Supplementary Material

Untangling The Environmental from The Dietary: Dust Does Not Matter

Methods

Controlled-food trials

The controlled-food trials were carried out at the Mourier farm (Limousin region, France; agreement number B-87-176-01), under the supervision of the *Centre Interrégional d'Information et de Recherche en Production Ovine* (CIIRPO) and the *Institut de l'Elevage* (Idele). G.M. and D.G. who have official approval to carry out such procedures, designed these trials. They were performed on domestic sheep (*Ovis aries*), using only ewes from the *Vendéen* breed. All experiments were conducted on cull ewes, meaning sheep no longer suitable for breeding and sold for meat. None of the experiments required the sheep to be handled. Sheep had full access to foods with which they were familiar and none of them were put down for the sole purpose of the study. As planned by the Mourier farm, cull ewes were sold for meat after the 70 days experimentation. Due to sanitary and veterinary regulations in the slaughterhouse, stomach content could not be sampled. All skulls and mandibles of ewes were prepared and are stored at the IPHEP lab, CNRS and Université de Poitiers, France.

All of these ewes spent three months together in the very same grass-dominated pasture before the experiment started. Given that dental microwear is known to reflect the last few days or weeks of the dietary habits [1], it was assumed that their dental microwear signatures prior to beginning the controlled-food trials reflected a homogenous grazing signal [2]. A 5-day period of adaptation to the diet was proposed. The ewes were kept inside a covered sheepfold and fed from July 15th to October 2nd 2014. The sheep were not kept on hay, which they would have eaten, but on dust-free wood shavings. Feeding troughs were covered with a plastic film and cleaned out daily to avoid contamination. None of the ewes lost weight during the experiments.

Forty sheep were included in this study, divided into four groups of ten. Two 10-ewe groups were fed on a red clover-dominated silage and the other two groups were fed on a multispecific assemblage highly dominated by grasses. The red clover-dominated silage is composed of 12% herbaceous monocots, mostly *Lolium hybridum*, and 88% herbaceous dicots, including 72% of red clover *Trifolium pratense*. The second fodder is dominated by Poaceae with 92% herbaceous monocots, mostly *Bromus hordeacus*, *Festuca arundinacea*, *Guadinia fragilis*, *Holcus lanatus*, *Poa trivialis*, and *Anthoxanthum odoratum*. Eight percent of this silage is composed of herbaceous dicots, i.e. forbs.

The two sets of fodders were harvested from a 2.5 ha field heavily sown with red clover (*Trifolium pratense*) in September 2013 and from a 1 ha 15 year old pasture that underwent several phases of mechanical cutting and sheep grazing every year. In early July 2014, after 81 mm of precipitations spread over June 23th to July 5th, 2014, the two fields were cut 10 cm above the ground to avoid including grit in the harvest. Also, due to the precipitations that occurred, the harvest was expected to be free of air-born dust. This has been double-checked by counting the phytoliths versus exogenous elements after mineralization by incineration and acid attacks on the two fodders. More than 90 % of the elements issued from the residues in both clover and grass fodders are indeed phytoliths. However, the weight of residues is larger for grasses than for clover. The harvest was bale-wrapped 24 hours after cutting in order to guarantee similar natural physical properties to the uncut plant throughout the controlled- food testing (percentage of dry matter about 50%). Silica phytolith and cellulose contents expressed as percentages of dry matter weight for each fodder, as well as toughness of red clover and of a set of grasses measured on fresh plants are given in Tables S1 & S2 (see also Fig. S1).

The ewes had full access to the food. Ewes were given ~1.650 kg (dry matter weight) of clover fodder and ~1.550 kg (dry matter weight) of grass fodder per day and per ewe. These amounts were defined by giving large amounts of fodder and measuring how much the ewes had consumed in 24 hours.

Every day, a load of dust was added to the fodder of one of the 10-ewe samples per diet category (Table S1). Fodder and dust were placed in large troughs which were cleaned daily. For several days, the remaining dust was gathered and measured. This showed that more than 90% of the dust load was ingested by the ewes. The quantity and the properties of the dust used in the controlled- food testing follow the study of Breuning Madsen & Awadzi [3]. To our knowledge, this is the only study in inter-tropical latitudes quantifying the dust deposits on vegetation. It was conducted in Ghana and aimed at quantifying such deposits due to the Harmattan winds blowing from the Sahara from November to March. The authors sampled dust on carpets simulating vegetation at 1m, 3m and 7m above the ground at different spots along a latitudinal transect. In this current study, we focus on simulating dust accumulation in areas of high primary productivity with high concentrations of wildlife, and not on more arid areas where dust accumulation would indeed be more important, but wildlife would also be scarcer. Also, we focus on simulating ungulates feeding on above ground plant parts and not on species such as suids which forage on underground items with soil particles [4]. Data for the Guinean savannahs in the Tamale region in Ghana were therefore chosen to calculate the amount of exogenous particles to be added to the fodder. We use data collected at 1m above ground. One month of dust accumulation represents on average 3.3 g/m², an average calculated from 3 consecutive years. Ten ewes forage on approximately 40 m² a day. Consequently, the food was laden with 132 g of dust per 10-ewe sample to simulate the amount of dust deposited by the Harmattan on a meadow in 30 days.

<u>Preparation, Casting, Scanning</u>

The skulls were prepared following standard procedures in osteological preparation [5]. Each tooth was carefully cleaned. The facet of interest is located on the disto-labial enamel band of the protoconid of one of the lower second molars (Fig 1). Molds are then made using a polyvinylsiloxane elastomer (Regular Body President, ref 6015 - ISO 4823, medium consistency, polyvinylsiloxane addition type; Coltene Whaledent). This product is known to be the most efficient one to replicate a given surface [6,7].

The molds are then placed under a Leica DCM8 confocal profilometer using white light confocal technology with a Leica 100× objective (Numerical aperture = 0.90; working distance = 0.9 mm). The center of the dental facet of interest was sampled (Fig 1). Surface elevations for each specimen were collected at a lateral (x, y) interval of 0.129 εm with a vertical numerical step of 1 nm. For each specimen, a surface of 200 × 200 µm (1550 × 1550 points; Fig 1) is scanned and treated through LeicaMap software (Fig 1).

Abnormal peaks, due to interferences with air bubbles within the silicone matrix, were automatically erased with a batch algorithm computed on ImageJ software based on mathematical morphological tools (Fig. S2). The original surface S_0 is modified using an opening procedure (combination of erosion and dilatation) with a radius of 9 pixels in order to remove feature finer than 18 pixels (~2.0 µm). The resulting surface S_1 is subtracted from the original surface S_0. From this emerges a surface S_2, which contains abnormal peaks and the slight elevation differences between the S_0 and S_1 that correspond to the acquisition noise and low scale features. S_2 is submitted to a threshold at Z = 0.2 µm to select only the highest features corresponding to abnormal peaks. Such a cut-off value was chosen by carefully identifying the slope change on a frequency histogram of Z values on S2. S_3 contains Z values associated with threshold pixels, i.e, the abnormal peaks. The difference between the original surface S_0 and S_3 generates the final surface S_4, free of abnormal peaks on which further analyses are conducted. Such procedures generate surfaces that differ from any surfaces treated by median denoising and gaussian filters which do not erase but partially attenuate the abnormal peaks and remove low-scale features in conjunction with removing the noise. In the present analysis, the abnormal peaks are totally erased from S_0, the rest of the surfaces initial S_0 and final S_4 being strictly identical. Also, this procedure is more efficient and replicable than manual deletions.

Cellulose and phytoliths contents, dust load and Total Ingested Silica index

Samples of the clover and grasses fodders were dried and the proportion of cellulose was quantified: 28.6 % (±2.0 %) of dry weight for the clover-dominated fodder and 28.3 % (±2.1%) of dry weight for the grass-dominated fodder. Samples of the clover and grasses fodders were mineralized and content in Si (exogenous particles and silica phytoliths) was then quantified by inductively coupled plasma atomic emission spectroscopy. The residues of clover and grass fodders after mineralization and acid attack were carefully checked to control potential air-born dust pollution. In the clover fodder, more than 93 % of the particles larger than 5 µm were silica phytoliths, the rest being quartz grains. In the grass fodder, more than 91% of the particles larger than 5 µm were phytoliths. It is worth noting that in every residue, micrometric scale clays were present but not counted. Results, given in percentage by dry weight, were then normalized to obtain how much silica phytoliths one ewe ingested per day using the total mass of fodder given per ewe (Table S4). This differed according the nature of the fodder (as dry weight; Clover=1650g/day/ewe; Grasses=1550g/day/ewe, Table S1).

The combination of X-ray diffraction, chemical element analysis and phase quantification was applied to the dust. It was composed of 72% to 74% quartz grains and 18% to 20% Mg-feldspaths. Clays represent less than 6% and Fe-oxides less than 1%. The dust load was sieved to retain only grains below 100 µm. The mineralogical composition and grain size are similar to the conditions met in the Harmattan windblown dust in Ghana [3]. The

Total Ingested Silica index is the sum of phytolith weight naturally contained in the plant tissues cumulated with the quantity of exogenous dust added to the fodder during the trials (Table S1).

