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PD1 Protected Volcanic Areas and Volcanological Heritage (IAVCEI, UNESCO, IUGS)

Volcanic geoheritage of Badenian explosive sequence and the related mining activity, Tokaj Mountains, Carpathian-Pannonian Region



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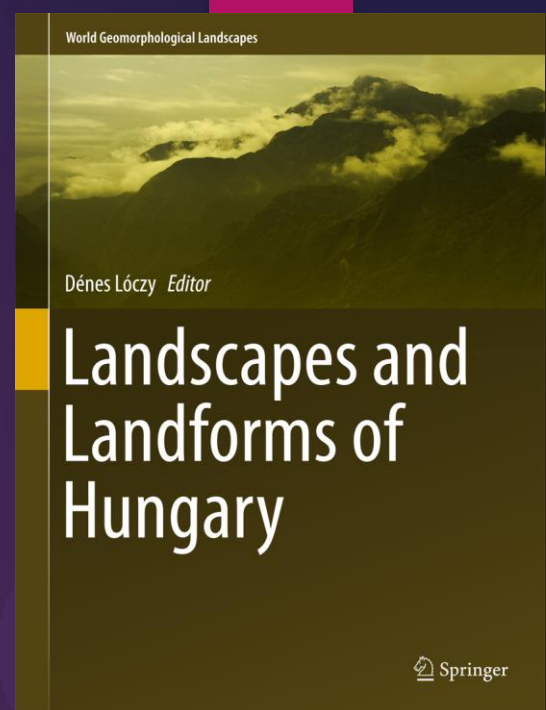


J. Szepesi & Zs. Ésik: Megyer Hill, Old Millstone Quarry
In D. Lóczy eds: Landscapes and Landforms of Hungary



The Quarry:

- operated for 500 years
- silicified rhyolite tuff
- Millstones won 1st prize World Expo London 1862



Tokaj Wine Region Historic Cultural Landscape



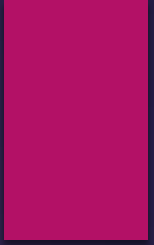
United Nations
Educational, Scientific and
Cultural Organization



Tokaj Wine Region
Historic Cultural Landscape
inscribed on the World
Heritage List in 2002



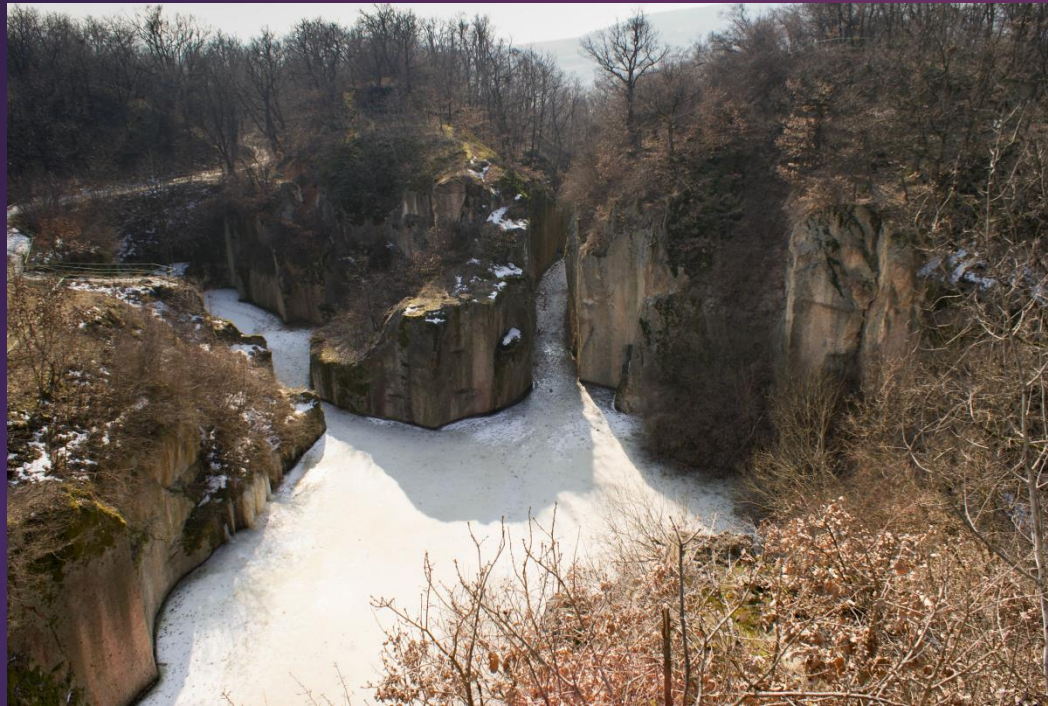
- ▶ The Tokaj Wine Region Historic Cultural Landscape is situated in North-Eastern Hungary
- ▶ 27 settlements, 88,124 hectares. Viticulture and wine-making probably date back to the Hungarian Conquest of the Carpathian Basin (896)
- ▶ The wine region has been under protection since the year 1737, the first of its kind in the world.
- ▶ **Cultural landscape
Inscribed on the World Heritage
List: 2002**



The volcanism and the landscape evolution give the foundation of unique tradition of viticulture and wine-making (oenology).

