

The origin and function of the Conrad Observatory

In 1975 I was commissioned by the ZAMG - Central Institute for Meteorology and Geodynamics to find a suitable site for a new geophysical observatory. It included the design and structuring of the complex to meet the specific needs of the Observatory especially in the fields of seismology, geomagnetism and gravimetry. The old observatory on the outskirts of Vienna, built around 1952 on the Cobenzl, had to be replaced because of the major interference from the big city. Following an intensive search, I was able, in 1979, to find a suitable location on the Trafelberg in 1,100 meters above sea level.

The essential criteria for the site are:

Best possible freedom from interference by natural and artificial sources such as vibrations and influences of technical equipment and machinery which generate electromagnetic fields. In addition, the location requires a geological underground, containing spacious largely non-magnetic rocks. Indeed, the Trafelberg has all these features and it is now a forest conservation area with direct road access, but without any settlement activity.

The generous bequest of Ida Conrad, the wife of Prof. Victor Conrad, and the subsidies provided by the province of Lower Austria made it possible to establish the Conrad Observatory at this excellent location. This external financial support was the starting point for the Ministry of Science and Research to go full speed ahead with the project.

The main points of the construction:

In order to carry out both the standard tasks and basic research in the Alpine region, I chose an underground construction. The large space for research and development consists of 1,200 m tunnels for different sensor systems and 1.000 m² of space for underground laboratory rooms plus six underground accessible drill holes with a total length of 700 m, all equipped with high end instrumentation systems.

The entire observatory complex is freely accessible all year round.

The constant temperature of 7 degree Celsius throughout the year is a great benefit for all sensors and electronic devices. The temperature stability is a "gift from the mountain", it provides the best prerequisite for highly accurate measurement of very faint signals, given the fact

that thermal noise is one of the greatest sources of signal distortion.

The Geomagnetic Observatory - GMO is a unique facility for basic research and I would like to highlight one of the major features, namely:



Figure 1: Peter Melichar in the GMO. Photo credit: Bernhard Wieland

The 3D Super gradiometer - it was a particular concern for me to open up this field of research.

Now, the geomagnetic field can be examined in a hitherto unachieved resolution, the phenomena of magnetic precursor signals from earthquakes can now be explored systematically. It is well established that ground motion excites waves in the ionosphere, which in turn generate observable electromagnetic signals. In any case the Conrad Observatory is ideally suited to verify records of tiny electromagnetic signals generated in the source rocks, e.g. by piezo-electric effects. The Conrad Observatory represents a milestone in scientific earthquake research and provides in the future an early warning system to the benefit of us all.

Our goal for the future:

To establish the Conrad Observatory as an international and well known meeting place for the scientific community!

Peter Melichar
Head of Geophysics and Head of Conrad Observatory /
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