Large-scale 3D Inversion of Helicopter Electromagnetic Surveys for Oil Sands Exploration near Fort McMurray, Alberta, Canada

Leif H. Cox[1], Glenn A. Wilson[1], Michael S. Zhdanov[1], Jonathan Rudd[2], and John Wilson[2]
[1]*Technolmaging, Salt Lake City, Utah, USA*
[2]*Aeroquest, Mississauga, Ontario, Canada*

Abstract

Helicopter time-domain electromagnetic (HTEM) systems have dominated the airborne electromagnetic (AEM) industry for mineral exploration and environmental studies over the past decade. This is, in large part, a result of the high spatial resolution, excellent depth of investigation, and operational versatility. For oil exploration and related environmental due diligence near Fort McMurray, Alberta, recent interest in HTEM has been driven by the requirement for a cost-effective method for characterizing surface mineable oil sands and shallow steam-assisted gravity drainage (SAGD) prospects. The primary advantage of HTEM is that high-resolution data can be easily and safely acquired over large areas with zero surface disturbances at a fraction of the cost of seismic reflection. Moreover, HTEM data can now be interpreted with full 3D inversion, obviating prior reliance on various 1D methods. In this paper, we present a case study for the 3D inversion of HTEM data for oil sands exploration near Fort McMurray.