AGS | Res**2D**Inv

Res2DInv 2024.1.2

new release

Release Notes

Res2DInv 2024.1.2 includes faster inversions and updated wiki pages available at the Seequent Help Center. This release also addresses issues such as the license not being released immediately after the program closes and occasional failures when importing and exporting Geosoft GDB files.

Table of Contents

New and Improved Features in Res2DInv 2024.1.2

Electrode management

Simplify the workflow to edit electrode data

- Modify electrode coordinates and elevation directly in a user-friendly visual interface.
- Add or update topographical data without manual file edits.
- Import coordinates and elevation from external files and interpolate missing values.
- Choose between true horizontal or along-surface measurements for correct electrode positioning.
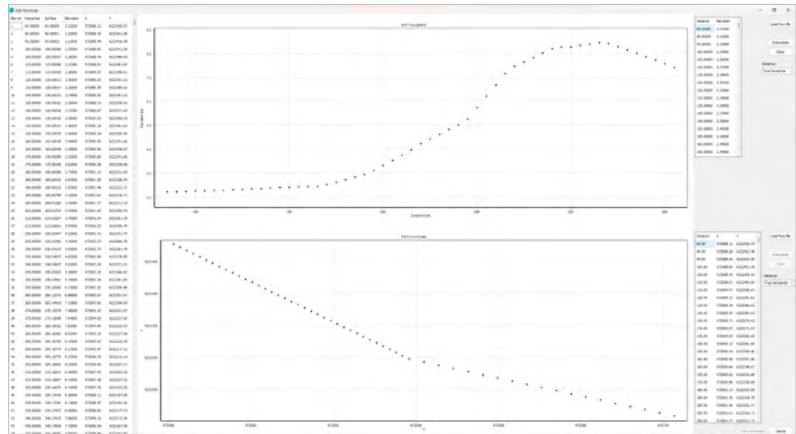
Sync Color Scales & X-Axes

Visual synchronisation for model comparison makes it easier to see the similarities and differences between models

- **Sync Color Scales Tool:** Apply a selected model's colour scale to multiple models with one click, ensuring visual uniformity for analysis.
- **Sync X-Axes Tool:** Align x-axis lengths across charts for consistent comparison across models and measured pseudo sections with one click.
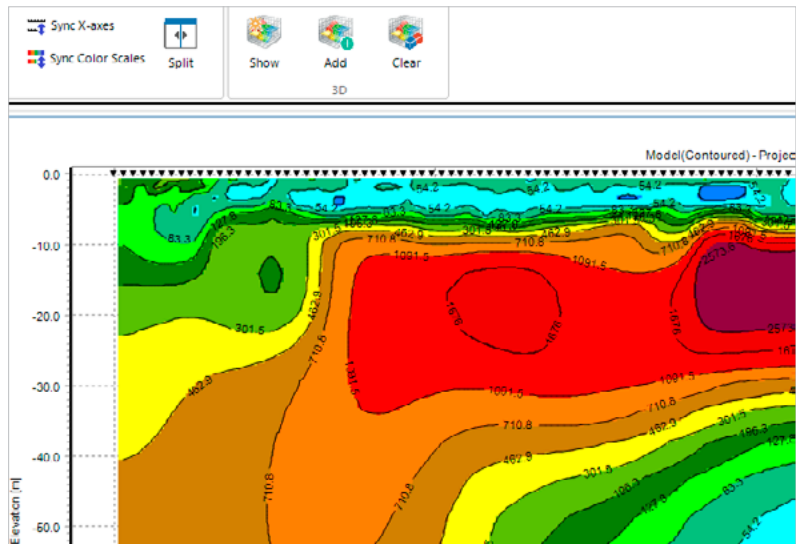

Export to Geosoft grid

Share data between Res2DInv and Oasis montaj

- Export Res2DInv inversion results to a Geosoft grid.
- Import Res2DInv grids into Oasis montaj or Leapfrog.
- Compare varied geophysical data sets with Oasis montaj for improved survey interpretation.

