Integration of Paleointensity Data

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The best approach to assess the geomagnetic origin of paleointensity indicators is to compare signals obtained by different materials and different techniques. Basically three kinds of information can be obtained using either magnetization of sediments and lava flows or cosmonuclide production. It is very delicate to compare directly individual records of relative and absolute paleointensity. Coherent results between these two indicators are obtained by calculating time-averaged field estimates within time windows that are long enough to eliminate the short-term components of the non-dipole field (thus restraining the analysis to the axial dipole field). This has been done with great success for the past 50 kyrs. Beyond this period the time resolution of the volcanics decreases but the variations displayed by stacked curves of relative paleointensity are in good agreement with global stacked records of 10Be deposition or with the chlorine-36 GRIP record. Differences between the curves are mostly caused by inaccuracies in time scales or limits in resolution. There is still some apparent compatibility between volcanics and sediments for the past 4 Ma but unfortunately no direct way to test the detailed pattern of the variations seen in relative paleointensity. Interestingly all records of absolute paleointensity obtained from sequences of superimposed lava flows indicate aysmmetrical field intensity across reversals similarly to the sedimentary signal. Finally information about field intensity for older periods has only be obtained from volcanics. Unfortunately, the current resolution does not allow to discern significant changes over distinc periods and this is actually the origin of controversy about the existence of the dipole low. However the accumulation of recent data older than 0.5 Ga made it possible to scrutinize the evolution of the time averaged field strength over periods of several hundreds of million years. The most surprising observation is the emergence of an apparent long-term trend between the low Precambrian field estimates and the high present field intensity.

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Long-term Phanerozoic Octupole Fields