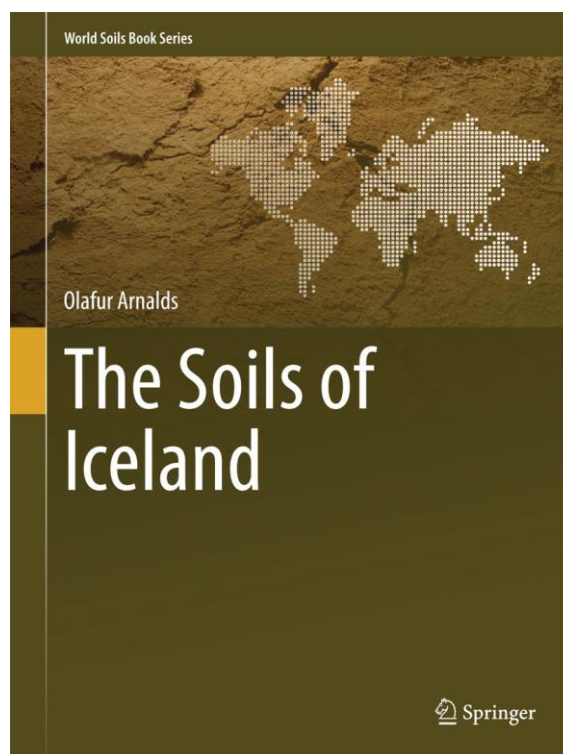


# WRB Workshop in Iceland 2022

## Field guide



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**Icelandic excursion team:**

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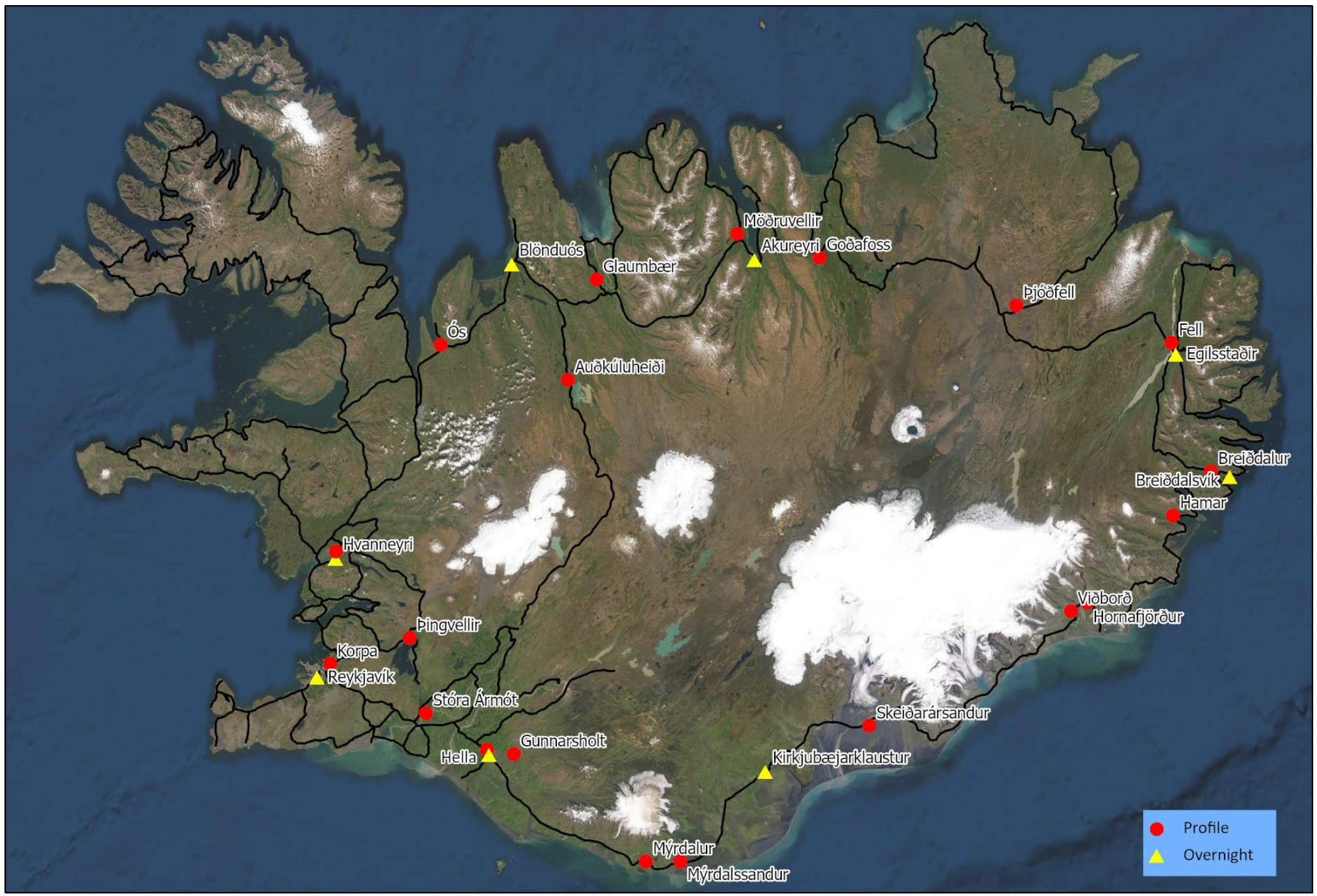
NOTE **Chemical data** in the back of the documentation

