



RAMMS::ROCKFALL CHANGELOG

V 2.1.02 [2026-06-19]

- **New Feature: Clear Cached Statistics** - Added notification when parameters affecting statistical analysis are changed (quantile values, minimum number of values). Users can clear cached statistics (Project → Clear Cached Statistics) and re-open the scenario to ensure results reflect current settings.
- **Improvement: Collision detection** - Replaced $\text{pow}(x, 2)$ with $x * x$ in hot loops (collision detection). Removes a ~8% CPU cost and is marginally more accurate (one rounding step instead of several). Individual trajectories may diverge from previous versions due to small numerical differences adding up over the course of a simulation. Aggregate statistics on validated scenarios match the previous version to within normal numerical variance.
- **Bugfix: Line-profile and polygon analyses** - Fixed a stability issue in RAMMS::Rockfall line-profile and polygon analyses when no valid result values were found in the selected analysis area.
- **Bugfix: JumpH vs Ekin Plot for Target Line** - Fixed a stability issue in the "JumpH vs Ekin Plot for Target Line" analysis when the required trajectory shapefile set was incomplete, for example when the .shp file existed but the corresponding .dbf or .shx files were missing.
- **Bugfix: Legacy v1.8.x projects** - Impact analysis on obstacles failed due to an MPa/kPa unit mismatch in stored ME values. Now converted on load.

- **Bugfix: Multi-scenario impact analysis** - Only the last selected scenario was analysed (ASTRA shed impact analysis); remaining scenarios were silently ignored. Users who ran multi-scenario ASTRA analyses in earlier 2.x versions should re-run them; shapefile-region analysis crashed. Both now process all selected scenarios.
- **Bugfix: Multi-scenario** - Deactivated multi-scenario *grid resolution adjustment* (introduced in v2.0.9) due to identified bugs. Feature will be re-enabled once fully tested.

V 2.1.01 [2026-05-28]

- **Improvement: Net Objects** - Improved rockfall net Qhull geometry. Net obstacles are still represented by a prism-like Qhull volume, but the base is now terrain-following and slightly embedded below the surface instead of being defined only by the post endpoints and a shifted base line. This reduces gaps below the net and helps prevent rocks from passing underneath the obstacle on irregular terrain.
- **Improvement: New Project**: The *Create Project* button is now only enabled after a valid DEM has been specified.
- **Bugfix: New Project**: Creating a new project in a write-protected folder now shows an appropriate error message instead of failing unexpectedly.
- **Bugfix: Updater**: Fixed an issue with the automatic updater. In some cases, RAMMS correctly detected that a new version was available and displayed the changelog, but the updater then reported that the installed version was already up to date. The updater now identifies itself correctly when communicating with the RAMMS web server, improving update detection and download reliability.
- **Bugfix: Dam/Net Summary**: In the *Dam/Net* tab of the *Run Simulation* window, only 5 entries were displayed even when more dams/nets were specified.

V 2.0.11 [2026-04-28]

- **New Feature: Improved 3D navigation usability** - Added a new navigation shortcut in the 3D view: hold **Shift** while dragging with the mouse to rotate the topography directly, without manually switching to the Rotate tool. This makes 3D navigation faster, smoother, and more intuitive.
- **New Feature: ASTRA-Analysis from Shapefile** - New feature to use ASTRA analysis also from shapefiles, if shed is included in the terrain (**Results -> ASTRA Analysis from Shapefile (Terrain)**).
- **Improvement: Module Access**: Improved module access handling to make multi-user usage more robust and prevent modules from remaining blocked after crashes. Users can now automatically recover from previous sessions when restarting RAMMS.
- **Improvement: ASTRA - GeotIFF raster results**: Improved impact-point interpolation by excluding cells too far from measured points, reducing artifacts in unsupported areas.
- **Improvement: Maximum scar depth: terrain-dependent cap**: Previously, the maximum scar depth was capped only by rock diameter ($2R$), which could allow unrealistically deep scars on stiff terrain where soil mechanics would prevent such penetration. The cap is now also bounded by a terrain limit, ensuring scar depths respect the local soil stiffness (ME).
- **Improvement: Scarring: large-rock corrections**: Added a static scar depth term for rocks $> 50 \text{ m}^3$ to compensate for insufficient energy dissipation at low impact velocities. Existing projects with large rocks may show reduced jump heights and runouts; smaller rocks and bedrock substrates are unaffected.

