Table 1 – Input files.

Inputs	ASCII file columns						Description
	1	**2**	**3**	**4**	**5**	**6**	
mnt.txt or dtm.txt	X [m]	Y [m]	Z [m]	N_x Unit vector perp. to surface	N_y	N_z	3D point cloud of the ground surface with its normals. Other columns, e.g. the RGB colours, must be removed from the file. The spacing in between the points should be relatively even. It should also be at least 4x smaller than the diameter d1 of the block to be simulated. Holes should be patch. Artefacts and points from vegetation should be removed (blocks will try to bounce on them as if they were part of the ground). (Hint: for a quick preliminary test, unfiltered 3D model, e.g. from SfM, can be use. Runouts and deviations will however be affected by the impacts against the artefacts and vegetation).
infrastructure.txt	X [m]	Y [m]	Z [m]				3D point cloud of the infrastructures without other columns. The spacing in between the points should be similar to the largest diameter (d1) of the smallest block to be simulated. (Hint: for now, infrastructures correspond to "information collectors". When intercepted by trajectories, they do not affect the paths of the blocks, but trigger stnParabel to save the position of each first contact with their related information and source origin).
fence.txt	X [m]	Y [m]	Z [m]				3D point cloud of the net fences without other columns. The spacing in between the points should be similar to the largest diameter (d1) of the smallest block to be simulated. When reached, they trigger the end of the simulated trajectory (the evaluation of the capacity of the net is left to the user). With this early version of stnParabel, it is recommended to filter out the impacts with a center of mass over the upper limit of the net, or to lower the height of the 3D model of the net by half of the largest diameter of the block (this will be done automatically later on).
wall.txt	X [m]	Y [m]	Z [m]				3D point cloud of the wall catchment without other columns. For now, it behaves like the ground and should have the same spacing in between the points.
tree_pts.txt	X [m]	Y [m]	Z [m]	DBH [cm]	FE_{ratio}	ΔZ_{ground} [m]	3D point cloud of the center line of the stems with their related diameter at breast height (DBH), their fracture energy ratio (FE_{ratio}) and elevation relative to the ground. The stems are then considered by stnParabel as cones with a diameter at the breast height that correspond to the DBH.
sources.txt	X [m]	Y [m]	Z [m]	N_x Unit vector perp. to surface	N_y	N_z	3D Position of the sources near the ground. (The blocks are offset perpendicularly to the terrain from their source point before being released). (Hint: If no sources are defined in the project, stnParabel will try to simulate from the sources identified in this file, if present. It can be modified to customise the sources to be used in the simulations).

Table 2 – Output files.

Outputs	ASCII file columns						Description
	1	2	3	4	5	6	
sources.txt	X [m]	Y [m]	Z [m]	N_x	N_y	N_z Unit vector perp. to surface	3D Position of the sources near the ground. (The blocks are offset perpendicularly to the terrain from their source point before being released). (Hint: If no sources are defined in the project, stnParabel will try to simulate from the sources identified in this file, if present. It can be modified to customise the sources to be used in the simulations).
trajectories.txt	X [m]	Y [m]	Z [m]	V_{tran} [m/s]	Time [s]	$Traj_{ID}$	3D simulated trajectories with their translational velocities and ID. They are composed of points located at the center of mass of the particles. (Hint: translational energy (E_{tran}) [J] can be obtain with: $E_{tran} = 1/2*mass*V_{tran}^2$).
reach_type.txt	$Traj_{ID}$	Imp_{ground} [0 or 1]	Imp_{tree} [0 or 1]	Imp_{infra} [0 or 1]	Imp_{fence} [0 or 1]	Imp_{wall} [0 or 1]	List of trajectories ID with their corresponding type of terrain/structure encountered. If a type of terrain/structure is impacted at least once, its value is switched from 0 to 1. (Note: this file is not meant to be loaded as a 3D point cloud).
pos_deposited.txt	X [m]	Y [m]	Z [m]	$Energy_{line}$ [°]	d_1 [m]		3D positions of the center of mass of the deposited blocks with their corresponding energy lines and largest diameter. (Hint: small energy line, e.g. 25°, usually correspond to long runouts. It is recommended to filter out values near 0° or 90°, if present, and to adjust the reach probability consequently).
pos_reach.txt	X [m]	Y [m]	Z [m]	V_{tran} [m/s]			First impact 3D location against an infrastructure of a trajectory and its translational velocity. (See hints of trajectories.txt for the energies).
source_reach.txt	X [m]	Y [m]	Z [m]	$Reach_{ratio}$ [%]	$V_{tran\_95\%}$ [m/s]	V_{tran_mean} [m/s]	3D Positions of the sources near the ground with their ratio of trajectories simulated from them that are reaching infrastructures. The mean and 95th percentile of the translational velocity when impacting infrastructure is also stored with the respective source. (For the energies, see hint of trajectories.txt).
impacts.txt	X [m]	Y [m]	Z [m]				3D positions of the detected impacts against the ground and tree stems (based on the original impact detection algorithm). The positions are shown with points oriented based on the perceived terrain roughness and added lateral and vertical perceived deviations, if present. With Dorren's model, they are shown in the 2D vertical plane of the incoming parabolas due to its 2D custom impact detection algorithm.
pos_reach_fence.txt	X [m]	Y [m]	Z [m]	V_{tran} [m/s]			First impact 3D location against a fence of a trajectory and its translational velocity. (See hints of trajectories.txt for the energies).
raster_max_height.tif			gridded data				Raster of the max elevation of the trajectories (and not height for this early version of stnParabel). The maximum vertical rebound height can be obtained by subtracting a dtm raster to this one. (Hint: it is important to define the raster projection when importing it in a GIS software. It uses the same projection as the one from the ground point).
raster_mean_height.tif			gridded data [m]				Raster of the mean elevation of the trajectories (and not height for this early version of stnParabel). The mean vertical rebound height can be obtained by subtracting a dtm raster to this one. (See hint of raster_max_height.tif for the projection).
raster_nr_passages.tif			gridded data				Raster of the number of trajectories passing over/on the terrain. A large block can reach a wider area than a small one, so the trajectories are not only lines connecting the center of mass points, but also have a buffer around them corresponding to the largest radius of the blocks. It is recommended to not mix different block sizes in one simulation, but rather to combine the different results after. (See hint of raster_max_height.tif for the projection).
raster_reach_prob.tif			gridded data [%]				Raster of the number of trajectories passing over/on the terrain divided by the total of simulated rockfalls. The ratio is expressed in %.
raster_log10_reach_prob.tif			gridded data [log_{10}(%)]				Log10 of raster_reach_prob.tif. (e.g. 2 means a reach probability of 1:1, 1 of 1:10, 0 of 1:100, -1 of 1:1k, -2 of 1:10k, -3 of 1:100k, -4 of 1:1M, etc.)
raster_velocity_max.tif			gridded data [m/s]				Raster of the maximum translational velocity of the trajectories. (See hints of raster_max_height.tif for the projection and of trajectories.txt for the energies).
raster_velocity_mean.tif			gridded data [m/s]				Raster of the mean translational velocity of the trajectories. (See hints of raster_max_height.tif for the projection and of trajectories.txt for the energies).
simulation_summary_image.png or simulation_summary_vector.svg							Print screens of the summary window that appears when the simulations are done, in png format or in vector format (clearer when scaled in Word).