

Langel, R. A. (1937-2000)

NASA (U.S.) scientist who served as the Project Scientist for the Magsat mission. Trained as an applied mathematician and physicist, Langel was born in Pittsburgh, Pennsylvania. He was a strong advocate of high-accuracy vector magnetic measurements from satellite. These measurements were used to demonstrate the break in the power spectra at about spherical harmonic degree 13 that represents the transition from core-dominated processes to lithospheric-dominated processes (Figure 1 below and Langel and Estes, 1982). Tantalizing suggestions of such a break had previously been reported from total field intensity measurements acquired on an around-the-world magnetic profile (Allredge et al., 1963). Langel also made use of the high-accuracy vector measurements, and magnetic observatory measurements, for the coestimation of internal (core and lithosphere), external (ionosphere and magnetosphere), and induced magnetic fields. These comprehensive models of the geomagnetic field were developed in collaboration with T. Sabaka (NASA) and N. Olsen (Denmark). Earlier workers had relied on a sequential approach, beginning with the largest (core) fields. Langel also pioneered mathematical techniques for the merging of a priori long-wavelength lithospheric magnetic field information with shorter wavelength observations (Figure 1 below and Purucker et al., 1998) using inverse techniques. This is necessary because the longest-wavelength lithospheric magnetic fields are inaccessible to direct observation as they overlap with the much-larger magnetic fields originating in the earth's outer core. Significant earlier developments with forward models came from Cohen (1989) and Hahn et al. (1984). Langel authored or coauthored in excess of 94 peer-reviewed publications, and helped train a generation of geomagnetists by virtue of his work on Magsat and his teaching at Purdue University (U.S.) and Copenhagen University (Denmark).

Bob was devoted to his family and church. His religiosity was well known amongst his colleagues, and he undertook missionary work, lead bible study groups, and worked with teenagers.

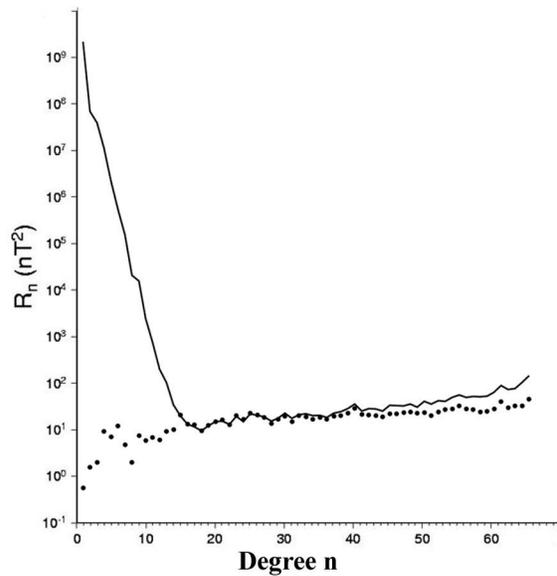


Figure 1. Comparison of the Lowes-Mauersberger spectra at the Earth's surface for a recent Comprehensive Model (line) of the core and lithospheric fields by Sabaka et al. (2004) and a lithospheric field model (symbols) by Fox Maule et al. (2005). R_n is the mean square amplitude of the magnetic field over a sphere produced by harmonics of degree n .

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Cross References

Magsat, Spherical Harmonics, IAGA