The unstructured data from Res2DInv is interpolated (potentially smoothing out or averaging changes captured in the unstructured grid) onto the structured grid when exported to the Geosoft grid format. This interpolation could lead to changes in the results due to differences in grid resolution and data distribution.
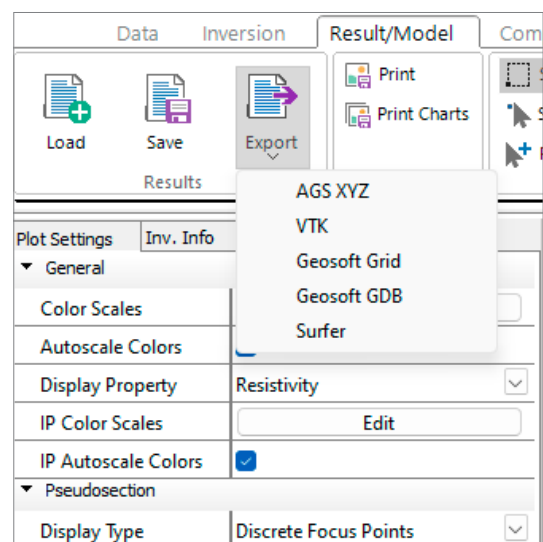
Autocorrect data before import

Automated error and inconsistency correction streamlines data reliability and eases import.

- Use the improved settings tool in the data tab to refine and autocorrect a dataset before import.

- Automatically exclude negative data points.

- Address field setup or data entry errors that invert the current direction.

- Align resistance and geometric factors to calculate positive apparent resistivities.

Merge 2D data

Easily merge 2D data sets with a user-friendly interface.

- Merge several data files into a single 2D data file.

- Set the horizontal distance each electrode is away from a reference point in the merged file.

- Change the direction of any profile.

Real-time colour scale preview

Immediate visual feedback makes it quicker and easier to see the changes the user makes to the colour scale.

- Live colour scale preview: Adjust the colour scale to your preference and see how it affects the visualization of the data in real time.
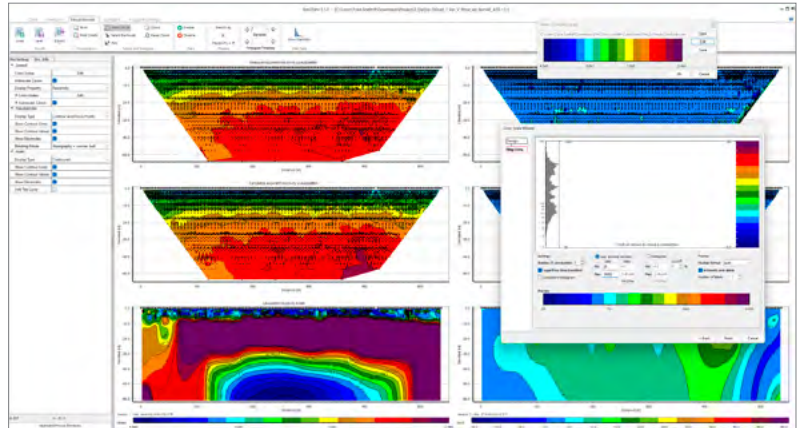
Print to scale

Export charts in different sizes and scales to control how a chart is exported for use in reports and PDF.

- Control how to export charts to a bitmap image.
- Choose to print charts as displayed or define a fixed scale with a DPI.
- Bitmap width and height are calculated for display.
- Provides consistent and accurate chart export, ensuring reports are professional and uniform.
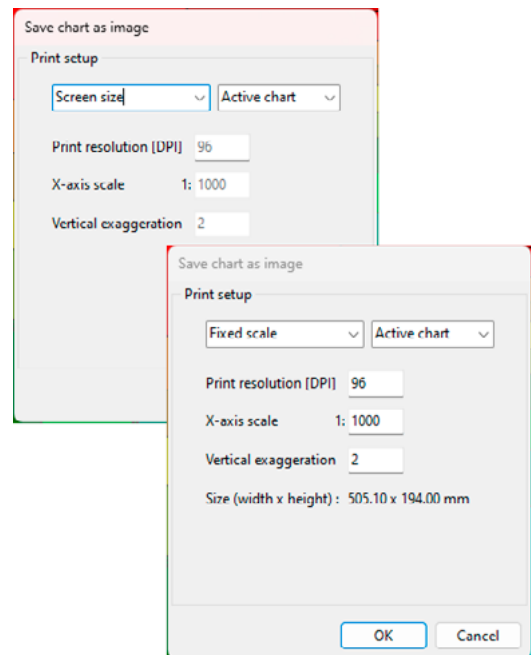
Geometric factor filter

Improved quality control provides better control over data and makes cleaning it more efficient.