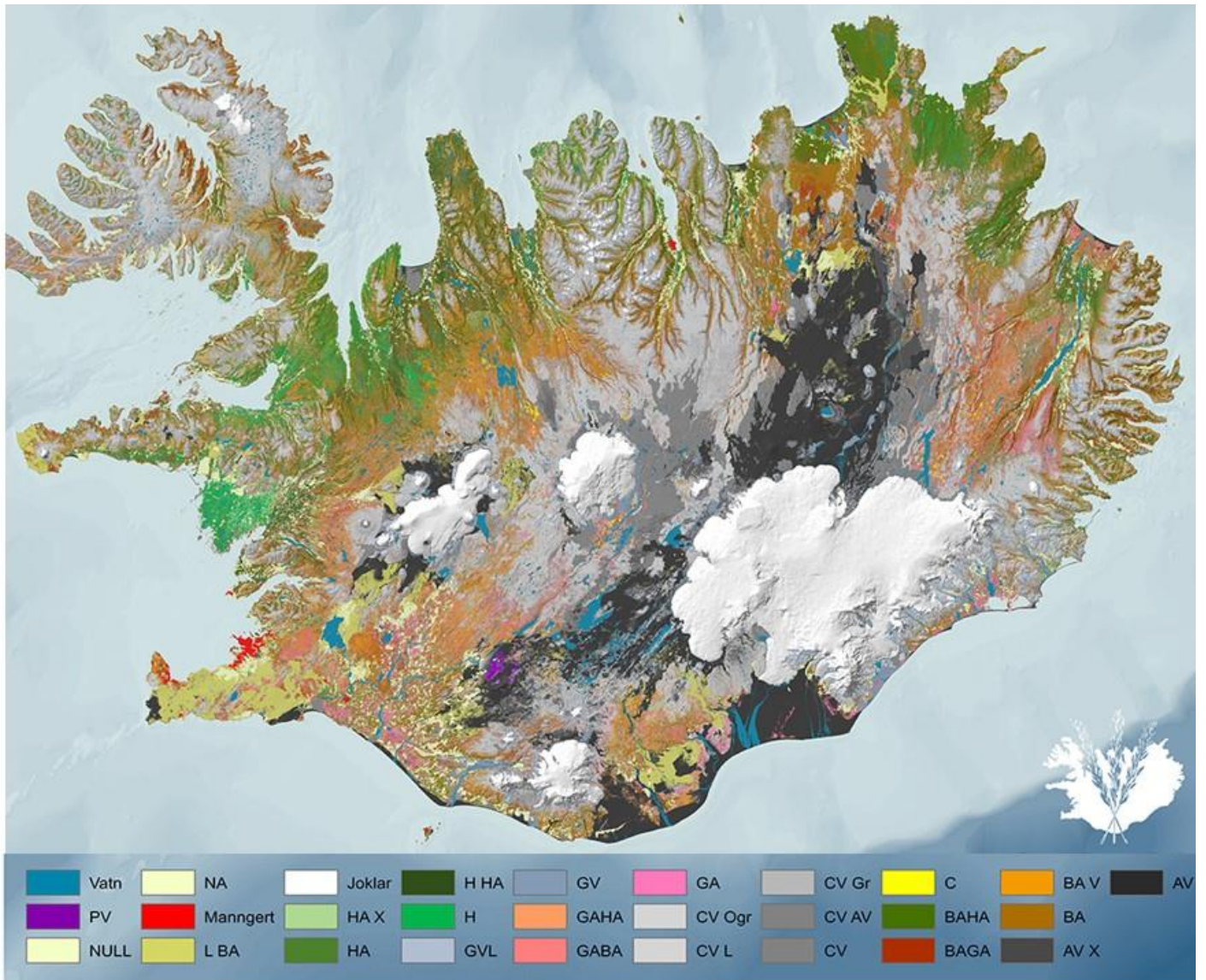
No	Day	Date	SITE	p.	Descript (not classification)	Source
0 Overnight Reykjavik – <b>Informal get-together at Mengi</b> Óðinsgata 2. 19:00 - 21:00.						
	1	<b>8:30</b> Departure Central Bus Station BSI (Umferðarmiðstöð), Vatnsmýrarvegi 10				
1	1	Mon June 6	Stóra Ármót	7	Dryland Andosol	Ýmir AUI
2	1	Mon June 6	Hella	8	Drained Wetland	COST 622
Overnight: <b>Hella</b>						
3	2	Tue June 7	Gunnarsholt	10	Desert and Hardpan	Ýmir AUI
4	2	Tue June 7	Mýrdalur	12	Thick Andosol	OA/Wilding/Hallmark
5	2	Tue June 7	Mýrdalssandur	14	Sandy desert (glacio-fluvial)	Arnalds/Kimble <sup>3</sup>
Overnight: <b>Kirkjubæjarklaustur</b>						
6	3	Wed June 8	Skeiðarársandur	15	Recently flooded sandy desert	Ýmir AUI
7	3	Wed June 8	Viðborð	16	Gleyic Andosol	Ýmir AUI
8	3	Wed June 8	Hornafjörður	18	Wetland forming in sand	Ýmir AUI
Overnight: <b>Breiðdalsvík</b>						
9	4	Thur June 9	Breiðdalur	19	Dryland	Ýmir AUI
10	4	Thur June 9	Hamar	21	Semi-wetland thick soil	Ýmir AUI
