SEEQUENT

GeoStudio

GeoStudio **2024.2**

new release

GeoStudio 2024.2 Release Notes

## Enhancing Geotechnical Analysis and User Experience

This latest release provides important updates and new features for GeoStudio users conducting slope stability, seepage, and consolidation analysis, particularly for defining conditions within the unsaturated zone and assessing the probability of failure.

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GeoStudio

Features and Functionality

UI/UX Improvement: Context Menus

GeoStudio 2024.2 now includes an enhanced user experience with the addition of context menus. The right-click context menu provides quick access to relevant actions, reducing the need for navigating through the UI to find specific commands. The enhanced usability and streamlined interactions make for a more enjoyable and efficient user experience.

Logarithmic Reliability Index in Results

The reliability index is an additional probabilistic analysis output that provides crucial value to the slope safety measure, as it represents the number of standard deviations that separate the mean Factor of Safety from the critical Factor of Safety. When analyzing the reliability of a system or structure, engineers often use this index to assess the safety margin and ensure that the design meets acceptable risk levels. Thus, a higher reliability index indicates a more robust and reliable design against failure.

Slope Stability: Unique Material in Unsaturated Zone

The geotechnical properties that govern stability are often different in the unsaturated zone. For example, an undrained strength definition might be needed in the saturated zone while a Mohr-Coulomb material model is required in the unsaturated zone. Similarly, liquefied strengths might be needed below the water table while drained effective stress strengths are required above. SLOPE/W and SLOPE3D now provide the option to use a unique material model in the unsaturated zone, removing the need to split regions along the piezometric surface.

Improve Consolidation Analysis in the Unsaturated Zone

Improve the handling of the unsaturated zone in a Consolidation analysis. The effective saturation (S_e) controls the influence of pore-water pressure changes on the deformations, and therefore effective stress changes, in the unsaturated zone. The value of S_e is now obtained as an average over the time step to improve the accuracy of the solution. This is particularly important if the pore-water pressures cycle in the unsaturated zone; however, it also improves the simulation of staged construction of an embankment since the fill material normally desaturates after placement.
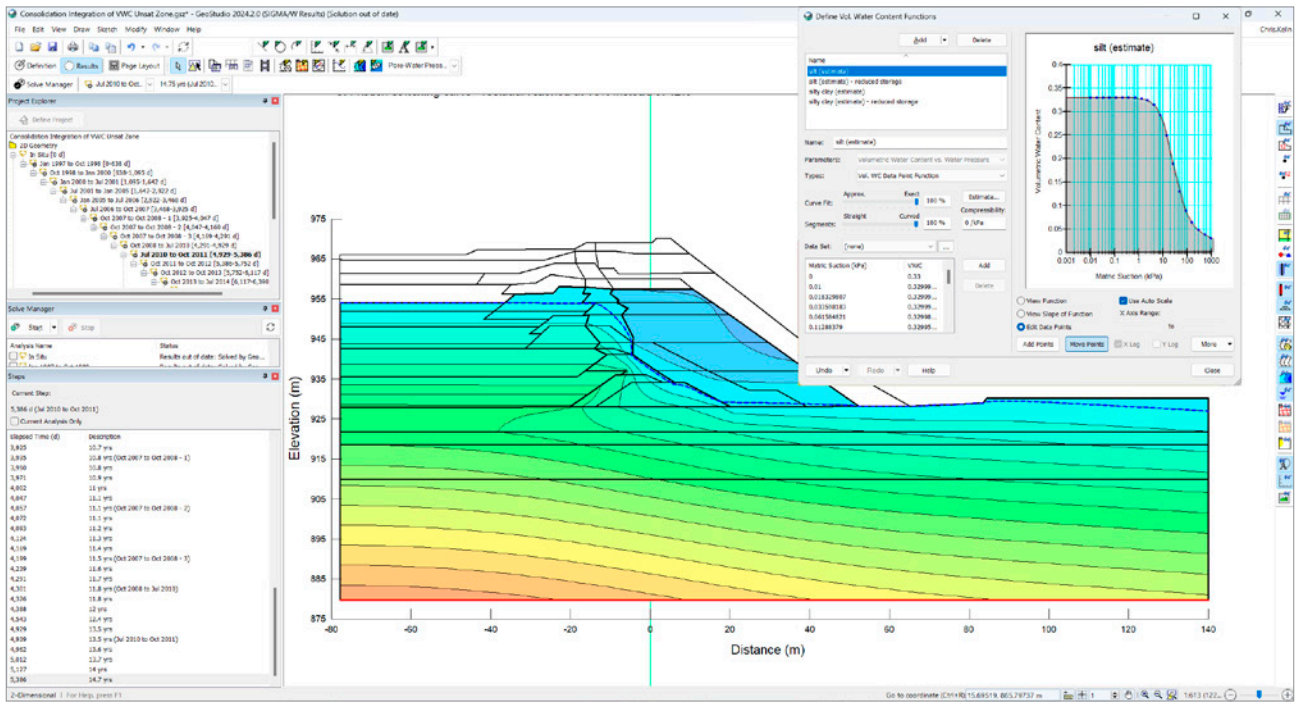
Exclude B-bar or Ru in the Unsaturated Zone

