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What does Earth's electromagnetic field from ground and space measurements tell us about conductivity of the mantle?

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This contribution presents an overview of new models of Earth's mantle conductivity that have been derived using new methodologies and data from magnetic observatories and satellite missions such as CHAMP and Swarm. The electrical conductivity of the mantle provides a wealth of information on composition and temperature of the mantle material at depths. Lateral and vertical variations of this physical property allow us to constrain rheological and dynamic states of the tectonic processes in the subsurface. Electromagnetic (EM) induction methods is the only tool that can be used to study electrical conductivity at depth. They exploit natural electromagnetic field variations to derive frequency-dependent responses that are used to conduct Earth sounding. These variations originate from electric current systems in magnetosphere, ionosphere and even oceans. Over the last 17 years, almost continuous operation of low-orbit satellites measuring Earth's magnetic field, installation of new magnetic observatories in remote locations as well as substantial improvements in processing and modeling have enabled us to study mantle electrical conductivity using a variety of EM methods either globally or/and at different locations on Earth.