<u>Toughness of the plants</u>

Several plants including aerial and underground organs with clumps of earth were sampled at different locations in the fields from which fodders were harvested. Samples were carried to the University of Poitiers where the measurements were performed. We measured the fracture toughness, the ductility, and the ultimate tensile stress of the red clover (stems) and several specimens of grasses (stems and leaves; Fig. S1). Mechanical behavior was estimated using tensile tests. The length of the specimens was constant (identical strain rate to limit any viscous effects) and their mean surface/diameters were estimated by averaging three points at three different positions. These tests have been performed using a Zwick Z0.5 testing system fitted with a 50 N load cell (Table S2). The specimen were tested using a strain rate of [illegible]= $1.5x10^{-3}$ s^{-1}. The fracture toughness ($J.m^{-3}$) represents the materialôs ability to absorb deformation energy per unit volume before failure. This can be estimated qualitatively by measuring the area under a stress ï strain curve obtained from a tensile test at low strain rate [illegible] [8]. The fracture toughness values are scattered within the same batch of plant items. However, grass leaves have the lowest median fracture toughness while stems of clover show the highest values. The ultimate tensile stress represents the force per unit surface required to initiate the crack at the failure point. It is worth noting (Table S2) that the leaves of grasses required much more force than the one required for stems of clover or grasses. However, the ductility of grass leaves is much lower than the ductility of the stems of either clover or grasses (Table S2). Sheep have to generate much more force to initiate cracks on grass leaves than on the other items.

<u>Data analysis on Dental Microwear Textures</u>

The analyses were performed using the Scale-Sensitive Fractal Analysis using Toothfrax and Sfrax software (Surfract, www.surfract.com) following Scott et al. [9]. Photosimulations of all of the 40 surfaces analyzed in this study are shown in Figure S3 and individual textural parameters are given in Table S3. Four microwear variables are used in this study (Table S4). Complexity (*Asfc* or Area-scale fractal complexity) is a measure of the roughness at a given scale (min scale: 0.02 μm^2; max scale: 7200 μm^2). Heterogeneity of complexity (*HAsfc* or heterogeneity of area-scale fractal complexity), quantifies the variation of complexity observed between within scan. *HAsfc* is calculated through 81 cells. Anisotropy (*epLsar* or exact proportion of length-scale anisotropy of relief) measures the orientation concentration of surface roughness (calculated at the scale of 1.8 µm). Textural fill volume (*Tfv*) does not depend on the surface shape but on its finer texture. *Tfv* is here estimated as the difference between the total fill volume generated by cubes with square faces 2 µm per side minus the structural fill volume generated by cubes with square faces 10 µm per side. All variables have been described in further details in Scott et al. [9]. It has been shown that wild grazing bovids tend to have lower values in *Asfc*, *HAsfc* and *Tfv* (less complex and less heterogeneous textures) and higher in *epLsar* (more anisotropic textures) than browsing antelopes [10]. It is worth mentioning here that the present ewe data set shows a reverse pattern for the *Tfv* parameter. Grass-fed ewes have higher *Tfv* than clover-fed ones; the latter groups simulating leaf browsing and not mixed- or fruit-browsing habits might be the source of difference between the two studies. Statistical tests were then used in order to highlight potential differences in dental microwear textural parameters between the dietary groups. As textural parameters violated conditions for parametric tests, they were rank-transformed before each analysis [11,12].

Two-way factorial ANOVAs (with diet and dust load as factors) for each parameter were used to determine the sources of significant variation. Jackknife resampling techniques were also used as a further investigation into the solidity of our results. The frequency of significant p-values was reported. Any potential difference was then highlighted using the combination of the conservative HSD test (Tukeyǿs Honest Significant Differences) together with the less conservative LSD test (Fisherǿs Least Significant Differences; Fig 1; Table 1; Table S4).

A species might be assigned to a dietary category based on a given parameter but plots with another one when a second parameter is considered. Combining all of the parameters into a set of linear combinations may offer some help in dietary classification. A principal component analysis was performed on the four textural parameters and the 40 ewes without an *a priori* classification. The first component of the analysis carries 46.9% of the variation seen in the total sample (Table S5). One-way ANOVA highlights significant differences in coordinates only along PC1 between the different ewe samples. Accordingly, coordinates along the first component are taken to form the *Wear Textural Index* (*WTI*).

References

1. Teaford, M. F. & Oyen, O. J. 1989 In vivo and in vitro turnover in dental microwear. *Am. J. Phys. Anthropol.* **80**, 447ï 460.

2. Calandra, I. & Merceron, G. 2016 Dental Microwear Texture Analysis in Mammal Ecology. *Mammal Rev.* **accepted**.

3. Breuning-Madsen, H. & Awadzi, T. W. 2005 Harmattan dust deposition and particle size in Ghana. *CATENA* **63**, 23ï 38. (doi:10.1016/j.catena.2005.04.001)

4. Souron, A., Merceron, G., Blondel, C., Brunetière, N., Colyn, M., Hofman-KamiŒska, E. & Boisserie, J.-R. 2015 Three-dimensional dental microwear texture analysis and diet in extant Suidae (Mammalia: Cetartiodactyla). *Mammalia* **79**, 279ï 291.

5. Jakway, G. E., Raskin, W. & Tytle, T. 1970 Sodium perborate process for preparation of skeletons. *Turtox News* **48**, 65ï 67.

6. Galbany, J., Estebaranz, F., Martínez, L. M., Romero, A., De Juan, J., Turbón, D. & Pérez-Pérez, A. 2006 Comparative analysis of dental enamel polyvinylsiloxane impression and polyurethane casting methods for SEM research. *Microsc. Res. Tech.* **69**, 246ï 252. (doi:10.1002/jemt.20296)

7. Goodall, R. H., Darras, L. P. & Purnell, M. A. 2015 Accuracy and Precision of Silicon Based Impression Media for Quantitative Areal Texture Analysis. *Sci. Rep.* **5**, 10800. (doi:10.1038/srep10800)

8. Callister, W. D., Rethwisch, D. G. & others 2007 *Materials science and engineering: an introduction*. Wiley New York. [cited 2016 Jan. 29].

9. Scott, R. S., Ungar, P., Bergstrom, T. S., Brown, C. A., Childs, B. E., Teaford, M. F. & Walker, A. 2006 Dental microwear texture analysis: technical considerations. *J. Hum. Evol.* **51**, 339ï 349.

10. Scott, J. R. 2012 Dental microwear texture analysis of extant African Bovidae. *Mammalia* **76**, 157ï 174.

11. Conover, W. J. & Iman, R. L. 1981 Rank transformations as a bridge between parametric and nonparametric statistics. *Am. Stat.* **35**, 124ï 129.

12. Sokal, S. R. & Rohlf, F. J. 1969 *Biometry*. New York: W. E. Freeman and Company.

Table S1: Silica and dust measurement. Bio-silica content, dust load and total ingested silica index depending on samples of ewes.

Samples	Bio-silica Content (% of dry weight)	Bio-silica Content Total (g/ewe/day)	Dust Load (g/ewe/day)	Total Ingested Silica (g/ewe/day)
Clover - dust-free	0.496	8.184	0	8.184
Clover - dust-laden	0.496	8.184	13.2	21.384
Grass - dust-free	1.14	17.67	0	17.67
Grass - dust-laden	1.14	17.67	13.2	30.87

Table S2: Food mechanical properties. Mean, median, standard deviation and extreme values of toughness ($J.m^{-3}$), ultimate tensile stress (Mpa), and ductility (%) of the most dominant items that compose the fodders given to ewes.

		Toughness				
	N	m	median	SD	min	max
Grass leaves	29	23.95	22.28	12.79	3.88	54.99
Grass stems	18	44.84	25.46	38.12	10.30	137.42
Clover stems	30	61.86	53.46	32.79	7.30	145.06
		Ultimate tensile stress				
	N	m	median	SD	min	max
Grass leaves	29	5.68	5.54	1.48	1.92	9.81
Grass stems	18	3.59	3.15	1.37	1.64	7.60
Clover stems	30	3.98	4.16	1.10	1.33	7.00
		Ductility				
	N	m	median	SD	min	max
Grass leaves	29	1.98	2.68	1.69	0.12	8.55
Grass stems	18	9.19	12.33	9.54	0.77	35.22
Clover stems	30	9.78	10.27	4.65	1.45	31.50

Table S3: **Textural parameters for every single ewe.** *Asfc:* Complexity, *HAsfc:* heterogeneity of complexity, *epLsar:* anisotropy, *Tfv*: Textural fill volume.

