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International Geomagnetic Reference Field 1975†

IAGA Division I Study Group, Geomagnetic Reference Fields

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An international geomagneticreference field (IGRF 1975) has been recommended by a study group of Division I of the International Association of Geomagnetism and Aeronomy (IAGA) and adopted on 4 September 1975 by the IAGA at its General Assembly at Grenoble. The reference field is given in the form of eighty main field coefficients and eighty secular variation coefficients, up to the eighth degree and order, of a spherical harmonic expansion. The coefficients are Schmidt quasi-normalized (CHAPMAN and BARTELS, 1940). For values on the Earth's surface, the international ellipsoid is used: equatorial radius 6378.160 km and flattening 1/298.25 (TRANSACTIONS OF THE INTERNATIONAL ASTRONOMICAL UNION, 1966). IGRF coefficients refer to a radius of 6371.2 km. Table 1 shows the IGRF 1975 coefficients, which apply to the period 1975.0 to 1980.0. At the epoch 1975.0 the main field coefficients are identical to those derived from IGRF 1965.0 for the same epoch (IAGA COMMISSION 2 WORKING GROUP 4, 1969).

The secular variation coefficients for 1975 have been newly derived to give a good estimate of the true rate of secular variation at epoch 1975.0. IGRF 1965.0 should be used for the period 1955.0 to 1975.0. For the period near, but preceding 1955.0, the 1945.0 field of VESTINE *et al.* (1947) is suggested.

The reference field is not intended as a source of compass information for nautical and aeronautical charts. A detailed explanation of the IGRF including the background of its adoption has been given in an article in World Magnetic Survey (ZMUDA, 1971). It should be noted that P in equation (6) on page 188 should read $P_n^{\frac{1}{2}}$.

Fortran programs to compute field values from IGRF are obtainable from the US National Space Science Data Centre, NASA Goddard Space Flight Center, Greenbelt, Maryland 20771 USA; from WDDC C1, Institute of Geological Sciences, Herstmonceux Castle, Hailsham, Sussex, BN27 1RP, UK; and from WDC A Solar Terrestrial Physics Environmental Data Service, Boulder, Colorado 80302, USA.

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Table 1. IGRF 1975 Coefficients.

		Main field, nT		Secular change, nT/year	
n	m	g	h	$\dot{g}$	$\dot{h}$
1	0	−30186		25.6	
1	1	−2036	5735	10.0	−10.2
2	0	−1898		−24.9	
2	1	2997	−2124	0.7	−3.0
2	2	1551	−37	4.3	−18.9
3	0	1299		−3.8	
3	1	−2144	−361	−10.4	6.9
3	2	1296	249	−4.1	2.5
3	3	805	−253	−4.2	−5.0
4	0	951		−0.2	
4	1	807	148	−2.0	5.0
4	2	462	−264	−3.9	0.8
4	3	−393	37	−2.1	1.7
4	4	235	−307	−3.1	−1.0
5	0	−204		0.3	
5	1	368	39	−0.7	1.2
5	2	275	142	1.1	2.3
5	3	−20	−147	−1.6	−2.0
5	4	−161	−99	−0.5	1.3
5	5	−38	74	1.0	1.1
6	0	46		0.2	
6	1	57	−23	0.5	−0.5
6	2	15	102	2.0	−0.1
6	3	−210	88	2.8	−0.2
6	4	−1	−43	0.0	−1.3
6	5	−8	−9	0.9	0.7
6	6	−114	−4	−0.1	1.7
7	0	66		0.0	
7	1	−57	−68	0.0	−1.4
7	2	−7	−24	0.0	−0.1
7	3	7	−4	0.6	0.3
7	4	−22	11	0.9	0.3
7	5	−9	27	0.3	−0.7
7	6	11	−17	0.3	0.1
7	7	−8	−14	−0.5	0.8
8	0	11		0.2	
8	1	13	4	0.3	−0.2
8	2	3	−15	0.0	−0.4
8	3	−12	2	0.2	−0.2
8	4	−4	−19	−0.4	−0.3
8	5	6	1	−0.3	0.4
8	6	−2	18	0.6	−0.3
8	7	9	−6	−0.3	−0.6
8	8	1	−19	−0.1	0.3

(Chairman), A.V. Cox, V.I. Kolesova, E.I. Loomer, S.R.C. Malin, N. Peddie, A.N. Pushkov, H.A. Roeser, P.T. Taylor, T. Yukutake, and A.J. Zmuda. The Group was assisted by the following consultants: L.R. Alldredge, D.R. Barraclough, E.C. Bullard, E. Dawson, E.B. Fabiano, P. Hood, R. Regan and P. H. Serson. J.C. Cain was Chairman of IAGA Division I.

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