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PARKINSON, WILFRED DUDLEY

Twentieth century scientist

Wilfred Dudley Parkinson (see Figure P44) was an internationally prominent geomagnetician of the 20th century (Barton and Banks, 2002). His origins in geomagnetism were classical, and he was active through the remarkable period that saw observing apparatus change from mechanical to modern electronic, and recording methods change from paper chart and photographic paper to electronic memory. Data analysis methods changed from graphical and hand-calculated to the full range of numerical, modeling and inversion methods, which were possible with electronic computers by the end of the century. Parkinson was a dedicated and effective teacher at the University of Tasmania, and his book *Introduction to Geomagnetism* (Parkinson, 1983) reflected the benefits of being based on an excellent lecture course.

His research contributions, together, thus very much appear as a period piece of his time. The International Geophysical Year (IGY), which spanned the 18 months from July 1, 1957 to December 31, 1958 (Bates *et al.*, 1982) promoted the observation of the geomagnetic time-varying field at an enhanced density of observatories relative to the then standard global network, and focussed attention on the spatial pattern of these time-varying fields. It was from an analysis of the fluctuating fields observed at Australian stations that Parkinson first observed the "coast effect" for which he became well known, and which he characterized by graphically constructed "Parkinson vectors" (also called "Parkinson arrows" see induction arrows).

The time of his activity, plus his natural skills, meant Parkinson led in pioneering much Australian geophysics. In pursuits promulgated by his national government employer, the Bureau of Mineral Resources, he was a pioneer in the construction of magnetic maps of the Australian continent, in developing the aeromagnetic survey method for Australia, and in instituting geomagnetic measurements in Antarctica.

However he is best known for his widely used "Parkinson arrow" contribution.

Brief biography

Parkinson was born in 1919 into a family active in geomagnetism, as his father worked for the Carnegie Institution of Washington (CIW), and was assistant observer at the Watheroo Observatory in Western Australia. Parkinson thus traveled extensively with his family in connection with geomagnetic activities. He received his first degree (BSc hons in mathematics) from the University of Western Australia, and then following service with the CIW at Huancayo Observatory in Peru he studied for his PhD at Johns Hopkins University in the United States of America. After some time in USA, he returned to Australia in 1954 to join the then Bureau of Mineral Resources. In 1967 he joined the Department of Geology at the University of Tasmania. He was promoted to Reader in Geophysics and spent the rest of his career at that university, traveling internationally to other places active in geomagnetism during his sabbatical leave periods.

Hobart and environs had been significant in the history of geomagnetism and Parkinson played an important role both in the celebration of the bicentenary of the year 1792 D'Entrecasteaux expedition (Lilley and Day, 1993), and in ensuring appropriate recognition of the site and history of the 1840 Rossbank Magnetic Observatory.

As a leader in Australian geomagnetism, he was an important figure at four Australian Geomagnetic Workshops which were convened in Canberra by C.E. Barton and F.E.M. Lilley in the years 1985, 1987, 1993, and 2000. It was appropriate that he was the invited guest speaker at the last workshop he was to attend, in 2000—the year before his death in 2001.

Dudley Parkinson, as he was widely known, was survived by his wife Mary, two sons Charles and Richard, and four grandchildren.

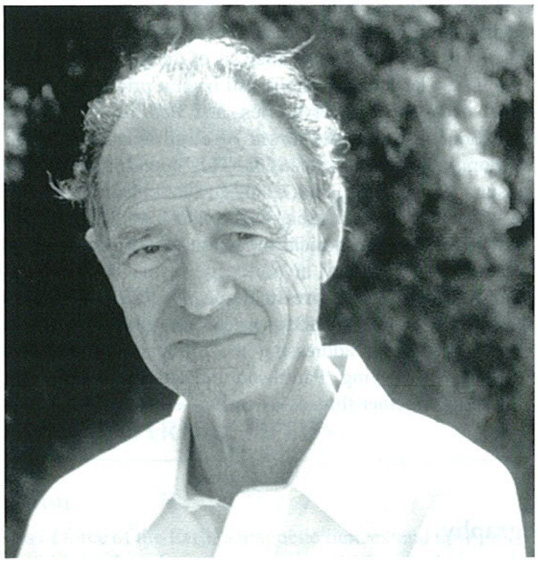

Figure P44 Wilfred Dudley Parkinson 1919–2001 (photo taken 1990, by F.E.M. Lilley).