Specimen	diet	dust	Asfc	epLsar ($\times 10^{-3}$)	HAsfc$_{(81\ cells)}$	Tfv
Ovis10098	clover	dust-free	9.508	1.880	2.078	45190.7
Ovis11723	clover	dust-free	2.230	1.407	0.735	38011.8
Ovis20939	clover	dust-free	5.871	2.427	1.844	17082.1
Ovis31042	clover	dust-free	2.869	0.194	0.692	35435.8
Ovis70519	clover	dust-free	10.211	0.795	1.371	39398.3
Ovis80140	clover	dust-free	2.573	2.888	0.782	29384.0
Ovis80307	clover	dust-free	1.687	6.144	1.210	33563.9
Ovis08045	clover	dust-free	6.612	3.084	2.898	26618.7
Ovis80729	clover	dust-free	2.719	2.593	1.073	43456.5
Ovis90287	clover	dust-free	10.014	0.288	1.441	38607.4
Ovis10106	clover	dust-laden	3.731	0.859	0.924	45184.2
Ovis11707	clover	dust-laden	3.124	1.231	0.603	2253.4
Ovis20094	clover	dust-laden	4.839	1.226	0.807	36079.5
Ovis21376	clover	dust-laden	5.829	1.347	1.000	54650.4
Ovis70379	clover	dust-laden	2.484	3.548	0.713	43623.4
Ovis80147	clover	dust-laden	4.985	2.690	1.046	58144.3
Ovis80288	clover	dust-laden	2.148	2.570	1.042	19106.0
Ovis80748	clover	dust-laden	2.831	4.471	0.849	47413.1
Ovis90074	clover	dust-laden	2.403	3.168	0.900	25216.3
Ovis90206	clover	dust-laden	3.322	3.162	1.468	25151.3
Ovis10053	grass	dust-free	2.380	2.561	1.014	37644.9
Ovis11739	grass	dust-free	5.495	2.511	0.472	42303.3
Ovis20965	grass	dust-free	2.953	1.187	1.157	44859.6
Ovis31028	grass	dust-free	4.900	0.943	1.044	52264.9
Ovis70520	grass	dust-free	0.895	5.163	0.698	37887.4
Ovis07898	grass	dust-free	5.741	11.40	0.899	88990.3
Ovis80133	grass	dust-free	1.728	6.304	0.805	40075.4
Ovis80312	grass	dust-free	1.389	8.192	0.616	38029.6
Ovis80718	grass	dust-free	1.233	6.057	0.545	54016.8
Ovis90455	grass	dust-free	3.931	2.255	1.167	52713.6
Ovis00234	grass	dust-laden	1.133	5.104	0.619	40806.3
Ovis08043	grass	dust-laden	2.787	1.578	0.392	30823.6
Ovis12772	grass	dust-laden	0.872	7.718	0.441	37125.2
Ovis80356	grass	dust-laden	0.979	6.125	0.384	46173.0
Ovis90045	grass	dust-laden	1.220	8.338	0.453	49253.8
Ovis90256	grass	dust-laden	6.000	7.029	0.608	67754.3
Ovis90300	grass	dust-laden	2.144	6.230	1.069	59132.3
Ovis90730	grass	dust-laden	1.826	4.269	1.111	37926.1
Ovis90764	grass	dust-laden	2.755	3.122	1.832	54238.6
Ovis90814	grass	dust-laden	1.434	1.405	0.831	25113.0

Table S4: Pair wise multicomparisons tests. Synthesis of the posthoc tests resulting from the Jackknife procedure and carried out on clover-fed, grass-fed, dust and dust-free groups. Percentages represent the frequency of significant difference (p-value<0.05) over the 40 iterations. Above the diagonal: Tukey's Honest Significant Difference Test; below the diagonal: Fisher's Least Significant Difference test.

Asfc		Clover		Grass	
		Dust-free	Dust-laden	Dust-free	Dust-laden
Clover	Dust-free		0.0%	0.0%	100.0%
	Dust-laden	0.0%		0.0%	0.0%
Grass	Dust-free	10.0%	0.0%		0.0%
	Dust-laden	100.0%	100.0%	2.5%	
epLsar		Clover		Grass	
		Dust-free	Dust-laden	Dust-free	Dust-laden
Clover	Dust-free		0.0%	0.0%	82.5%
	Dust-laden	0.0%		0.0%	0.0%
Grass	Dust-free	20.0%	0.0%		0.0%
	Dust-laden	100.0%	95.0%	0.0%	
HAsfc		Clover		Grass	
		Dust-free	Dust-laden	Dust-free	Dust-laden
Clover	Dust-free		0.0%	0.0%	90.0%
	Dust-laden	2.5%		0.0%	0.0%
Grass	Dust-free	75.0%	0.0%		0.0%
	Dust-laden	100.0%	2.5%	0.0%	
Tfv		Clover		Grass	
		Dust-free	Dust-laden	Dust-free	Dust-laden
Clover	Dust-free		0.0%	0.0%	0.0%
	Dust-laden	0.0%		0.0%	0.0%
Grass	Dust-free	77.5%	0.0%		0.0%
	Dust-laden	5.0%	0.0%	0.0%	

Table S5: Results of the Principal Component Analysis. The analysis is conducted with the 40 ewes without *a priori* diet assignation and with the four textural parameters (a: Eigenvalues b: communities r and square communities r2 between variables and components). An ANOVA (c) on ranked individual score is performed on PC1 to PC3 to test significant differences between samples of ewes (see also Table 2 in text).

a)

Component	Eigenvalue	% variance	× Eigenvalues	× variance
1	1.88	46.89	1.88	46.89
2	1.27	31.68	3.14	78.58
3	0.59	14.68	3.73	93.26
4	0.27	6.74	4.00	100.00

b)

	PC1		PC2		PC3		PC4	
	r	r^2	r	r^2	r	r^2	r	r^2
Asfc	-0.744	0.554	0.537	0.288	-0.233	0.054	-0.322	0.104
epLsar	0.769	0.591	0.398	0.158	0.430	0.185	-0.257	0.066
HAsfc	-0.766	0.587	0.301	0.091	0.538	0.289	0.182	0.033
Tfv	0.380	0.144	0.855	0.731	-0.243	0.059	0.258	0.066

c)

	df	SS	MS	F	p
PC1					
diet	1	1742.40	1742.40	18.1070	**0.000142**
dust	1	122.50	122.50	1.2730	0.266
diet*dust	1	0.90	0.90	0.0094	0.923
Error	36	3464.20	96.23		
PC2					
diet	1	90.00	90.00	0.6382	0.429
dust	1	160.00	160.00	1.1347	0.293
diet*dust	1	3.60	3.60	0.0255	0.873
Error	36	5076.40	141.01		
PC3					
diet	1	40.00	40.00	0.2799	0.600
dust	1	0.40	0.40	0.0028	0.958
diet*dust	1	144.40	144.40	1.0103	0.321
Error	36	5145.20	142.92		

Figure S1. Schematic representation of the mechanical properties of the three types of food items measured during tensile tests. It is worth to mention that clover is tougher but require less stress to reach the limit between elastic and plastic deformation and that leaves of the grasses we measured are significantly less ductile than the stem of these same plants. The inner structure of the stems arranged as a furrows of multiple layers.