- **Bugfix: Rotation integrator:** Fixed convergence failure for very large rocks ($>200 \text{ m}^3$). The Newton-Raphson tolerance is now scaled relative to the initial angular momentum magnitude, making it work correctly for rocks of any size. Previously, large rocks could produce "Convergence_error" messages and cut off trajectories due to an absolute tolerance at machine-precision level. Results for smaller rocks are unchanged within floating-point precision.
- **Bugfix: Impact-Analysis from Obstacles:** Fixed a bug in multi-obstacle impact analysis that could cause an error when some obstacles were not hit. Non-hit obstacles are now skipped correctly during processing.

V 2.0.10 [2026-03-12]

- **New Feature: Create TFW from GeoTiff** - RAMMS can now generate a .tfw world file directly from a georeferenced GeoTIFF, making it easier to use external map and image overlays without manual GIS preprocessing. Use *Extras* → *Create TFW from GeoTIFF (World File)*.
- **Improvement: Release lines - point distribution:** Improved point distribution along multipart lines with length-weighted allocation and exact total point count.
- **Bugfix: Release lines:** Fixed an issue where the number of points per release line was saved incorrectly in the input file, causing an incorrect simulation setup when reopening the file. Simulation results themselves were unaffected.

V 2.0.9 [2026-03-04]

- **Breaking changes: NEW GUI** - Major UI overhaul with new, bigger icons and GUI dimensions.
- **New Feature: Reduced Mode** - RAMMS::Rockfall can export results in two packaging styles:
 - (1) **Full mode** (per trajectory): one file per trajectory - .rts for trajectories, .bes for obstacle hits, .tes for tree hits.
 - (2) **Reduced (container) mode (default)** (per process/CPU): many trajectories batched into one file per worker - .rtc for trajectories, .bec for obstacle hits, .tec for tree hits.Both modes are supported by post-processing. The big difference is how much data each trajectory carries. In container mode we deliberately store only:
Kinetic energy, Jump height, Velocity (resultant), Scar depth, plus X/Y (we get zt from the DEM to reconstruct Z). Everything else from the full dump is not written to reduce size and accelerate I/O.
- **New Feature: Analyse Obstacle Impacts** - For each obstacle, the tool identifies all rocks that hit the obstacle, finds the first impact on that obstacle, extracts the key kinematic quantities at that moment and writes one CSV file per pts-file. A html report is created and shown in your browser. The same analysis is possible for impacts on terrain (polygon shapefile region).
- **New Feature: Visualize Obstacle Impacts (Experimental)** - In addition to the CSV output, RAMMS::Rockfall provides a small 3D visualisation of the obstacle impacts. This helps you to see **where** rocks hit a net or dam and **how** they arrive (direction and speed).
- **New Feature: Probability of Reaching Target Line** - The SOL-line analysis (SOL: Schadenobjektline = Damage Object Line) quantifies how many simulated rockfall trajectories reach and cross one or more user-defined line(s) in the terrain (the "SOLs"). For each rock type and each SOL segment, the tool reports the reach probability *pEr* and the probability of occurrence *prA*.



- **New Feature: Kin. Energy vs Jump Height Plot** - This analysis tool provides a simple way to **visualize** the **impact energy** and **jump height** of rock trajectories **along a line shapefile**.
- **New Feature: Activity Log** - The Activity Log records the most important actions you take in RAMMS::Rockfall so you can audit your work, retrace steps, and find files quickly. 'Track → Activity Log... → Show All Activity' shows all actions, or you can filter by action.
- **Improvement: Slope angles and hillshade image**: Calculation of slope angles and hillshade visualization improved (performance). When creating a new project, the hillshade image is automatically created, saved in the folder `\hillshade` and the user can overlay it directly.
- **Improvement: New Dam Design Tool** - Build precise 3D dam geometries in seconds! Simply define your dam foot outline - now with support for **multiple face points** for maximum terrain conformity. Then, shape your structure with:
 - Customizable face inclination (e.g., 70°)
 - Constant horizontal crest altitude
 - User-defined dam crest widtha clean, realistic dam surface that hugs the terrain and fits your model.
- **Improvement: Automatic Output of Velocity** - Previously, after a successful calculation, GeoTIFF's of the most important output parameters were automatically exported-except for velocity. This has now been fixed, and velocity is now included in the automatic output.
- **Bugfix: Rockfall License Request File**: Fixed an issue where the generated rockfall license request file had the wrong filename (AVA instead of ROCK).
- **Bugfix: Map/Orthophotos**: Fixed an issue where maps or orthophotos were not found if they were stored in a folder with spaces in the file path.