11	4	Thur June 9	Fell	23	(if time) Semi wet	Ýmir AUI
Overnight: <b>Egilsstaðir</b>						
12	5	Frid June 10	Thjodfell	25	Gravelly Vitric soil	Arnalds/Kimble
13	5	Frid June 10	Goðafoss	26	Typical Andosol - Monoliths	OA/Wilding/Hallmark
14	5	Frid June 10	Godafoss Vitric	29	Gravelly vitric surface	OA/Wilding/Hallmark
Overnight: <b>Akureyri</b>						
15	6	Sat June 11	Möðruvellir Histic	30	Deep, drained wetland	Ýmir AUI
16	6	Sat June 11	Möðruvellir dry	32	if time Typical Andosol (heath)	Ýmir AUI
17	6	Sat June 11	Glaumbær or:	33	Gleyic Andosol roadcut	Ýmir AUI
18	6	Sat June 11	Auðkúluheiði	35	Highland heath Andosol	COST 622
Overnight: <b>Blönduós</b>						
19	7	Sun June 12	Ós	37	Shallow wet Andic	COST 622
20	7	Sun June 12	Hvanneyri		depends on route on day 8	?
Overnight: <b>Hvanneyri</b>						
21	8	Mo June 13	Thingvellir	39	Andosol under heath	OA/Wilding/Hallmark
22	8	Mo June 13	Korpa I (and/or II)	41	Depends on route / weather	Ymir AUI
	8	Arrival Reykjavik Centra Bus Station (BSÍ) Aiming for <b>18:00</b>				