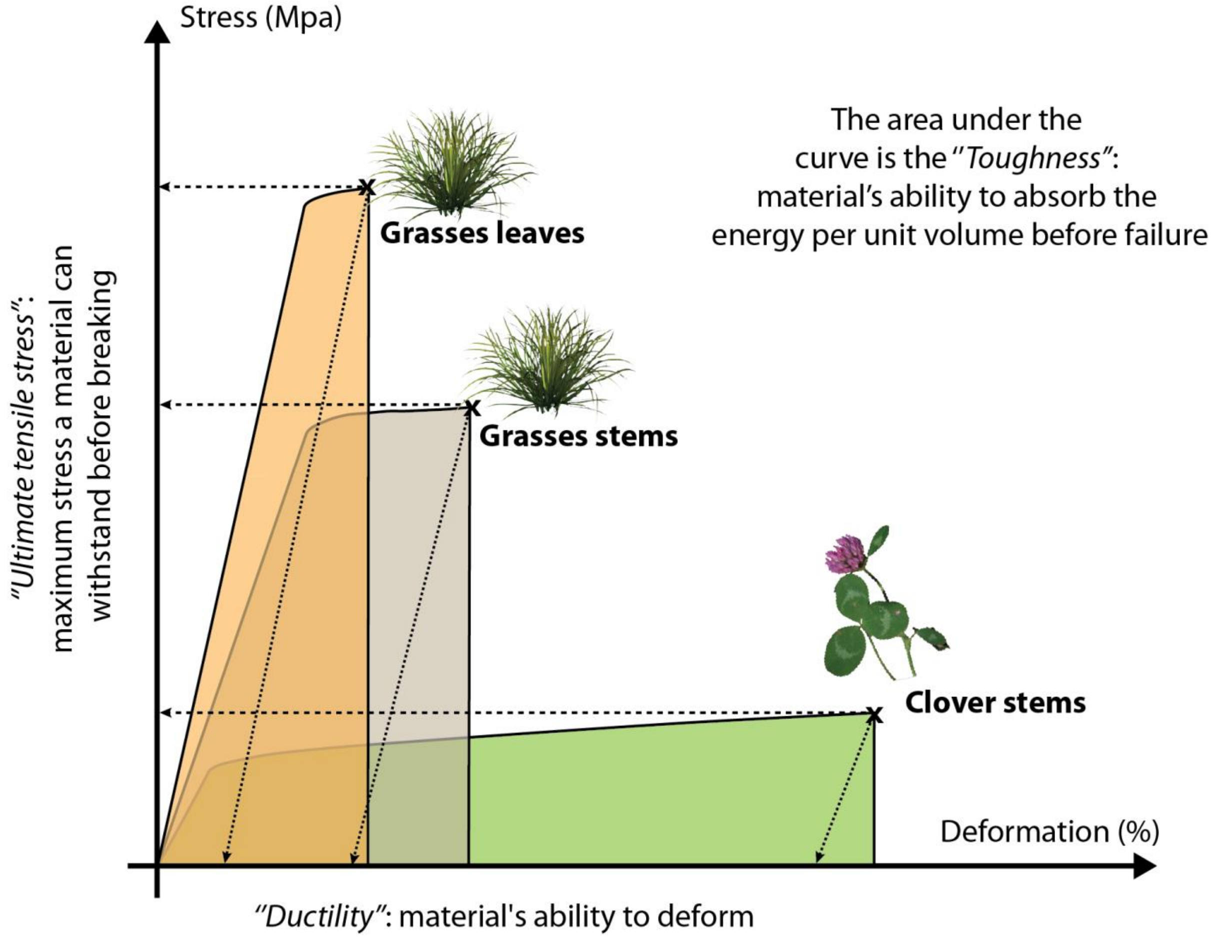


Figure S2. Flow charts showing the bivariate filtering process erasing abnormal peaks. 3D views of a raw surface S0 including abnormal peaks, which are automatically erased by combing mathematical morphological filters (opening) with a height-threshold filter and surface subtraction on ImageJ software. N: number of pixels. Black and Gray frequency histograms representing N and log (N) respectively depending on Z height values. Note that abnormal peaks which represent less than 0.025% of the pixel amount of S0 had a significant effect on textural parameters. All the other pixels are unaffected in Z values.

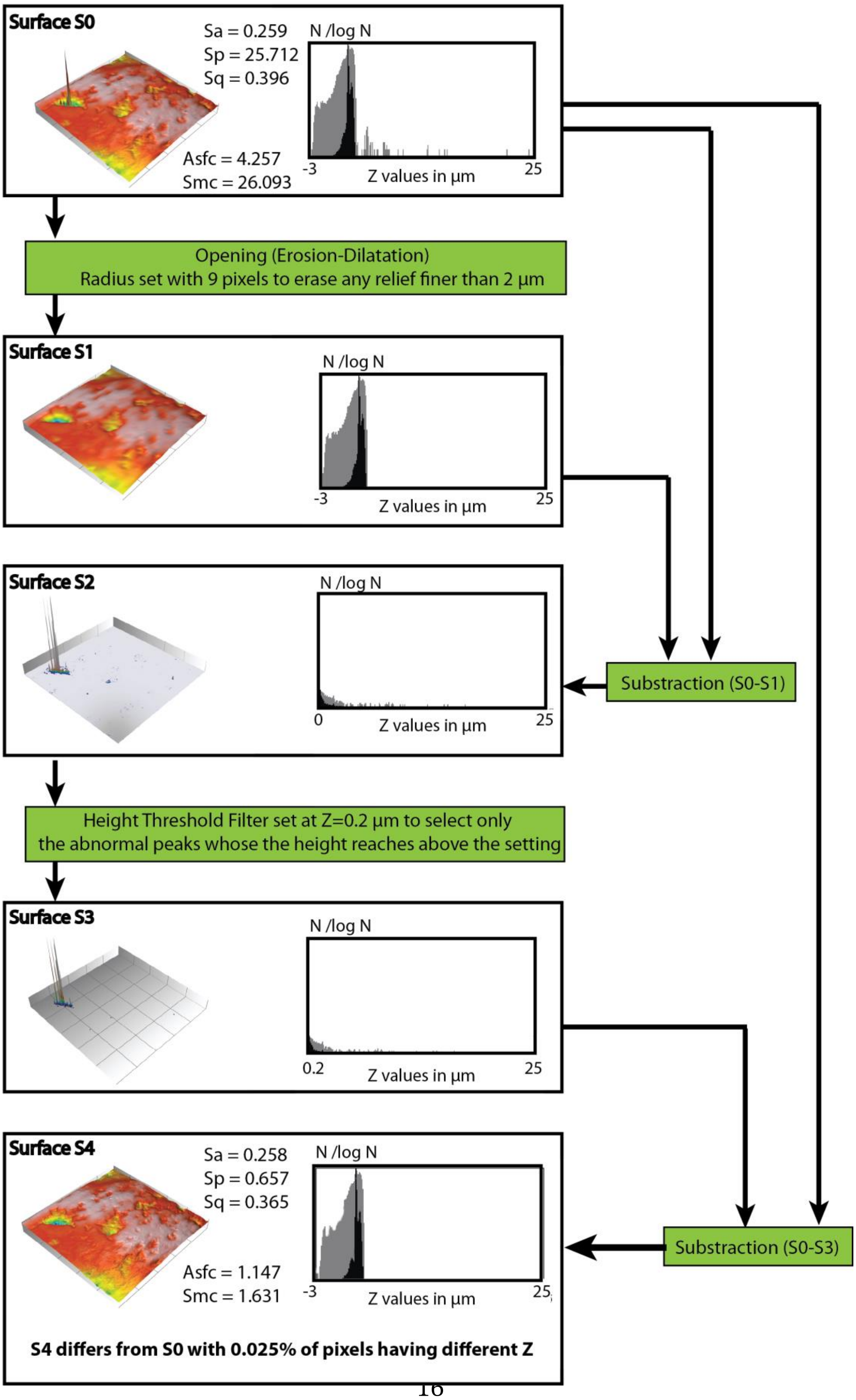


Figure S3. Photosimulations from the dental wear surfaces of all of the 40 ewes scanned and analyzed in this study.

