Explanations for the available axial test datasets (http://doi.org/10.5880/GFZ.4.1.2016.006)

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These datasets are supplementary material to
Klinkmüller, Matthias; Schreurs, Guido; Rosenau, Matthias; Kemnitz, Helga (2016): Properties of granular analogue materials: A community wide survey. Tectonophysics, http://doi.org/10.1016/j.tecto.2016.01.017

This dataset provides compaction data from axial testing on natural and artificial granular materials used for experimental simulation by the analogue geodynamic modelling community (21 sands and glass beads). The material samples have been collected community-wide and analysed at GFZ Potsdam in the framework of the GeoMod2008 conference benchmark initiative. The context of data collection, details of the material samples and measuring techniques as well as interpretation and discussion of results can be found in Klinkmüller et al. (2016) to which this dataset is supplement material.

The data presented here are derived by uniaxial, confined compression testing using the Axial Tester at GFZ Potsdam's analogue laboratory for tectonic modelling. Each sample has been carefully prepared by the same person and measured consistently following the same protocol. Preparation included sieving at 250 ml/min from 30 cm height into the container (jar). Up to 2000 kPa of uniaxial compression has been applied in 50 cycles. Laboratory conditions were air conditioned during all the measurements (temperature: 23°C, humidity: 45%).

The resulting **stress curve data** are presented at 20 Hz frequency and the Unit of N. From the stress curves the **compaction data** have been derived. These correspond to the normalized sample height (normalized to the initial height) of the sample at the beginning of each cycle and are characterized by an exponential decrease over the 50 cycles. From that the following compaction parameters are derived: total compaction (shortening after 50 cycles Ct=eps50), the compaction during the first cycle (eps1) as well as the compaction index (Ci = eps1/eps50). Compaction data are finally visualized in the **compaction plot**.

Each material sample has a relation to three files: stress curve data (txt format, 50 files per sample), compaction data (xls/txt format), compaction plot (pdf format), examples of which are shown below. An overview of all files of the data set is given in the table **AT-CompactionDataOverview.**

***Example of data file type stress curve data**: first line = header for time series data in rows below second line, second line = container height / sample height at beginning of cycle / force at beginning of cycle*

s engine [mm]	s sample [mm]	Force [N]
800.000.000	845.006.746	76.419.900
0.0021819	0.0006052	146.240.785
0.0026563	0.0014809	192.803.936
0.0030878	0.0021872	232.321.818
0.0035828	0.0029296	274.259.649
0.0037312	0.0040186	286.275.946
0.0041050	0.0048696	315.661.037
0.0044620	0.0057501	342.721.548
0.0047988	0.0070887	367.552.844
0.0050955	0.0080169	389.201.253

***Example of data file type compaction data**: lines 1-5 = setup parameters and conditions, line 7 = test-ID, lines8-10 = sample details, lines 12-14 = compaction parameter from corresponding compaction data in rows below.*

GFZ-HelTec Axial Tester				
Routine:	Uniaxial, confined compression test			
Result:	Compaction parameter, elastic constants			
Setup:	Confined container (circular; D = 80 mm; H = 85 mm)			
Force sensor max load (N):	10000			
GFZ-Test-ID	M1-	069	070	072
Abbreviation	:	UBESAN	ULISAN	NTUSAN
Material	:	Quartz sand	Quartz sand	Quartz sand
Origin	:	U Bern	U Lille	Nat Taiwan U
Total Compaction	Ct = eps50	-0,01063319	-0,01378766	-0,00665381
Compaction Index	i = eps1/eps5	0,36205712	0,3522263	0,41291383
Compaction in 1st Cycle	eps1	-0,00384982	-0,00485638	-0,00274745
Normalized height at start of cycle	1	1	1	1
Normalized height at start of cycle	2	0,99615018	0,99514362	0,99725255
Normalized height at start of cycle	3	0,99486898	0,99419874	0,99668907
Normalized height at start of cycle	4	0,99426158	0,99346056	0,99627585
Normalized height at start of cycle	5	0,99370094	0,99291254	0,99613135
Normalized height at start of cycle	6	0,99312669	0,99252365	0,99556329
Normalized height at start of cycle	7	0,99263038	0,99206192	0,9954497