Director of Seismograph Stations,
Professor Olafur Gudmundson
Geophysics, Dept of Earth Sciences, Uppsala University Sweden

- A visit to the Uppsala University by Colin Lynam (Volunteer Seismologist) from The University of Queensland, Brisbane, Australia in June 2014.

• Heritage Seismographs at Uppsala University, Sweden

"In view of the importance of this earthquake, we attempted to collect as many historical seismograms as possible so that we can better understand its seismological characteristics. Unfortunately, at many seismological stations and observatories, old seismograms are rapidly being lost, partly because of deterioration of the recording paper, lack of space, or lack of maintenance personnel and infrastructure, and we could not find many records. Nevertheless, we could find a few good seismograms that proved extremely useful for unravelling some key characteristics of this unusual earthquake.

Conclusion

We note, however, because of the limited number and quality of old seismograms, our conclusion is subject to considerable uncertainty and should be taken with caution. We tried to present as much raw data as possible to allow other investigators to examine them if some aspects of the conclusions are questioned.

If more seismograms with well-documented instrument characteristics are available, we would be able to harden our conclusion.

The current situation (Lee & Benson 2008), however, is alarming because old seismograms are being discarded at many seismological observatories and institutions because of the space, budgetary and personnel limitations. We hope that this study has demonstrated the value of old seismograms for unravelling key characteristics and diversity of subduction-zone earthquakes which can be understood well only from data over an extended period of time. A better understanding of the diversity of subduction-zone earthquakes is critically important for implementing comprehensive hazard mitigation measures."

Historical seismograms for unravelling a mysterious earthquake: The 1907 Sumatra Earthquake

Hiroo Kanamori,1 Luis Rivera2 and William H. K. Lee3

Geophys. J. Int. (2010) 183, 358–374

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Geophysics

In geophysics we use quantitative physical methods to investigate the Earth and its environment. We measure natural and man-made ground vibrations (seismic waves), magnetic and electromagnetic fields, gravity, the shape of the Earth and other physical parameters and use these together with sophisticated computer modelling and processing methods in order to investigate the Earth's internal structure and dynamics. Measurements are made on the surface, in boreholes, and from boats, aircraft and satellites. Geophysics is important commercially in prospecting for minerals, water, oil, and gas, for studying earthquakes and in environmental applications such as monitoring groundwater pollution. More academic research targets include the geological evolution of Sweden, the very deep composition of the Earth, and large scale deformation processes (plate tectonics).

We run the Swedish National Seismic Network (www.snsn.se), consisting of over 60 stations covering most of Sweden. We also own advanced instrumentation for reflection seismic, electromagnetic, borehole, and gravity measurements, which are used in basic and applied research projects.

Sub groups:

- Environmental geophysics (under constructions)
- CCS
- Earthquake seismology (under constructions)
- Orogenic dynamics (under constructions)
- Scientific drilling
- Ore prospecting (under constructions)
- Geodynamic modelling
- SNSN (under constructions)

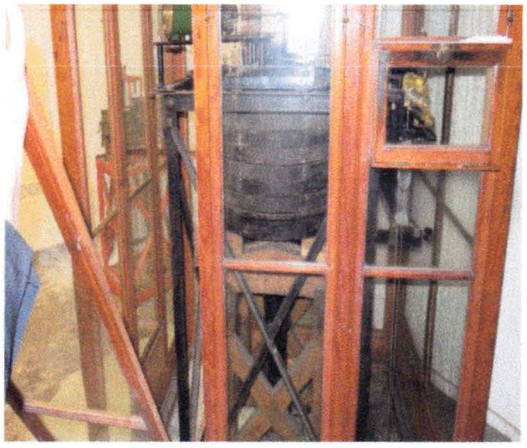

Figure 1

Weichert seismometer (1904) Uppsala University vault (photo 05/06/2014)

Figure 2

1000Kg astatic Weichert seismometer (1904) Uppsala University vault (photo 5/06/2014)

Figure 3

Entry to the 1904 seismograph vault in Uppsala University, Sweden

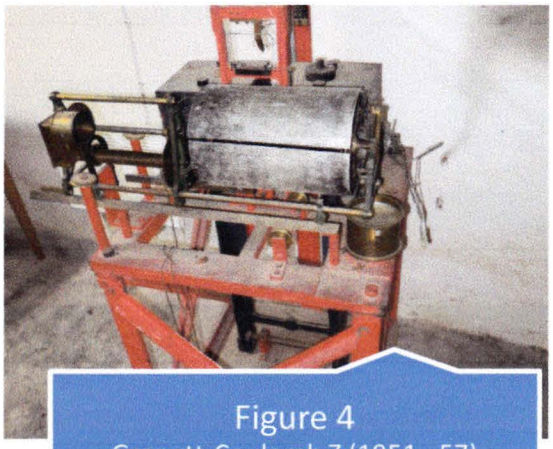

Figure 4
Grenett-Coulomb Z (1951 - 57)

