occasionally in the middle stratosphere (25 km) could both be formed by the condensation of water-vapour carried downwards from the higher levels. Such a concept involving a secondary source of water-vapour in the upper atmosphere could qualitatively account for some of the new features revealed by the recent data on stratospheric humidity. Since relatively large values of humidity occur only to the north of lat. 60° and only during the sunlit period of the year, it is tempting to suggest a photochemical origin for the water-vapour in accordance with the equation:

$$OH + H \rightleftarrows H_2O$$

From available data on the spectrum of the night airglow, there is evidence for the presence of OH radical at about 70 kilometres where there is an appreciable amount of atomic hydrogen also. The dominant circulation in the upper stratosphere and the lower mesosphere during summer is a vast circumpolar anticyclone of great persistence[10]. The subsidence associated with this anticyclone might be effective in transporting the water vapour downwards from the mesosphere to the lower stratosphere.

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Barometer and Wind Fluctuations in North-West Europe, 1796–1950

BAROMETRIC series from manuscript and printed sources were recently utilized for the preparation of maps of annual anomalies. From these maps it was possible to determine the pressure at the Wash (53° N., 0½° E.) since 1706 and pressure gradients (since 1796) between positions 400 km south-south-west and north-north-east and 400 km east-south-east and west-north-west (corresponding to west and south calculated components of surface wind). In Fig. 1 the mean values for ten-year periods of pressure and pressure gradients are shown. The 'SW wind' is a measure of the closeness of the isobars directed west-south-west to east-north-east, and the 'NW wind' relates to a component of pressure gradient at right angles to this. The latter component is small. Indeed, the variation in direction from one thirty-year period to another of the prevailing wind, as shown in Fig. 1 (for example, 224°), is much smaller than has hitherto been supposed.

Wind observations of north-west Europe since 1635 were likewise combined into components, as explained in a recent issue of *Geografiska Annaler* (**44**, 303; 1962). The apparent mean wind in any decade, determined without taking velocity differences into account, was found to be directed along the isobars, on the average from west-south-west, with frequency components of the order of 18 per cent from west and 8 per cent from south. The 'true' surface wind at a typical land station comes from the south-west, not west-south-west. The vector anomalies of the wind, if one year is compared with another, were nevertheless found to follow Buys Ballot's law in the usual way, and are directed from the west-south-west when the isobaric anomaly lines lie west–east. Using empirical relationships with the wind components in percentages, it was possible to 'calibrate' the pressure gradient curve as indicated at the right-hand part of Fig. 1, and to determine the pressure-gradient fluctuations quantitatively in the seventeenth and eighteenth centuries.

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RADIATION CHEMISTRY

Radiation-induced Ionic Reactions: *Cyclo*pentadiene Polymerization

RECENT investigations[1–3] on the radiation-induced polymerization of certain monomers have provided evidence for the production of ionic as opposed to radical initiation. The polymerization of such monomers can be initiated by Friedel-Crafts catalysts, and *cyclo*pentadiene[4] falls into such a class. Pure, rigorously dried (silica-gel treated) *cyclo*pentadiene was irradiated with cobalt-60 γ radiation (dose-rate $2{\cdot}27 \times 10^{17}$ eV g^{-1} min^{-1}). At $-78{\cdot}5$° C a gel was formed after conversion of 1·6 per cent of the monomer to polymer. The results of carbon, hydrogen analysis fitted an empirical formula of C_5H_6. The gelling dose was $8{\cdot}5 \times 10^{17}$ eV g^{-1}, and the subsequent increased rate of polymer formation corresponded to the removal of $17{,}760 \pm 1{,}521$ (*S.D.*) monomer molecules per 100 eV. This was linear

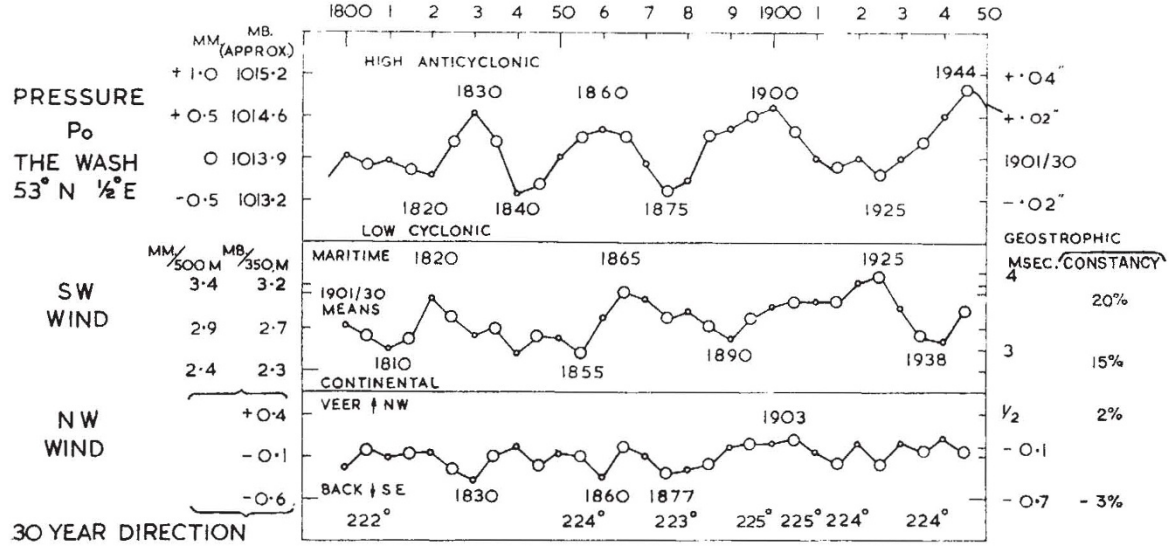

Fig. 1. Pressure and pressure gradient in north-west Europe, 1796–1950. Ten-year means at five-year intervals, commencing 1796–1805. The 'winds' are calculated from the pressure gradient between points 800 km apart. The pressure for 1951–60 is approximately 1,014·7 at the Wash. This diagram, together with another for the period before 1795, was first published in the *Annals of the New York Academy of Sciences* (**95**, Art. 1, p. 110), by the kind permission of which it is reproduced here