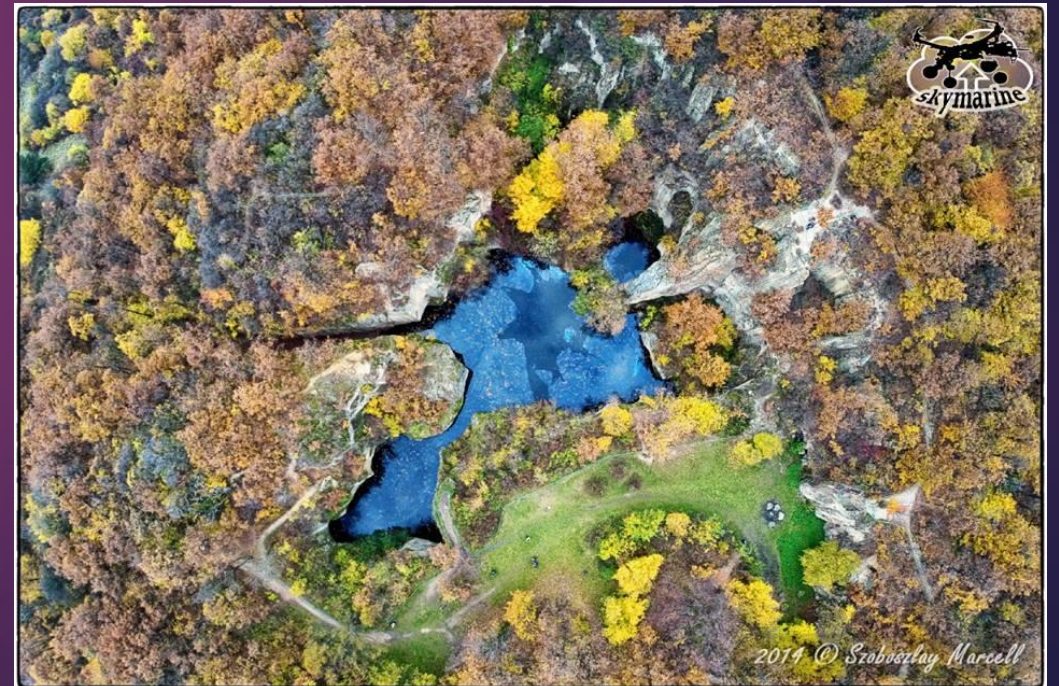
Question: Can the UNESCO Heritage site integrate the volcanic heritage in the touristic brand?

A complex geomorphosite: The Megyer-hill, Old Millstone Quarry

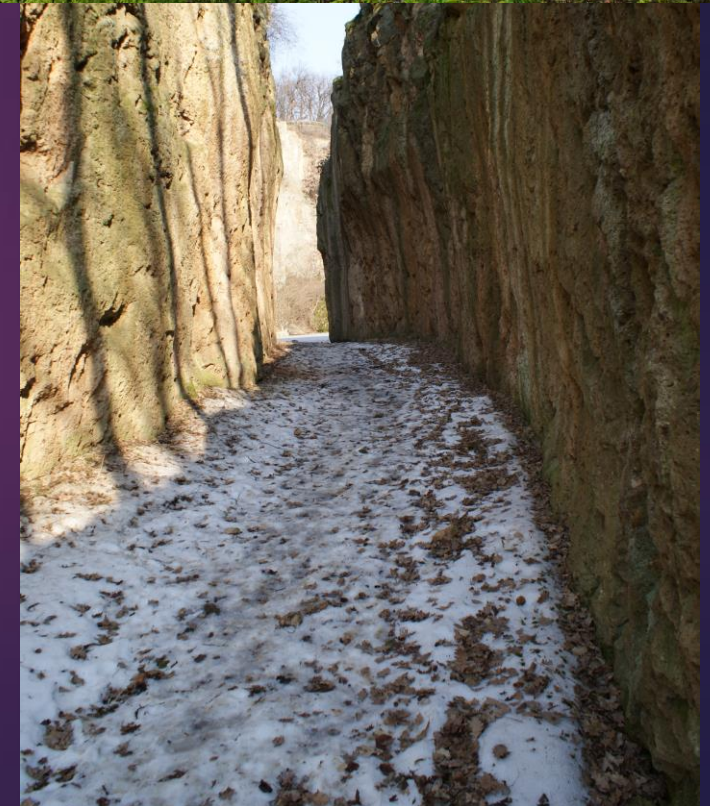


- landscape
- geological,
- cultural,
- ecological values
- mining heritage

- declared as a *natural reserve* in 1977,
- nature conservation area of national interest in 1997.
- Hungary's most beautiful natural attraction in 2011.



Landscape



The Király-Megyer Hill area:

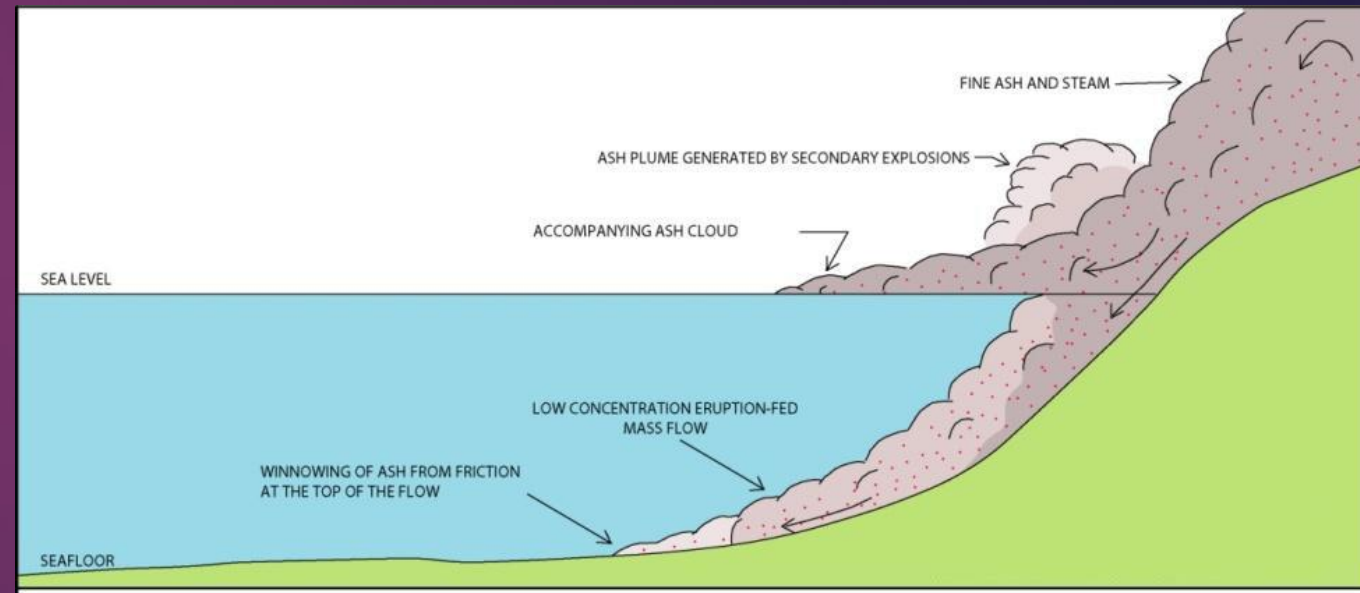
- ▶ 9 km² semicircular range
- ▶ a local basin opening to the south.
- ▶ operated from 15 th century
- ▶ The vertical quarry walls are up to 70 metres high above the lake
- ▶ a *three-level* mine (150x50 metres) the canyon-like narrow wagon road and the picturesque lake

Geological values

- ▶ The thick Badenian ash flow deposits accumulated in submarine settings and later uplifted and suffered intensive hydrothermal alterations

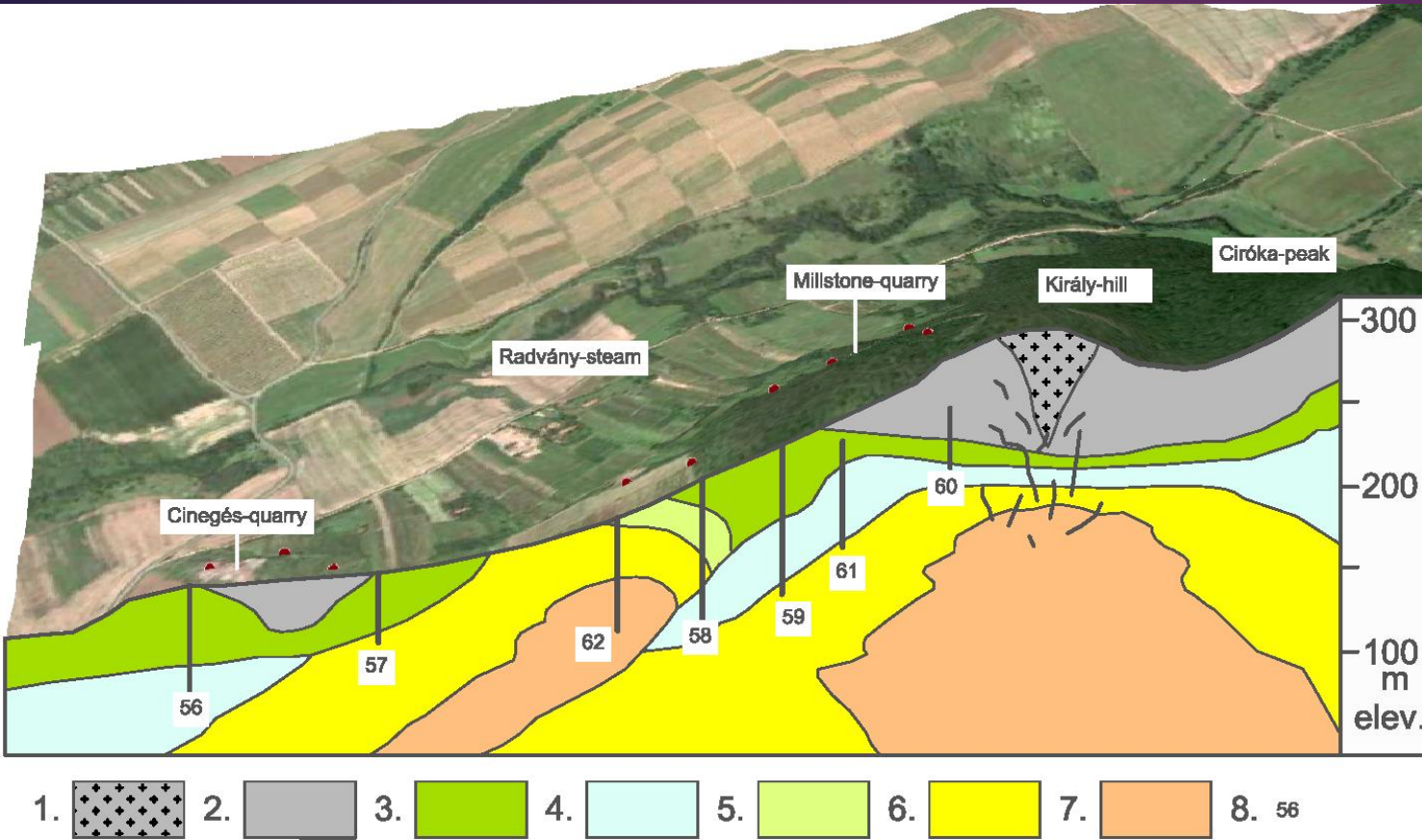


- ▶ The silicified pumice breccia character of the ash flow tuff in the wall of the wagon road



