

3 EARTH-PHYSICAL RESEARCH

31 RESEARCH OF THE TEMPORAL VARIATION OF TERRESTRIAL FIELDS

In the Geophysical Observatory in Tihany, recording of the temporal variations of the magnetic field elements and systematical absolute magnetic measurements have been continued. The assembly of the geomagnetic section of the Szarvas observatory has begun.

In co-operation with the Geophysical Department of the ELTE, continuous spherics-recording went on. For the recording of whistlers, a magnetic tape recorder has been set into operation and occasional recordings carried out with it. Interpretation scales and curves have been prepared. The material was processed with Sonagraph and interpreted. The construction of the control unit circuitry of the automatic recording equipment has started.

The petrophysical laboratory continued to operate. Unfortunately, no velocity measurement could be made on most samples, on account of their unsatisfactory size. A program for the storage of data in a form suitable for computer processing has been prepared and the processing of data has started.

*

With the aid of an electronic computer it has been established that the equatorial cross-section of the geoid can be best approximated with a mathematically symmetrical shape (with zonal spherical functions) from the direction of the points 58° and 156.5° E. Gr. of the Equator. Assuming both approximating shapes as rotation-symmetrical, the anomaly pattern corresponding to their sum has been drawn.

The sum-pattern can be regarded not only similar, but identical with the measured geoid shape. That is, the individual geoid-anomalies have no independent material or energetic inhomogeneity background. Such inhomogeneities exist in the two directions mentioned; the remaining anomalies are the superpositions of these two basic anomalies.

The coefficients of the subsequent even and odd members of the function series approximating from the direction of Australia decrease regularly; in the function series approximating from the direction of India, however, the even members are small in comparison to the odd ones, i.e. this shape has no ellipticity. This permits to conclude to the following:

1. From Australia the elongated elliptical shape refers to a very deep, long-existing, static (though eventually temporally varying) positive material eccentricity in this direction.

2. From the direction of India no static material eccentricity can be assumed. The phenomenon may be due rather to an energetic inhomogeneity, effect or process. The approximating shape from the direction of India is flat over a large area.

Estimates led to the guess that by shifting the agents off the Equator a considerable part of the known polar asymmetry of the Earth can also be explained.

*

The final processing of our tidal series recorded from February 1968 until January 1970 for more than 23 months, notable also in international relations, has been finished, and 8 months from the 1970 recordings have been prepared for being processed.

We plan to introduce automatic recording of the tidal effects, since this may furnish additional informations, especially for the long-period own oscillations of the Earth. Filtering and transforming programs needed for the automatic processing have been prepared and checked in numerous model experiments.

With the aid of these programs, the amplitude-quotient of the M_3 wave belonging to the $n+3$ term of the series expansion of the tides has been determined. Informations independent of the waves belonging to the $n+2$ term have been obtained for the inner structure and for certain physical properties of the Earth. In spite of a very low amplitude of the M_3 wave the results agree well with the theoretically determined values.

*

According to international regulations, the measurement of our geomagnetic secular basis network consisting of 15 points has been completed. A first processing of the measured data has been finished.

Employing the measurements made so far along our national magnetic basis network the results of both old and recent magnetic surveys have been merged into a uniform data system. This consistent magnetic data series is based on the data of all national surveys made in Hungary so far, therefore it describes the magnetic field of our country and its variations in the best possible way.

32 PALEOMAGNETIC INVESTIGATIONS

In Kiev, within the KAPG,* we presented a report on elaborating the collection of Paleozoic rocks from the upper section of the Lena river. With a rock-generator having a sensitivity of 10^{-8} , the direction of the natural remanent magnetism of 5 formations from 3 sampling sites has been determined. The purification of the samples was made in 5 steps, up to a peak value of 600 Oe, with AC demagnetization. The results will be published, according to the convention of the working committee No 1.5 of the KAPG, in a common paper to be prepared by the researchers of the participating countries.

Concerning the volcanic formations of Tarpa and Barabás, it has been established that they have a very strong remanent magnetism with a direction contrary to the present geomagnetic field.

The main statements from the investigations in the Mátra and the Börzsöny Mountains are as follows:

1. In a part of the sample groups which are stable against the usual paleomagnetic purification procedures, magnetism is born by maghemite and iron hydroxide crystallized subsequently or at least at a low temperature, consequently these have to be eliminated from the interpretation.

2. The rocks crystallizing at a low temperature on account of their high content in volatiles (hyporocks) mainly contain crystalline iron hydroxide (generally lepidokrokyte), and their magnetism of chemical origin is primary.

Joining to the Börzsöny theme, the direction of NRM, further the ratio of remanent and induced magnetism on rocks from the area lying between Nagyirtáspuszta, Márianosztra, Kóspallag, (15 sampling sites) has been established. With the exception of the first sampling site (Kóspal-

*(Academic Committees of Planetary Geophics)

lag), the direction of remanent magnetism is reverse, and the Koenigsberger ratio generally higher than unit. Sampling was made on very good exposures only, generally on the margins of the area.

The direction of remanent magnetism on rocks of the Hegyeshegy, showing a 5000 gamma negative aeromagnetic anomaly, is: $D=167.5^\circ$, $I=-49.5^\circ$. The intensity of the remanent magnetism is: $I_n=13,053 \cdot 10^{-6}$; $Q_n=83$.