On the Electromagnetic Seismographs at Syowa Base, Antarctica

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第5次南極地域観測隊地震部門報告 (昭和基地の電磁式地震計について)

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要　旨

昭和基地における自然地震の観測は，1959年以来HES型上下動1成分をもって，行なってきた．第5次隊は新らしくHES型水平動地震計を2台，基地に設置することができた．これで昭和基地には，3成分の地震計がそろったことになる．

Since 1959, seismological observations at Syowa Base have been continued by the Japanese Antarctic Research Expeditions, using HES-V (Hagiwara Electromagnetic Seismograph, Vertical component).

In the fifth Expedition, two horizontal components of HES-H (E-W component

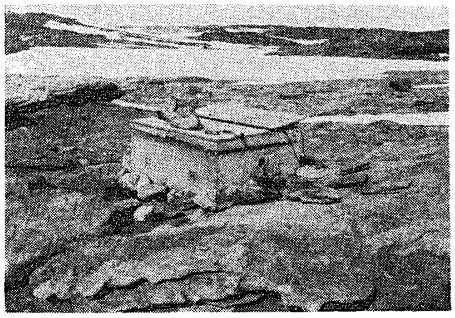

Photo. 1. Seismometer box.

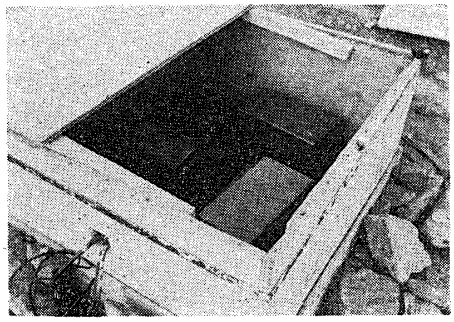

Photo. 2. Interior of the seismometer box.

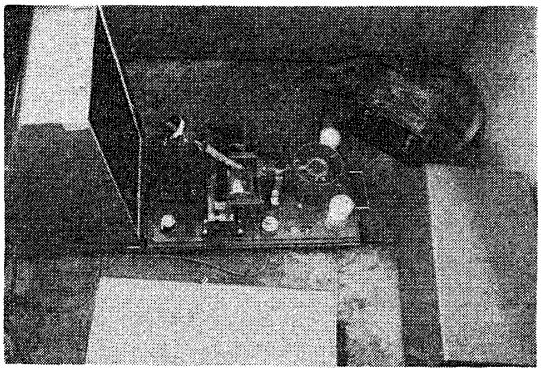

Photo. 3. Vertical component of H E S.

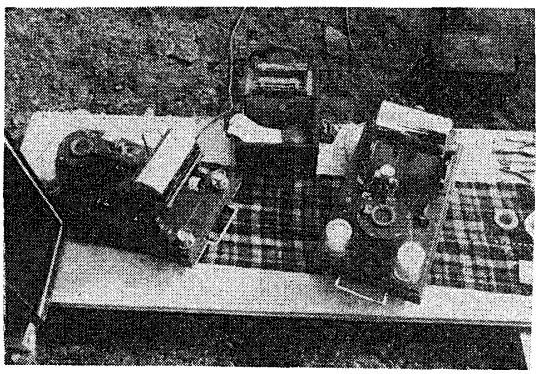

Photo. 4. Two horizontal components of H E S-H, newly placed.

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and N-S component) were transported to Syowa Base and set up in February 1961.

The seismometer box in which three components of seismographs were placed, had been fixed on the bed rocks. The position of the seismometer box is about 200 meters SW from the observation hut at Syowa Base (Photos. 1, 2, 3 and 4).

The seismograms were registered on 35mm standard photographic films of the recorder on the desk in the observation hut.

The constants of the pick-ups and the galvanometers of the two horizontal component seismographs were as follows (Table 1).

Table 1. The constants of the pick-ups and the galvanometers.

H E S-H E-W component		Galvanometer		H E S-H N-S component		Galvanometer	
M	1.0×10^4 gr.			M	1.0×10^4 gr.		
H	5.0 cm			H	5.0 cm		
T_1	1.0 sec.	T_2	1.1 sec.	T_1	1.0 sec.	T_2	1.1 sec.
S_1	2.05×10^2 rad/unit current in C.G.S. e.m.u.	S_2	1.22×10^8 cm/unit current in C.G.S. e.m.u.	S_1	2.18×10^2 rad/unit current in C.G.S. e.m.u.	S_2	1.25×10^8 cm/unit current in C.G.S. e.m.u.
R_1	1049 Ω	R_2	600 Ω	R_1	1047 Ω	R_2	620 Ω
Ω_1	1600 Ω	Ω_2	1600 Ω	Ω_1	1300 Ω	Ω_2	1580 Ω
h_1	1.0	h_2	1.0	h	1.0	h_2	1.0
h_{01}	0.0	h_{02}	0.0	h_{01}	0.0	h_{02}	0.0
V_{max}	μ_1=1/5: 6300 μ_1=1/2:16000			V_{max}	μ_1=1/5: 7800 μ_1=1/2:19000		

where,

- M : mass of the pendulum
- H : distance between the center of gravity and the axis of rotation of the pendulum
- T_1 : period of the pick-up
- T_2 : period of the galvanometer
- S_1 : sensitivity of the pick-up (angular deflection of the pendulum when unit direct current is conducted to the pick-up coil)
- S_2 : sensitivity of the galvanometer (displacement of the light spot on the recording drum when unit direct current is conducted to the galvanometer coil)
- R_1 : resistance of the pick-up coil
- R_2 : resistance of the galvanometer coil
- Ω_1 : external damping resistance of the pick-up
- Ω_2 : external damping resistance of the galvanometer
- h_1 : damping constant of the pick-up
- h_2 : damping constant of the galvanometer

h_{01} : damping constant of the pick-up when the circuit is open and no current passes through the pick-up coil

h_{02} : damping constant of the galvanometer when the circuit is open and no current passes through the galvanometer coil

V_{max}: maximum magnification of the seismograph on the recording film

μ_1 : attenuation factor

Attenuators of the attenuation factor $\mu_1=1/5$ were used in the seismological observation from the end of January to May, and $\mu_1=1/2$ were used from the end of May to the next January.

Reference

1) T. Hegiwara (1958): A Note on the Theory of the Electromagnetic Seismograph. Bulletin of the Earthquake Research Institute, **36**, 139-164.

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