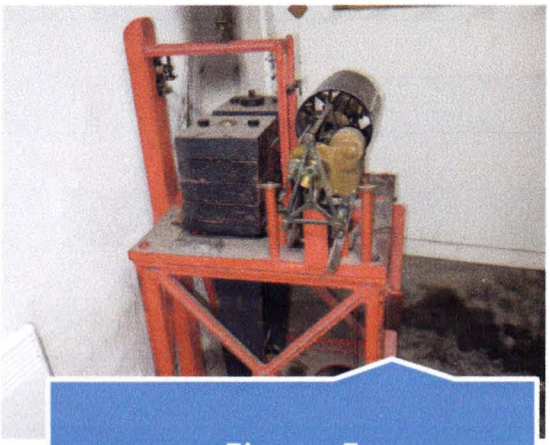

Figure 5
Side view

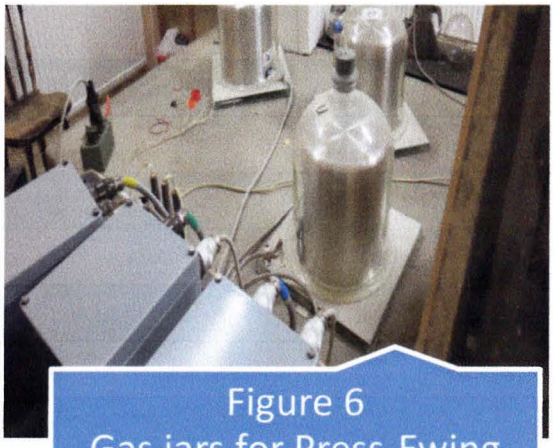

Figure 6
Gas jars for Press-Ewing ULP - N,E seismometers (1955)

The Press-Ewing owed its basic design to the 1904 electromagnetic seismograph invented by Czarist Russian prince Boris Galitzen. A magnet and wire coil allowed Galitzen's instrument to record a friction-free electric signal on photographic paper, improving on its mechanical predecessors. In 1934, a University of Texas undergraduate and tennis star, Lucien Lacoste, invented the zero-length spring that made the detection of ultra-slow earthquake waves possible. The spring had to be soft yet extremely stable, and so the triumph of the Press-Ewing may have been its use of a special alloy that gave this critical part those properties, said Wielandt. The Press-Ewing's unique glass sphere was designed to eliminate the influence of atmospheric pressure but it was dropped from its successor, the Sprengnether, because it did not work particularly well, said Wielandt. (ref: http://blogs.ei.columbia.edu/2012/06/07/press-ewing-seismograph-on-jeopardy/)

Figure 7

- ULP, Press-Ewing Z seismometer with glass atmospheric compensator (1957)

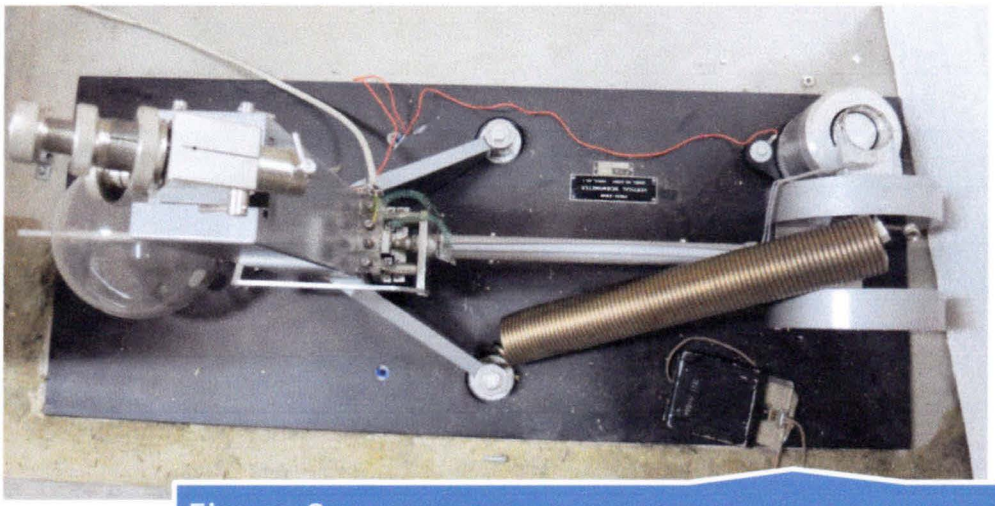

Figure 8

- Press-Ewing Z seismometer working parts

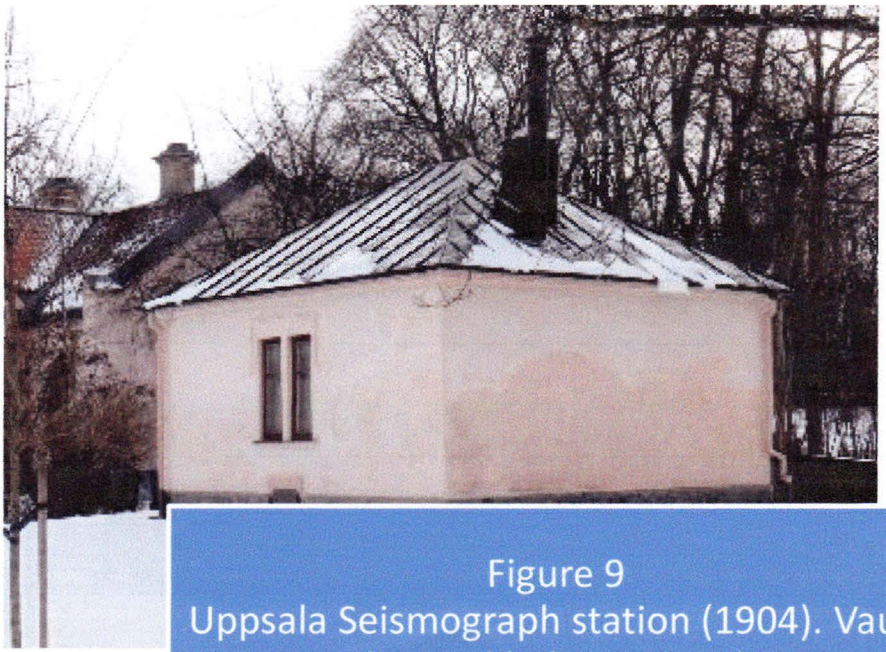

Figure 9
Uppsala Seismograph station (1904). Vault located below ground