EMIGMA V11.x *October 2025*

EMIGMA V11x is a powerful interpretation platform for many kinds of non-seismic geophysical data. It has been developed entirely by Eikon Technologies over the last 30 years. The software is supported and regularly augmented. It offers versatile solutions for Gravity, Magnetic, Electromagnetic, Induced Polarization, Resistivity, CSAMT and Magnetotelluric geophysical applications as well as new techniques such as CSEM, MTEM, ZTEM and Xhole EM, IP and RIM. The product design seeks a unique style of integrating data processing, simulation, inversion and imaging software as well as many other associated tools.

EMIGMA V11.x SERIES and PACKAGES

EMIGMA can be packaged in many combinations but essentially EMIGMA V11.x is available in three series, EMIGMA Premium, EMIGMA Professional and Academic packages.

EMIGMA Premium Series (or our Exploration Series) is primarily intended for practicing geophysicists involved in mineral, oil & gas exploration or groundwater investigations as well as for anyone who utilizes airborne or borehole geophysics. It is available in a complete version applicable to almost all data types that we support and covering a whole range of techniques for their processing, simulation, and interpretation or in separate packages. As will all EMIGMA packages, it framework is a relational database. Thus, a database may contain data from many surveys or many subsets of different surveys with attached models, inversions, grids, etc.The EMIGMA data structure is truly a database and not merely an extended spreadsheet like other geophysical products on the market.

The Premium Series is represented by the following packages but not exclusive to the these packages: EMIGMA Complete, EMIGMA for Gravity, EMIGMA for Magnetics, EMIGMA for Airborne TEM, EMIGMA for Airborne FEM+TEM, EMIGMA for FEM, EMIGMA for TEM, EMIGMA for Resistivity/IP, EMIGMA for Potential Fields (EMIGMA for Magnetics and Gravity), EMIGMA EM for Oil and Gas Applications and EMIGMA for Airborne and Ground EM for Natural Fields. .

EMIGMA Professional Series (Near-Surface) is designed specifically for near-surface applications, such as environmental or geotechnical investigations, where only surface data are involved. The user may purchase a complete version that provides a full range of modeling/inverson and analyses functionalities for Magnetics, FEM, TEM, resistivity/IP, and Gravity. Separate packages are aimed at a certain types of data and thus offering a set of techniques suitable of this type. The Professional Series is represented by the following packages: EMIGMA Ground Complete, EMIGMA Ground for IP/Resistivity, EMIGMA for MMR, and EMIGMA for VLF/VLF-R

Apart from the packages within these two series, *Eikon Technologies* offers academic licenses of EMIGMA. In essence, ***EMIGMA for Academics*** features the same capabilities as EMIGMA Ground Complete. The main difference, however, is the much lower price for the Academic license, which is *Eikon Technologies* contribution to the educational programs at universities teaching data analyses and modeling skills to the young generations of geophysicists. Multiple license discout packages available.

BASIC FEATURES

All the licenses of EMIGMA, both in the Premium and Professional Series, feature the following general set of functionalities that can be looked upon as a framework into which data type-specific functionalities are "plugged in":