SLOPE/W and SLOPE3D now include an option to exclude B-bar or Ru in the unsaturated zone. B-bar is often used to model the pore-water pressure response due to loading, while Ru is used to capture spatial variation in pore-water pressure as a function of effective overburden stress. In both cases, the pore-water pressure definition is often not valid in the unsaturated zone. This new option allows GeoStudio to better reflect field conditions.
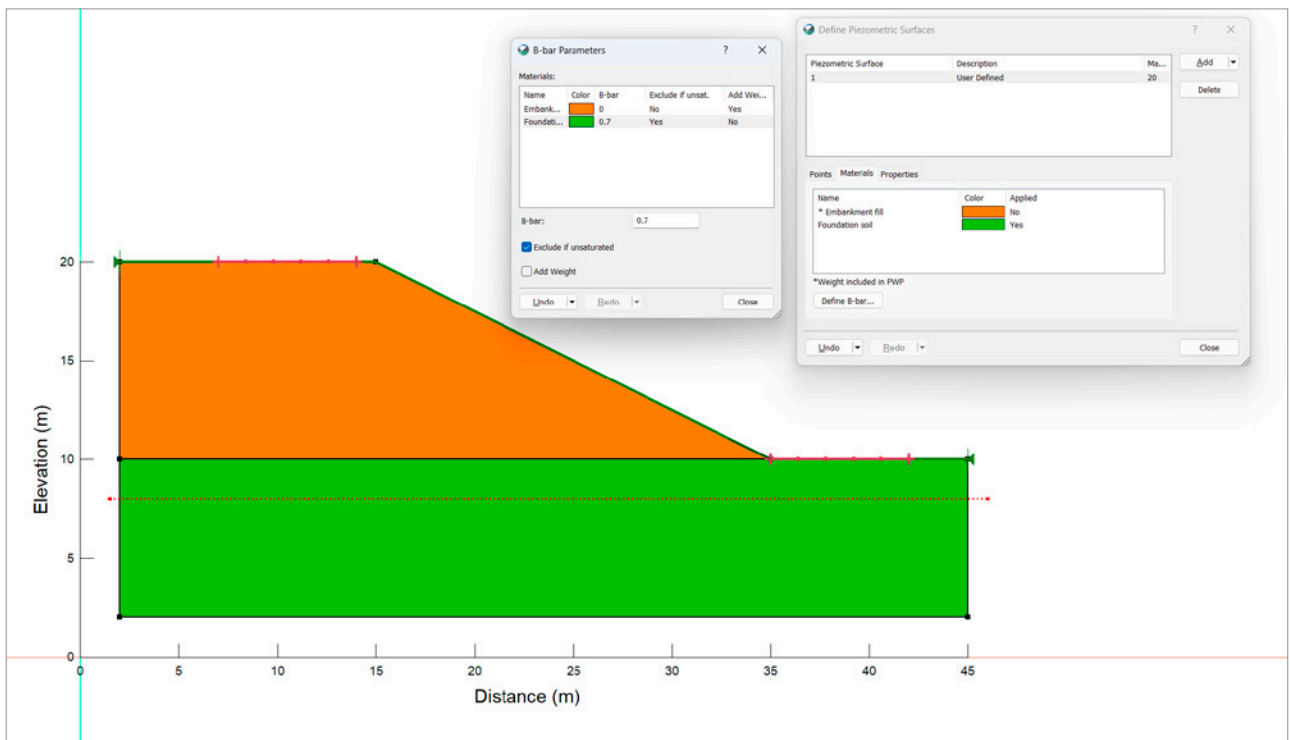
Probabilistic and Sensitivity Analysis in SLOPE3D

