

**APPLICATION OF AIRBORNE ELECTROMAGNETICS FOR  
HYDROGEOLOGICAL MODELING BELOW INTERNAL SURFACE WATERS.**

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Airborne ElectroMagnetics (AEM) is been used more and more often has a great potential in groundwater applications by geological surveys worldwide. However, its full potential over surface waters has not been fully explored yet, with the most documented stream of publications describing the use of AEM over surface water mainly to recovery bathymetric data rather than information about groundwater and its interaction with surface water. We believe AEM can also greatly improve the data quality and coverage in tidal and coastal areas, together with lagoons, esturaries, and river deltas while cutting significantly the acquisition costs. Integrated with ancillary information, it can provide a very flexible and powerful tool for the management of these areas.

Here we present results from AEM surveys over the Venice lagoon in Italy and over the Murray river in Australia, flown respectively with SkyTEM and RESOLVE, touching on the main technical aspects of the data processing and modeling when applied over surface water.

The Venice lagoon dataset shows interesting paleostructures in the sediments, large fresh water aquifers, and delineates the interface between different geological units with different permeabilities. The comparison with sub bottom profiling (seismic) data is also very encouraging, in the sense that technique measuring different physical parameters, from different platforms, produce comparable and complementary results. Incorporating

prior information from, e.g., bathymetry data in the inversion can help resolving otherwise poorly resolved model parameters.

In the Murray river case, the AEM shows very clearly the interaction between surface and groundwater, the areas of recharge and discharge. This information is extremely valuable when managing the river and riverine system in a broader sense.