



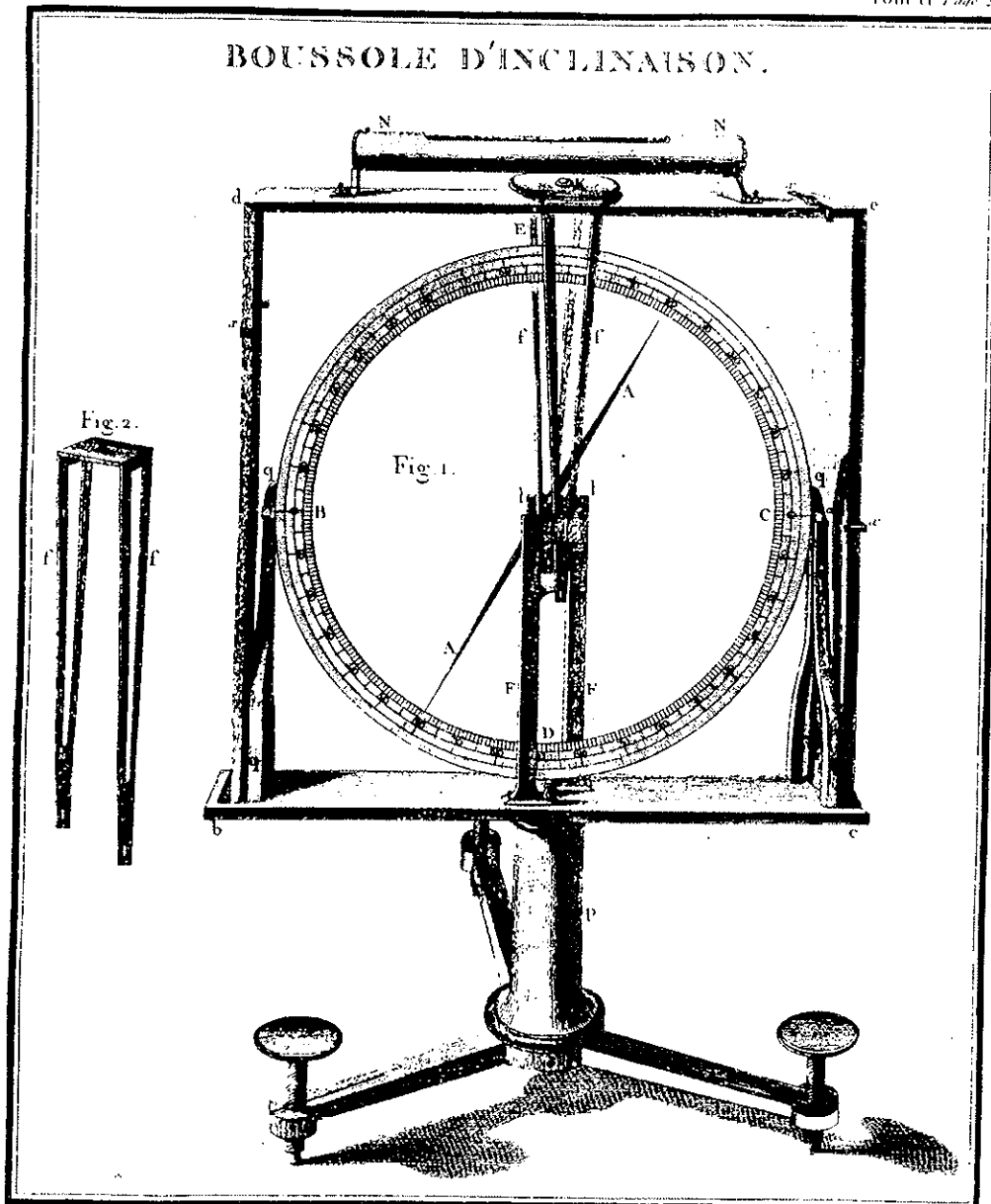
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GEOPHYSICS DOWN UNDER

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D'ENTRECASTEAUX IN VAN DIEMEN'S LAND, 1792; A BICENTENARY IN GEOMAGNETISM

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INTRODUCTION

The paper on the history of Australian geophysics by Day (1966) draws attention to the discussion by Sabine (1838) of the geomagnetic measurements, especially of intensity, made by the 1791-1793 expedition of D'Entrecasteaux. These geomagnetic measurements are reported in the comprehensive account of the expedition by De Rossel (1808). The first volume of De Rossel is a journal of the expedition, and the second volume is a compilation of the observations and results. There is also an accompanying atlas of maps in folio size (Beautemps-Beaupré, 1807).

