

ATMOSPHERICS ACCOMPANIED BY COLD FRONTS*

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Investigation was made on the atmospherics observed with a narrow sector goniometer tuned to 12 kc/s and an automatic intensity recorder tuned to 27 kc/s in Toyokawa Observatory from December, 1952 to September, 1953.

We classified these atmospherics into three groups, *i.e.* (1) atmospherics of distant origins which displace gradually in accordance with time of the day or seasons of the year, (2) atmospherics not directly correlated with cold fronts, (3) atmospherics accompanied by cold fronts passing across the Japan Islands.

We examined time and direction of appearance of atmospherics (3), and found that clearly defined cold fronts generally accompany atmospherics when they are activated by landing on the Japan Islands after passing over the Japan Sea or by ascending on the central mountain-ranges of Japan.¹⁾²⁾

As an example we shall explain atmospherics on 3rd September, 1953.

A group of atmospherics appeared at 1430 J.S.T., 2nd September, 1953 in the sector 345° to 30° , and became very active at 2000 to 2300 J.S.T. It is understood to be emitted from a cold front relating to a low pressure of 1002 mb in Siberia (Fig. 1), because the front developed remarkably at these times, and we observed

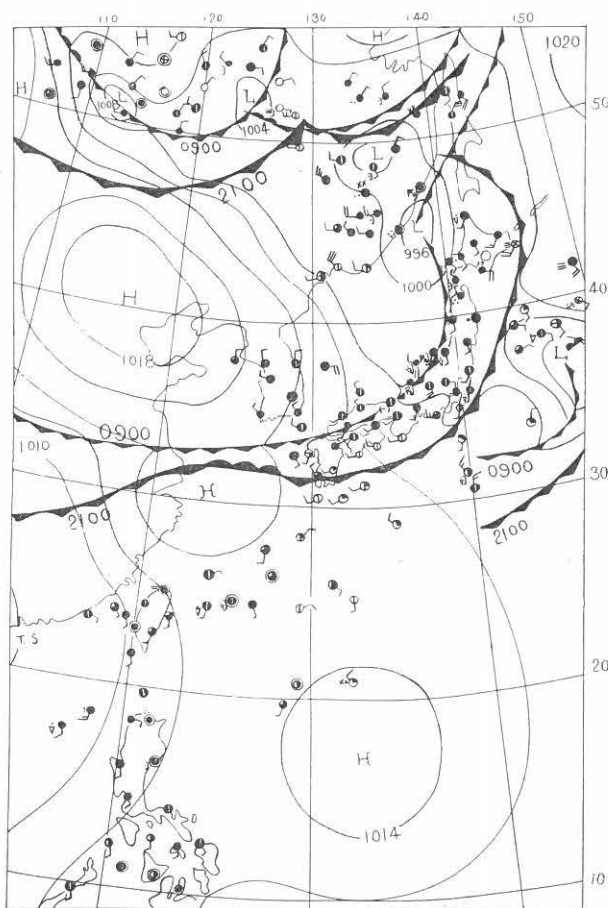


FIG. 1. Weather map of 0900 J.S.T., 3rd September, 1953. Displacement of the cold front is indicated.

* The full paper is found in Bul. Res. Inst. Atm., Nagoya Univ. Vol. 4, No. 2, 1953.

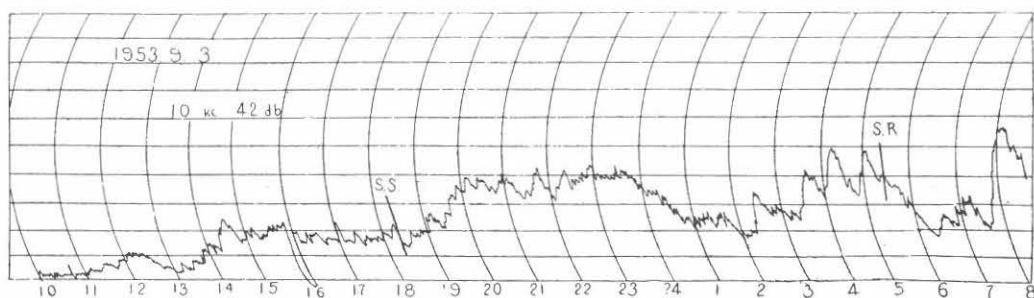


FIG. 2. Intensity record of atmospheric on 3rd September, 1953.

thunderstorms at several points on the front and noticed clearly the increase of atmospheric simultaneously (Fig. 2).

The cold front landed on the Japan Sea coast at 0900 J.S.T., on the 3rd September, and, being accompanied by thunderstorms and showers everywhere, passed over Mt. Fuji into the Pacific Ocean at 1700 J.S.T., and correspondingly at the same time the direction of arrival of atmospheric changed to the sector 0° to 40° at first and to 40° to 90° afterwards (Fig. 3).

The atmospheric at 1900 to 2300 J.S.T. in the sector 0° to 40° seems to be emitted from the cold front, which developed remarkably on landing upon Hokkaido Island. Really it generated thunderstorms and showers at several places on passing across. The index of the low pressure concerned was deepened to 984 mb. After midnight both atmospheric and the cold front decayed simultaneously.

