

SHORTER CONTRIBUTION

ARCTIC SEA-SMOKE IN LOW LATITUDES

by F. Loewe

Department of Meteorology, University of Melbourne

(Manuscript received December, 1956)

Whittingham describes in Aust. Met. Mag. (14, p. 53, 1956), a case of sea-smoke in southern Queensland (28°S) and mentions an occurrence at Hongkong ($22\frac{1}{2}^{\circ}\text{N}$). Sea smoke may occur where relatively cold air flows over a warmer water surface. It can, therefore, be expected in winter with outbreaks of cold air along the east coasts of the continents where they are skirted by the warm waters of the Gulf Stream or the Kuro Siwo. Cases of arctic sea smoke in subtropical latitudes have been collected by Rodewald (Seewart 6, p. 86, 1937, not available in Australia), and an extreme case off Cape Hatteras (35°N , 75°W) has been described in Bull. Am. Met. Soc. (15, p. 146, 1934). On 9th February 1934 the temperature difference between water and air over the Gulf Stream reached 45°F . On this day the British ship "Montrolite" encountered, 100 miles east of Cape Hatteras, in a heavy gale from the north, snowfall and sea smoke of such thickness that the visibility became extremely reduced. When later the sun appeared and shone on the spiralling steam columns, the picture resembled one out of Dante's Inferno. After the snowfall ended the air temperature dropped to 25°F with a water temperature of 70°F . The steam columns increased as the difference in temperature between air and sea rose. They disappeared gradually when near the coast the water temperature sank to 52°F .

The high instability led in this admittedly extreme case to an enormous transfer of sensible and latent heat from the sea into the atmosphere. After an oceanic passage of 600 miles the air arrived at the Bermudas with a surface temperature of 50°F . In view of the simultaneous winds this means a heating of not less than 2°F per hour; this heating is likely to have extended to a height of at least 20,000 ft (Fiat Review of German Science, vol. 19, p. 139).