Probabilistic analysis enhances slope stability assessments by embracing variability, acknowledging geological uncertainties, and providing a more comprehensive understanding of the failure probabilities. The release of GeoStudio 2024.2 sees the expansion of probabilistic analysis into 3D stability, providing a realistic assessment of the probability of failure, considering the probabilistic distribution of a wide-ranging set of input parameters.
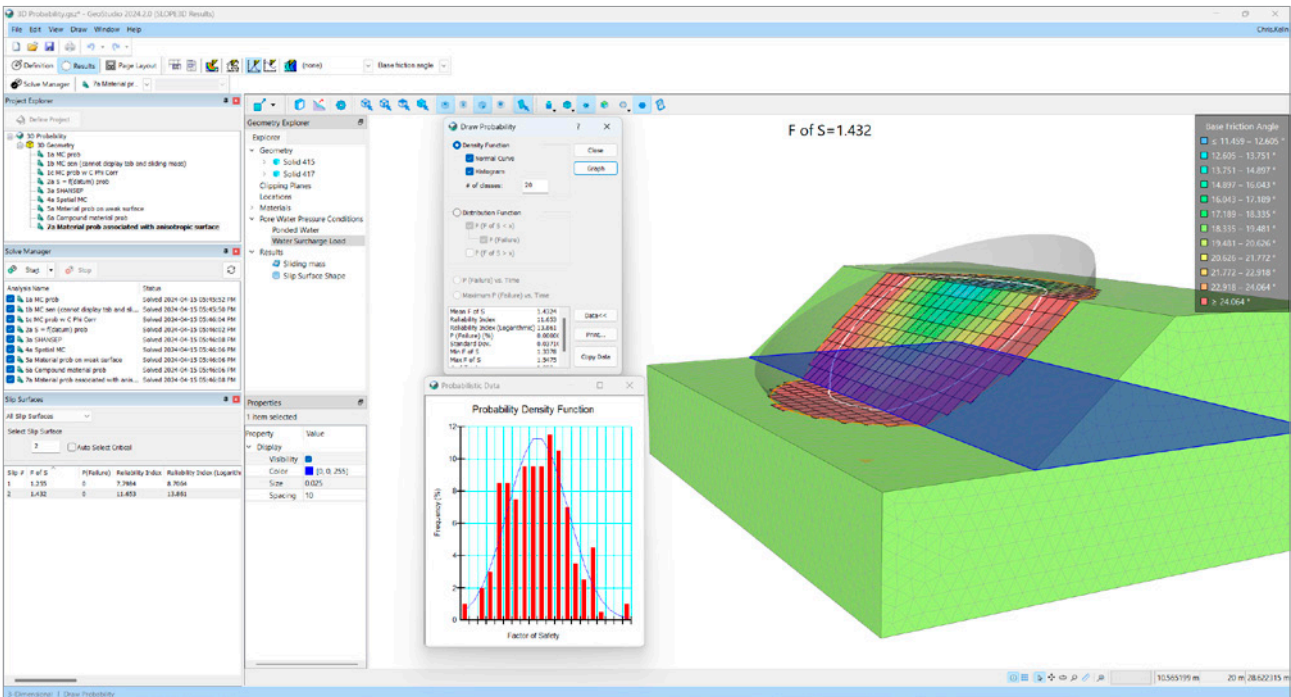

