



## **Two Matlab routines for rock material propagation modelling: PLANOS, a volume assessment by infinite planar discontinuities, and PrePostDAN3D, a data treatment tool for before and after DAN3D processing**

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Rockfall, rock avalanches, and other hazards are driven by discontinuities that can lead to a problem. In order to identify and calculate the potential risk associated with these discontinuities, it is necessary to know the volume of the unstable material and the potential reach when it collapses. The following two routines were created in Matlab to facilitate these calculations.

If the discontinuities are planes like faults, bedding, and other structural features, a body can be isolated, and its volume can be calculated. Planos aims to help the researcher to display the planes mapped on the field and to display their relation to the topography. The user needs to have the position of planes on the topography, the dip, and the dip direction. This can be found on the field during the campaign, on a geological map, or using a high-resolution digital model (Lidar or Photogrammetry). Finally, Planos requires the digital elevation model (DEM) of the study zone. The planes are prolonged to have the same extent as the DEM, and the section of the topography will be delimited by those planes. Planos closes the body between planes and creates a mesh with the nodes of each plane underneath the topography and the DEM. This allows the application to calculate the volume and to create a new elevation model minus this volume. Today, expensive and complicated software allows the user to upload the digital elevation model (DEM), to create the planes and to estimate the volume. This procedure takes time and requires a certain knowledge to perform. Planos was created to make these functions accessible and to simplify the procedure.

In our recent research on landslide propagation, the propagation models were performed with DAN3D (Hung and McDougall 2009). This software uses ascii grid files (.grd) to work and exports a text file with the characteristic of each particle in the space. Constructing the grid can be time consuming and complicated. If the user performs multiple models, it is also a long process to compare all of them in order to find the best fit. Finally, the user must create rendering. PrePostDAN3D aims to replace complicated software and to accelerate the pre and post treatment. First, the user needs to have the topography, and the source in ascii files (.asc). The program helps the user to choose the correct parameters from a database (McKinnon 2010), and creates a sensitivity analysis table. After DAN3D processing, the program compares the numerical models and the data collected on the field and looks for the minimum difference between the same parameters. Finally, the user can select the model that they consider to be most conform to reality and visualise the result in 2D or 3D. PrePostDAN3D looks for a simple way to accelerate the procedure for propagation modelling.