Supporting information for "Impact of tephra fallout from the largest explosive basaltic eruption in Iceland: The Veiðivötn 1477 CE eruption (VEI 6)"

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Supplementary Figures S1 and S2

Supplementary Tables S1 and S2

References

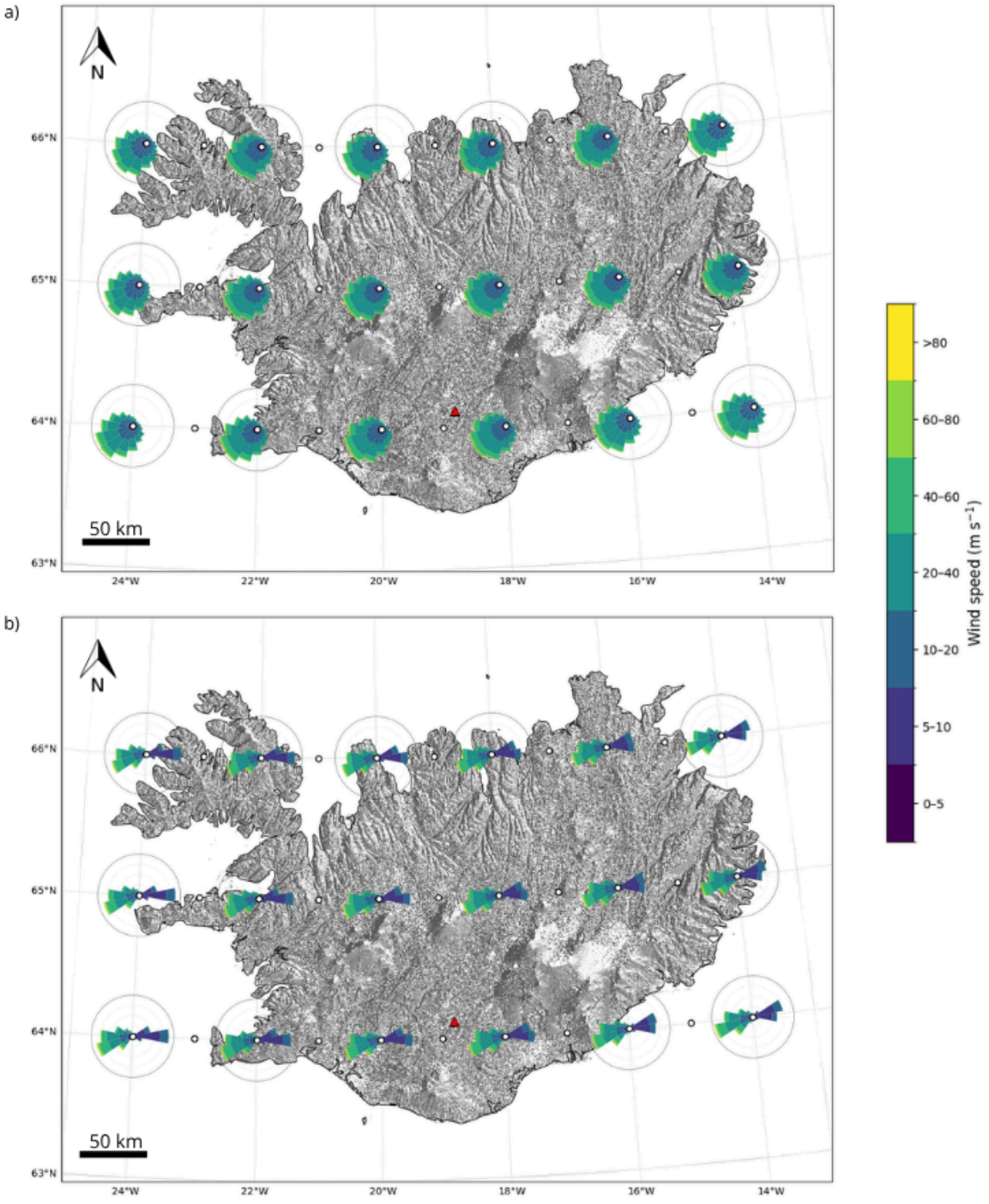

Figure S1: Wind roses illustrating the spatial variability of wind conditions over Iceland at a) 250 hPa and b) 10 hPa. Each point represents a series of wind data over the 30 years of ECMWF data (1994-2024). Color shading represents wind speed classes, ranging from the lowest velocities (i.e., <5 $m \cdot s^{-1}$), in deep purple, to the highest velocities (i.e., >80 $m \cdot s^{-1}$), in yellow.