Hydraulic Conductivity Anisotropy in SEEP3D

The hydraulic conductivity of porous media is often higher in one direction than in other directions. This directional dependency (i.e. anisotropy) is generally due to sedimentation, consolidation, dissolution, and/or homogenization of layered media as equivalent homogeneous media. In these cases, the hydraulic conductivity is assumed orthotropic; that is, unique, and independent, in three mutually perpendicular directions. SEEP3D now accommodates this type of anisotropy, allowing engineers and hydrogeologists to enter the dip and dip direction of the principal axis, along with anisotropy ratios defining the conductivity in the opposing directions of the rotated Cartesian coordinate system.
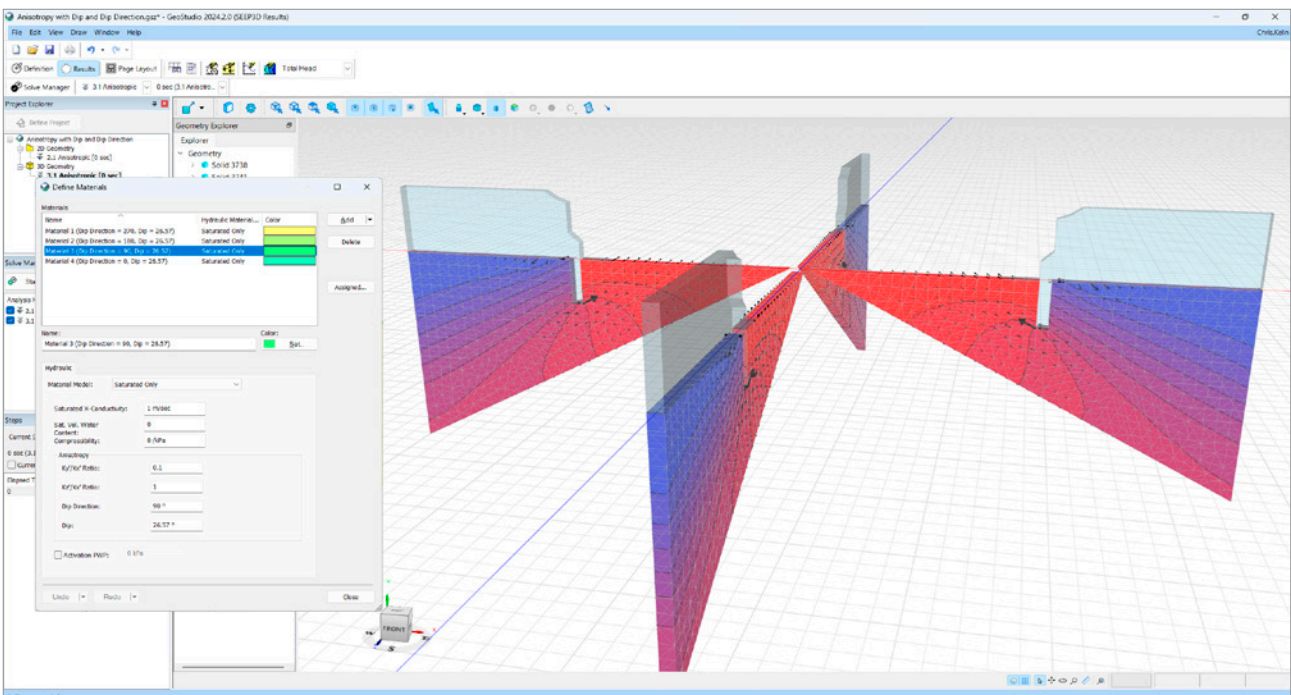
Add-In Support for Slope Stability Columns