- ▶ A schematic view when a subaerially erupted pumice flow enters the sea. (Cas & Wright 1987)

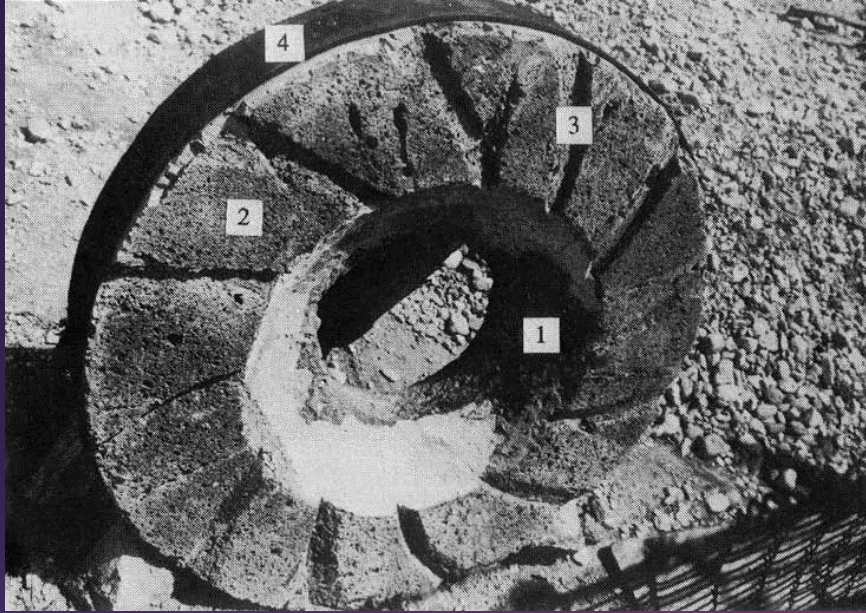
Alterations



- The millstone quarry deepened in the silified cap
- The argillation zone with clay minerals (kaolinite, illite, monmorillonite) forms an impermeable layer
- A picturesque lake was formed by rainwater accumulation in the quarry yard. The constant volume of water is ca 4,000 m³ with a maximum depth about six metres

Geological cross-section Cinegés quarry–Király Hill tectonic line (with the main alteration zones (modified after Molnár 1993). 1 Hydrothermal breccia; 2 quartz-opal-barite-cinnabarhematite; 3 quartz-opal-alunite kaolinite; 4 quartz-opal-kaolinite; 5 montmorillonite-illite-kaolinite; 6 illite-kaolinite-montmorillonite; 7 adularia-illite-hematite; 8 Sárospatak boreholes.

Mining heritage



Ruins of miner buildings

So called world champion „french style” millstones,
Piece together from individual bricks around central stone

- The excavation was carried out with the similar *manual technique* and toolkit for centuries, as attested by the curvy walls.
- The wheat grains slightly roasted during the milling which gave a pleasant flavour to the flour.
- French style millstones manufactured from 1859
- Prices fell by half in Europe, 1st prize in London World Expo



A traditional millstone sculptured from one rock

Cultural heritage: City of Sárospatak



Habán ceramics



www.vatera.hu

Famous black pipe



Tile stove



Rákóczi castle



Rákóczi cellar

- ▶ The exploited clay minerals developed ceramic industry had golden age during 1800s. Pottery, tile stove and pipe factories ("famous black pipe") also operated
- ▶ Historic heritage : Rákóczi castle
- ▶ UNESCO objects: Rákóczi cellar

The interpretation of geoheritage

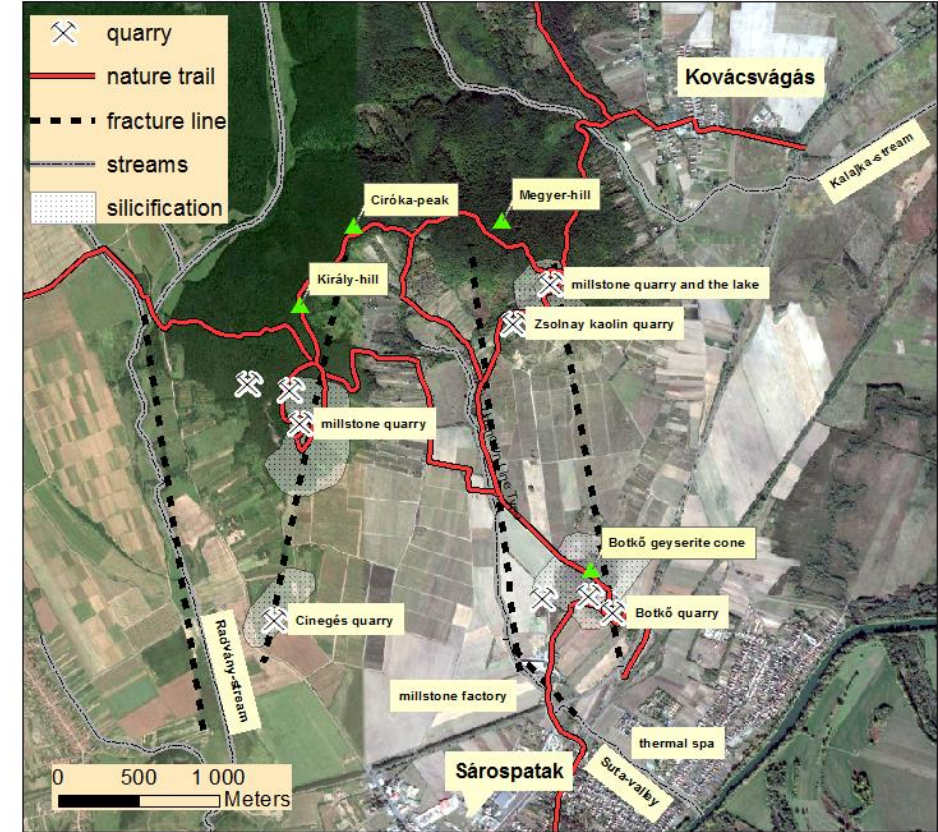
- ▶ The complexity of the geosites is hidden for visitors
- ▶ No visitor center
- ▶ No guided tours
- ▶ No millstone related gifts
- ▶ Only a nature trail with information tables



