GP24A-01 - Observing, Understanding and Predicting the Earth's Magnetic Field: Successes and Challenges (Invited)

Tuesday, 10 December 2019

17:00 - 17:50

Moscone South - 201-202, L2

Abstract

Since the pioneering years of Sir Edward C. Bullard, when it was first understood that only a self-sustaining dynamo within the Earth's liquid core could possibly produce the Earth's main magnetic field, remarkable progress has been made in our understanding of the way this dynamo, now known as the geodynamo, likely operates. Vast efforts have been made to collect paleomagnetic and archeomagnetic records, ground-based measurements and data acquired using ships and dedicated satellite missions. The way the field behaves on long, medium and even very short terms is now better reconstructed and documented, providing invaluable information, also very useful in the broader context of Earth's global dynamics. Progress in computational power and numerical methods have also independently led to the possibility of numerically simulating self-sustaining dynamos, some of which now display remarkable Earth-like behaviours. More recently, both lines of efforts converged and led to the possibility of using data assimilation approaches, opening the path to a deeper understanding of the observed field behaviour and of possibly predicting its future behaviour, a subject of much interest for many applications in our more and more technologically dependent society. In this review talk, I will illustrate some of the successes achieved so far in all these areas, discuss some of their current limitations, and highlight the multiple challenges that remain ahead of us to make further progress and even better observe, reconstruct, understand and predict the Earth's magnetic field.

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