(So far no analysis has been made of $W24$–$B2$.) This was also evident on the 200 kc/s bandwidth output which showed changes of amplitude over periods of an hour. The effect is illustrated in Fig. 1, which is a facsimile of a section of the 200 kc/s and 3 kc/s bandwidth analogue records obtained for $W3$. In this source, for example, it is found that the +255 kc/s left-hand component is displaced 1·4″ relative to the +250 kc/s left-hand component. This displacement is thirty times greater than the upper limit of the apparent size of the components. In the case of $W49$ the two major complexes found at shorter baselines to be separated by 100 arc seconds were clearly discernible by their different fringe rates. Within complex A (R.A. = 19h 07m 50·0s, $\delta = 09°\ 01'\ 12''$, 1950·0 co-ordinates) the angular separation of the strongest spectral features was found to be about 0·1 arc seconds. The linear separation of the components in $W3$ and $W49A$ is about 0·01 pc.

From these observations a picture emerges of compact OH emission sources near HII regions with overall dimensions of about 10^{-2} pc. Within these sources narrow spectral components of characteristically high left-hand or right-hand circular polarization are emitted from smaller regions with apparent diameters of less than 10^{-3} pc. Such a source configuration would be consistent with a maser amplification process for the OH emission (see, for example, ref. 4). On the basis of a maser process the observed brightness temperature limits are equivalent to an amplification factor (In A) greater than twenty which would imply that the emission of a particular frequency component would come from a very small fraction of the volume of the OH region. A narrowing of the emission lines by a factor of more than 5·5 would result from this amplification. If the overall spread of velocity in the spectra of the sources is representative of the width of the unamplified emission, then the ratio of this spread to the width of individual lines (typically 5–40) would be the true narrowing factor. The present data are consistent with these values.

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PLANETARY SCIENCE

Recent Changes in the Magnetic Dipole Moment of the Earth

IN the course of an investigation into magnetic secular variation, a number of spherical harmonic analyses were performed on successive 5 year means of results from eighty magnetic observatories. From the first three spherical harmonic coefficients the moment of the equivalent dipole of the geomagnetic field (M) can be deduced in terms of the radius of the Earth (a) from the relation $Ma^{-3} = \{(g_1^0)^2 + (g_1^1)^2 + (h_1^1)^2\}^{\frac{1}{2}}$.

The same set of observatories was used at each epoch in order to avoid spurious effects due to different conditioning of the equations. Great care was also taken to remove discontinuities at an observatory due to changes of site or standard. In view of these precautions it is considered that the change of moment between epochs is well determined, although no special claim is made for the accuracy of the absolute value.

The results are given in Table 1.

Table 1

Epoch	Ma^{-3} γ	ΔMa^{-3} γ/yr
1942·5	31,324	
		−7 ± 1
1947·5	31,291	
		−7 ± 1
1952·5	31,257	
		−13 ± 1
1957·5	31,194	
		−17 ± 1
1962·5	31,111	

Table 2

	Epoch	Ma^{-3} γ	ΔMa^{-3} γ/yr
Nagata[1]	1922–1955	—	−12
Nagata[1]	1945–1960	—	−15
Finch and Leaton[2]	1955	31,200	—
Leaton[3]	1955	—	−11 ± 1
Nagata[1]	1955–1960	—	−17
Leaton[4]	1960	—	−12 ± 1
Nagata[1]	1958–1962	—	−16
Hurwitz *et al.*[5]	1965	30,981	—
Leaton *et al.*[6]	1965	30,987	−16 ± 2

It is of interest to compare these results with those from other sources (Table 2).

The suggestion by Procopiu[7] and others[8–10] that the dipole moment passed through a minimum some time between 1930 and 1952 has been questioned by Nagata and Rikitake[11] and by Leaton[3]. The figures in Table 1 clearly indicate that the dipole moment continues to decrease, and suggest an increasing rate of decrease. It is tempting to suggest an eventual field reversal within the next few thousand years.

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Rotational Speed of the Upper Atmosphere, from the Orbits of Satellites 1966-51*A*, *B* and *C*

THE rotational speed of the upper atmosphere at heights near that of the perigee of a satellite can in principle[1] be evaluated from the change Δi in the orbital inclination i of the satellite. If Λ denotes the ratio of the atmospheric angular velocity to the Earth's angular velocity, Δi is given[2], as a first approximation, by

$$\Delta i \simeq 0{\cdot}007\ \Lambda \sin i\ \Delta T \text{ degrees}$$

where ΔT is the change in orbital period, in minutes. In practice the change in inclination, Δi, is often too small to be accurately measurable, and the most accurate values of Λ are likely to be obtained from the orbits for which Δi is largest. We therefore seek orbits which (i) are near-polar and (ii) show a large change in orbital period.