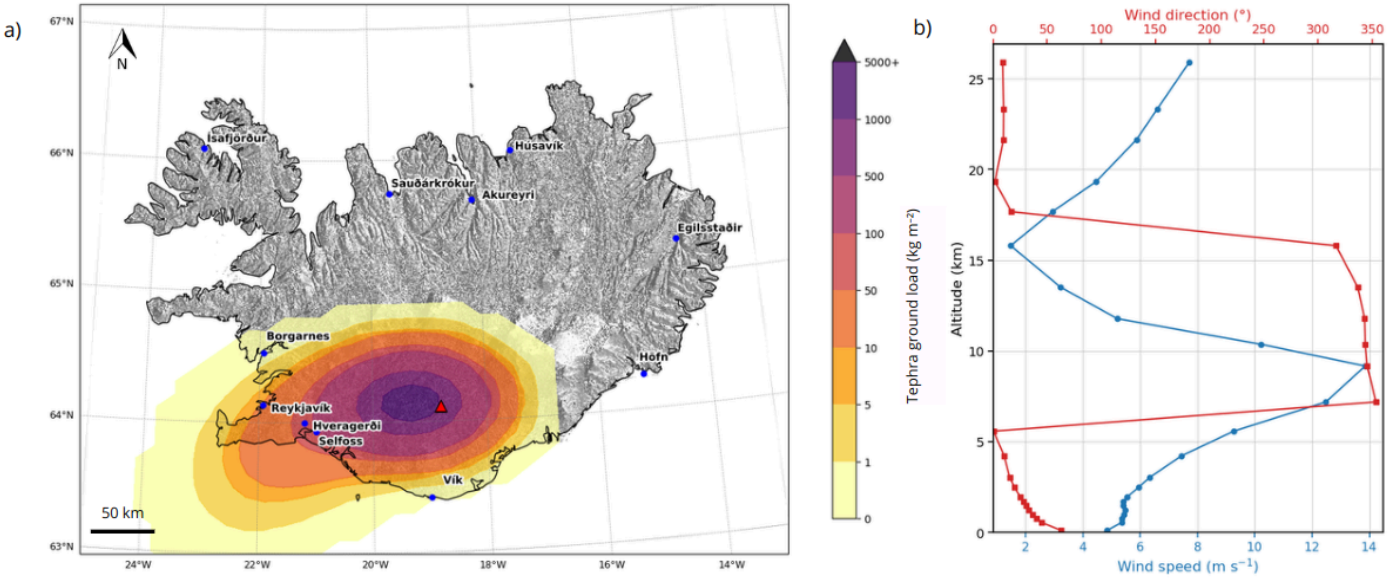

Figure S2: Single-scenario simulation of the Veiðivötn 1477 CE eruption with meteorological conditions of July 14, 2014, illustrating the effects of NW to N stratospheric winds and NE tropospheric winds on tephra dispersion. a) deterministic map, b) wind speed and origin direction profiles. The map is displayed in the UTM Zone 27N projection.

Table S1: Outcrop locations and ground load measurements used in this study.

Outcrop	Latitude	Longitude	Ground load (kg m^{-2})	Source
1	64.343	-15.421	16	Benjaminsson (1982)
2	64.42	-14.879	15	Benjaminsson (1982)
3	64.41	-14.588	16	Benjaminsson (1982)
4	64.526	-14.623	64	Benjaminsson (1982)
5	64.567	-14.592	9	Benjaminsson (1982)
6	64.683	-14.38	21	Benjaminsson (1982)
7	64.694	-14.271	21	Benjaminsson (1982)
8	64.781	-14.531	39	Benjaminsson (1982)
9	64.788	-15.638	43	Benjaminsson (1982)
10	64.904	-14.557	27	Benjaminsson (1982)
11	64.801	-14.089	27	Benjaminsson (1982)
12	64.788	-14.041	16	Benjaminsson (1982)
13	64.831	-13.854	30	Benjaminsson (1982)
14	64.86	-13.789	48	Benjaminsson (1982)
15	65.002	-13.789	16	Benjaminsson (1982)
16	65.04	-14.592	32	Benjaminsson (1982)
17	64.851	-15.4	54	Benjaminsson (1982)
18	64.873	-15.356	54	Benjaminsson (1982)
19	64.947	-15.204	69	Benjaminsson (1982)
20	64.978	-15.113	47	Benjaminsson (1982)
21	65.068	-14.809	75	Benjaminsson (1982)
22	65.055	-14.874	54	Benjaminsson (1982)
23	65.04	-14.909	20	Benjaminsson (1982)
24	64.858	-16.411	43	Benjaminsson (1982)
25	64.853	-15.929	96	Benjaminsson (1982)
26	64.914	-16.146	129	Benjaminsson (1982)
27	65.017	-15.929	129	Benjaminsson (1982)
28	65.057	-15.89	64	Benjaminsson (1982)
29	65.177	-15.964	64	Benjaminsson (1982)
30	65.003	-15.614	43	Benjaminsson (1982)

