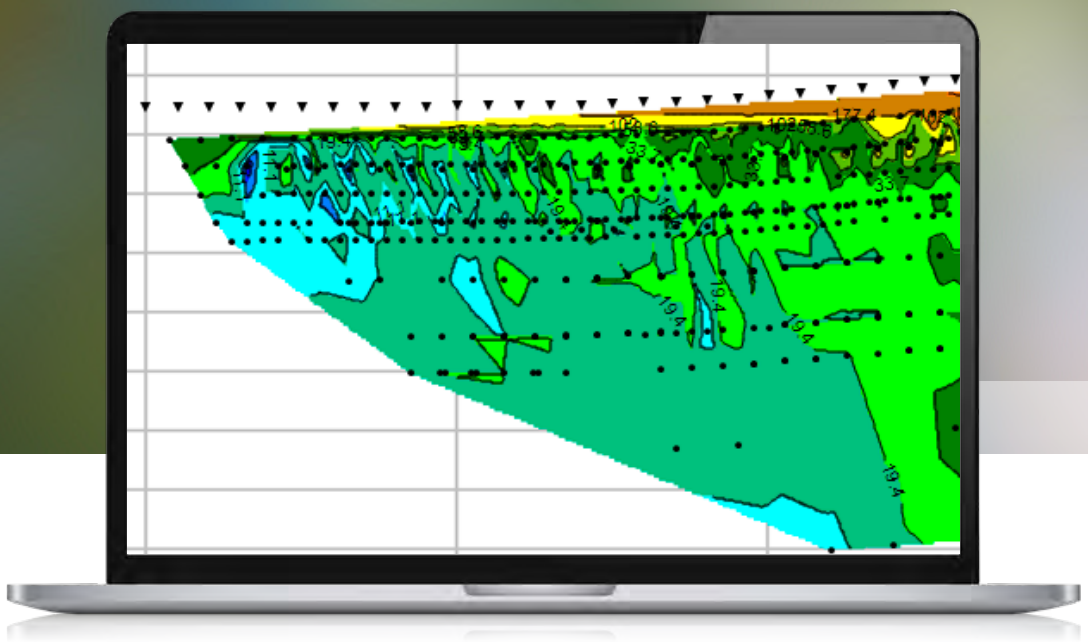
SEEQUENT

AGS | Res2DInv

Res2DInv 2025.1

new release



Release Notes

Res2DInv 2025.1 continues to shorten the path to interpretation with new and improved features. These include better borehole data integration, more keyboard shortcuts, and tools to identify outliers and quickly address issues. These updates improve subsurface model accuracy, simplify borehole data processing, and help users analyse their survey data more efficiently.

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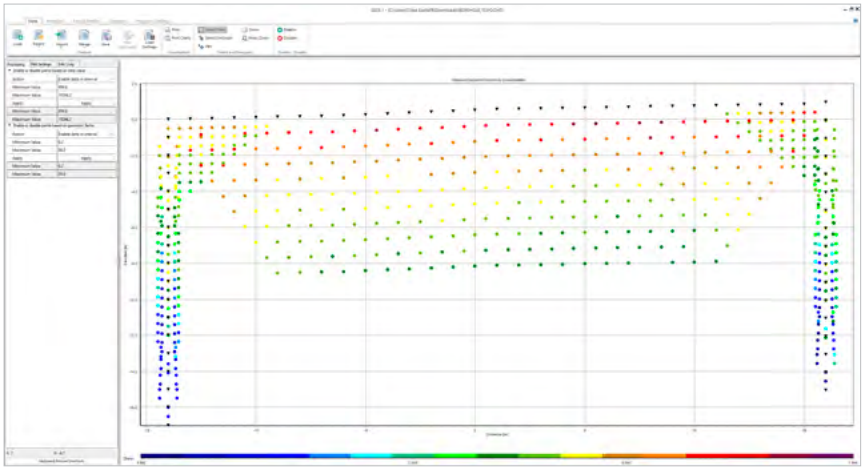
New and Improved Features in Res2DInv 2025.1