- Selectively disable data points based on the geometric factor.

- The Geometric factor depends on electrode positions and is inversely proportional to the voltage difference for each measurement. A high geometric factor may therefore be associated with relatively low voltage readings that are near the instrument noise level and therefore have higher uncertainty than measurements involving a lower geometric factor. Filtering based on geometric factors can therefore be a fast and efficient means of removing data points of low quality.

- Set minimum and maximum geometric factor limits to retain desired data points and eliminate outliers or unreliable data.

- Use this tool to maintain high-quality datasets, removing data points of low quality.

Processing	Plot Settings	Focus Depths	Info \Log	
▼ Enable or disable points based on data value				
Action		Enable data in interval		⌄
Minimum Value		2.8		
Maximum Value		550.4		
Apply		Apply		
Minimum Value		2.8		
Maximum Value		550.4		
▼ Enable or disable points based on geometric factor				
Action		Enable data in interval		⌄
Minimum Value		61.6		
Maximum Value		1852.1		
Apply		Apply		
Minimum Value		61.6		
Maximum Value		1852.1		

Additional user experience improvements

Improved user experience, control, and workflow.

- Active charts on the Compare tab are highlighted with a distinct blue border, making it easier to identify the active chart. Adjust text sizes for chart titles, axis titles, and labels, accessible in all chart properties.

- Simplify file naming with automatic suggestions based on data file names when using the Print function.

- Get notified if electrode positions are outside of the topography and suggestions for calculated unit electrode spacing

- Profile distance, Number of topography points, and Number of coordinate positions are logged when loading data.

- Normalized sensitivity are added when exporting to AGS XYZ format.

- Display or remove electrodes on all charts, in chart settings.

- Support for empty lines in .dat format.

- Automatically average duplicate and reciprocal measurements before inversion.

Res2DInv 2024.1.2 Release History

■ **10.9.2024, 2024.1.2**

New and improved features

- Faster inversions.
- Wiki pages moved to https://help.seequent.com

Corrected bugs

- License would not be released immediately on program close, even when using 'While app is running'.
- Geosoft GDB file import and export would sometimes fail.

■ **08.05.2024, 2024.1.1**

New and improved features

- Add an extra blanking file when exporting to Surfer format, which blanks the area corresponding to the contoured model plot in Res2DInv.

Corrected bugs

- Saving data with IP into a new .dat file could in some cases result in an erroneous new .dat file.
- Export to Geosoft Grid now sets the default orientation to vertical.
- Export charts from the compare tab did not autosave file extension.
- Export to Geosoft Grid prefix label is changed from "_gdb" to "_OM" as users confused them with a GeoSoft GDB file.
- Data that contains both IP and error estimates was not handled correctly when going to the inversion tab.
- Better error handling and user warnings when inversion crashes due to noisy data that is not processed.

■ **DATE 21.02.2024, 2024.1**

New and improved features

- Edit electrode topography and coordinates in the new Edit Electrode tool. Edit existing topography or coordinates, or load from an external file. Select if the distance is true horizontal or along the surface and interpolate topography and coordinates to electrode positions.
- New Sync Colour Scales option for Compare tab. Quickly sync all colour scales to align with the selected chart. Only colour scales with the same unit will be synched. This option makes it much faster to compare results from different data or inversions.
- New Sync x-axis option for Compare tab: Quickly sync all x-axes to align with the selected chart to compare results that are displayed with different visualization options, e, g, models and measured pseudo section.
- Export inversion models to the Geosoft grid format. Note that this operation changes an unstructured grid to a structured grid and will change the inversion results.
- New settings tool with default settings for loading data:
  - Automatically switch electrode positions if they give a negative geometric factor but a positive resistivity.
  - Automatically gives resistance and geometric factor the same sign if they are different, to create positive resistivity.
  - Automatic removal of negative resistance.
- New tools to merge data: Merge several Res2DInv .dat files into one .dat file
- Edit Color Scale: Changes in the colour scale editor are applied live to the charts. This makes it easier to see if the edited colour scale gives the expected result.
- New geometric factor processing filter: Disable or enable data within the specified minimum and maximum level of the geometric factor.