Information tables



Millstone manufacture
visitors center in Epernon,
France



The nature trail

What is a destination brand?

- ▶ A destination brand is totality of perceptions, thoughts and feelings that customers hold about a place.

UNESCO criterions

- ▶ **Criterion (iii):** The Tokaj wine region represents a distinct **viticultural tradition** that has existed for at least a thousand years and which has survived intact up to the present.
- ▶ **Criterion (v):** The entire landscape of the Tokaj wine region, including both vineyards and long established settlements, vividly illustrates the specialized form of **traditional land use** that it represents.

1st conclusion

- ▶ **The volcanic geoheritage is not an integrated part of Tokaj UNESCO World Heritage brand**

How can we integrate the geoheritage in the brand?

1. Volcanic landform based classification of Tokaj Wine Region

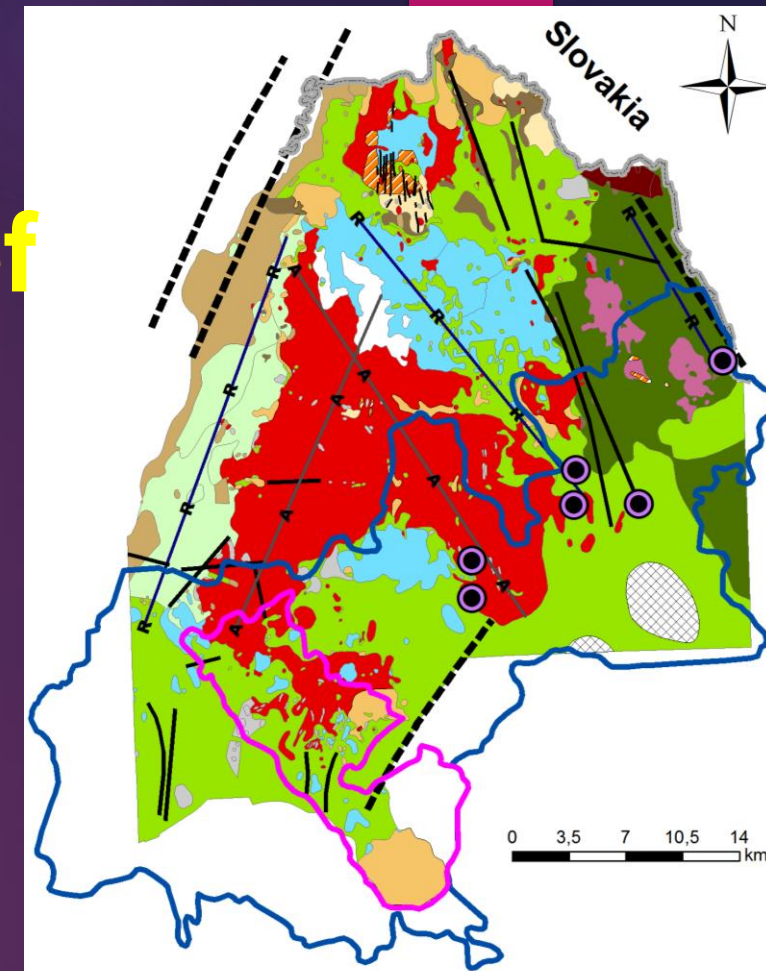
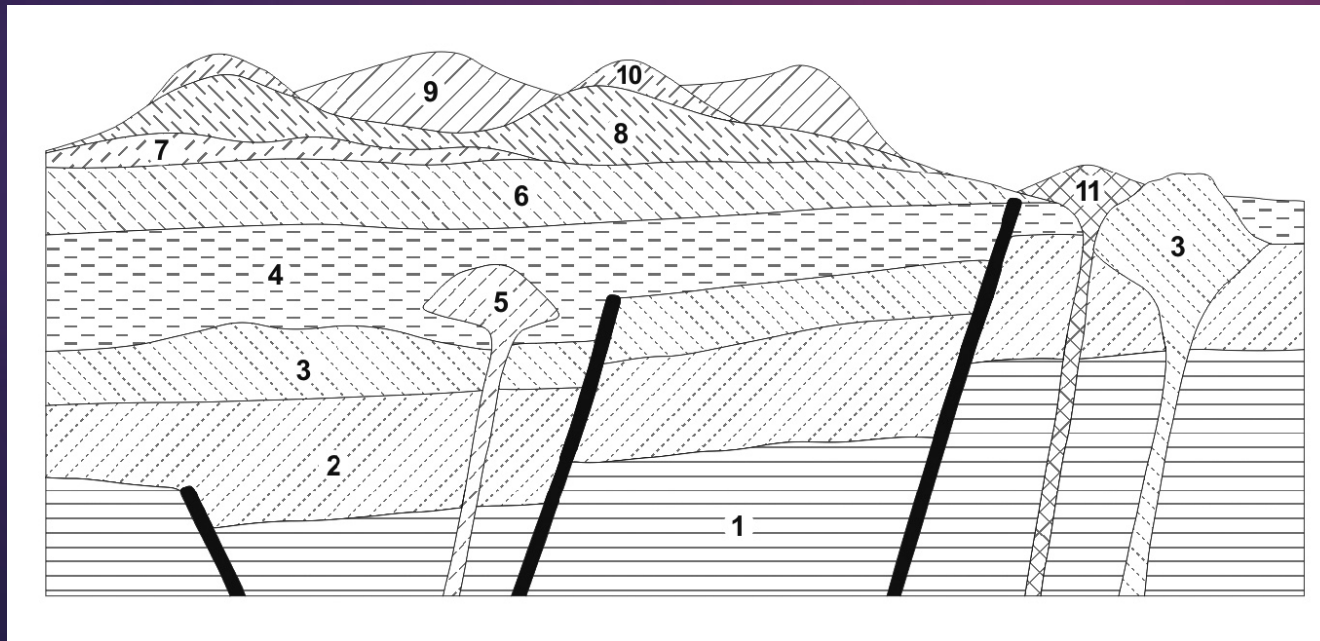
Classification of volcanic landforms with emphasis on volcanic mountains, after Thouret (2004).