- All licenses include the appropriate QCTool license which facilitates import from many types of format, processing, analyzes and mapping and then import to EMIGMA.
- Imports in manufacturers' format, ASCII columnar files and .QCT format
- Database backbone allowing for an easy handling of many datasets and projects and very large survey datasets
- Data quality control including plotting, editing, filtering, survey location controls, cleaning, trend removal, comparison analyses, and various corrections
- 3D Visualization intended for displaying measured, processed, simulated, or inverted data in 3D space as profiles, vectors, true 3D surfaces, or 3D contoured surfaces, but also used for the interactive building and editing 3D models and inversions
- Gridding based on five interpolation algorithms and incorporating a ProfileViewer tool for graphic editing and survey viewing. Grids are not single frequency/time/component grids but one grid can contain the entire survey in multiple layers for components/windows/frequencies/separations. The grids may be displayed in a variety of visualization tools, exported and returned to the database as new surveys.
- GridPresentation, MultiGrid, and Contour for viewing the results of interpolations; with Contour allowing for both 2D and 3D data representation
- Expannsive Plotting capabilities providing comparison between measured, simulated and processed data as well as a quick assessment of a single data set. Quick flips between profile,decay,spectral,separtion views.
- 3D Modeling allowing for unlimited prism, plate and polyhedra targets, complex topography, multiple body interactions and providing fast and accurate 3D simulations, with a batch mode tool fully integrated into the platform. Two thin sheet algorithms and our new complete response "SPHERE" algorithm being the by far the most accurate EM algorithm available. First, formulated by Debye.
- 1D and 3D Inversions specific for each data ype and well as CDT (CDI) tools for most applications.
- Mapping: Through the use of several geotiff formats, maps can be exported for use in such applications as ArcGIS, Mapinfo, AutoCAD. Geotiffs can also be imported to serve as underlay or overlay maps or explorted. Google Earth formats.

FEATURES BY LICENSE

On top of the above-listed key functionalities, each separate license is completed with its own suite of modeling, inversion, and data analyses algorithms that have entirely been developed by *Eikon Technologies* and thus are easy to support and customize.Our inversions and forward algorithms are easily adapted for new systems.

EMIGMA for Gravity provides gravity-specific corrections (latitude, free-air, tidal, Eotvos, Bouger, topography, isostatic); a series of FFT/DFT processing tools including derivative calculation, upward/downward continuation and wavelength filtering; 3D modeling enriched with a new, very accurate technique developed specifically for long strike bodies and an ability to calculate up to the 2nd order derivatives of the gravitational acceleration vector; 3D Euler Deconvolution with statistical and Rodin post-processing and, finally, the newly developed 3D gravity inversion algorithm which may include topographic effects if desired along with 2 types for 2D/3D modeling.

EMIGMA for Magnetics provides magnetics-specific corrections (Magnetic Base Station, advanced aeromagnetic compensation for drones, UAV, helicopter applications and fixed wing); 2D FFT/DFT tools for wavelength/wave number filtering, upward/downward continuation, derivative generation, and Reduction-to-the-Pole (3 approaches); an extension to the LN algorithm for non-linear magnetic effects (satisfies all of Maxwell's conditions) as well as the means to allow modeling interactions between multiple bodies 3D Magnetics Inversion based on linear and non-linear inversion tools (Optimization & Direct Matrix Inversion, physical sensitivity functions, iterative non-linear solutions, iterative born approximations, magnetization vector inversions), multi-elevation surveys and for TMI and vector components as well as their derivatives. The 3D topographic can be included in the 3D inversion grid. An advanced 3D Extended Euler Deconvolution with statistical and Rodin post-processing and 2D/3D visualization of Euler solutions is also provided.

EMIGMA for TEM is provided with import procedures for various Geonics TEM systems (e.g. EM37, EM57, EM67), and Geonics EM61/EM63, UTEM3 and UTEM4, Zonge (nanoTEM and ZeroTEM), Sirotem; WTEM, Phoenix TEM, TerraTEM, FastTEM, Crone and multi-instruments using the AMIRA format. Several airborne TEM systems are supported and we upgrade the application when new systems are released. Both In-Loop and Out-of-Loop Inversions are provided for either moving or fixed transmitter survey configurations; multi-layer inversion based on smooth Occam and non-smooth Marquardt algorithms all techniques may utilize one or many starting models and allow full model constraints. Multi-parameter inversions are now also provided. CDI volumes and secitons. Full 3D modelling including borehole surveys and our new Thin-Sheet Plate inversion with a huge range of capabilities.

