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Jensen D C & Cain J C. An interim geomagnetic field.
J. Geophys. Res. **67**:3568-9, 1962.
[Dikewood Corporation, Albuquerque, NM and Goddard Space Flight Center, NASA, Greenbelt, MD]

This paper was the first presentation of results from the direct analysis of recent magnetic survey data using modern numerical analysis on a high-speed computer. The results were presented as a set of spherical harmonic coefficients to degree and order six, epoch 1960. [The *SCI*® indicates that this paper has been cited over 150 times since 1962.]

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"The status of the 'article,' actually only an abstract, as a 'Citation Classic' is probably one of the more incongruous events in the history of science. Its popularity resulted from the sudden scientific need for an accurate model of the main magnetic field to organize the newly obtained data on particles trapped in the magnetosphere. It happened to appear at the appropriate moment (spring 1962 meeting of the American Geophysical Union), so the set of spherical harmonic coefficients given was incorporated into the many different computer codes used for these studies.

"Part of the interest developed from the impetus given US science by the successful launch of the first artificial satellite by the USSR. The subsequent activities led to the US moon landing program, which required a study of the radiation environment near the earth, and bilateral cooperation in space with the Russians which included a joint survey of the geomagnetic field by satellite.

"On the military side there were also keen interests in knowing the exact magnetic field for a number of uses: (1) Prior to the development of inertial guidance systems, schemes were devised to guide ICBM's by using the geomagnetic field, (2) satellite radiation monitors of atmospheric nuclear tests depended on having an accurate coordinate system against which to compare their data, and (3) antisubmarine detectors using newly developed alkali vapor magnetometers were used to look for unmapped magnetic 'anomalies' against the known main field background.

"Our work was a followup of the Vanguard 3 satellite magnetic field experiment that took place in 1959 in which we had to develop procedures for analyzing such data, and was in preparation for the magnetic field measurements planned for the Orbiting Geophysical Observatories (OGO) to be launched during the International Quiet Sun Year (IQSY) as part of both the bilateral agreements and the World Magnetic Survey being sponsored by the International Association of Geomagnetism and Aeronomy. One reason for the acceptance of the 'JensenCain' model was that we devised a simple procedure to make direct leasesquares fit to all available magnetic survey data using newly available computers (IBM 7094). These techniques allowed incorporating into the analysis the total field data that were being accrued from the newly developed proton magnetometers, and from measurements of field directions. The total field surveys were being carried out by aircraft and ships mainly for geological purposes spurred by the revolutionary 'new' ideas of seafloor spreading and continental drift now known as 'plate tectonics.' Previous workers in geomagnetism had been forced to adapt analysis techniques from the 19th century to earlier and more limited computers, and were able to utilize data only where field components were given. The use of highspeed computers also allowed for making corrections for the Earth's true shape in place of having to assume sphericity.

"The results of our computation were somewhat more accurate than any previously obtained, and were certainly satisfactory for the many applications even though better models were later produced. At the time we were somewhat timid about the results and even omitted printing the computed secular change coefficients that were later seen to be valid and would have improved the utility of the model

"As in many other fields of science, this particular result was not the objective of the work, only a byproduct. We were interested only in developing the models as a tool, so that when the data from the OGO became available, we could investigate the observed field variations caused by electrical currents above the Earth."