- New inversion setting: Generate Model blocks from sensitivity values. This option allocates the arrangement of the blocks in the model using the sensitivity values as a guide. The model created using the sensitivity values increases the width of the blocks near the sides in the deeper parts of the model section to increase the sensitivity values of the blocks.

- Data loading: Negative data is automatically disabled. This setting can be changed in the new Settings Tool.

- Show Electrodes: Display or remove electrodes from plots. This option is available on all tabs in the settings list for each chart.

- Duplicate and reciprocal measurements are automatically averaged before inversion.

- The active chart on the Compare tab is now enclosed by a blue line, making it easy to see which chart is active.

- File names are automatically suggested from data file names when for the Print function on Data and Result/Model tabs.

- Support for empty lines in .dat format.

- Added new messages when loading data files:

  - If unit electrode spacing in the data file is not correct. A calculated unit electrode spacing is calculated and suggested to the user.

  - If electrode positions extend outside topography positions.

- Additional info added to the log when loading data:

  - Profile distance

  - Number of topography points

  - Number of coordinate positions

- Export to XYZ format: Normalized sensitivity has been added to the export format.

- Possibility to change the font size of axis labels, axis titles, and chart titles.

Corrected bugs

- Maximising the window does not cover the Windows taskbar.

- Disable the option for the logarithmic x-axis.

- Fixed a bug where the x-axis on charts is not aligned when colour scales have different widths.

- Fixed a bug where repeated measurements were not correctly removed.

- Fixed a bug where some old .inv Res2DInv results could not be exported to GeoSoft GDB.

- Fixed bugs where triangulation of the model grid failed due to negative resistivity values.

- Fixed a bug where a saved data file could miss a space between columns due to many decimals.

- Fixed bugs in handling negative resistivity on data load.

■ <u>21.09.2023, 5.0.2</u>

Corrected bugs

- Fixed a bug occurring when loading data sets with relatively small unit electrode distance compared to line length.

- Fixed a problem where the layer thickness of model grids would sometimes be set incorrectly.

- Fixed problems occurring when opening certain .dat-files and (legacy) .inv-files.

- Fixed a bug occurring when disabling log-axes on the data profile panel.

- Fixed a problem with importing data with IP from gdb-files.

- Fixed an issue with wrong IP data points somes being selected when using selection tools in the data profile panel.

- Certain data sets would sometimes crash when attempting to run inversions. The problem has been resolved.

- Resolved a problem loading data sets with the combination of error estimates, IP data and one or more invalid IP data points.

- Fixed mismatch between lines and points sometimes occurring in the data profile panel.

- Corrected erroneous tick values sometimes appearing on the vertical axis of the data profile panel.

- Cancelling inversions would sometimes cause the program to crash. The problem has been resolved.

- Pseudosections showing forward-modelled IP response would sometimes be incorrect. This problem has now been resolved.

■ **06.07.2023, 5.0.1**

New and improved features

- Support for import of Full IP decay .dat files.

Corrected bugs

- Fixed a problem related to importing gdb files with IP data.

- Fixed a bug where dummy value 999.0 for IP data was not recognized.

- Fixed a bug where plot axes were not aligned in the Result tab when coordinates were displayed.

- Fixed problems where loading index-based data would sometimes fail.

- Fixed a bug where data could not be inverted if coordinates had too many digits.

- Fixed a bug where an error could occur when unclicking all focus points.

- Fixed incorrect calculation of 'resolution per unit area index'.

- Fixed incorrect binning of data points in terms of left/right asymmetry in the 'data profile' processing panel.

- Fixed an issue related to loading data with <4 electrodes and nonzero topography.

- Fixed a problem occurring when removing data points with apparent resistivity > 1e6 ohm m.