EMIGMA for FEM is provided with joint Susceptibility/Apparent Resistivity Inversion based on smooth Occam or non-smooth Marquardt algorithms for resistivity; Apparent Resistivity inversion tools; PEXShow for 2D representation of geoelectric sections, pseudo-section tools, 3D modelling as well as specific tools for integration of data for presentation and inversion. And our new 3D thin-sheet inversion tool. Imports for all dipole-dipole systems.

EMIGMA for Airborne FEM provides import procedures for virtually any historic dipole-dipole system such as Fugro DIGHEM, RESOLVE, Impulse, Geophex and fixed-wing surveys. Joint Susceptibility/Apparent Resistivity Inversion based on smooth Occam is provided, a non-smooth Marquardt algorithms both model constrained and non-constrained; an Apparent Resistivity tool and Sengpiel Depth-Sections; PEXShow for 2D representation of geoelectric sections and of course a range of 3D modelling as well as our 3D thin-sheet inversion tools. Includes ground data functionality and magnetic data functionality

EMIGMA for Airborne TEM + FEM combines the capabilities our airborne TEM and FEM licenses.

EMIGMA for IP/Resistivity is completed with import procedures for time-domain GDD, ELREC 6, IPR10/11/12, frequency-domain IP, and resistivity in ASCII format and various manufacturers' native formats; generic XYZ resistivity import as well as frequency and time domain IP, 3D modeling algorithms allowing for EM effects, off-time or out-of-phase resistivity contrast effects, MIP solutions; Resistivity depth inversions; PEXShow for 2D representation of resistivity inversions; pseudoshow functionality.

EMIGMA for Airborne and Ground Natural Field data is provided with 3D modeling and inversion, and Resistivity-depth inversions; GBDecomp tool for decomposition algorithms is also available as add-on. Note, a full range of data and grid displays are allowed but EMIGMA/QCTool does not contain all the basic MT processing tools. Generally, data is imported as impedances or as spectra. Suitable for ground MT/AMT, Tipper data, airborne AFMAG and ZTEM.

EMIGMA for CSEM/CSAMT is provided with 1D and 3D modeling and inversion as well as processing and visualization of such inversions. Note, a full range of data and grid displays are allowed. E,H or Z data can be imported and utilized. There are no far-field assumptions for but rather the full solution is always processed for all forward and inverse algorithms. Multiple sources may be utilized in forward and inverse apps.

EMIGMA Electromagnetics for Oil and Gas: In addition to the tools within *EMIGMA Complete*, this EMIGMA package includes import, modeling and inversion for **MTEM**, land based **CSEM** 1D and 3D modeling and inverson as well as the tools for MT/CSAMT/AFMAG/ZTEM.

ADVANTAGES OF EMIGMA

The major advantage of EMIGMA is that it provides a general framework and intuitive interface for a state-of-the-art suite of non-seismic data interpretation techniques for a wide range of survey data. The database allows for it to contain many different surveys and survey styles. You can have it "all-in-one" or as separate data type-specific packages; however, no matter what kind of license you choose, you will be fully equipped with all the required tools of data analyses, data presentation and data interpretation, starting with raw data imports through processing and corrections to the most sophisticated modeling, inversion and data mapping techniques.

No less important is EMIGMA's flexibility and high responsiveness to the demands of this continuously developing industry. From the very beginning, EMIGMA was conceived to have a huge potential from both the scientific and programming standpoints. Its framework was designed with a provision for new tools and functionalities to be added whenever required. That Eikon Technologies has developed all of the embedded modeling and inversion algorithms adds tremendously to its flexibility and makes it even more competitive among similar software products based on academic algorithms. Improvements and extended developments can easily be made and in fact are continuing on an ongoing basis. Most importantly, if you find a bug, we can find it quickly and get it fixed. Also, professionals not just as mathematicians develop the algorithms but as software developers, the algorithms are tested exhaustively on a range of hardware and all prevalent Windows operating systems. We are fully compatible and with the latest Windows operating systems.