Preliminary Report on the Westerly Waves in the Southern Ocean

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暴風圏における偏西風帯上の小波動

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暴風圏の偏西風帯では，長波や短波の波動のほかにそれ等よりも規模の小さい気圧波があるらしい．以下，この波動について若干知りえた点を個条書きにしてあげてみる．

1. この小波動は，気圧の谷や峯の小規模なものらしく，又，東進性をもっている．

2. この小波動をみつけるには，島や船からの報告から気圧の変化曲線をつくり，そのキンクによって谷や峯を探せばよい．

3. この小波動は南緯 50～60 度の間で，はっきり見付けられるようである．

4. 南大洋にブロック気味の高気圧がある時，この波動の東進に伴って南極前線上にも気象変化が生じ，その変化も一緒に東進する．場合によっては，高気圧の南北の両端を小低気圧が一つずつ小波動に伴って，一緒に東進することもある．

5. この小波動の東進速力は，1時間に経度1度前後と考えられる．

6. この小波動は，大規模の擾乱の中では不明瞭になり，擾乱がおとろえると明瞭になってくる．

7. 暴風圏の強風帯が南下すると，この小波動は速さをます傾向がある．

8. この小波動の寿命はかなり長いものもある．

9. この小波動は，極高気圧の圏内では不明瞭になるようである．

10. ロス海では，この小波動は進行方向は顕著な南分をもつようになる．

1. There are two kind of waves in the so-called westerly waves; namely, the long waves and the short waves. It is said that the long waves proceed 5–10° per day eastward while the short waves 15° per day. However, in the Southern Ocean, careful observation of barometric changes reveals the existence of small scale waves proceed successively from west to east as the troughs and wedges which seem like of the so-called stormy zone.

2. In order to distinguish these waves, it is enough to trace troughs and wedges on the sequence chart of barometric change. Such sequence chart is constructed using 3-hourly reports of remote islands and ships. However, for this purpose, it is desirable to use the data obtained south of 50°S, because in such area, diurnal variation of the atmospheric pressure becomes considerably small (*see* Fig. 1).

3. Northern limit of these waves is rather vague, and is difficult to distinguish. However, the barometric variation by these waves is comparatively large in the zone between 50°–60°S, and it becomes small and can not be distinguished in the southern portion.

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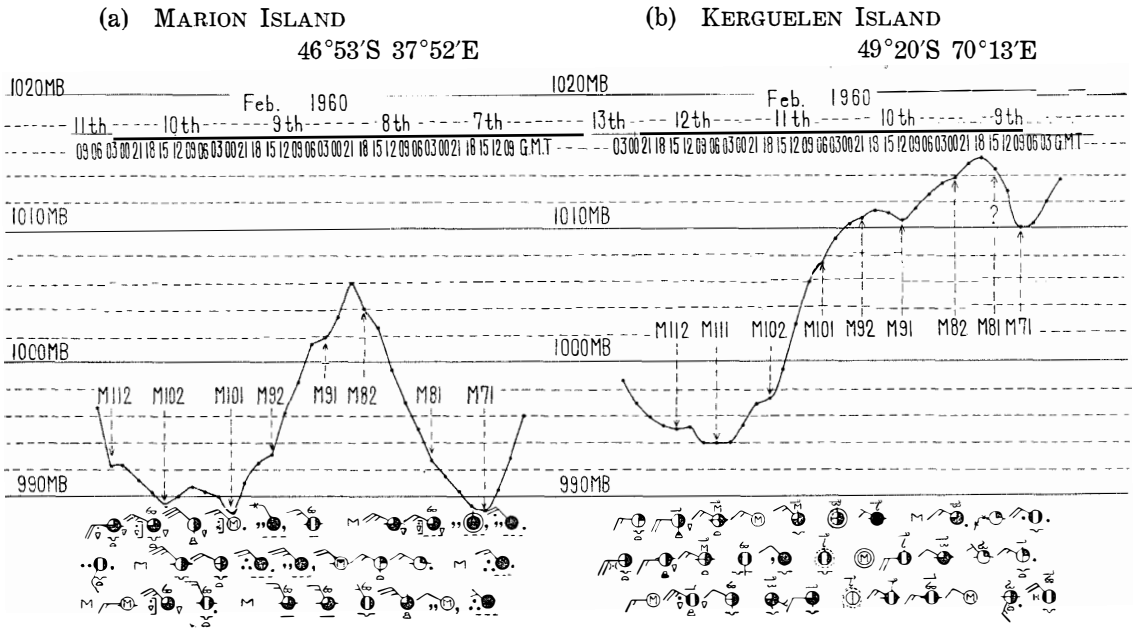

Notes: (1) M 71, M 81, M 82, ...are wave numbers.
(2) Wave number in (a) corresponds with the number in (b)

Fig. 1. Example of small scale waves.

