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Telluric currents add stress to seismoactive zones and regulate earthquake activity

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The presentation focuses on the induced telluric currents in the Earth's lithosphere, in three time domains, the daily, the seasonal and the long term range, and on their geodynamic impact. The results obtained in an 8 year research programme at the Central Institute for Meteorology and Geodynamics (ZAMG), Vienna, and in several international co-operations (e.g. Duma, 1996; Duma, Vilardo, 1998; Duma, Ruzhin, 2003), provide a strong indication of a major trigger mechanism for earthquakes by forces which originate from the telluric currents, according to the Lorentz law F = [I . B], B being the magnetic field induction of the Earth's main field. The corresponding geophysical model reveals that the energy involved in this effect, named 'Magneto-Seismic Effect MSE', is very high, comparable to tectonic deformation energy itself, e.g. it is equivalent to the energy of a magnitude 4 earthquake, for an area of 200 km times 200 km.

The currents in the lithosphere are induced by the daily and seasonal geomagnetic variations, which originate externally from the ionospheric current system, mainly controlled by solar radiation. On the other hand, low frequency geoelectric currents are generated by the long term geomagnetic variations ('secular variations') which predominantly result from the geomagnetic dynamo itself, situated in the deep Earth interior, in the core-mantle zone. All those magnetic variations are routinely measured at geomagnetic observatories.

The changes of seismic activity with time in several major earthquake zones are analysed in the light of the effect MSE, including regions in Europe (e.g. Italy, Greece), Asia (e.g. Sumatra, Japan) and in USA (California).

It turns out, that the MSE applies obviously also to strong earthquake activity with

events $M \geq 6$, thus probably being of high relevance for preventive safety measures and disaster mitigation.