31	65.03	-15.58	86	Benjaminsson (1982)
32	65.061	-15.565	75	Benjaminsson (1982)
33	65.103	-15.578	59	Benjaminsson (1982)
34	65.099	-14.718	27	Benjaminsson (1982)
35	65.186	-14.664	18	Benjaminsson (1982)
36	65.136	-14.521	27	Benjaminsson (1982)
37	65.075	-14.36	19	Benjaminsson (1982)
38	65.114	-14.336	31	Benjaminsson (1982)
39	65.098	-14.327	30	Benjaminsson (1982)
40	65.136	-14.325	19	Benjaminsson (1982)
41	65.141	-14.364	17	Benjaminsson (1982)
42	65.17	-14.367	43	Benjaminsson (1982)
43	65.262	-14.408	27	Benjaminsson (1982)
44	65.04	-14.212	43	Benjaminsson (1982)
45	65.037	-14.156	19	Benjaminsson (1982)
46	65.194	-14.037	43	Benjaminsson (1982)
47	65.137	-13.972	4	Benjaminsson (1982)
48	65.101	-13.935	13	Benjaminsson (1982)
49	65.099	-13.893	43	Benjaminsson (1982)
50	65.093	-13.846	26	Benjaminsson (1982)
51	65.207	-15.571	11	Benjaminsson (1982)
52	65.139	-15.417	21	Benjaminsson (1982)
53	65.205	-15.243	16	Benjaminsson (1982)
54	65.263	-15.217	21	Benjaminsson (1982)
55	65.282	-15.486	21	Benjaminsson (1982)
56	65.308	-15.17	107	Benjaminsson (1982)
57	65.329	-15.115	43	Benjaminsson (1982)
58	65.347	-15.05	37	Benjaminsson (1982)
59	65.36	-14.898	54	Benjaminsson (1982)
60	65.409	-14.36	16	Benjaminsson (1982)
61	65.451	-14.332	16	Benjaminsson (1982)
62	65.478	-14.347	11	Benjaminsson (1982)
63	65.513	-14.367	11	Benjaminsson (1982)

64	65.485	-14.49	9	Benjaminsson (1982)
65	65.514	-14.403	5	Benjaminsson (1982)
66	65.537	-14.356	5	Benjaminsson (1982)
67	65.544	-14.534	54	Benjaminsson (1982)
68	65.599	-14.362	31	Benjaminsson (1982)
69	65.551	-14.104	11	Benjaminsson (1982)
70	65.562	-14.05	21	Benjaminsson (1982)
71	65.526	-13.746	25	Benjaminsson (1982)
72	65.574	-13.906	16	Benjaminsson (1982)
73	65.638	-14.295	21	Benjaminsson (1982)
74	65.364	-15.915	48	Benjaminsson (1982)
75	65.48	-15.566	21	Benjaminsson (1982)
76	65.537	-15.414	32	Benjaminsson (1982)
77	65.587	-15.179	21	Benjaminsson (1982)
78	65.617	-15.11	32	Benjaminsson (1982)
79	65.742	-14.619	43	Benjaminsson (1982)
80	65.577	-16.089	27	Benjaminsson (1982)
81	65.594	-16.13	64	Benjaminsson (1982)
82	65.584	-16.401	32	Benjaminsson (1982)
83	65.559	-16.564	32	Benjaminsson (1982)
84	65.524	-16.757	54	Benjaminsson (1982)
85	65.633	-16.607	32	Benjaminsson (1982)
86	65.659	-16.492	27	Benjaminsson (1982)
87	65.779	-16.555	16	Benjaminsson (1982)
88	65.82	-16.419	21	Benjaminsson (1982)
89	65.85	-16.366	27	Benjaminsson (1982)
90	65.902	-16.46	21	Benjaminsson (1982)
91	65.944	-16.486	16	Benjaminsson (1982)
92	65.988	-16.399	32	Benjaminsson (1982)
93	66.017	-16.401	21	Benjaminsson (1982)
94	66.047	-16.575	21	Benjaminsson (1982)
95	66.069	-16.672	21	Benjaminsson (1982)
96	66.085	-16.807	11	Benjaminsson (1982)

