

WEATHER NEWS FROM THE OUTPOSTS

The following notes have been culled from monthly reports, annual reports and other correspondence from field stations, or have been specially contributed by the officers concerned. They are printed as items of both meteorological and general interest.

METEOROLOGICAL OBSERVATIONS AT HEARD ISLAND

SUNSHINE:

From visual observations it has been noticed that the hours of daily sunshine vary considerably around the island, the Eastern end of the island (Spit Bay area) showing a very marked contrast to the Atlas Cove area in that the Eastern end appears to have a much greater amount of sunshine. It will be appreciated therefore that little reliability can be placed in yearly and monthly statistics derived from Atlas Cove readings as being representative for the Island.

It is thought that the Eastern end of all sub-antarctic islands will show this peculiarity, particularly with those islands in which the interior rises to any appreciable altitude. The wisdom of choosing this end of the island for the Main Base Camp lies in the fact that more observations can be made of such phenomena as Aurora, Pilot Balloon Winds, etc.

RADIOSONDE - GENERAL REMARKS:

Successful releases were obtained on every day of the 1952-53 tour, thus bringing the Island total of successful successive daily releases to more than 750; a record unequalled anywhere else in Australia, and even the more remarkable when one considers the severe conditions experienced on Heard Island, where successful releases have been obtained in winds with a mean speed exceeding 50 knots and on some occasions with soft snow underfoot up to a depth of two feet.

RADIOSONDE - RELEASE IN HIGH WINDS:

The successful release of Radiosonde Balloon and Train in high winds is dependent upon the overcoming of two main hazards, firstly the transporting of the balloon from the inside of the filling shed through the door and out clear of the shed without bursting the balloon through allowing it to come in contact with the shed, and secondly, the successful release of the balloon and train without incurring damage to the transmitter mainly caused by train striking the ground on release. The first hazard can only be overcome by practice but two main helping points should be remembered: (a) the transporting of balloon out of the shed should be done as speedily as possible,

and (b) sufficient helpers should be available to manhandle the balloon safely through the doors of the shed.

It is to be noted here that the most favourable orientation of the filling shed would be with doors facing South East. The second hazard can be successfully overcome by the use of string unwinders, and there is no doubt as to the value of these unwinders when releases are to be made in high winds.

UPPER WINDS:

All observations of Upper Winds were of the single theodolite assumed rate of ascent pilot balloon method with the exception of two SOWIN flights that were made during the year.

As low cloud coverage and height of base as well as present weather are co-related to wind stream direction it was found that high flights were being obtained with windstream in the South West quarter, and low or Norep flights with windstream in the North East quarter. As a result any straight frequency analysis of upper winds will erroneously weight those winds whose directions are in the South West quarter, and will not give representative percentages of upper winds.

It is suspected that with turbulent North West surface winds due to local topographical effects, the pilot balloon on release does not rise with anything like its assumed rate of ascent, and as a result the calculation of speed of the wind in the first 1000 feet gives velocities so high as to be incompatible with the surface wind speed showing on the Dines Anemometer. Pilot balloon flights attempted during the hours of darkness are very seldom successful due to the fact that the wind speed is usually quite high and the wind flow usually turbulent resulting in the light of the candle becoming indiscernible after a few minutes from release.

GENERAL NOTES ON FORECASTING:

Forecasts for the Station area were issued daily for a period covering 24 hours. Forecasts for periods greater than 24 hours were not prepared daily as little confidence could be placed in them, but were only given when occasion demanded, as in the case of Field trips, etc.

As the nature of the weather at Heard Island is very variable and marked by rapid changes forecasts for these regions can at the best only give generalized descriptions of expected weather conditions.

