



The ARCH Project: The holy grail of magnetosphere-ionosphere physics

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The ARCH project addresses a science need of the magnetosphere-ionosphere-atmosphere communities, the complete electromagnetic solution of the auroral ionosphere. The solutions are based on AMPERE, SuperMAG, and SuperDARN gridded distributions. We have developed a set of algorithms that ingest all the high-latitude electrodynamic related data available. By applying first principle physics constraints we produce a set of self-consistent output state variables that completely characterize the high-latitude polar electrodynamic environment on a high spatial and temporal resolution grid. The solution includes: Hall and Pedersen current intensities, Poynting flux, Joule heating, Hall and Pedersen conductances, electron energy flux and characteristics energy. We present the overarching framework and show examples of why this is the holy grail for magnetospheric-ionospheric coupling.