Clover
Dust free

Photo simulation - Clover-no-dust-Ovis-8045

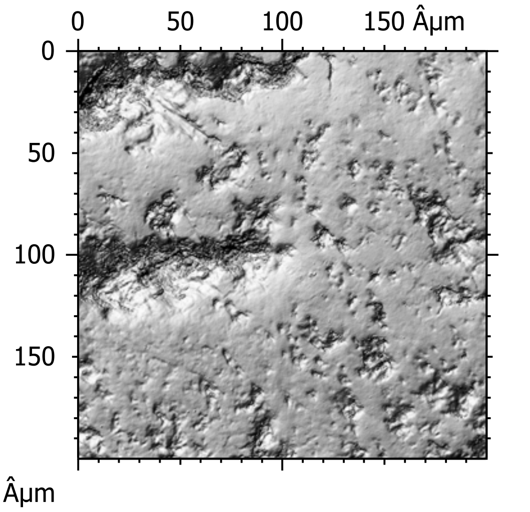


Photo simulation - Clover-no-dust-Ovis-10098

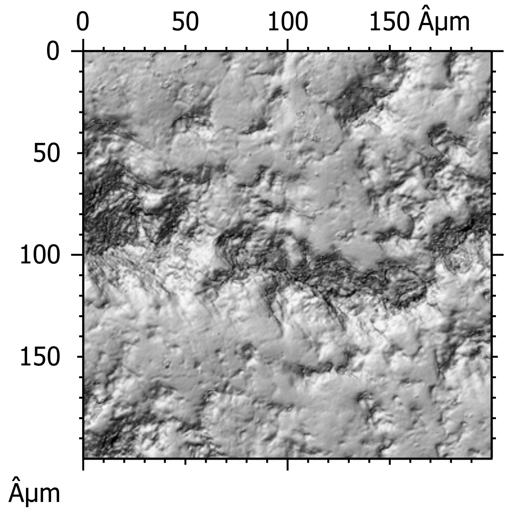


Photo simulation - Clover-no-dust-Ovis-11723

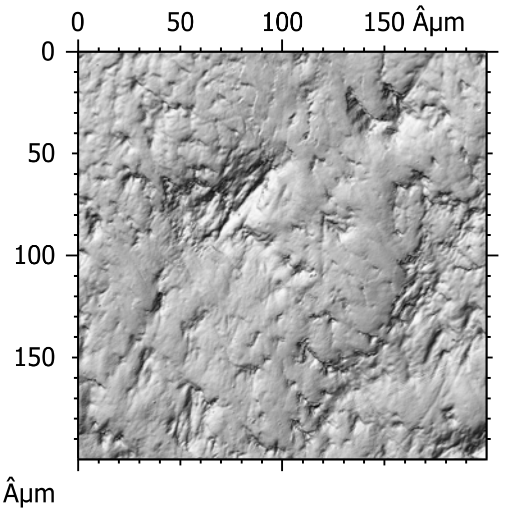


Photo simulation - Clover-no-dust-Ovis-20939

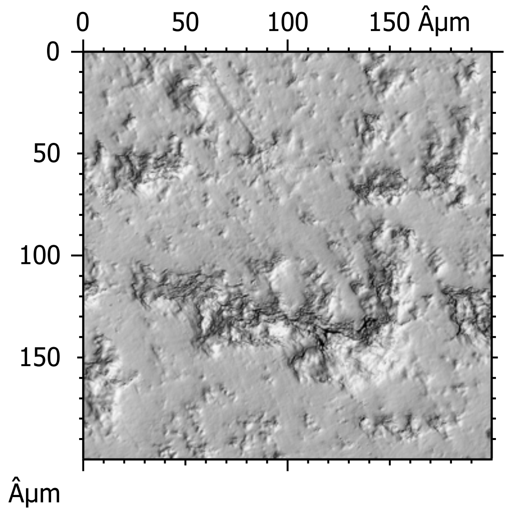


Photo simulation - Clover-no-dust-Ovis-31042

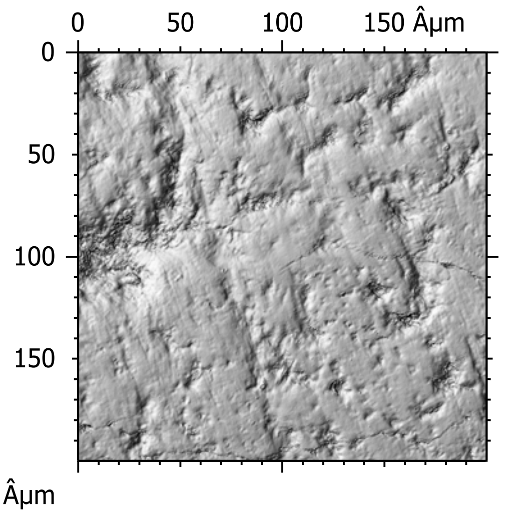
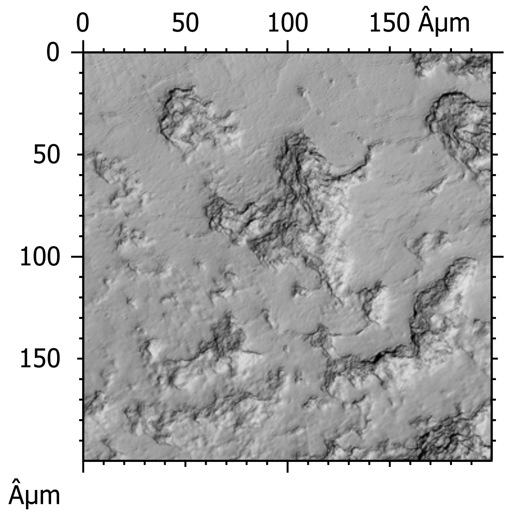


Photo simulation - Clover-no-dust-Ovis-70519



Leica Map DCM 3D 7.0.6863

Clover
Dust free

Photo simulation - Clover-no-dust-Ovis-80140

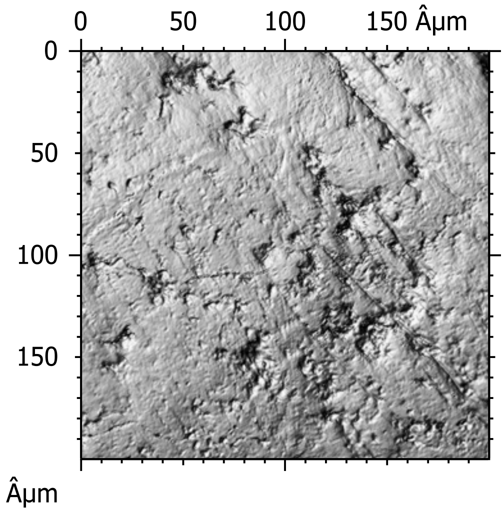


Photo simulation - Clover-no-dust-Ovis-80307

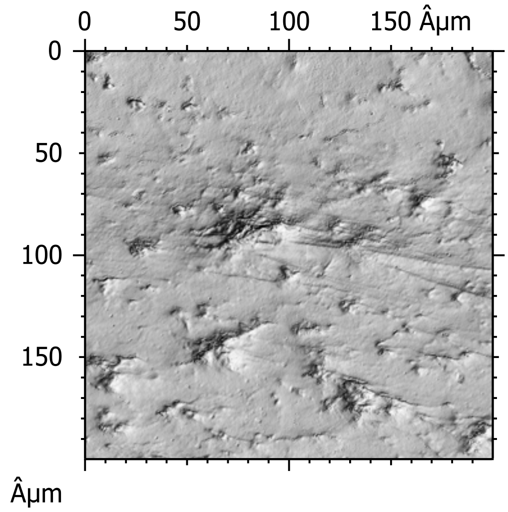


Photo simulation - Clover-no-dust-Ovis-80729

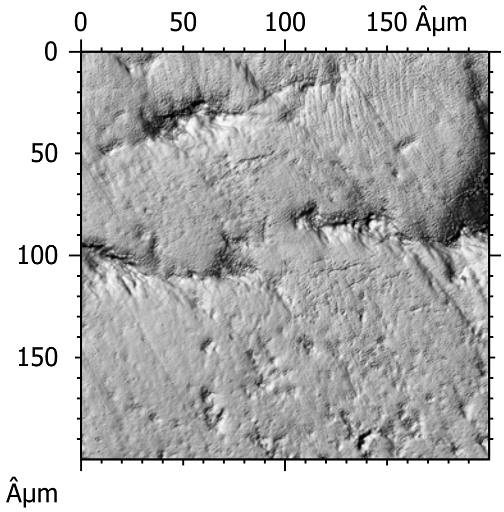
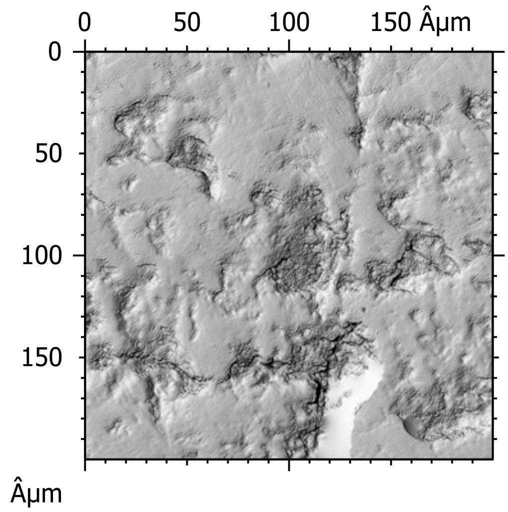