- **Bugfix: Reach Probabilities:** Reach probabilities were correctly calculated after the calculation of a scenario but not saved. After re-opening a scenario, reach probabilities results were empty.
- **New Feature: Drag & Drop Support** - You can now drag and drop input files, output files, DEM files (GeoTIFF and ASCII), and shapefiles directly onto the main window of the GUI.

V 1.8.27 [2024-12-04]

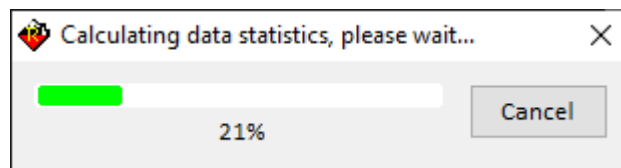
- **Bugfix: Velocity-TIFF-Output:** In reduced mode, the velocity-TIFF-output was not automatically exported. This issue has now been resolved.
- **Bugfix: Random Forest Distribution:** When generating random tree distributions, the pattern appeared overly uniform due to a high default standard resolution, which prioritized speed over variability. The default resolution has now been reduced, leading to improved distribution quality, albeit with slightly slower generation times.
- **Bugfix: Trajectory-Mode:** Several minor bugs were resolved following the relocation of output files to the *traj_files* folder.

V 1.8.26 [2024-07-10]

- **Bugfix: Nr of available CPUs:** When starting a scenario, RAMMS suggests an optimal nr of CPUs to use. These numbers were too high, as twice the nr of available CPUs on the system were used. Resolved.
- **Bugfix: Web Update:** In version 1.8.25 and earlier, the Web Update feature did not work, due to a wrong URL-string. Resolved. From version 1.8.26 on, Web Update should work.

V 1.8.25 [2024-07-01]

- **Improvement: Preferences:** The 'Additional Preferences'-File is now saved in the Windows-User-Directory.
- **Improvement: Statistics Data:** Up until now, the trajectory information was cached in an internal binary RAMMS format, such that opening an existing scenario takes less time. However, the statistical analysis was recalculated each time, see Figure below. **Improved:** The statistical analysis is now also cached in an internal format, and opening an existing scenario will take much less time.
Beware: If two or more scenarios are opened together, or if a scenario is filtered (e.g. by a rock-name), then neither the cached trajectory data nor the cached statistical data can be used, and all the trajectories have to be parsed and the statistical analysis has to be calculated again.



- **Bugfix: Release Points:** There was a problem when assigning not enough release points to very large polygon shapefiles. **Resolved:** If this is the case, RAMMS will make sure that there is at least one release point within very small release polygons. The total nr of release points will thus be increased accordingly.
- **Bugfix: Shapefile File Tree:** When adding the same folder with shapefiles twice, the shapefiles were listed twice in the file tree. **Resolved.**
- **Bugfix: Trajectory Impact-Analysis from Shapefile** → Doing a trajectory impact-analysis of 4 or less trajectories resulted in RAMMS crashing. **Resolved.**

V 1.8.20 [2024-05-28]

- Official release of the new RAMMS::ROCKFALL “**SCARRING**” Module.
- **New Feature:** **New Tree/Forest Approach** → See manual about details.
- **New Feature:** **New Scarring Approach** → See manual about details.
- **New Feature:** **Rockfall Nets** → See manual about details.
- **New Feature:** **Rockfall Dams** → See manual about details.
- **New Feature:** **Rockfall Galleries** → See manual about details.