97	66.186	-16.484	11	Benjaminsson (1982)
98	65.927	-17.3	11	Benjaminsson (1982)
99	66.003	-17.354	16	Benjaminsson (1982)
100	66.015	-14.984	21	Benjaminsson (1982)
101	66.033	-15.11	21	Benjaminsson (1982)
102	66.086	-15.166	16	Benjaminsson (1982)
103	66.13	-15.19	11	Benjaminsson (1982)
104	66.121	-15.396	21	Benjaminsson (1982)
105	66.22	-15.728	11	Benjaminsson (1982)
106	66.29	-16.421	5	Benjaminsson (1982)
107	66.244	-16.405	21	Benjaminsson (1982)
108	66.41	-16.466	16	Benjaminsson (1982)
109	66.488	-16.195	11	Benjaminsson (1982)
110	66.199	-17.048	11	Benjaminsson (1982)
111	66.097	-17.267	11	Benjaminsson (1982)
112	65.056	-17.708	32	Benjaminsson (1982)
113	65.118	-17.506	64	Benjaminsson (1982)
114	65.088	-17.547	107	Benjaminsson (1982)
115	65.277	-17.061	86	Benjaminsson (1982)
116	65.322	-17.256	64	Benjaminsson (1982)
117	65.33	-17.341	64	Benjaminsson (1982)
118	65.287	-17.434	64	Benjaminsson (1982)
119	65.237	-17.471	64	Benjaminsson (1982)
120	65.402	-17.289	37	Benjaminsson (1982)
121	65.431	-17.363	43	Benjaminsson (1982)
122	65.428	-17.048	32	Benjaminsson (1982)
123	65.483	-17.1	43	Benjaminsson (1982)
124	65.484	-17.577	43	Benjaminsson (1982)
125	65.568	-16.948	43	Benjaminsson (1982)
126	65.582	-16.859	43	Benjaminsson (1982)
127	65.612	-16.892	21	Benjaminsson (1982)
128	65.629	-17.254	11	Benjaminsson (1982)
129	65.642	-17.31	21	Benjaminsson (1982)

130	65.661	-17.373	16	Benjaminsson (1982)
131	65.62	-17.486	27	Benjaminsson (1982)
132	65.71	-17.449	21	Benjaminsson (1982)
133	65.698	-17.488	11	Benjaminsson (1982)
134	65.769	-17.569	11	Benjaminsson (1982)
135	65.776	-17.38	16	Benjaminsson (1982)
136	65.761	-17.326	16	Benjaminsson (1982)
137	65.732	-17.933	32	Benjaminsson (1982)
138	65.694	-17.855	43	Benjaminsson (1982)
139	65.63	-17.831	16	Benjaminsson (1982)
140	65.344	-18.261	5	Benjaminsson (1982)
141	65.433	-18.216	5	Benjaminsson (1982)
142	65.696	-18.328	5	Benjaminsson (1982)
143	65.895	-18.576	5	Benjaminsson (1982)
144	65.949	-18.539	7	Benjaminsson (1982)
145	65.872	-17.92	5	Benjaminsson (1982)
146	65.808	-17.855	16	Benjaminsson (1982)
147	63.477	-18.884	5	Larsen (1984)
148	63.512	-18.407	11	Larsen (1984)
149	63.51	-18.363	11	Larsen (1984)
150	63.565	-18.407	16	Larsen (1984)
151	63.64	-18.487	16	Larsen (1984)
152	63.654	-18.504	11	Larsen (1984)
153	63.693	-18.428	11	Larsen (1984)
154	63.701	-19.511	11	Larsen (1984)
155	63.738	-19.47	2	Larsen (1984)
156	63.843	-19.464	5	Larsen (1984)
157	63.821	-18.578	48	Larsen (1984)
158	63.813	-18.543	37	Larsen (1984)
159	63.778	-18.179	16	Larsen (1984)
160	63.78	-18.112	54	Larsen (1984)
161	63.75	-17.988	21	Larsen (1984)
162	63.851	-18.211	27	Larsen (1984)

