AARHUSINV
INVERSION CODE

AGS Aarhus GeoSoftware

OVERVIEW

AarhusInv is a high performance modeling and inversion code supporting a variety of geophysical data types, configurations, and source-receiver types. It provides efficient and high precision modelling and inversion of any airborne EM configuration and ground based TEM, GCM, Resistivity/IP, MRS and time domain IP configurations.

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Inversion

AarhusInv generally uses a local 1D model description. The models are laterally and spatially constrained forming pseudo 2D and 3D model spaces. The inversion code is designed to handle data from very big airborne EM surveys and is fully parallelized for use with multiple CPU's. Besides inversion models parameters such as resistivity, chargeability, Tau and C, AarhusInv also calculates a data residual and a depth of investigation value (DOI) and for each inversion model. The inversion setups are:

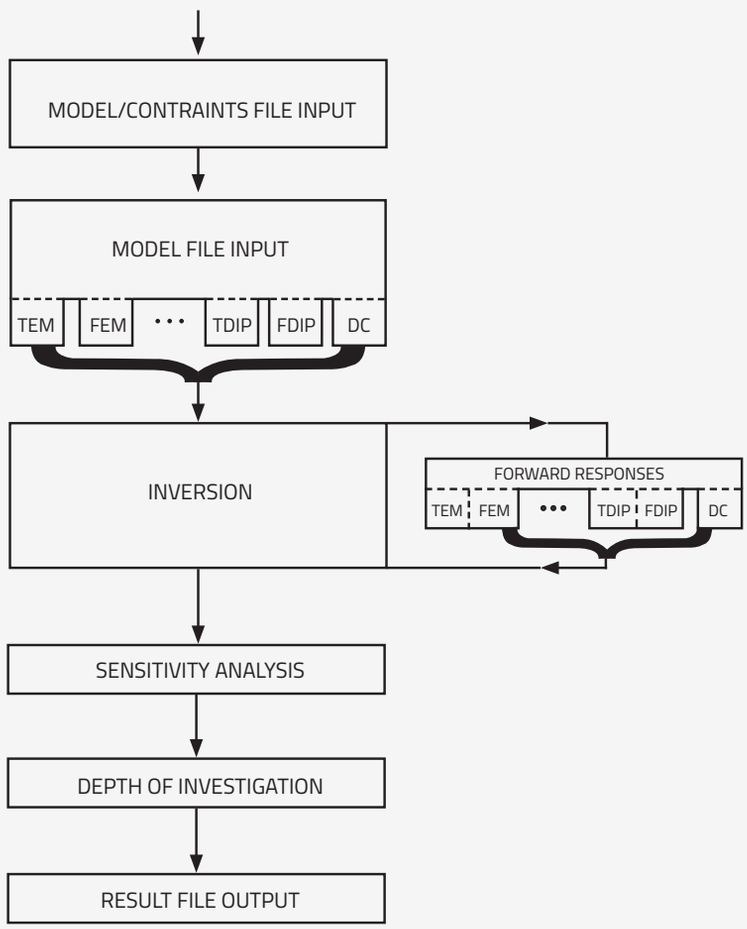
- LCI setup: The models are laterally constrained along the flight lines forming a 2D model space
- SCI setup: The models are laterally constrained along the flight lines and across the flight lines, resulting in a 3D model space
- Voxel setup: The resistivity model is defined in a regualr 3D grid decoupled from the data positions
- For resistivity and IP, a full 1D and 2D Integrated IP, Cole-Cole, Maximum Phase Angle or Constant Phase Angle model parameterization is used

The inversion is done iteratively and supports:

- Smooth models: The resistivity model is discretized using several layers (~10-40) with fixed layer boundaries. The L2 regularization penalizes vertical changes in the inversion parameters resulting in a vertical smooth model
- Blocky models: The resistivity model is discretized using several layers (~10-40) with fixed layer boundaries. The L1 regularization penalizes vertical changes in the inverison parameteres, resulting in a vertical smooth model, but highlights the big changes as a layered model .
- Sharp models: The resistivity model is discretized using several layers (~10-40) with fixed layer boundaries. The regularization penalizes the number of vertical resistivity transitions of a certain size, resulting in resistivity models with relatively sharp vertical resistivity transtions.
- Layered models: The resistivity model is characterized by a small number of layers (~4-6). Both layer thickness and resistivity are model parameters.
- Prior constraints on any model parameter. The prior constraints can be initialized from grids, directly from the GIS map or can be specified at borehole locations with decreasing strength moving away from the borehole locations

The high performance is obtained by an efficient code parallelization, iterative sparse matrix solvers and sparse matrix data stored for efficient memory handling. AarhusInv is therefore capable of handling vary large airborne EM surveys in a single spatial constraint model setup (SCI) and utilizing multi core CPU's.

The AarhusInv inversion code is available through the Aarhus Workbench and Aarhus SPIA software; it cannot be acquired as a standalone program.



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