The new Column Force add-in API allows a force to be applied to every column of every slip surface. The add-in returns the force components and point of application on each column, allowing engineers to create add-ins to simulate the application of static or dynamic loads applied to a sliding mass. This new functionality provides users the ability to expand the current pseudo-static approach in slope stability and better accommodate spectral pseudo-static or similar seismic practices in LEM.
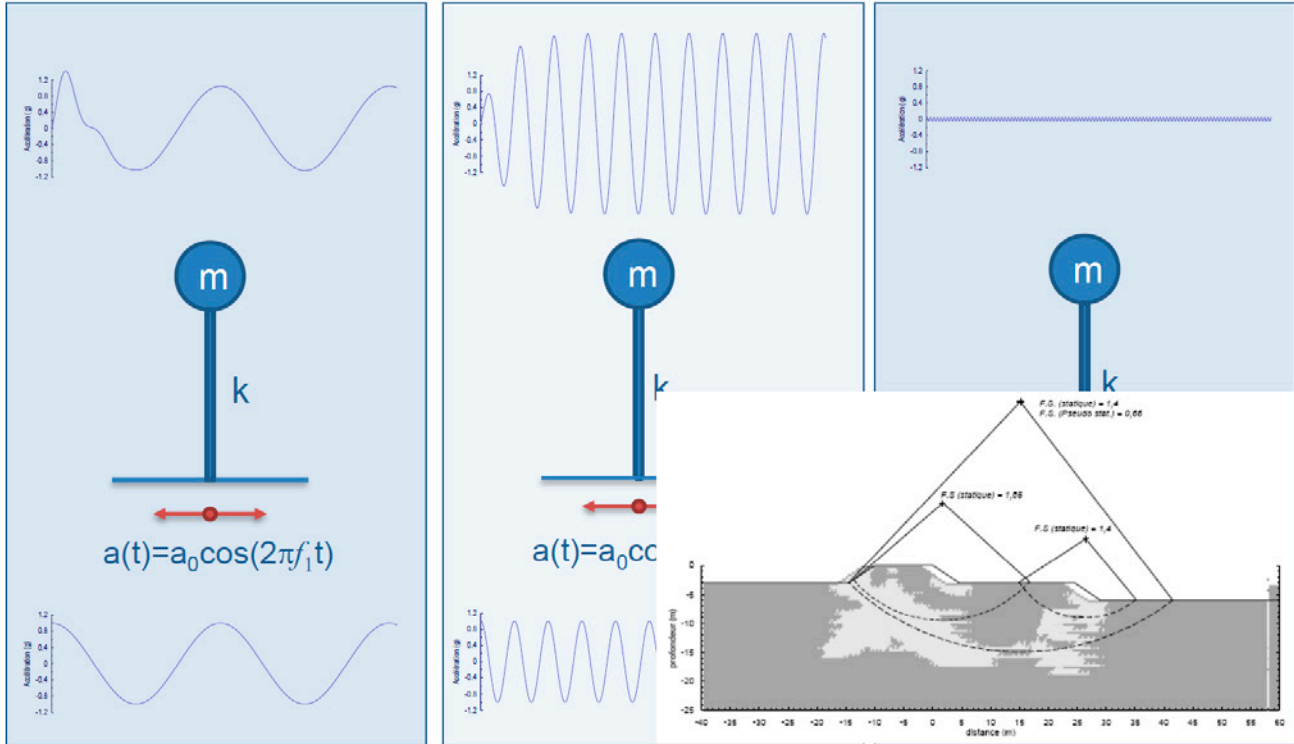
Bug Fixes and Changes