163	63.867	-18.237	48	Larsen (1984)
164	63.803	-18.005	21	Larsen (1984)
165	63.852	-17.94	27	Larsen (1984)
166	64.072	-16.909	21	Larsen (1984)
167	64.052	-17.439	64	Larsen (1984)
168	63.963	-17.66	64	Larsen (1984)
169	63.957	-17.686	75	Larsen (1984)
170	63.917	-18.175	48	Larsen (1984)
171	63.967	-18.237	86	Larsen (1984)
172	64.101	-19.564	16	Larsen (1984)
173	64.047	-19.346	16	Larsen (1984)
174	64.024	-19.231	16	Larsen (1984)
175	64.069	-19.364	14	Larsen (1984)
176	64.329	-19.271	32	Larsen (1984)
177	64.329	-19.305	11	Larsen (1984)
178	64.227	-19.169	21	Larsen (1984)
179	64.214	-19.24	32	Larsen (1984)
180	63.868	-18.578	43	Larsen (1984)
181	63.908	-18.61	43	Larsen (1984)
182	63.9	-18.596	32	Larsen (1984)
183	63.887	-18.688	32	Larsen (1984)
184	63.96	-18.8	64	Larsen (1984)
185	63.97	-18.775	80	Larsen (1984)
186	64.015	-18.579	214	Larsen (1984)
187	64.018	-18.565	107	Larsen (1984)
188	63.989	-18.93	75	Larsen (1984)
189	63.987	-19.046	43	Larsen (1984)
190	63.98	-18.251	203	Larsen (1984)
191	64.016	-18.232	337	Larsen (1984)
192	64.036	-18.23	214	Larsen (1984)
193	64.027	-18.677	278	Larsen (1984)
194	64.035	-18.537	214	Larsen (1984)
195	64.045	-18.664	857	Larsen (1984)

196	64.065	-18.651	2088	Larsen (1984)
197	64.055	-18.516	1071	Larsen (1984)
198	64.082	-18.476	1071	Larsen (1984)
199	64.104	-18.449	439	Larsen (1984)
200	64.043	-18.795	782	Larsen (1984)
201	64.01	-18.935	107	Larsen (1984)
202	64.026	-18.953	268	Larsen (1984)
203	64.06	-18.773	2463	Larsen (1984)
204	64.09	-18.622	3106	Larsen (1984)
205	64.103	-18.593	2463	Larsen (1984)
206	64.081	-18.8	5355	Larsen (1984)
207	64.105	-18.746	7497	Larsen (1984)
208	64.114	-18.658	5248	Larsen (1984)
209	64.133	-18.72	12852	Larsen (1984)
210	64.153	-18.685	10710	Larsen (1984)
211	64.062	-18.895	8568	Larsen (1984)
212	64.071	-18.937	6426	Larsen (1984)
213	64.024	-19.058	75	Larsen (1984)
214	64.039	-19.02	107	Larsen (1984)
215	64.051	-19	214	Larsen (1984)
216	64.066	-18.958	2035	Larsen (1984)
217	64.081	-18.935	3534	Larsen (1984)
218	64.129	-18.875	3213	Larsen (1984)
219	64.093	-18.979	1285	Larsen (1984)
220	64.144	-18.89	1499	Larsen (1984)
221	64.152	-19.135	32	Larsen (1984)
222	64.197	-18.885	375	Larsen (1984)
223	64.202	-18.845	428	Larsen (1984)
224	64.239	-18.79	536	Larsen (1984)
225	64.152	-18.778	6426	Larsen (1984)
226	64.165	-18.748	6426	Larsen (1984)
227	64.167	-18.787	5891	Larsen (1984)
228	64.177	-18.748	5355	Larsen (1984)