(Signed) R. BORLAND
(Weather Officer)

CLONCURRY CELEBRATES THE CORONATION

Extract from Cloncurry's monthly report for June:-

"Part of the Cloncurry Coronation celebrations consisted of a procession in which was included a combined D.C.A. and Meteorological float. A D.C.A. Commer utility was draped with various aerodrome traffic flags, and the meteorological gear displayed included a radar scanning unit, pluviograph and P.B. theodolite mounted on the tripod. A partially air-filled sonde balloon was held in an expanding mesh cover over the cab top, and the only gas-filled balloon was captive at the end of a long string attached to the P.B. tripod. Suitable printed cards were prepared by Mr. McKauge, who also rode on the float. The effort created quite a lot of interest."

(Signed) W.B. SWAN

UNUSUAL PHENOMENON OBSERVED FROM EAST SALE

In this "Flying Saucer" era there must be a certain reluctance to report on any strange sights or objects observed for fear of the resulting ridicule. However, the following correspondence is presented as a matter of interest.


1. Letter to the Director, Meteorological Branch:-

Herewith a brief account of an unusual phenomenon observed from Office. The observations occurred from approximately 0430K to 0630K on the morning of Sunday, 29th March, 1953.

About 0430K a very bright thin streak of light was noticed on the far eastern horizon and parallel to it. It was soon obscured by some 6 to 8/8 sc. which persisted throughout the hours concerned. However, another opportune break in the cloud about half an hour later revealed the light still to be present and the theodolite telescope was trained onto it. Viewed through the telescope, it appeared much brighter than the moon does and was positively dazzling. The theodolite showed the elevation to be about 0.4 to 0.5 degrees above the horizon and the direction to be 087 degrees from the northern end and 093 degrees from the southern end. The theodolite was left trained on the object and it did not appear to move in the next hour or so whilst under observation. Unfortunately, it was no longer possible to observe it after 0630K when the edge of the sun appeared over the horizon. It was observed that traces of cirrus were not illuminated by the sun until 0615K about fifteen minutes before the sun was actually sighted, traces of altocu at 0620K, and the stratocu at 0625K. An attempt was made by a navigator to calculate the height and distance of

object for the sun to be reflected from it two hours before sunrise but no finality was reached. Could reflected light from the moon - then in the western sky - have shone on high cirrus which in turn could have reflected the moon light? If so, the object was much brighter than the moon. Is reflection/refraction at the tropopause of the sun's rays possible? Many odd optical effects have been observed with surface inversions so perhaps an upper inversion could also create this optical effect.

The matter is reported as an unusual phenomenon and any comment would be appreciated.

Sketch of phenomena as observed 
very thin bright line

(Signed) ALEX. W. KEBBLEWHITE

2. Reply from the Director, Meteorological Branch:-

Your report of an unusual phenomenon observed at East Sale is interesting.

It seems probable that the phenomenon was due to atmospheric refraction.

The equation relating refractive index to meteorological elements is

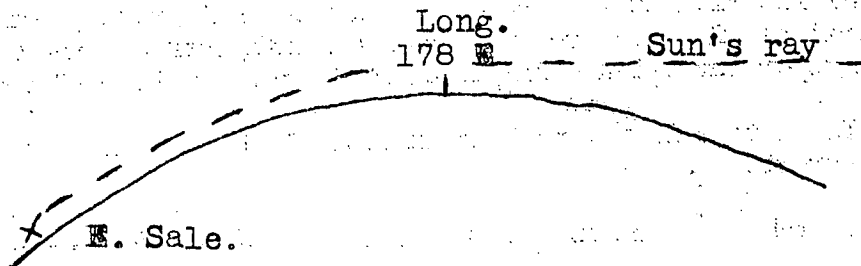
$$(n-1)10^6 = \frac{79}{T} (p - \frac{e}{7} + 4800e/T)$$

- where
- n is refractive index
 - p is atmospheric pressure in mbs
 - e is water vapour pressure in mbs.
 - T is absolute temperature

This refraction will occur when gradients of T and e occur and will be particularly marked when gradients of both elements of opposite sign occur together. Strong radiation inversions in dry air and strong subsidence inversions are therefore conducive to refraction.

