

Magnetic surveying with UAV to fill the gap between ground and airborne magnetic surveys

Pauline Le Maire¹, Guillaume Martelet², Julie Billy², Nicolas Bernon², Sébastien Nuns¹ and Denis Thieblemont²

¹ Cardem-pyro, Pôle industriel du Malambas, 3 rue de la Darse, 57280 Hauconcourt, France

² BRGM-French Geological Survey, Orléans, France

Abstract

The magnetic method is used for imaging magnetization contrasts (from centimetric to kilometric scales. In order to properly characterize these contrasts, it is necessary to conduct surveys with sufficient resolution (spacing between profile and distance between the source and the sensor). Ground prospecting is often hindered in presence of vegetation, swampy areas, steep slopes, houses, fences, etc. Aeromagnetic campaigns cannot be performed at a too low altitude for safety reasons and, in some cases, have insufficient resolution to study targeted structures for reservoir or mining exploration, such as local faults, folds and lithological variations. Magnetic measurements with an unmanned aerial vehicle (UAV) are a good alternative for filling the gap between ground and airborne magnetic surveying. In this paper, we present solutions of magnetic measurement with fluxgate magnetometers fitted on rotary-wing UAV. Three scales and objectives are addressed, one concerning geological application at semi-regional scale in the French Alps. The second operated at 7 m AGL on a 8 ha littoral area, targets building remains of the Atlantic Wall in the dunes. The third one is a very high resolution multi-magnetic survey investigating UXO risk.