BUILD3D / 3D Products

Change	1375373	Clarified various error messages when importing or meshing objects like Background Meshes, Geological Model Volumes (GMVs), and Solids.
Change	1396477	Improved performance during interaction with the 3D view camera.
Change	1402795	Decreased load time of the Results view on first open.
Change	1420766	Parallelized processing of some 3D components to improve general performance.
Bug	1414484	Fixed some cases where graph locations were not persisted when remeshing.
Bug	1442648	Fixed a crash on import of background meshes during mesh cleanup when the mesh consists of many non-manifold components.
Bug	1399290	Fixed a hang on importing a DWG file as a background mesh if duplicate triangles were encountered.
Bug	1305668	Improved handling of import of Geological Model Volumes for some specific cases with non-manifold meshes.
Bug	1373431	Improved 3D contour line drawing around solid intersections for cases where the lines may have been missing or the lines may have been drawn at the intersections.
Bug	1398502	Fixed screenshot export when custom sizes were chosen.
Bug	1388834	Imported sketch line points with the same coordinates are now merged.
Bug	1385324	Fixed a case where the vertices of an internal line did not contribute to the mesh refinement where the line intersected a solid.

SLOPE3D

Bug	1416356	Hidden bodies are now ignored when snapping points to the ground surface to draw Entry and Exit grids.
Bug	1377008	Improved the display of Ponded Water for the case where a parametric solid is generated by horizontal extrusion of an irregular curved profile.
Bug	1410715	Fixed the case where a unit conversion was not being done when a Sphere fully specified slip surface shape was specified and the display units were changed.

SLOPE/W

Bug	1456540	Fixed a crash when performing multiple Zoom operations on an analysis with many boundary conditions and text labels.
Bug	1421425	Draw Graph of kind Probabilistic was not displaying if a slip surface other than the critical or optimized was selected.
Bug	1404587	Fixed object placement in print of Page Layout when an analysis had reinforcements.
Bug	1445843	Analysis Type can now be changed in the Student Edition.
Bug	1449285	Fixed cases where Sketch Text was displaying improper strings for some objects.
Bug	1405425	Fixed a case where the nonconvergence in some runs caused a shift in the Sensitivity Data graph.
Bug	1445828	The graph of Probability Distribution Function now displays for non-critical slip surface results.
Bug	1321176	Fixed the F of S display label to display aligned with the slip surface for the case where the Critical Slip Surface is from the Parent Analysis. Also improved the label to display closer to the ground surface for the case of an automatic search that resulted in a slip surface with a large radius.
Bug	1422113	Fixed an issue introduced in v2024.1, where use of an anisotropic material with a uniform modifier function could cause a crash.
Bug	1424919	Fixed use of anisotropic surfaces giving incorrect results if the sliding direction was right-to-left.
Bug	1409581	Fixed a scenario where using Split Regions would not work if a Point existed behind a Region, but the Point was not part of the region.
Bug	1384210	Fixed the incorrect display of the Governing Component in View Object Information for results of a Reinforcement.
Bug	1410684	Corrected the effect of user-specified Resisting/Driving angles in Right-to-Left optimization analyses.
Bug	1387731	Fixed a crash in a project for a case when both SLOPE/W and SLOPE3D analyses were present and View All Slip Surfaces was toggled on in SLOPE/W.

SEEP/W

Bug	1397709	Volumetric water content and hydraulic conductivity estimation dialogs were not discarding changes using the Cancel and X buttons.

QUAKE/W

Bug	1396936	Fixed the case where an Initial Static QUAKE/W analysis would report a File Not Found XML error if the analysis was previously set as another Analysis Type and initial conditions were set to the Parent.

All Products

Bug	1414396	Fixed a problem introduced in version 2024.1 that prevented keyboard entry or pasting of data for a spatial function.
Bug	1428188	Fixed a case where SLOPE/W would give a Skipped status in the Solve Manager after upgrade to GeoStudio 2024.1.0, due to unused spatial functions in the file.
Bug	1430504	A fresh installation can now be done without an internet connection.
Bug	1351624	Prevented a crash or hang on attempting to open a newer GSZ file version than currently supported by the current product version.