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Advances in external source model assumptions for satellite induction studies

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Electromagnetic induction studies with satellite magnetic data may ultimately provide important new constraints on mantle conductivity. However, a better understanding of magnetospheric and ionospheric sources will be required before these studies reach their full potential. As recent results on induction demonstrate, interpretation of data under erroneous source assumptions can lead to substantial biases. Geodynamically significant variations in mantle conductivity will result in relatively subtle changes in induction transfer functions, so even small biases have the potential to be very misleading. For instance, most induction studies to date have assumed that long period external magnetic variations are due to a symmetric magnetospheric ring current. However, recently has clear evidence been presented for asymmetry of the ring current at all activity levels. Additionally, it has been shown that field-aligned currents connected to the polar regions contribute significantly to low- and mid-latitude magnetic activity, through a long-distance effect. As satellite induction studies become more ambitious (e.g. SWARM mission) and three dimensional Earth models are considered the issue of external source model assumptions will become even more important. Advances on this topic will be presented.