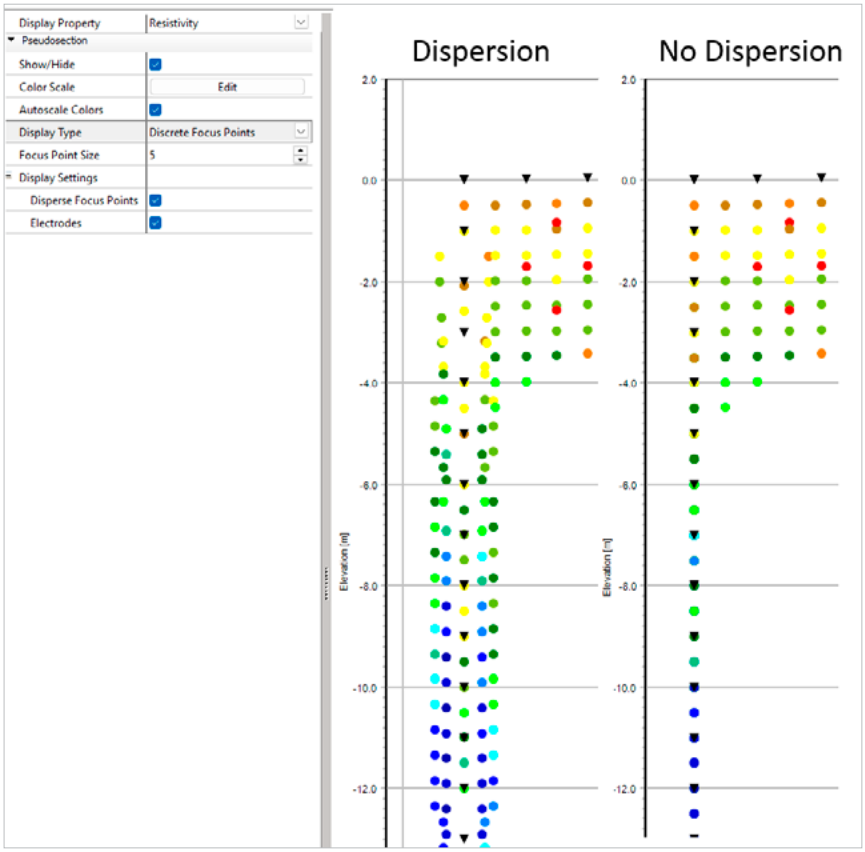
Borehole data processing and inversion

Process and invert borehole data, including single boreholes, cross-boreholes, and surface-borehole combinations. Previously, while borehole data could be loaded, it could not be processed or inverted, limiting the detail and accuracy of subsurface models. By integrating borehole data with surface measurements, you can add vertical profiles, making it easier to identify groundwater flow paths and aquifer extents.



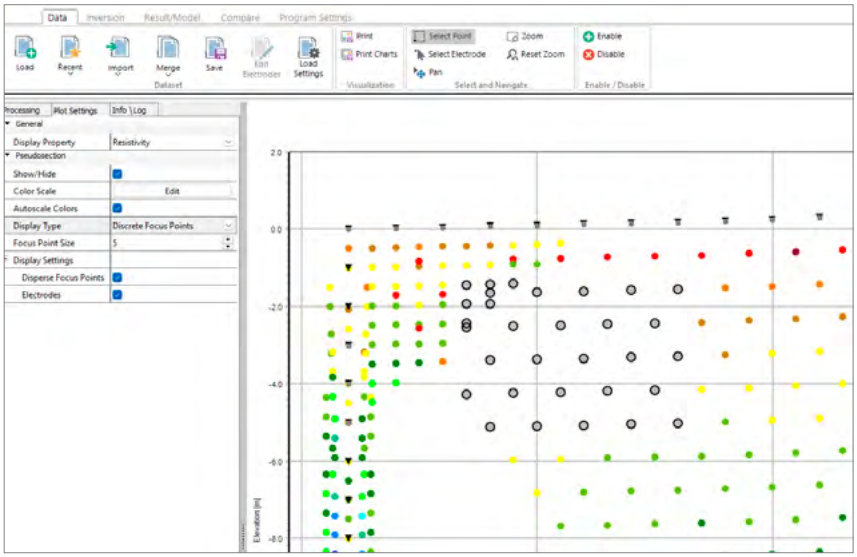
Borehole data display

When loading borehole data, you can display the focus depth as a geometric median instead of an arithmetic average. Using the median is useful for surveys with irregularly spaced electrodes because it more accurately positions the focus points without affecting the inversion outcome. By spreading out coincident focus points and adjusting overlapping data points, you simplify data processing before inversion, leading to more reliable and accurate visualisation.