Photo simulation - Clover-no-dust-Ovis-90287



Grass
Dust free

Photo simulation - Grass-no-dust-Ovis-7898

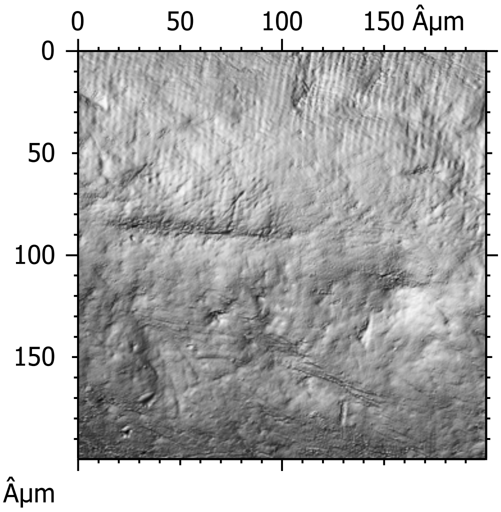


Photo simulation - Grass-no-dust-Ovis-10053

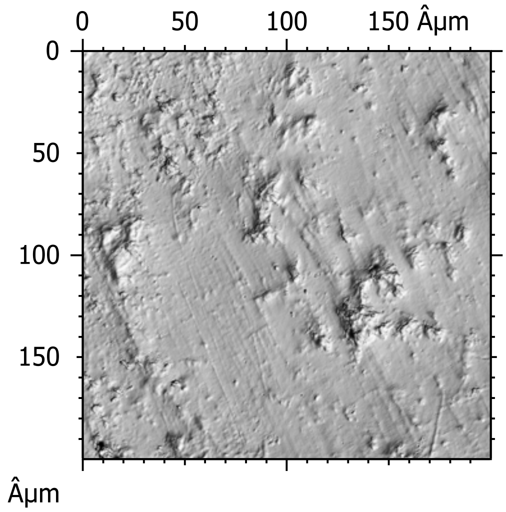


Photo simulation - Grass-no-dust-Ovis-11739

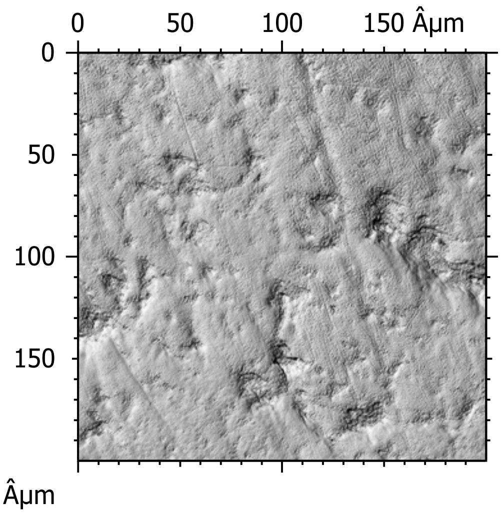


Photo simulation - Grass-no-dust-Ovis-20965

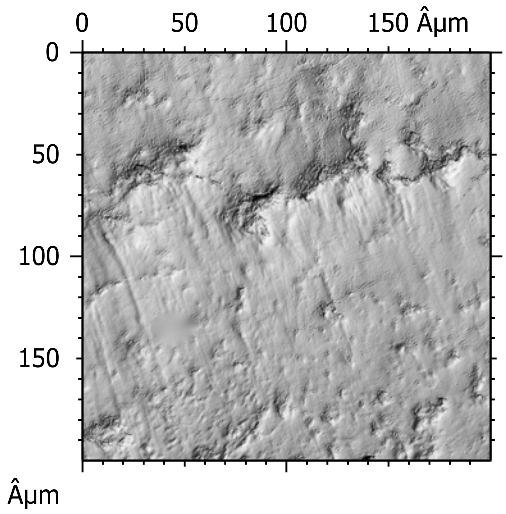


Photo simulation - Grass-no-dust-Ovis-31028

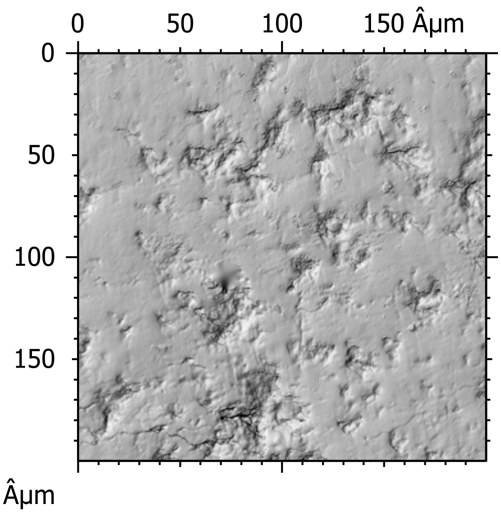
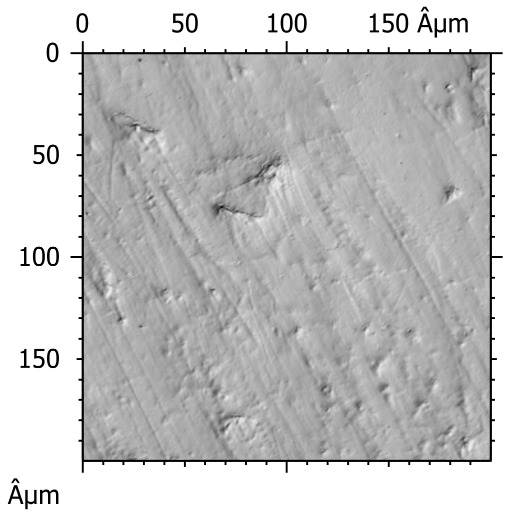


Photo simulation - Grass-no-dust-Ovis-70520



Grass
Dust free

Photo simulation - Grass-no-dust-Ovis-80133

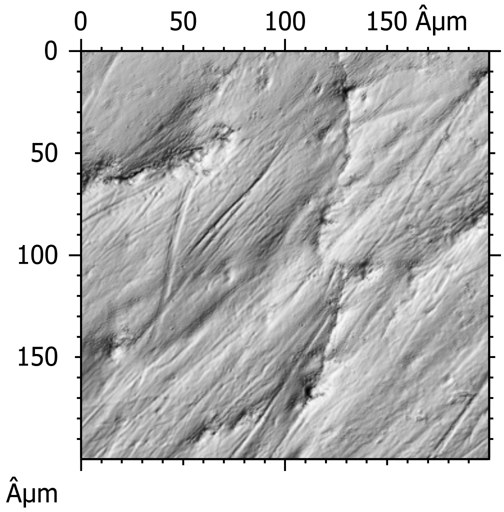


Photo simulation - Grass-no-dust-Ovis-80312

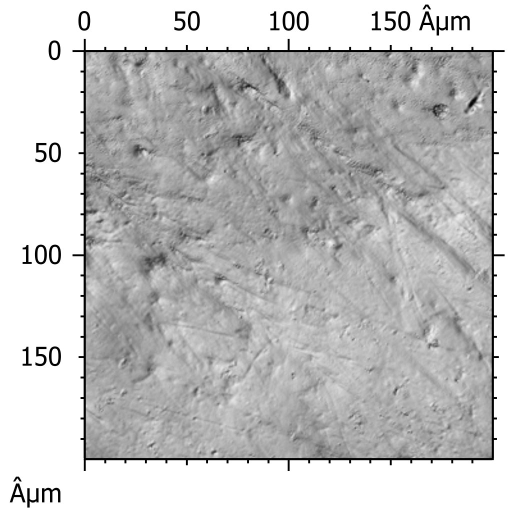


Photo simulation - Grass-no-dust-Ovis-80718

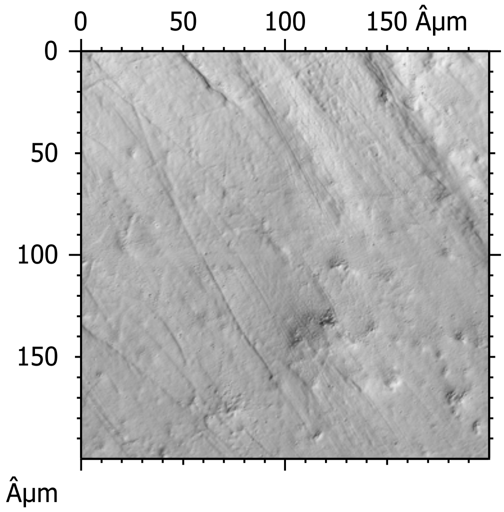
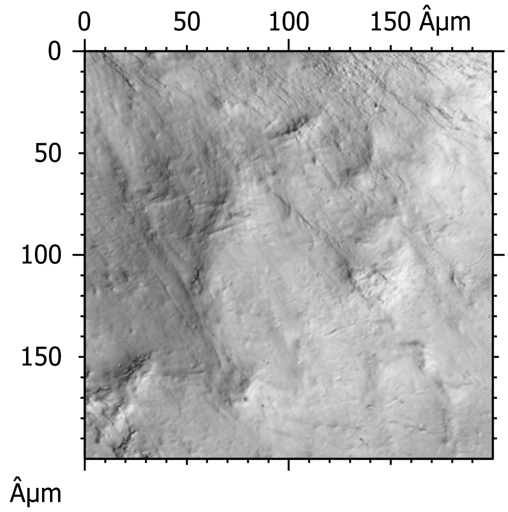


