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Electromagnetic imaging with an arbitrarily oriented magnetic dipole

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We present the theoretical background for the geophysical EM analysis with arbitrarily oriented magnetic dipoles. The first application of such a development is that we would now be able to correct the data when they are not acquired in accordance to the actual interpretation methods. In order to illustrate this case, we study the case of airborne TEM measurements over an inclined ground. This context can be encountered if the measurements are made in mountain area. We show in particular that transient central loop helicopter borne magnetic data should be corrected by a factor proportional to the angle of the slope under the system.
In addition, we studied the sensitivity function of a grounded multi-angle frequency domain system. Our development leads to a general Jacobian kernel that could be used for all the induction number and all the position/orientation of both transmitter and receiver in the air layer. Indeed, if one could design a system controlling the angles of Tx and Rx, the present development would allow to interpret such a data set and enhance the ground analysis, especially in order to constrain the 3D anisotropic inverse problem.