METEOROLOGY

Rocket Soundings of the Upper Atmosphere

During the first World Geophysical Interval of the IQSY, measurements of temperature and winds were made at heights up to 60 km, using the new meteorological rocket *Skua*, launched from the Royal Artillery Guided Weapons Range at South Uist in the Outer Hebrides (57·3° N., 7·4° W.). The results of these measurements are shown in Figs. 1 and 2. By sheer good fortune

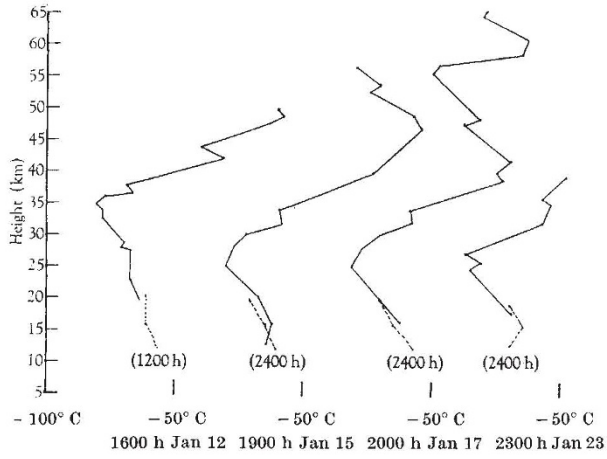

Fig. 1. Temperatures recorded by rocket sondes from South Uist. Dotted lines refer to balloon ascent from Stornoway (75 miles to the north) at times shown

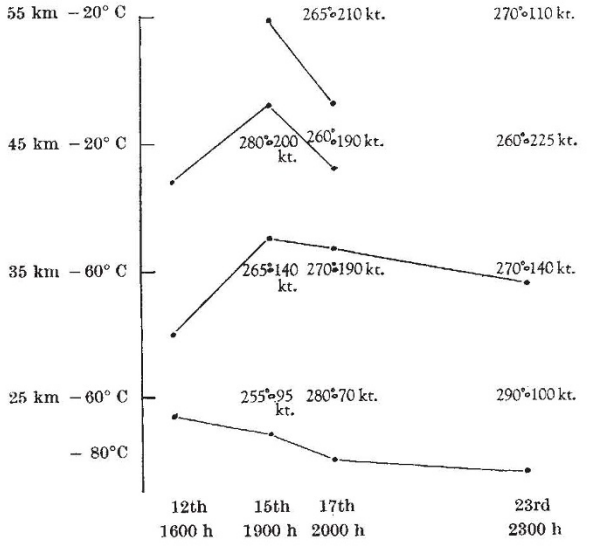

Fig. 2. Winds and temperatures at four levels at South Uist in January 1964

these first four ascents spanned a 'stratospheric warming'. Stratospheric warmings and coolings of this type are recorded by balloon ascents from time to time during the early months of most years, but this may be the first series of measurements showing the rapid growth and decay of a warming at levels above 35 km.

R. Almond
S. F. G. Farmer
R. Frith

Meteorological Office,
Bracknell,
Berkshire.

METALLURGY

Liquid Metal Hold-up in Packed Beds

In recent years there appears to have been a growing interest in the investigation of liquid metal and slag irrigation of packed beds, either at zero gas flow or countercurrent to flowing gases. The interest apparently stems from a desire for a better understanding of the related processes in an operational blast furnace. So far, all such investigations have been performed under laboratory conditions. Moreover, because of various experimental difficulties, laboratory systems used for hold-up or other related studies featured liquids different to those of actual systems. One apparent exception is the recent investigation of the flooding phenomenon by Shavrin *et al.*[1] using molten slags.

In the field of hold-up measurements, earlier investigators, notably Gardner[2], used water flowing through a non-wetting bed of coke particles, while more recently, Warner[3] and Standish[4] used beds of regular shaped packing irrigated with mercury. Other examples of this kind are to be found in the study of hanging phenomenon in a blast furnace, for which, in their laboratory investigations, Elliott *et al.*[5] used molten wax, whereas, more recently, Kukarin and Kitaev[6] used aqueous solutions of glycerine and Wood's metal to simulate molten blast furnace slag and metal, respectively.

The question which arises in all investigations of this type is that of deciding the correct liquid to be used as a room temperature analogue of molten metal or slag. Thus, in one of the investigations of this kind, namely, that of hold-up determinations, mercury appears to have been used exclusively, and it is pertinent to enquire whether or not this liquid is a good room temperature substitute for a molten metal. At first sight it would seem that this choice is at least logical since mercury itself is a liquid metal.

However, my recent hold-up investigations (supported by University Grants Committee grant 62/87), with a fusible alloy ('Cerrobend'), using similar beds to those that were reported earlier for mercury irrigation[4], indicate that mercury may not be such a good substitute for a molten metal as was hitherto assumed.

Thus, my results show that the most significant difference occurs in the static hold-up, but that the dynamic

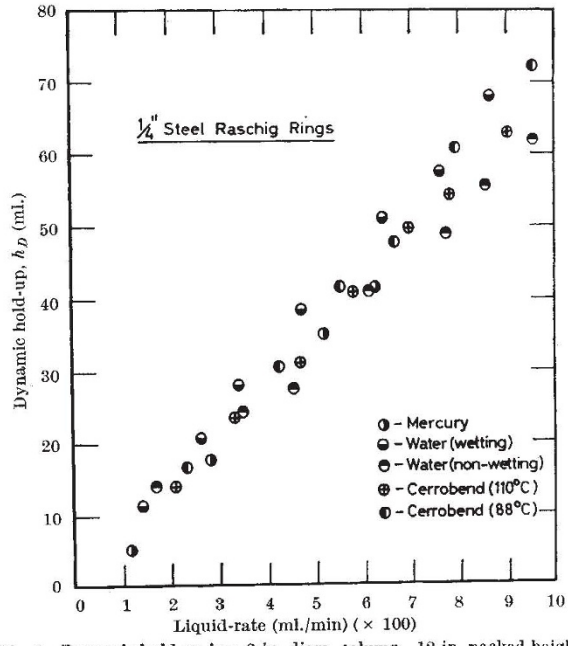

Fig. 1. Dynamic hold-up in a 2-in. diam. column. 12-in. packed height. Zero gas-rate