Photo simulation - Grass-no-dust-Ovis-90455



Clover
Dust

Photo simulation - Clover+Dust-Ovis-00234

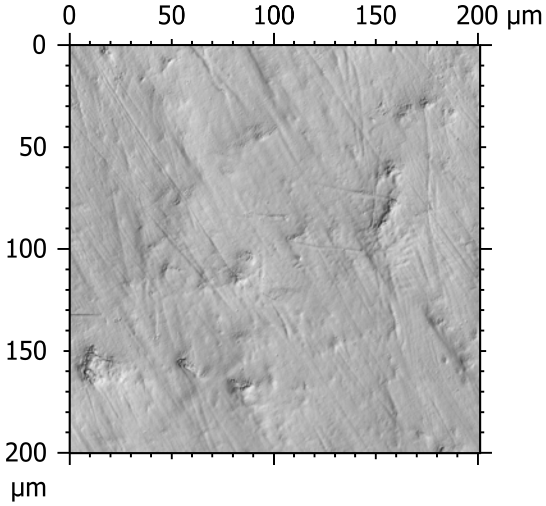


Photo simulation - Clover+Dust-Ovis-10106

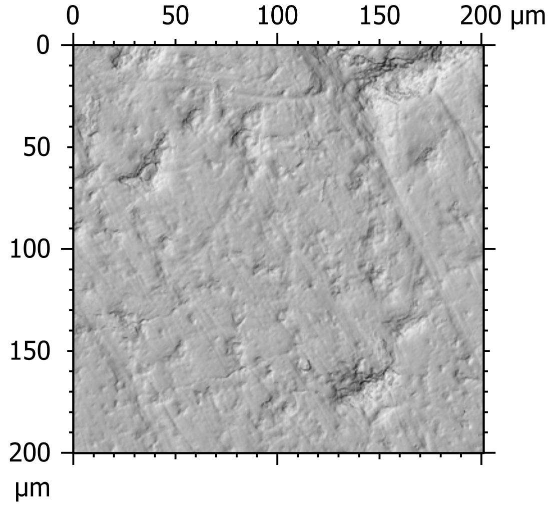


Photo simulation - Clover+Dust-Ovis-11707

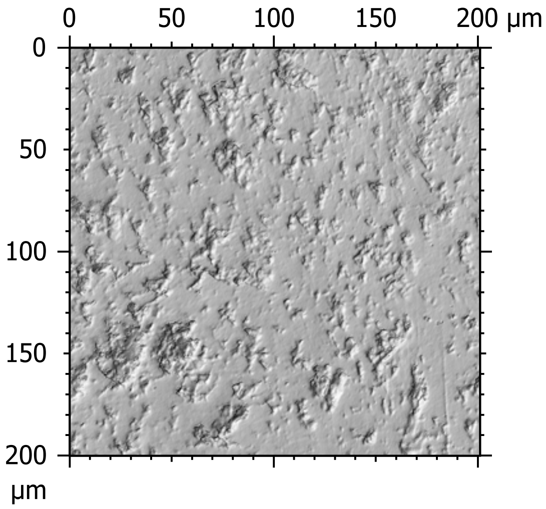


Photo simulation - Clover+Dust-Ovis-20094

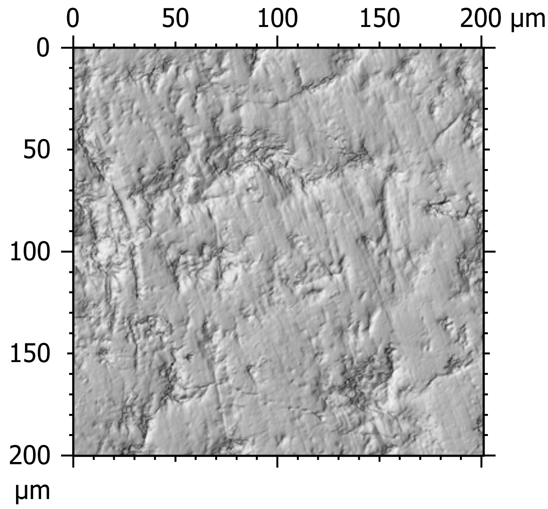


Photo simulation - Clover+Dust-Ovis-21376

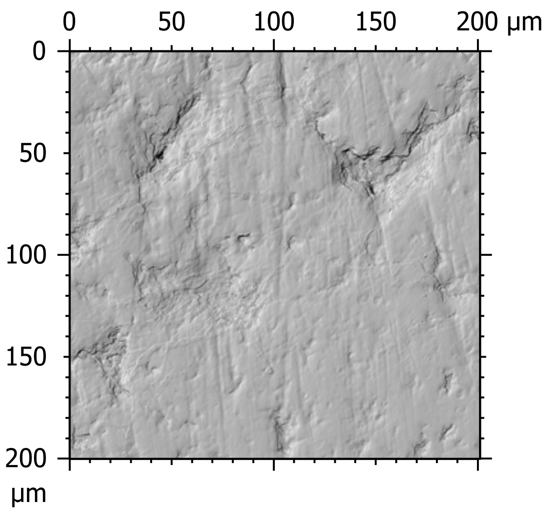
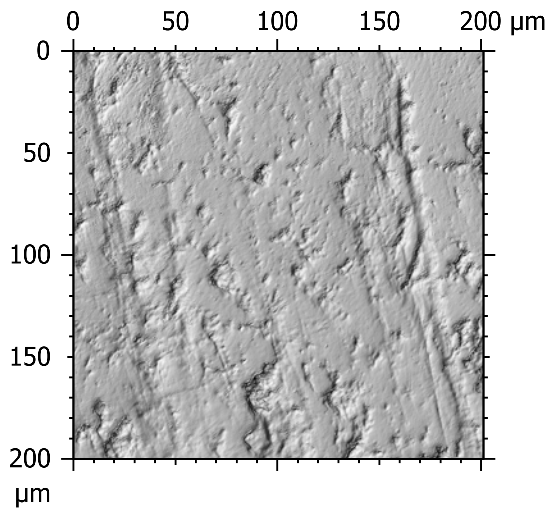


Photo simulation - Clover+Dust-Ovis-70379



Leica Map DCM 3D 7.0.6863

Clover
Dust

Photo simulation - Clover+Dust-Ovis-80147

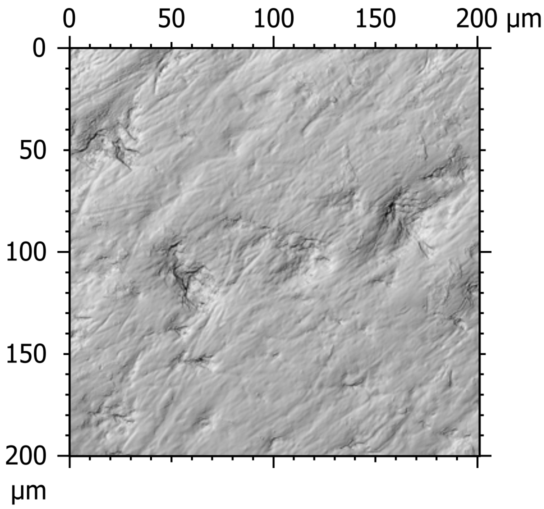


Photo simulation - Clover+Dust-Ovis-80288

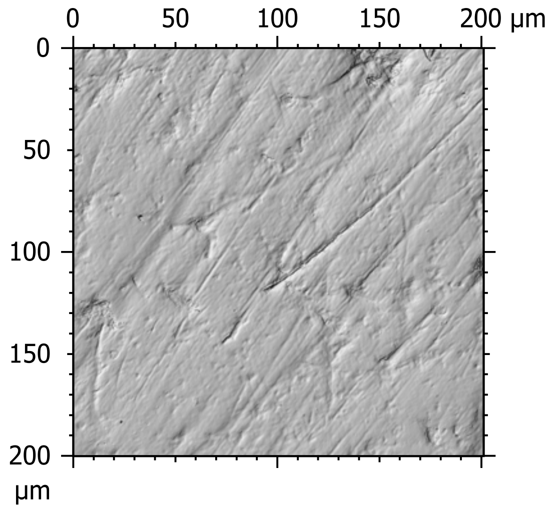


Photo simulation - Clover+Dust-Ovis-80748

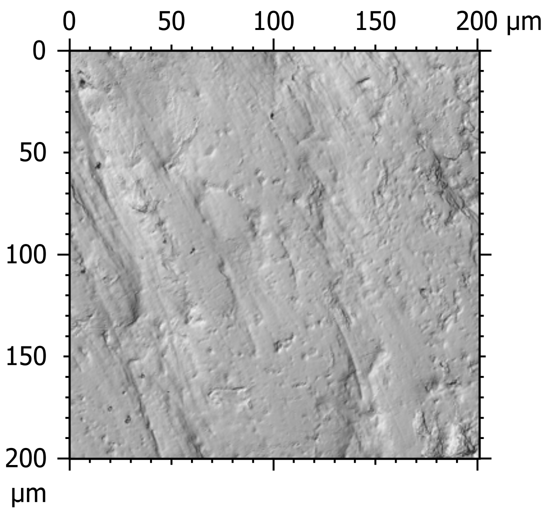
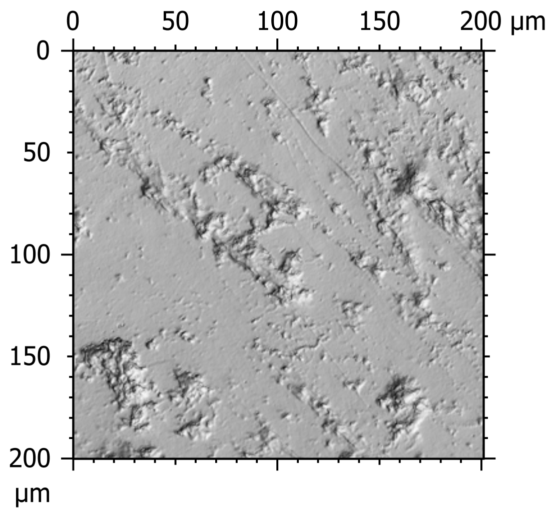