Recognition of the coast effect, Parkinson arrows, and crustal conductivity structure

From his familiarity with magnetic observatory data, in the 1950s Parkinson had noticed that commonly for coastal observatories the vertical component of the fluctuating field had an evident correlation, best seen during magnetic storm activity, with the onshore horizontal component. Parkinson realized that from some starting point, the vectors of magnetic field change, reckoned at intervals of say half-an-hour, tended to lie on a plane in space. Parkinson called this plane the "preferred plane."

In investigating the phenomenon, Parkinson developed a graphical method for determining the plane at a particular observatory. To characterize the effect he plotted the horizontal projection of the (unit-length) downwards normal to the plane on a map, at the observatory site. The plane became known as the "Parkinson plane," and the horizontal projection of the downwards normal became known as the "Parkinson vector."

Subsequently, usage of the term Parkinson arrows was adopted to avoid any implication that Parkinson vectors of structures considered in isolation could necessarily be added vectorially to produce the effect of the structures in combination. Later Parkinson supported use of the term "Induction arrow", out of respect for others who had developed similar ideas.

Remote from a coastline, such arrows generally point to the high conductivity side of any conductivity structure present in the regional geology. (Note that in some conventions, such as that attributed to Wiese, the arrows are plotted in the opposite direction.) Plotted for an array of stations, the arrows demonstrated that electrical conductivity contrasts within continents, as well as at continent-ocean boundaries, could thus be mapped. The realization that the phenomenon was controlled by Earth electrical conductivity structure guided much of Parkinson's research for the rest of his career.

Chronicle of publications

Parkinson's published work provides a representative chronicle in geomagnetic research for the later half of the 20th century. Thus Parkinson (1959) describes recognition of the "preferred plane," and Parkinson (1962) introduces the Parkinson vector technique. In Parkinson (1964) a laboratory model comprising copper sheeting for the seawater of the world's oceans is described—Parkinson's "terrella"—in an attempt to test whether induction in the seawater alone is sufficient to account for the coast effect. The coast effect is reviewed further in Parkinson and Jones (1979).

Parkinson (1971) addresses an analysis of the Sq variations recorded during the IGY. These observations had been a prime objective of the IGY global network of observatories, and Parkinson's analysis was one of the first to exploit the power of electronic computers, which were developing rapidly in the 1960s. This thread is picked up again in Parkinson (1977), Parkinson (1980) and Parkinson (1988).

Dosso *et al.* (1985), Parkinson *et al.* (1988), and Parkinson (1989) see attention given again to local induction, and the discovery of the Tamar conductivity anomaly in northeast Tasmania. The Australian island State proved a productive field area for Parkinson and his students, based in Hobart. In Parkinson (1999) several earlier pursuits are brought together, in addressing the influence of time-variations on aeromagnetic surveying. Parkinson and Hutton (1989) is a major review, bringing together threads of earlier research contributions.

F.E.M. Lilley

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Cross-references

Coast Effect of Induced Currents
Electromagnetic Induction (EM)
Geomagnetic Deep Sounding

PEREGRINUS, PETRUS (FLOURISHED 1269)

Virtually nothing is known of the life or wider circumstances of the Frenchman Peter, Pierre, or Petrus Peregrinus, beyond what he wrote in his *Epistola Petri Peregrini de Maricourt*, from the camp of the army besieging Lucera in Apulia, Italy, and dated August 8, 1269. Most probably, he was a native of Méharicourt, Picardy, in north-east France, and from his fascination with all kinds of machines and self-acting devices, he could have been a military engineer. His honorific title "Peregrinus," no doubt stemming from the Latin *peregrinator*, or wanderer, could have derived from his having been on pilgrimage or Crusade, though there is no evidence to back the legend that he was a monk or priest. Whether he was the same "Master Peter" referred to as a mathematician of brilliance by his English contemporary Friar Roger Bacon is uncertain but possible.

Peter's historical importance, however, derives from his being the first significant author on magnetism. His *Epistola* of 1269 was widely circulated across Europe in manuscript form, and in the 16th century