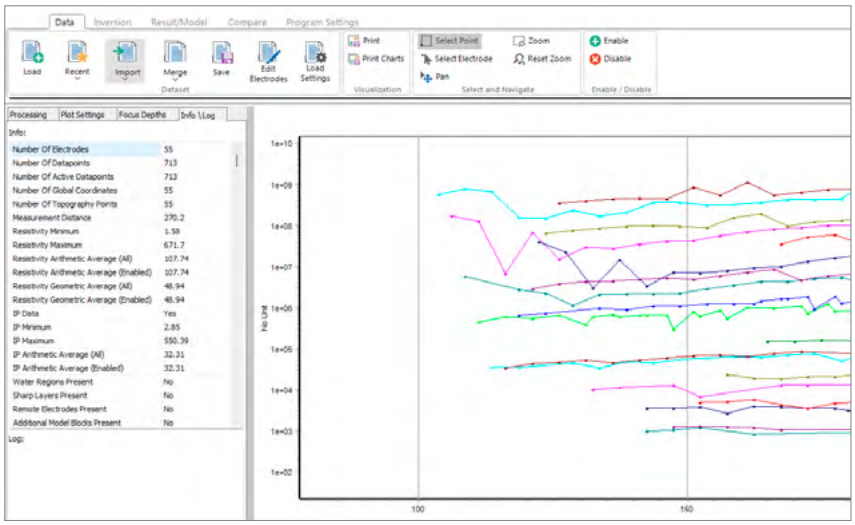
Keyboard shortcuts

Keyboard shortcuts (‘q’/’a’) can disable or enable selected data points on the result/model tab. This feature simplifies data processing by allowing quick management of data points without navigating through multiple menus. During data analysis, outlier data points can be quickly disabled with shortcuts, making data management more intuitive and efficient.



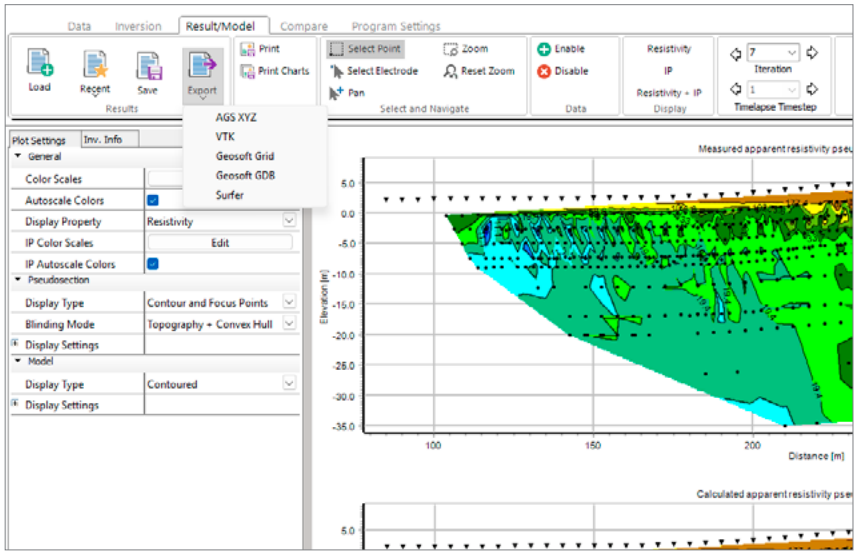
Resistivity and IP average logging

The log now includes resistivity and IP averages for the entire dataset and the subset of data points specifically enabled for analysis. This additional information helps users identify outliers and anomalies, providing valuable insights into data quality and aiding decision-making during data processing.



New export features

Exporting contoured model results truncated with a trapezoidal polygon to Geosoft grids now appends a ‘_trapezoidal’ postfix to the filename. Additionally, when exporting models to the Geosoft database (GDB) format, properties are now organised in arrays, making it easier to visualise results in Oasis montaj.



Res2DInv 2025.1 Release History

VERSION: 2025.1, DATE: 25.03.2025

New and improved features

- Support for processing and inversion of borehole data including a new processing tool for borehole, cross-borehole, and surface-borehole data.
- New “Load Settings” option for borehole data: Use Geometric Median or Arithmetic Average Algorithm to determine focus point positions for subsurface surveys.
- Use keyboard shortcuts ‘q’/’a’ to disable/enable selected data points on Result/Model tab.
- Additional info in the log when loading the dataset (resistivity and IP averages).
- When exporting contoured model results truncated with trapezoidal polygon to Geosoft grids, the filename now contains ‘_ trapezoidal’ postfix.

Corrected bugs

- If the topography header is not present in the .dat file, topography should not be loaded.
- Do not undo zoom when enabling/disabling points on data and pseudo-section plots.
- Added a scrollbar for Settings on the Inversion tab to prevent the settings from disappearing due to certain combinations of screen resolutions and scaling.
- ‘Show lines’ setting was not applied properly in all cases.