- ▶ Monogenetic hills and small mountains
- ▶ Medium to large, high composite volcanic mountains
- ▶ High plateaux with altitudinal range and dissected relief
- ▶ Calderas on stratovolcanoes or on uplifted basement
- ▶ Landforms resulting from a combination of eruptive and/or erosional processes on volcanic mountains
- ▶ **Landforms resulting from denudation and inversion of relief**



Landforms resulting from denudation and inversion of relief

- ▶ eroded cone; inverted small-scale landforms: necks, culots
- ▶ much eroded cone, inverted lava flow and planeze
- ▶ roots of palaeo-volcanic mountain: dissected cauldron and hypovolcanic complex



Sarmatian-Pannonian series

- basalt flows
- hydrothermal sedimentary sequence
- clay, sand, marl, tuffite
- younger ash flow tuffs
- alkaline metasomatized intrusions
- rhyolite lava domes
- pyroclastic fall, flow and reworked deposits
- rhyodacite lava domes
- dacite lava domes and intrusions
- andesite lava flows and intrusions

Badenian series and basement

- clay
- rhyolite domes
- dacite lava domes
- pyroclastic flow and reworked deposits
- schist, sandstone, porphyrite

Tokaj Wine Region

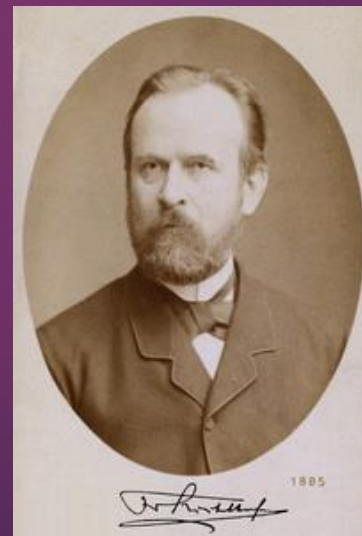
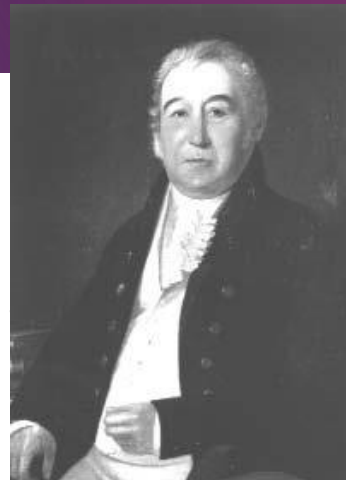
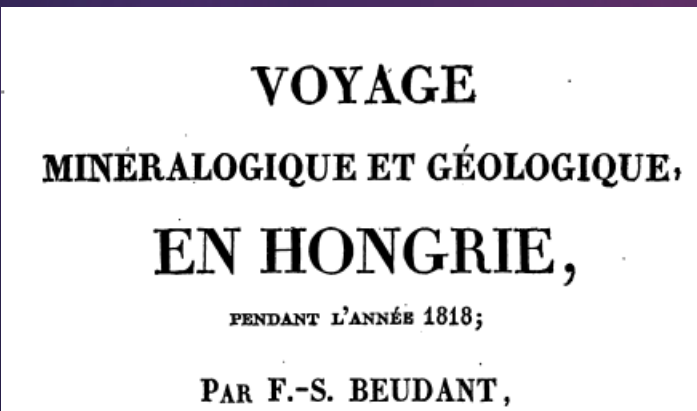
- Cellars (world heritage objects)
- UNESCO buffer zone
- UNESCO Core area
- state boundary