- Fixed a problem where the program would crash when removing and reading certain focus depth bins for the 'data profile' processing panel.

- Fixed a problem occurring for global coordinates with > 6 digits.

- Fixed a problem where .dat-files with fixed regions specified would not open under certain circumstances.

■ **25.05.2023, 5.0.0**

New and improved features

- Completely new user interface with new processing, inversion setup and visualization tools in 2D and 3D.

- New licensing system (Seequent ID) making it easier for individual users to manage their individual or shared licenses.

Corrected bugs

- Fixed a problem in legacy Res2DInv where the 'Splice large data sets' feature would sometimes not open.

- Fixed a problem where the thickness of model blocks was sometimes not correctly set.

■ **10-10-2022, 4.10.21**

New and improved features

- Import data in Geosoft GDB format.

- Export model results in Geosoft GDB format.

- Select the number of CPU cores used in inversions.

Corrected bugs

- The VTK-export feature would sometimes produce incorrect output for models without topography. This bug has been fixed.

- The 'change thickness of layers' feature would not allow the thickness of the first layer greater than 4 times the unit electrode spacing. For some surveys, this would cause a conflict with the automatically calculated first layer thickness which is performed when loading a data set. The automatically calculated thickness is based on the smallest pseudo-depth of all measurements, and e.g. streamed surveys where electrode distance may be much smaller than pseudo-depths, the limitation of 4 times minimum electrode distance is not ideal. The limitation has therefore been removed.

■ 09-02-2022, 4.10.20

New and improved features

· Program start-up time has been substantially reduced.

· Maximum block width has been increased to 30 times the unit electrode distance (can be set from ivp-file).

· Updated importer for gdd files.

· Support for floating licenses – automatically unregister licenses when the program is closed.

Corrected bugs

· Block width was erroneously limited to 7 times the unit electrode distance when loading settings from ivp file.

· The "concatenate data into RES2DINV format" feature would incorrectly produce merged .dat-files without topography if the source files were in index format with topography given in a separate list. The problem has been fixed.

· Inverted data sets with underwater surveys with electrodes on the seafloor given in index format would produce distorted contour plots in display mode under certain circumstances. This has been fixed.

· When loading certain .dat-file formats, the program would not always show the correct minimum x-position of the electrodes in the status text. This has been corrected.

■ 30-07-2021, 4.10.14

Corrected bugs

· For inversion models with block width>1, exports to vtk-format were incorrect. This bug has been fixed.

· Inversion models for certain data sets and inversion settings would incorrectly be output to vtk-files where cells would have zero width. This problem has been fixed.

· Inversion models based on data sets with underwater electrodes and a specified, nonzero water level, would be incorrectly output to vtk-files. This problem has been fixed.

· The 'modify depth to layers'-feature was not correctly working for models with more than 28 layers. It has now been fixed.

■ 19-04-2021, 4.10.11

New and improved features

· License check now automatically uses Windows proxy server settings (if applicable).

Corrected bugs

· When displaying modelled vs. observed IP data using the RMS error statistics option, the program would erroneously always display modelled apparent IP values from the first inversion iteration. This bug has been resolved.

· The function for concatenating multiple 2D data sets into a single data set introduced a bug when the concatenated files included remote electrode positions specified in their respective headers. This bug has now been corrected, and a warning will be issued if inconsistent remote electrode positions are specified.

■ 15-02-2021, 4.10.8

New and improved features

· Updated user interface for choosing which time steps to show in the display functions for time-lapse models.

· Select which reference time step is used for displays that compare two time steps in a time-lapse model.

· The new AGS XYZ format can now be output when running batch inversions.

Corrected bugs

· When loading data sets with a large number of electrodes in display mode, Res2dInv would sometimes crash. This has been fixed.

· For some of the time lapse displays that compare two-time steps, the shown time step numbers were sometimes incorrect. This has been fixed.

· The function for collating multiple Res2dInv files into a Res3DInv dataset would produce erroneous results if 2D data was given as resistances. This bug has been fixed.

· The function for combining individual 2D data sets into a time-lapse file suffered from the following bug: If one or more measurements were missing for a given electrode configuration, and if, when prompted by Res2DInv, the user would select to filter out such missing points, the resulting time-lapse file would contain measurements with resistivities at wrong times/ electrode positions. The issue has been fixed.

