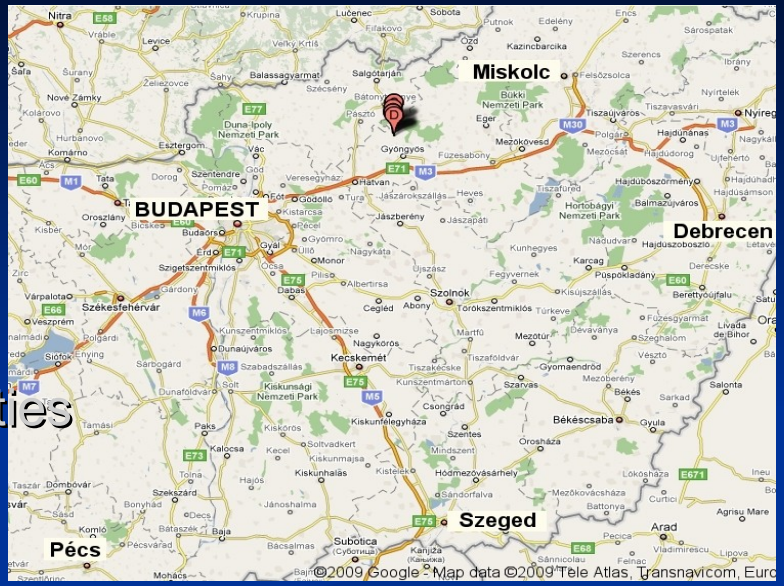
Hotel Galyatető






Infrastructure (universities, etc.)

- Four large universities for basic sciences
  - Eötvös University, Budapest
  - University of Debrecen
  - University of Szeged
  - University of Pécs
- Two of the most important technical universities
  - Technical University of Budapest and Miskolc
- Two recent events have also relevance
  - Budapest was chosen to host the headquarters of the planned European Institute of Innovation and Technology. The EIT, Europe's version of MIT, is not a fixed campus but a linking of academic and industrial research from around the 27-nation European Union. “The decision is recognition of Hungary's scientific prowess and will boost R&D investment in the country.”
  - Szeged will be the host of one of the biggest investment of the European Union: a laser centre with the highest efficiency in the world. The project, called the Extreme Light Infrastructure (ELI), involves building a highly advanced super laser 1000 times more powerful than either the Laser Megajoule in France or the National Ignition Facility in the US.



Summary

- The Mátra mountains (hills) provide ideal site in seismological sense.
- The Gyöngyösoroszi mine already have several straight and almost horizontal tunnels. One of them is 3 km long.
- The most important part of the mine is in good condition with operating infrastructure.
- The population density and cultural noise is low.
- There is a built in Seismological Observatory on site.
- It is state owned so acquisition of the land for ET might be possible.
- Access of technical facilities and skilled work force.
- Support by several local universities and research institutes.
- Accommodation for permanent and visiting staff.

It could be an ideal site to acquire knowledge about some of the new type of infrastructure that has to be used in ET.