Compiling elements



Cellars and vineyards

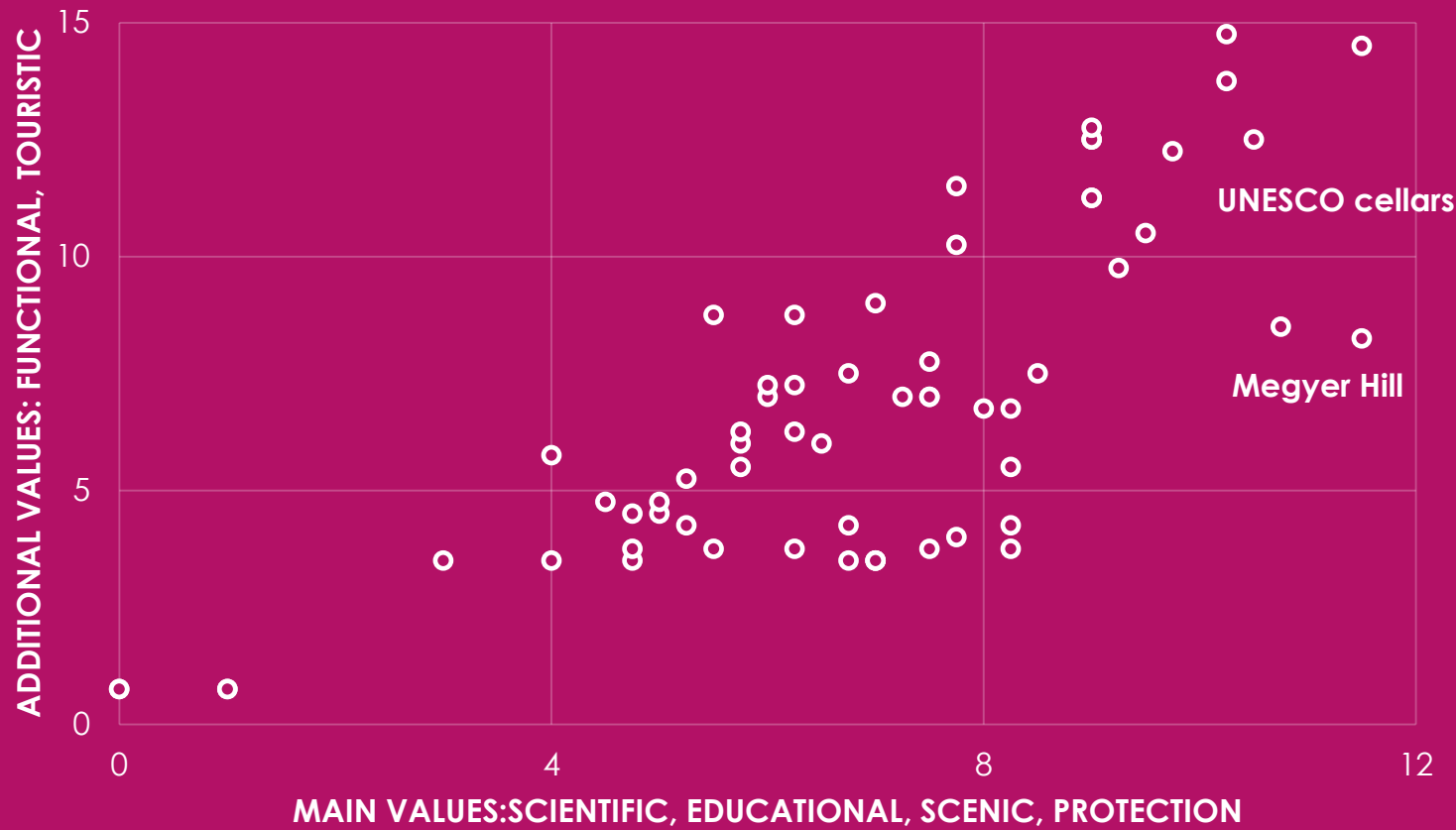
- ▶ geomorphosites: quarries, volcanic forms, based on geosite assesment modell



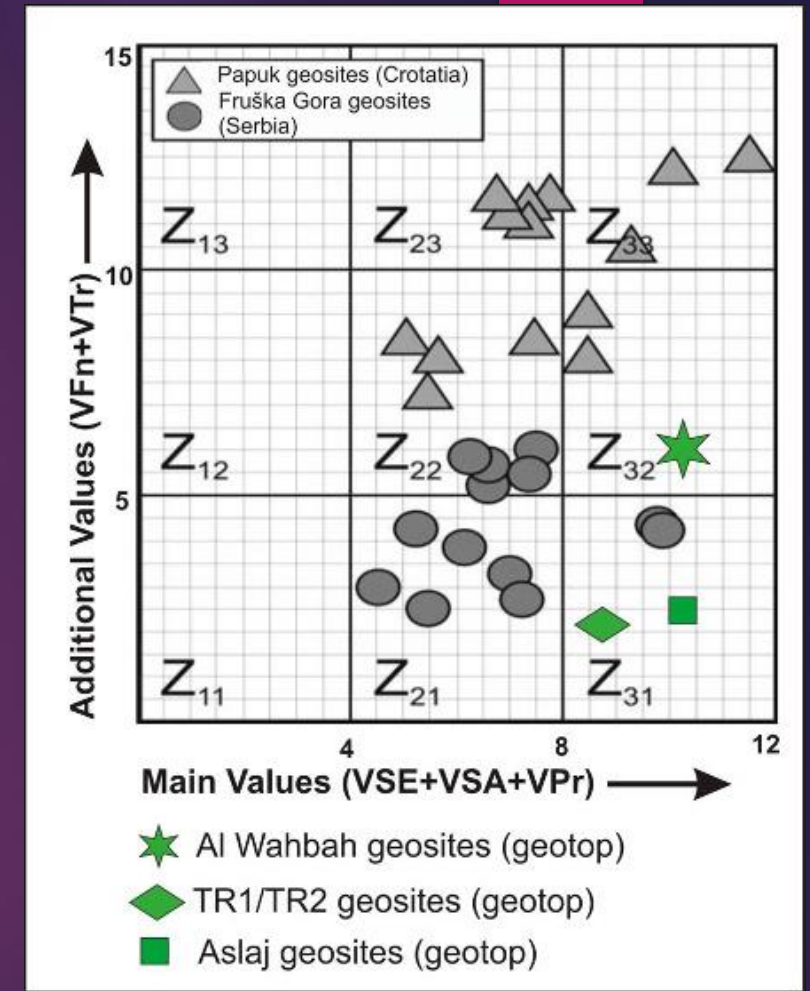
- ▶ R. TOWNSON (1762– 1827), F. RICHTHOFEN (1833-1905)

