

## Res3DInv Release History

<b>Date</b>	<b>Version</b>	<b>History</b>
25-05-2023	3.20.0	<p><b>New features</b></p> <ul style="list-style-type: none"><li>• Improved 3D viewer</li><li>• New licensing system (Seequent ID) making it easier for individual users to manage their individual or shared licenses.</li><li>• Program start-up time has been reduced.</li></ul> <p><b>Corrected bugs</b></p> <ul style="list-style-type: none"><li>• Fixed problem where batch-mode inversions would hang when number of layers exceeds the memory-dependent limit.</li><li>• Fixed issue where inversions would sometimes run out of memory.</li></ul>
10-10-2022	3.19.2	<p><b>New features</b></p> <ul style="list-style-type: none"><li>• Option for importing data in Geosoft GDB format.</li><li>• Option for exporting model results in Geosoft GDB format.</li></ul> <p><b>Corrected bugs</b></p> <ul style="list-style-type: none"><li>• Collate to time-lapse files feature would produce incorrect and invalid data sets if original files contained data error estimates. The problem has been fixed.</li><li>• Option for exporting models in Slicer/Dicer format would sometimes produce erroneous output. This has been fixed.</li></ul>
09-02-2022	3.19.1	<p><b>New features</b></p> <ul style="list-style-type: none"><li>• Very large reduction of time spent to display large inversion results using the AGS viewer.</li><li>• Very large reduction of time spent to export VTK files.</li><li>• Select whether to include or ignore measurements of array configurations that are not present at all times when collating multiple files to a single time-lapse file.</li><li>• Select whether to convert to apparent resistance or retain resistivity when collating multiple files to a single time-lapse file.</li><li>• Support for floating licenses – automatically unregister license when program is closed.</li><li>• Faster inversions due to changes to compilation procedure.</li></ul> <p><b>Corrected bugs</b></p> <ul style="list-style-type: none"><li>• Collate to time-lapse files feature would produce incorrect and invalid data sets if original files contained data error estimates. The problem has been fixed.</li></ul>
21-06-2021	3.19.0	<p><b>New features</b></p> <ul style="list-style-type: none"><li>• Very large reduction of time spent by several procedures called during load of large datasets: Check of data positions, electrode number calculations, check of topography data and calculations of nearest point electrodes.</li><li>• Less restrictive limitations for the number of electrodes allowed in a given data set for professional and enterprise license.</li></ul>

- For the ‘Splice large survey grids’ (enterprise license only), the possible number of subdivisions in each horizontal dimension has been increased.

**Corrected bugs**

- The program performs a check for whether two or more point electrodes in a given measurement are too close. This check, which did not always yield correct results in earlier versions, has now been fixed and its performance has been substantially improved.
- The option for outputting xyz-files during batch-inversions did not work. It has now been fixed.
- When loading an inversion based on vector array data (enterprise license only) and trimming the data using the RMS error statistics feature, the resulting .dat-file was not a proper vector data set. This has been fixed.

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19-04-2021 3.18.4

**New features**

- The ‘Modify depths to layers’ feature has been updated so that it is now possible to save and load depths to/from a file.
- The ‘Display point electrodes’ feature has been changed so that it is no longer restricted to showing data sets with point electrodes only. Uniform and non-uniform are now also displayed, even if no point electrodes are present. The feature is now called ‘Display/edit grid and view point electrodes’.
- The cut-off value for data compression when using the Incomplete Gauss-Newton method is no longer restricted. This may help reduce the time required for the inversion of certain data sets.
- Improved performance when loading data sets with a large number of electrodes.
- License check now automatically uses windows proxy server settings (if applicable).

**Corrected bugs**

- The procedures for automatically editing data upon loading would not correctly ensure e.g. positive geometric factor for some data sets. This would sometimes lead to unsuccessful inversion results where a ‘dodgy array configuration’ error would be thrown. This problem has been resolved.
- If a user would manually specify layer depths, the procedures that cause the program to recalculate layer depths automatically were disabled. For example, if ‘factor to increase layer thickness’ was changed in the ‘Change Inversion Parameters’ after having manually changed layer thicknesses, nothing would happen. This problem has been resolved.

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25-08-2020 3.18.2

**New features**

- License server security update

**Corrected bugs**

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- For certain data sets with ‘bad’ I.P. data points, inversion using the Linear Perturbation method could lead to incorrect apparent resistivity results. This bug has now been fixed.

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06-04-2020 3.18.1

### **New features**

- New improved version of the AGS 3D viewer with new color scale module.
- Option to automatically combine repeated data points by taking the average of the apparent resistivity and IP values.
- Option to select number of CPU cores used in inversions.

### **Corrected bugs**

- Fixed bug preventing Res3DInv to be called from command line
- Various bugfixes related to reading data files with repeated electrodes and very high dynamic range.
- Fixed bug preventing 3D viewer to be opened if file name contains spaces
- Change in VTK file header that caused rounding errors in some programs
- Fixed bug preventing 3D viewer from showing topography in certain cases
- Fixed bug causing slowdown of the inversion of very large data sets due to unnecessary memory swapping.
- Fixed bug causing Res3DInv to crash in certain situations where subsurface electrodes are present.