Photo simulation - Clover+Dust-Ovis-90074



Grass
Dust

Photo simulation - Grass+Dust-Ovis-08043

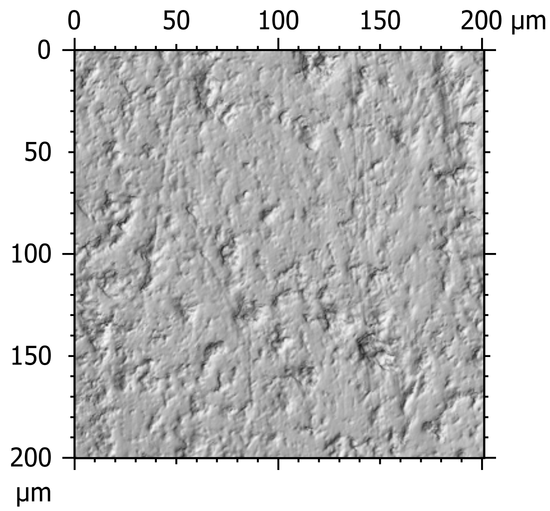


Photo simulation - Grass+Dust-Ovis-12772

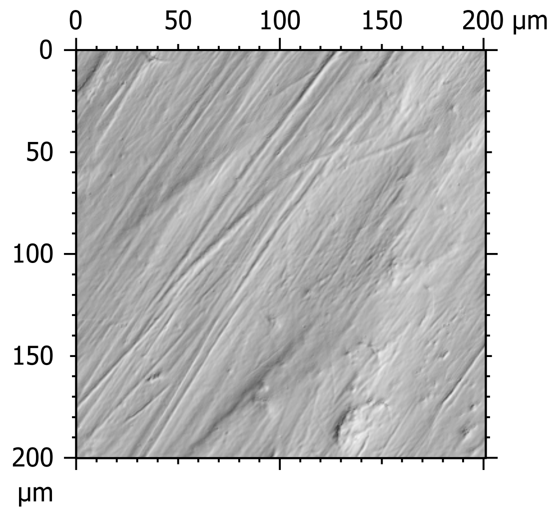


Photo simulation - Grass+Dust-Ovis-80356

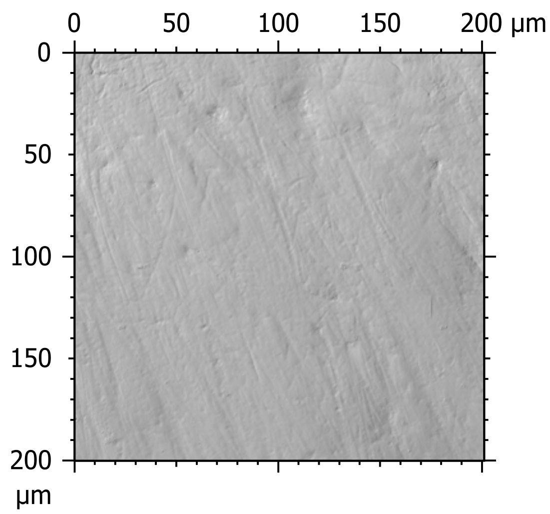


Photo simulation - Grass+Dust-Ovis-90045

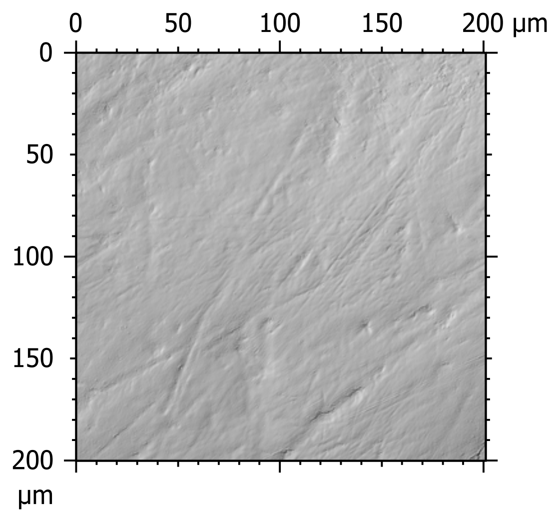


Photo simulation - Grass+Dust-Ovis-90206

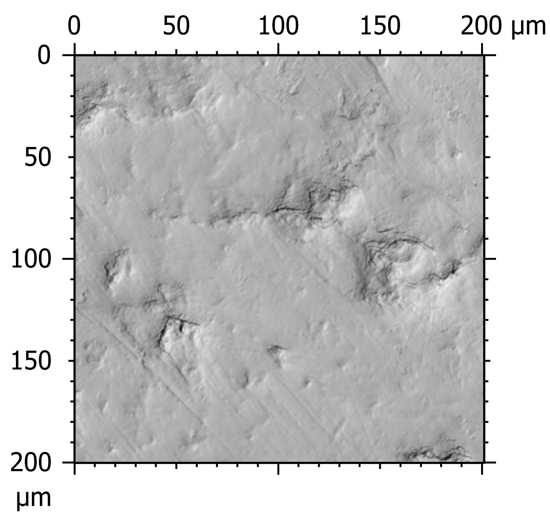
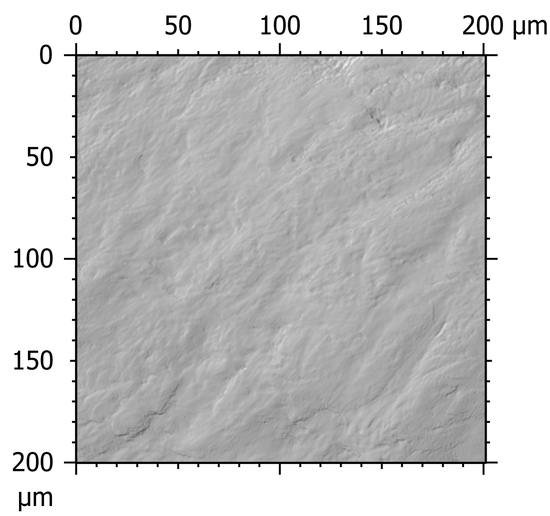


Photo simulation - Grass+Dust-Ovis-90256



Leica Map DCM 3D 7.0.6863

Grass
Dust

Photo simulation - Grass+Dust-Ovis-90300

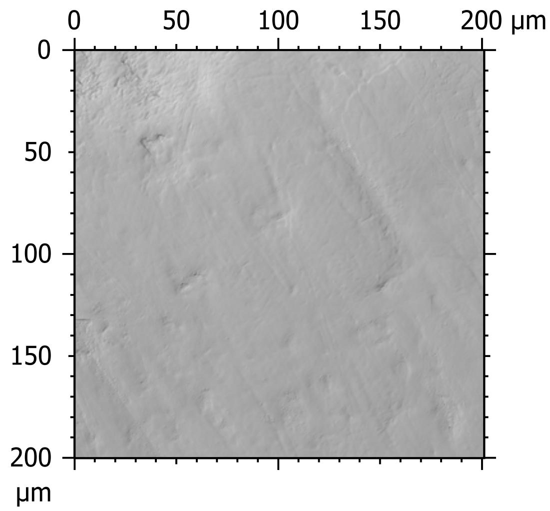


Photo simulation - Grass+Dust-Ovis-90730

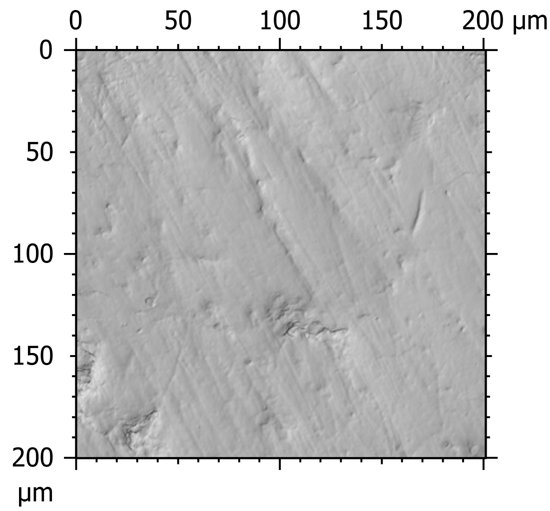


Photo simulation - Grass+Dust-Ovis-90764

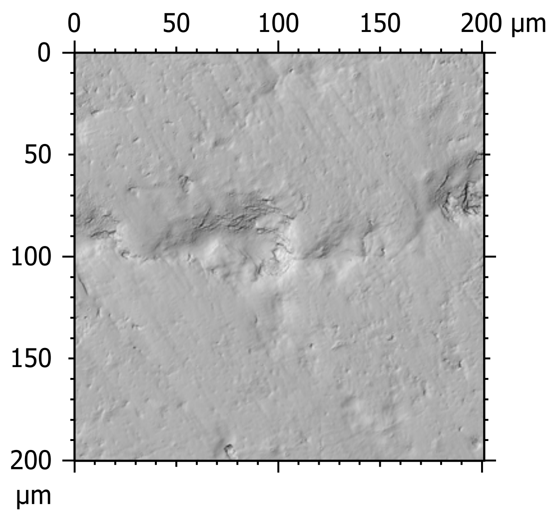
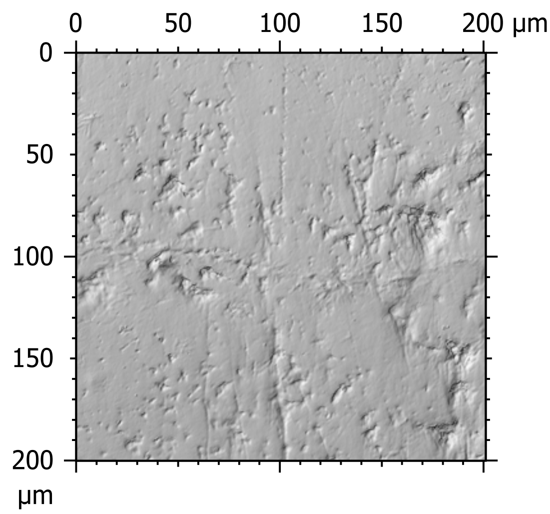


Photo simulation - Grass+Dust-Ovis-90814



Leica Map DCM 3D 7.0.6863