Early volcanologist activity: since the neptunist-plutonist debate

GAM

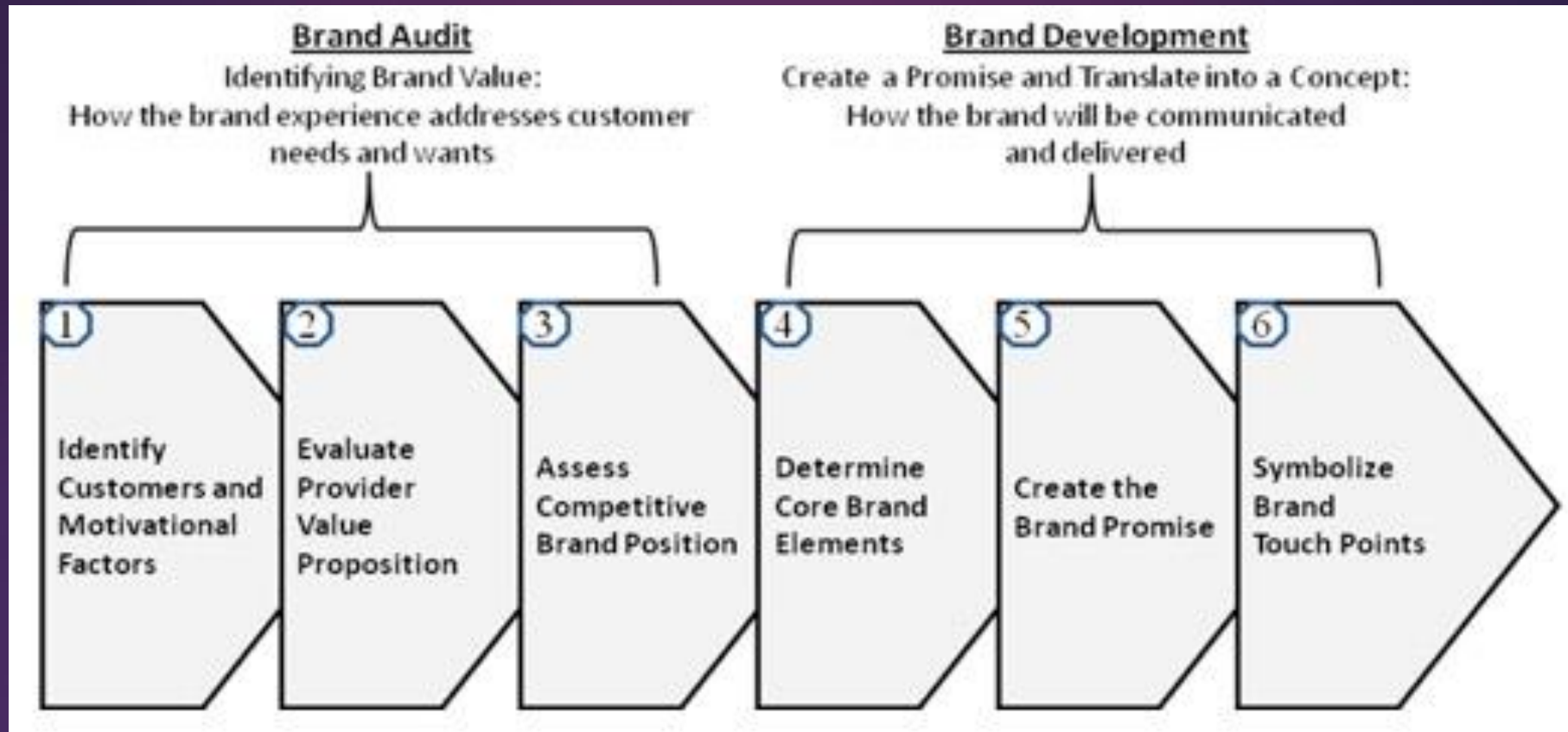


- ▶ Preliminary geosite assesment from the Tokaj Wine Heritage, and surroundings
- ▶ The classic geosites needs improvement in interpretation and torism infrastructure to reach higher level in ranking (like UNESCO objects)



- ▶ Discrimination diagram of the evaluated geosites: Papuk UNESCO geopark. Saudi Arabia
- ▶ Mouffi et al 2013

Take home message



- ▶ The perception of volcanic geoheritage is a more complex process: evaluate the sites, reaching the targets, proper collaboration of the nature conservation, nature park, UNESCO World Heritage and the tourism industry



Thank you for your attention

See you on 2nd Volcanapark
Conference, Lanzarote, Spain