

THE SUBSUN ON SATELLITE PICTURES

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ALTHOUGH most halo observations concern phenomena which appear above the horizon, it is known that there exist a large class of sub-horizon haloes. The reason that sub-horizon haloes are less frequently observed is essentially that for this the position of the observer has to be above the clouds, a condition which is relatively rarely fulfilled.

To our knowledge, up to now sub-horizon halo phenomena have been observed only from mountains or aircraft. It seems likely, however, that this kind of halo should also appear on satellite pictures of the Earth. The only difference between satellite and aircraft observations is that the distance with respect to the clouds is about two orders of magnitude higher for satellites. A halo of finite dimensions will therefore appear in a much larger area of the Earth for satellite pictures. As a consequence, specific haloes which are generated by ice crystals in a certain orientation will only be visible on satellite pictures, if this orientation exists over a large area.

The subsun, originating from a simple reflection of the sun on horizontally orientated faces of ice crystals (Visser 1960) is one of the brightest halo phenomena. Moreover, this phenomenon has a well-defined shape and is concentrated in a small solid angle. In a search for halo phenomena on satellite pictures we therefore focused our attention to this particular halo. It was found that this halo is indeed frequently observed from satellites. In Fig. 1 a typical example is given of a subsun, photographed by the ESSA-8 satellite on 27 April 1975, from a height of 1420 km above the Atlantic Ocean. Calculations show that the bright spot in Fig. 1 is situated just at the place where the solar reflection should be expected. Since it is overcast at the place where the reflection is generated, the reflection is not a 'sunlint', i.e. a trivial reflection of the sun in the ocean (Zwart 1973). From the irregular shape of the subsun it can be concluded that in this case the orientation of the generating ice crystals is not perfect.

It would be interesting to see if other sub-horizon optical phenomena are also recorded on satellite pictures. Since most of them are coloured, it can be expected that they will be most pronounced on colour pictures of the Earth.

REFERENCES

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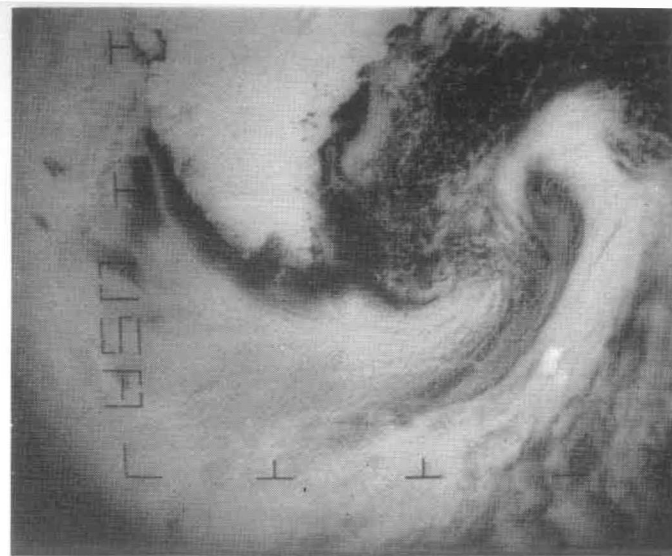


Fig. 1 The subsun in frontal clouds over the Atlantic, recorded by ESSA-8 at 1333 GMT on 27 April 1975. The location of the subsun is indicated by arrows. The continent of Greenland is visible in the upper left