4. These small scale waves are well observed when a blocking small High having a north-south axis with the Polar High existed in these regions. Sometimes, small cyclones in the southern side of the Southern Ocean High coincide with the small cyclones of the northern side. In such case, the northern side cyclones are apt to strong compared with the southern cyclones.

Experiences obtained on board whaling ships operating in the Ross Sea area show that even in the very central part of such Southern Ocean High, rapid spreading of clouds is seen for short period when the trough of waves passes over the ship.

5. The small waves can be traced with troughs and wedges. The moving velocity is 20°-25° lat. per day, namely, about 1° per hour. Accordingly, along 60°S it is 30 kt, and along 70°S, respectively.

6. These small scale waves become vague when they proceed into large scale atmospheric disturbance. However, it becomes very distinct when such disturbance become weak.

7. Velocity of these waves is apt to be accelerated when the tight westerly comes down southward from the so-called stormy zone.

8. Duration of these waves is comparatively long, and some waves reach even to the Ross Sea area from the Indian Ocean area.

9. These small waves are indistinct in the easterly zone of the Polar High and such waves can not be traced in such case.

10. In the Ross Sea area, the small waves do not proceed along the longitudinal line but become to have a southerly component for its proceeding direction, because there are high mountains along the west side of the Ross Sea coast. Namely, the

mouth of the Ross Sea gets prior influence of these waves rather than the inner part of the Sea (*see* Fig. 2).

11. This is only a preliminary report, therefore the detailed report will be published in the near future.

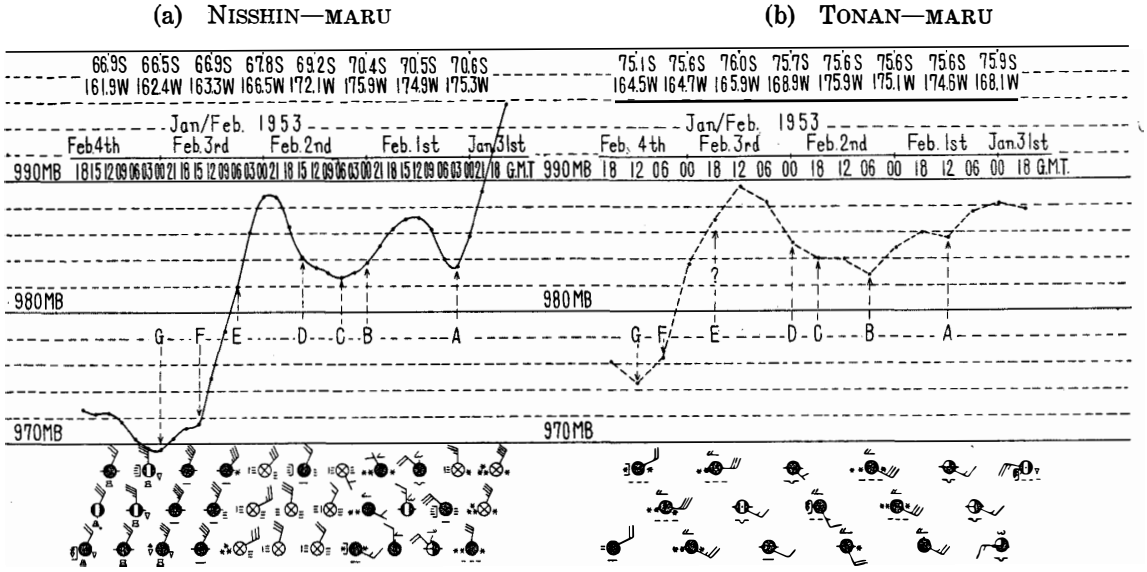

Fig. 2. Small scale waves in the Ross area.

Notes: (1) A, B, C, ...denote characteristic points on the wave.
(2) Characteristic point in (a) corresponds with the one in (b).