

Recent tectonic movements recorded in the Bohemian Massif

JOSEF STEMBERK

Institute of Rock Structure and Mechanics, Academy of Sciences of the Czech Republic CR,
V Holešovičkách 41, Praha 8, Czech Republic

During the last 10 years, regular and long-term 3-D monitoring of the fault displacement has started in many parts of the Bohemian Massif and other parts of Europe (see www.tecnet.cz). Monitoring is organized preferentially under Earth's surface, inside the caves and galleries. It can reduce or eliminate displacement induced by climatic variation. From our long-term monitoring of displacement, it has been possible to recognize periods of increased geodynamic activity (Stemberk et al., 2010). The suitability of this monitoring technique for the observation of geodynamic activity was confirmed by other geophysical methods (Košťák et al., 2011).

Principal results of the monitoring of tectonic faults will be presented:

- The results exemplify successful monitoring of present tectonic micro-deformations on faults, which most experts considered impractical until recently.

- Results had evidenced deep tectonic processes of continental extent which culminated in particular earthquakes. Examples have been found in an extensive territory of Europe (Bohemian Massif; Western Carpathians, Rhine fault, Mediterranean – Central Apennines, Gulf of Corinth, and SW Bulgaria – Turkey).

- Recent records from a series of caves instrumented with 3D crack gauges TM71 displayed similarities in development which occurred irrespective of the position of caves in the structure of Bohemian Massif. A conclusion

was drawn that registered displacements are very likely connected with significant changes in the recent configuration of tectonic stress field.

- Periods of relative tectonic stability, as well as of increased tectonic activity were identified. Records concern underground objects (caves, galleries, tunnels) or superficial objects (rock massifs, fault slopes, engineering structures).

- Results indicate interference of aseismic tectonic impulses into slope deformation processes in an extent more effective than anticipated before.

A complex tectonic monitoring network based on our original instrumentation was gradually put into operation in Bohemian Massif, now being implemented into the international geophysical monitoring system (TecNet as a part of the EPOS project). Moreover, monitoring bases were successfully established in a series of European, as well as non-European countries.

References

- STEMBERK, J., KOŠŤÁK, B., & CACON, S., 2010: A tectonic pressure pulse and increased geodynamic activity recorded from the long-term monitoring of faults in Europe. *Tectonophysics*, 487, 1 – 4, 1 – 12.
- KOŠŤÁK, B., MRLINA, J., STEMBERK, J., & CHÁN, B., 2011: Tectonic movements monitored in the Bohemian Massif. *J. Geodynamics*, 52, 34 – 44.