LA PÉROUSE

The D'Entrecasteaux expedition was sent in search of the missing explorer La Pérouse. The instructions of the La Pérouse expedition had also included making magnetic intensity measurements, so that La Pérouse may well have done so, and thus preceded D'Entrecasteaux. However there seem to be no such records from the La Pérouse expedition, which was sometime later, in 1827, determined by a sea-faring adventurer Peter Dillon to have been shipwrecked on the island Vanikoro, east of the Solomon Is. (Wilson, 1991). La Pérouse had last been seen in Botany Bay, New South Wales, in 1788, by the British just arrived with the First Fleet. Some information on the latter part of his voyage may have been returned to Europe through this contact. Earlier, after exploring widely in the Pacific, La Pérouse had sent copies of his journals back to France by special envoy from Kamchatka (Marchant, 1967).

D'ENTRECASTEAUX AND DE ROSSEL

The procedure for measuring magnetic intensity at that time was new, and comprised timing the period of oscillation, in the vertical plane, of a dip needle. The magnetic intensity is then inversely

proportional to the square of the period of oscillation. Relative intensities were measured by oscillating the same dip needle at various sites.

Over the course of three years, D'Entrecasteaux's expedition made six measurements of relative magnetic intensity - at Brést, Teneriffe, Van Diemen's Land (Tasmania), Amboyna, Van Diemen's Land (repeat station), and Surabaya (Java) - summarized in Table I. Sabine combines the values with measurements using other dip needles, to compile a global data set. He emphasizes the significance of the repeat measurements at Recherche Bay, noting that these show the stability with time of the equipment, and thus establish (for the first time) the increase of magnetic intensity with increasing dip angle.

The dip needle used by the expedition is described in detail by De Rossel (1808), and the figure given there (page 20, vol. 2) is reproduced here as the cover picture. Sabine describes the needle as one which would oscillate for typically 3 minutes: that is, some 100 oscillations - each of period 2 s. --

Quite apart from the geomagnetic data and descriptions of procedures, the De Rossel (1808) journal makes fascinating reading, especially in conjunction with the atlas of maps. The ships' tracks into Recherche Bay are plotted in detail, showing laborious tacking into a headwind from the northwest when arriving in 1792. The two ships, *La Recherche* and *L'Espérance*, then moored near each other in the northern part of the bay, called "Port du Nord" by D'Entrecasteaux and now known, rather less romantically, as Pigsties Bay. The charts show the "observatoire" of 1792 clearly marked on what is now Bennetts Point, on the eastern side of the entrance to "Port du Nord". Further into the bay the sailors planted a garden, also marked on the chart.

Upon returning in 1793, the two ships moored in the southern part of Recherche Bay, "Port du Sud" or Rocky Bay as it is now known. The chart shows their observatory on what is now Snake Point; thus Table I gives slightly different co-ordinates for the two Recherche Bay sites.

Upon return the sailors were disappointed to find that nothing had flourished in the garden. They appeared to experience bush flies for the first time, and (hardened salts that they were) this nuisance tested them severely.

VON HUMBOLDT

The discovery that magnetic intensity increases away from the equator is commonly credited (as by Chapman, 1967) to Von Humboldt, who made measurements in South America from 1798-1803. However, even in 1838, Sabine, as quoted in Day (1991), was at pains to emphasize that De Rossel's measurements were earlier. Evidently priority in publication counted then as now! Malin and Barraclough (1991) note that Humboldt was

scrupulous in giving due recognition to earlier observers of this phenomenon, who had not been able to publish their results.

THE BICENTENARY

The day of 11 May, 1992, the bicentenary of De Rossel's first measurement at Recherche Bay, will thus mark a significant bicentenary in geomagnetism for Australia. Such first steps to establish the basic characteristics of a dipole field may be remembered by a subject which now maps magnetic intensity by aeroplane over continents to give geologic information, by ship over oceans (where D'Entrecasteaux sailed unknowingly) to map the magnetic stripes of plate tectonics, and by satellite to map the whole globe. Studies of rock magnetisation have shown that continents have moved and that Earth's magnetic field has reversed, and the structure, causes and time variations of the field are studied from Earth's core out to the limits of the magnetosphere.

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Table I. Summary of De Rossel's (1808) Intensity measurements, in terms of the "time of vibration" (period of oscillation) of the dip needle in seconds (Sabine, 1838).

STATION	DATE	LAT.	LONG.	MAGNETIC DIP	TIME OF VIBRATION
Brest	20 Sept. 1791	48°24'N	355°34'	71°30'N	2.02"
Teneriffe	21 Oct. 1791	28°28'N	343°42'	62°25'N	2.081
Van Diemen's Land	11 May 1792	43°32'S	146°57'	70°50'S	1.869
Amboyna	9 Oct. 1792	3°42'S	128°08'	20°37'S	2.403
Van Diemen's Land	7 Feb. 1793	43°34'S	146°57'	72°22'S	1.850
Surabaya	9 Feb. May 1794	7°14'S	112°42'	25°20'S	2.429



Dr Dudley Parkinson on the southern shores of Recherche Bay, close to the site of the second measurement of magnetic intensity made by the Dentrecasteaux expedition.