229	64.19	-18.786	1607	Larsen (1984)
230	64.191	-18.804	3213	Larsen (1984)
231	64.197	-18.724	5355	Larsen (1984)
232	64.207	-18.66	6962	Larsen (1984)
233	64.204	-18.542	4284	Larsen (1984)
234	64.242	-18.578	2463	Larsen (1984)
235	64.235	-18.605	4177	Larsen (1984)
236	64.223	-18.638	4498	Larsen (1984)
237	64.163	-18.703	7497	Larsen (1984)
238	64.171	-18.683	8568	Larsen (1984)
239	64.157	-18.659	9639	Larsen (1984)
240	64.245	-18.714	1285	Larsen (1984)
241	64.252	-18.684	428	Larsen (1984)
242	64.262	-18.614	2035	Larsen (1984)
243	64.27	-18.656	536	Larsen (1984)
244	64.286	-18.606	1607	Larsen (1984)
245	64.286	-18.543	1499	Larsen (1984)
246	64.298	-18.565	1607	Larsen (1984)
247	64.281	-18.48	2142	Larsen (1984)
248	64.319	-18.598	1017	Larsen (1984)
249	64.333	-18.617	696	Larsen (1984)
250	64.357	-18.634	321	Larsen (1984)
251	64.257	-18.455	750	Larsen (1984)
252	64.254	-18.417	1607	Larsen (1984)
253	64.249	-18.39	536	Larsen (1984)
254	64.299	-18.338	428	Larsen (1984)
255	64.383	-18.619	107	Larsen (1984)
256	64.411	-18.557	643	Larsen (1984)
257	64.434	-18.628	193	Larsen (1984)
258	64.369	-18.677	236	Larsen (1984)
259	63.835	-18.594	10	Payet--Clerc et al. (2026)
260	63.784	-18.533	8	Payet--Clerc et al. (2026)
261	63.804	-18.571	8	Payet--Clerc et al. (2026)

262	63.739	-18.583	4	Payet--Clerc et al. (2026)
263	63.971	-18.553	10	Payet--Clerc et al. (2026)
264	65.434	-17.062	34	Payet--Clerc et al. (2026)
265	65.725	-16.999	10	Payet--Clerc et al. (2026)
266	65.655	-16.609	9	Payet--Clerc et al. (2026)
267	65.471	-15.494	14	Payet--Clerc et al. (2026)
268	65.635	-15.115	6	Payet--Clerc et al. (2026)
269	65.929	-17.329	6	Payet--Clerc et al. (2026)
270	66.127	-17.242	4	Payet--Clerc et al. (2026)
271	65.880	-16.391	5	Payet--Clerc et al. (2026)
272	66.350	-16.437	8	Payet--Clerc et al. (2026)
273	66.230	-15.723	5	Payet--Clerc et al. (2026)
274	66.092	-15.172	8	Payet--Clerc et al. (2026)
275	64.111	-18.706	29	Payet--Clerc et al. (2026)
276	64.145	-18.780	37	Payet--Clerc et al. (2026)
277	64.145	-18.780	37	Payet--Clerc et al. (2026)
278	64.145	-18.780	37	Payet--Clerc et al. (2026)
279	64.111	-18.706	29	Payet--Clerc et al. (2026)
280	63.698	-18.436	13	Payet--Clerc et al. (2026)
281	64.426	-14.952	8	Payet--Clerc et al. (2026)
282	65.082	-14.885	4	Payet--Clerc et al. (2026)
283	65.490	-14.538	7	Payet--Clerc et al. (2026)
284	63.964	-18.324	6	Payet--Clerc et al. (2026)
285	64.057	-18.237	8	Payet--Clerc et al. (2026)
286	63.979	-18.045	13	Payet--Clerc et al. (2026)
287	63.894	-17.879	4	Payet--Clerc et al. (2026)
288	64.217	-19.135	3	Payet--Clerc et al. (2026)

Table S2: Total grain size distribution, particle density and sphericity used in all simulations. Data from (a) Payet--Clerc et al. (2026); (b) Kaminski & Jaupart (1998); and (c) Payet (2026).

Particle size (ϕ)	**Mass fraction** (wt%)[a]	**Density** (kg m^{-3})[a,b]	**Sphericity** (-)[c]
10.5	0.037	462	0.700
10	0.019	463	0.700
9.5	0.029	465	0.700
9	0.057	467	0.700
8.5	0.135	470	0.700
8	0.242	475	0.700
7.5	0.404	481	0.700
7	0.854	491	0.712
6.5	1.771	504	0.722
6	3.050	522	0.741
5.5	5.643	549	0.759
5	7.832	586	0.770
4.5	8.252	638	0.783
4	7.721	713	0.792
3.5	7.482	818	0.800
3	4.824	966	0.805
2.5	2.800	1176	0.796
2	1.869	1473	0.754
1.5	1.908	1893	0.770
1	2.110	2487	0.785
0.5	2.509	2700	0.799
0	3.704	2700	0.813
-0.5	6.250	2700	0.825
-1	7.242	2700	0.827
-1.5	6.236	2700	0.827
-2	5.867	2700	0.822
-2.5	4.990	2700	0.821
-3	3.434	2700	0.819
-3.5	1.897	2700	0.818
-4	0.564	2700	0.818

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