A peak of the recording of atmospheric at 1430 J.S.T. (Fig. 2) is likely to be due to development of the cold front by passing over the Japan Southern Alps and the allied mountain-ranges.

The remarkably frequent distribution of atmospheric in the sector 200° to 280° at 1300 to 1700 J.S.T. should be understood as nearby atmospheric and, in fact, it was found to be due to thunderstorms and showers in the Kyûshû and the Ryûkû Islands (Fig. 1).

As a reference, we shall remark briefly the stationary atmospheric of distant origins in autumn. A weak but broad distribution of atmospheric in the sector 110° to 150° at 0900 to 2000 J.S.T. seems due to thunderstorms or squalls in the Caroline and the Marshall Islands.³⁾

Heavy atmospheric observed day and night in the sector 200° to 280° are likely to be emitted from thunderstorms or squalls in Thailand, Indo-china (northern part), Malaya, Java, Sumatra (southern part), Philippine, China (southern coast), etc., as shown in Fig. 4.⁴⁾

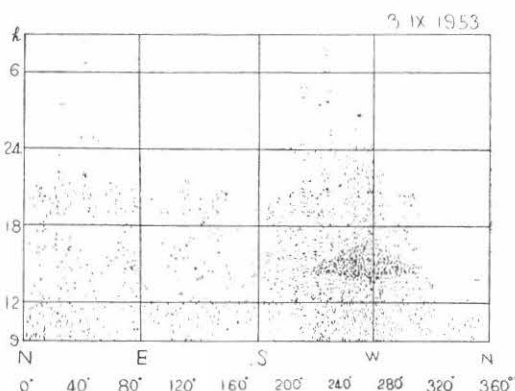


FIG. 3. Directional record of atmospheric on 3rd September, 1953.

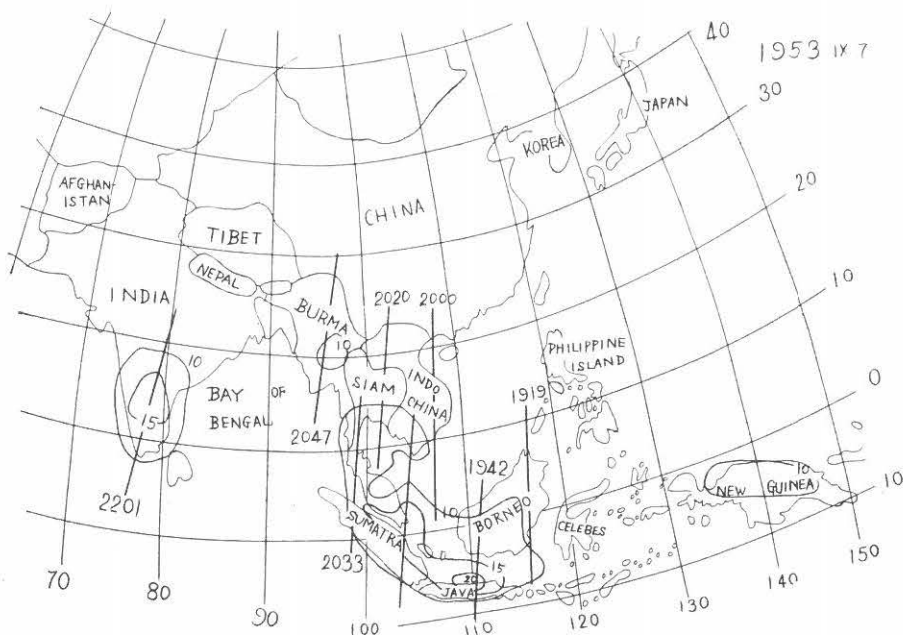


FIG. 4. Distribution of thunderstorms in the Far East in September, 1953. The sunset lines on 7th September are indicated.⁴⁾

Those atmospherics observed in the sector 210° to 290° at night come from thunderstorms in Burma (southern part), Deccan (India), Ceylon, etc., as the night goes on, and after midnight it is very likely that they come from thunderstorms in the tropical zone in Africa such as Ethiopia, Nigeria, etc., in referring to the direction of arrival as well as the time of sunset and that of appearance of atmospherics (Fig. 5).⁵⁾

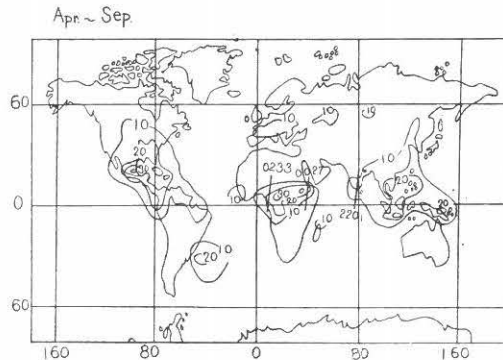


Fig. 5. Distribution of thunderstorms over the world. The sunset lines on 7th September are indicated except those in Fig. 4.⁵⁾

References

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