VERSION: 2024.2, DATE: 10.12.2024

New and improved features

- Support for EPSG coordinate systems for data and models in the compare tab. Includes the option to transform to another coordinate system.
- Support for import of Iris Instrument .bin files.
- Optionally mask Model blocks by sensitivity or resolution. The user can set the threshold and mask fading.
- Support for import of ABEM Terrameter LS database files.
- New keyboard shortcuts in the Focus Depth tab:
  - Page down:
    - If several focus depths are selected: Disable all focus depths except the uppermost selected focus depth.
    - If one focus depth is selected: Disable the selected focus depth and enable the next focus depth below.
  - Page up:
    - If several focus depths are selected: Disable all focus depths except the lowermost selected focus depth.
    - If one focus depth is selected: Disable the selected focus depth and enable the previous focus depth above.
- New keyboard shortcuts on the Result/Model and Compare tab:
  - Page down: Previous Iteration
  - Page up: Next Iteration
  - End: Previous timelapse step
  - Home: Next timelapse step
- New keyboard shortcuts: Use keyboard arrows and Q/A to select individual data points for enabling/disabling.
- Load Recent button added to the Result/Model tab.
- Save button added to the Compare tab to save coordinate system changes made to the result file.
- Speed on selecting data points on large data sets has been improved.

- Surfer export:
  - Global coordinates added to the _post.dat file.
  - Extra file with measured and modelled data is automatically created: _measurement.dat file.
- New option under Program Settings where distance on charts can be set to ft. Data and results need to be reopened to take effect.
- AGI SuperSting importer automatically merges all data sets into one data set on import.
- When exporting models to VTK or Geosoft Grid, an extra file is automatically exported where the model is clipped (trapezoidal).
- It is now possible to right-click on a chart and edit the title.
- Report presence of reciprocal and duplicated data points.
- Updates to Zonge importer.
- Improved customisation of data and model display settings.
- Time lapse display options: Display changes, relative changes and desaturation changes between any two time steps.
- Possibility to set the image and contour grid resolutions under the Settings tab.
- The Info in the Data tab is now more informative for surveys with water regions.
- Default inversion settings changed to be consistent with Res2DInv legacy settings.

Corrected bugs

- Fixed problem associated with negative resistivities in McOhm files.
- Fixed bug where all chargeability is zero for an MAE imported data file gave an error.
- Fixed bug where two focus depths were shown on the data plot when only one focus depth was selected.
- Fixed problem with model contouring occurring when 'Add top layer' was enabled.
- Global coordinate in lat/long did not include enough decimals.
- 3D viewer was missing mouse-over hints.
- Fixed issue in Electrode Editor where interpolated focus points could be above topography.
- Fixed bug where Edit Colour Scale preview didn't work on model blocks.
- Fixed issue with inversion of streamed surveys with floating electrodes and i.p. data present.
- Fixed issue where inversion of streamed surveys with bottom electrodes would generally fail.
- Fixed issue where import of external ERT data formats would not work properly for pole/pole and/or pole/dipole array types.
- If only IP was shown for a survey in the Result/Model tab, the Model display was not correct when switching between 'Model blocks' and 'Contoured'.
- The 'Timelapse Settings' popup was not synchronised with the settings from the 'Plot Settings', giving you the possibility to select the Time Step in the popup already used.
- .dat file with empty dataset name could not be inverted.

VERSION: 2024.1, DATE: 21.02.2024

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.

VERSION: 5.0.2, DATE: 21.09.2023

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 some 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.

VERSION: 5.0.1, DATE: 06.07.2023

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.

VERSION: 5.0.0, DATE: 25.05.2023

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.

VERSION: 4.10.21, DATE: 10.10.2022

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.

VERSION: 4.10.20, DATE: 09.02.2022

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.

VERSION: 4.10.14, DATE: 30.07.2021

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.

VERSION: 4.10.11, DATE: 19.04.2021

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.

VERSION: 4.10.8 DATE: 15.02.2021

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.

VERSION: 4.10.4 DATE: 11.01.2021

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.

VERSION: 4.10.3, DATE: 25.08.2020

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.

VERSION: 4.10.2, DATE: 25.05.2020

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.

VERSION: 4.10.1, DATE: 19.03.2020

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.

VERSION: 4.9.11, DATE: 12.11.2019

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.

VERSION: 4.9.3, DATE: 29.05-2019

Corrected bugs

- Fixed error when exporting VTK files with global coordinates.

VERSION: 4.9.1, DATE: 23.05.2019

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.

VERSION: 4.8.18, DATE: 05.03.2019

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.

VERSION: 4.8.12, DATE: 10.12.2018

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.

VERSION: 4.8.9, DATE: 16.10.2018

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.

VERSION: 4.8.3, DATE: 28.08.2018

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.

VERSION: 4.8.1, DATE: 07.05.2018

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.

VERSION: 4.7.25, DATE: 20.04.2018

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.