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12-11-2019 3.17.34

### **Corrected bugs**

- Added check for free physical RAM before loading potentials for Jacobian matrix calculation to avoid using virtual disk based memory
- Fixed bug in finite-element resistivity only calculation that occurs on a few PCs

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17-10-2019 3.17.33

### **New features**

- Borehole data sets automatically converted to subsurface points electrodes format.
- Option to adjust the cutoff factor for L1-norm model constraint automatically added.
- The fast ‘incomplete Gauss-Newton’ (linear conjugate gradient) method can now be used for the main inversion iterations if the option to calculate the model resolution is selected. Previous versions automatically select the full Gauss-Newton method which can be significantly slower for very large data sets and models
- The user can now select which iteration number to use in the ‘RMS error statistics’ option to display the misfits for any iteration in the file with the inverse model.
- Option to subdivide large finite-element mesh into segments to reduce computer time, memory and disk space required. - Enterprise version only.
- Support for vector arrays data sets. - Enterprise version only.

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- Calculation of VOI (Volume of Investigation. - Enterprise version only.
- Calculation of point-spread-function. - Enterprise version only.

### Corrected bugs

- Fixed bug in selecting the biggest buffer drive automatically for some system setups.

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02-09-2019 3.16.13

### New features

- Allow inversion of IP data sets using Jacobian matrix with size of more than 2GB elements using the Gauss-Newton method with linear sequential inversion method.

### Corrected bugs

- Fixed bug in export of model to Ctech csv format.
- Fixed bug with setting of buffer drive.

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23-05-2019 3.16.6

### New features

- Improved statistical processing tools for IP data.

### Corrected bugs

- Fixed error when plotting arbitrary electrodes locations coinciding with grid points.
- Various minor bug fixes.

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05-03-2019 3.15.11

### New features

- Option to use AGS 3DViewer to view inversion result in 3D.
- Option to use 2 or 3 nodes per model mesh line spacing for data in arbitrary electrodes data format.
- Support for up to 220,000 arbitrary electrodes positions for PCs with at least 256 GB RAM.

### Corrected bugs

- Several minor bug fixes..

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10-12-2018 3.14.22

### Corrected bugs

- Fix for the way the amount of RAM on the machine is detected causing problems for some users.

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16-10-2018 3.14.19

### New features

- Various optimizations for inversion of very large datasets.
- Finite-element mesh size limit for Res3DInv Basic increased to 1.6 million nodes.
- Support for 256GB RAM.

### Corrected bugs

- Missing line change on export of large VTK files fixed.

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28-08-2018 3.14.14

### New features

- Minimum thickness of first model layer reduced to 0.2 times minimum depth of investigation.
- Maximum thickness of first layer increased to 5 times the minimum model grid spacing.
- Warning message added if free disk space is less than 4 times the RAM.

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- Amount of PC RAM listed in GB in System Resources box.
  - Model resolution calculations changed to double precision.
  - Option to disable automatic continuation of iterations for large meshes if program has not converged.
  - Number of model parameters allowed to exceed 16384 for IP data inversion using complex resistivity method.
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02-07-2018 3.14.7

### **New features**

- Option to trim data set and change model grid spacings for arbitrary electrodes data set.
- Voxler model output includes I.P., sensitivity and resolution values in same file as resistivity values.
- Sign of measured apparent resistivity is automatically inverted if most values read in from a file are negative.
- Option to create a new data file using the data misfits from an inversion output file as data error estimates.
- Inversion will automatically continue for models with more than 200,000 nodes if option to add 1 or more iterations is used

### **Corrected bugs**

- Thickness of first layer of model can be set to less than one-tenth the minimum depth of investigation of the data set (mainly intended for traditional gradient arrays).
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13-06-2018 3.14.3

### **Corrected bugs**

- Shows correct support and update dates for Aarhus GeoSoftware license
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07-05-2018 3.14.1

### **New features**

- Function to automatically disable removal of negative calculated apparent resistivity values if logarithm of apparent resistivity is not used as inversion data parameter added
- Option to convert data file in boreholes format to subsurface point electrodes
- Changes to option to save model values to VTK format, I.P. model values automatically saved with resistivity values, second file automatically generated if global coordinates present.
- Support for 256GB RAM.

### **Corrected bugs**

- Fixed bugs in options to set the thickness of the first layer, the depth range of the model and number of layers
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07-05-2018 3.13.50

### **New features**

- Option to combine 3-D data sets into a single file
- Scatter plots for calculated versus measured apparent resistivity and I.P. data
- Screen dump to BMP, JPEG, PNG, TIFF and GIF formats
- Finite-element mesh size limit for Res3dinv64 Basic increased to 1.5 million nodes