On the particular occasion you describe, the bearing of the phenomenon corresponds closely with the azimuth of the sun at that time.

The altitude of the sun would be about -30.0° so that if the phenomenon was caused by refraction the path of the sun's rays from the east would be



It is interesting to note that similar phenomenon are observed with micro-wave radio and radar transmission.

(W.J.G.)

SOME METEOROLOGICAL ASPECTS OF VOLCANOES

In the New Hebrides, almost on the air route Vila to Santo, is the active volcano on Ambrym Island. Not infrequently, this emits vast quantities of dust which reduces visibility over portion of the route to a true zero.

In full action it is an impressive sight to see the mile diameter crater shooting up a thick impenetrable column of black volcanic ash, or cinders, about 1500 feet above the rim of the crater. After this stage it rolls upwards in the conventional churning pattern of a large cumulus. Normally there is an inversion about the 7000 ft. level, through which the dust seldom penetrates for more than 1000ft. but this is sufficient to spread the dust fall widely on both sides of the crater.

A visit to the crater rim whilst the volcano is in mild to moderate activity involves a seven mile walk, a 4000 ft. climb, severe thirst, and an unique experience. For several miles round the volcano, the lush, jungle-ridden New Hebrides scenery gives way to an arid rain scored ash plain. The track winds through valleys of volcanic ash, rising 100 ft. or more each side, reminiscent of Arizona cow-boy film scenery.

Lightning and thunder accompanies the activity. Vulcanologists debate whether the lightning is caused by the cb. like cloud which forms above the crater, or by the electrical potential difference between the rising ejectamata and the surrounding atmosphere. On a recent visit, the large cu. above the crater did not exceed an estimated 10-12,000 ft. yet numerous crash of thunder could be heard, the flashes remaining within the dust and seeming to go back down towards the crater. Mostly the ascending dust is moist or mixed with a quantity of steam, so physically the action is similar to that

in Cb, but the increased speed and the higher temperature of the rising particles would seem to make possible the lightening discharge when there is less vertical development than in the conventional cb. cloud.

A common model structure inside a volcano is first a layer of lava or detrius, lying in part over a compressed chamber of gas under which is normally a water lens, then below that the magma which, of course, is the main source of heat. With the volcano inactive, these are often in a delicate state of balance. A decrease in the atmospheric pressure is sometimes sufficient to bring about reactivation. For example, Ambrym is sometimes more active in the summer months, when the average atmospheric pressure is some 3 to 4 millibars lower than that for the rest of the year.

Precipitation, indirectly, also plays a part. Around the volcano the ground is very porous so that a considerable quantity of rain soaks down to the water lens, or reservoir. On the Ambrym ash plain some of this spills up quietly as a warm spring feeding a lagoon, which later drains into the sea. In dry periods the level of the reservoir falls so that with the pressure on the water surface less, it boils more actively causing geysers and intermittent activity in the volcano. This was the situation towards the end of 1952. Climatology gave the expected end of the dry season. A forecast that the activity would decrease a few weeks after this date proved correct.

So far vulcanology appears as straightforward as a first reading of the principles of forecasting make that occupation seem infallible. But, as in forecasting, it is the unrecorded immeasurable forces which soon induce a humble approach to the subject. Seismic tremors may open up passages deep in the earth allowing the intrusion of quantities of magma, which will upset the balance of forces and set off an eruption. Objective data, such as temperature, composition and quantities, and near all other factors except as an end result, are impracticable or impossible to obtain. Temperatures are often above 1000 C., and even were funds available for drilling and conventional methods of assay, the pressure at depth is so great that any pipes etc., are usually blown out, taking with them the rig and personnel, long before any satisfactory information can be obtained.

Despite these limitations, much is being learnt from a careful and world wide observation of earth tremors, the behaviour of eruptions, and an assay of ejectamata.

(Signed) W.B. ROBERTS