■ 11-01-2021, 4.10.4

New and improved features

· Override limitations governing the maximum possible number of timelapse timesteps, number of electrodes and number of boreholes. This e.g. allows for time-lapse inversions with several 100s of timesteps.

· AGS XYZ export: New and simpler option to output grid values and position to a fixed-format text file that can be readily imported, analysed, and displayed using 3rd-party software.

Corrected bugs

· Sensitivity, uncertainty, and resolution displays would sometimes not show for borehole-inversion models. This issue has been fixed.

· In certain situations when displaying plots including topography, the thickness of the lowermost model layer was slightly incorrect. This bug has now been fixed.

· When loading DOI-calculated inversion models with topography and exporting (to XYZ, surfer and other formats), res2dinv would require the model to be displayed before export with topography was possible. This has now been fixed.

· Progress indicators for certain procedures run during time-lapse inversions were faulty. These have been fixed.

■ 25-08-2020, 4.10.3

New and improved features

· License server security update.

Corrected bugs

· For some datasets, the plots of modelled vs observed apparent resistivities in the 'RMS error statistics' function would plot the wrong values against each other, and data trimming by RMS error would therefore also lead to an erroneous selection of measurements. This has now been fixed.

■ 25-05-2020, 4.10.2

Corrected bugs

· In display mode, the 'RMS error statistics' function in the 'edit data' menu displayed data points wrongly under some circumstances for general array data sets. This bug, which arose in version 4.10.1, has been fixed.

■ 19-03-2020, 4.10.1

New and improved features

· Output the positions of all 4 electrodes in xyz file.

· Different plotting order of general array data in 'remove bad data points'. Results in less messy plots.

Corrected bugs

· Option to automatically combine repeated data points by taking the average of the apparent resistivity and IP values.

· Change in VTK file header that caused rounding errors in some programs.

· Fixed bug causing error calculations from repeated or reciprocal data points not to work properly for unsorted data.

· Removed cause of memory leak occurring in certain situations.

■ 12-11-2019, 4.9.11

Corrected bugs

· Fixed possible bug in setting model refinement options when loading inversion settings from .ivp file.

· Fixed bug causing the program to crash in rare instances if failing to erase temporary files during inversion.

■ 29-05-2019, 4.9.3

Corrected bugs

· Fixed error when exporting VTK files with global coordinates.

■ 23-05-2019, 4.9.1

New and improved features

· Calculate and display the model resolution point-spread function values. Model resolution values are included in the xyz output file for data with global coordinates.

· Export of VTK file with electrode positions.

Corrected bugs

· Various bug fixes.

■ 05-03-2019, 4.8.18

New and improved features

· Check added for missing and negative apparent resistivity values.

· Option to remove data points with missing or negative values.

Corrected bugs

· Fixed bug that forced positive apparent resistivity values for general array data sets.

· Fixed a bug in exporting a time-lapse model to Lund format.

■ 10-12-2018, 4.8.12

Corrected bugs

· Fix redraw and rescale errors to exterminate bad data points.

· Added message when data has been automatically converted from resistance to apparent resistivity for a borehole data set.

■ <u>16-10-2018, 4.8.9</u>

New and improved features

· Removal of message boxes during batch inversion that could cause the inversion to pause.

Corrected bugs

· Missing line change on the export of large VTK files fixed.

■ <u>28-08-2018, 4.8.3</u>

Corrected bugs

· Fixed bug in display of IP profiles in option to 'Exterminate bad data points'.

· Fixed bug in detecting gamma array type.

· Shows correct support and update dates for the Aarhus GeoSoftware license.

■ <u>07-05-2018 4.8.1</u>

New and improved features

· A model with borehole electrodes is saved to xyz file with global coordinates if present.

· Save an output model in Paraview vtk format. I.P. model values are automatically saved with resistivity values and a second vtk file is automatically generated if global coordinates present.

■ <u>20-04-2018, 4.7.25</u>

New and improved features

· Add or remove a series of data points in the "exterminate bad data points" window is added. This is done by right-clicking the first and last data point in the series to be removed.