**This plan depends on time taken for each pedon – and weather – and is subjected to modifications.**

Day 6: decide between Glaumbær and Auðkúluheiði (highland) depending on weather.

Day 8: If weather good: may take highland route (important geomorphology/soils considerations) – which may leave Korpa/Hvanneyri out.





**A new draft soil map of Iceland by OA (AUI), Sigmundur Helgi Brink and Bryndís Marteinsdóttir (Icelandic Soil Conservation Service). Will be in 1:25 000 or better**

H: Histisols.

A: Andosols. BA: Brown Andosols. GA: Gleyic Andosols. HA: Histic Andosols.

V: Vitrisols. CV: Cambic Vitrisols, GA: Gravelly Vitrisols, AV: Sandy Vitrisols, PV: Pumice Vitrisols. gr: vegetated.

Other: L: Leptosols, C: Cryosols. X: with something else.

## Preface

Iceland has ~ 5% of world's Andosols. The development of the Andisol order in Soil Taxonomy (ICOMAND) took place without Icelandic participation and soil information. Which is unfortunate. WRB draws considerably from this initial work (Parfitt, Quantin, Shoji, and others have published papers about this work). It is therefore an important step to look at Icelandic soils with a wide perspective to address the classification of soils of volcanic areas. Some of Icelandic uniqueness includes widespread deserts with vitric soils, the basaltic nature of the PM, steady vitric-aeolian additions, intense cryoturbic processes, highly andic wetland soils and more.

Some of the most wide-spread soils in Iceland fit poorly within Soil Taxonomy and contrasting soils are classified as the same soils down three levels (Vitricryands). Changes were made to WRB following the COST-622 EU collaboration (Volcanic Soils of Europe – a large consortium) – with Otto Spaargaren, Paul Quantin and many others being actively involved. Roger Parfitt, Alan Hewitt (NZ classification) and Randy Dahlgren all participated at one point. Previously, OA collaborated with Larry Wilding (Texas A&M University) and John Kimble (USDA-NRCS) on classification issues.

The AUI classification for Iceland was in part based on this background and Icelandic conventions in relation to soils – addressing Icelandic needs and to enter Icelandic soil information into international maps and databases. It has worked well so far.

Organizing the trip was not an easy task. The population of Iceland is low and soil science has not many practitioners! Many of the pedons we visit are a bit old. The preparations included both “digging” for data and finding back the pedons – which was not always fully successful. The descriptions bear mark of many systems used – but they should suffice for the purpose. We did our best.

We very much look forward to this trip and hope for fertile collaboration and exchange of ideas.

## Main references are:

*The Soils of Iceland*. OA 2015. Springer. This book was intended for visitors – and in addition to soils it has general information that is important for understanding Icelandic nature today, and the collapse of Icelandic ecosystems. *So we recommend that participants obtain a copy (pdf or printed)*.

*Andisols from four different regions of Iceland*. Ólafur Arnalds, C.T. Hallmark and L.P. Wilding 1995. Soil Science Society of America Journal 59:161-169.

*Andisols of deserts in Iceland*. Ólafur Arnalds and John Kimble. 2001. Soil Science Society of America Journal 65:1778-1786. Ólafur Arnalds and John Kimble.  
[https://www.moldin.net/uploads/3/9/3/3/39332633/arnalds\\_kimble\\_24654pdf.pdf](https://www.moldin.net/uploads/3/9/3/3/39332633/arnalds_kimble_24654pdf.pdf)

*Soils of Volcanic Regions in Europe*. Arnalds O, Bartoli F, Buurman P, Garcia Rodeja E, Oskarsson H, Stoops G (eds.) 2007. Springer, 644 p. ALSO Special issues of Geoderma and Catena with some papers with Icelandic data:

*Volcanic Soils Resources: Occurrence, Development and Properties*. Arnalds O, Stahr K (eds.). 2004. Catena, special issue 56, 261 p. Elsevier.

*Volcanic Soils: Properties and Processes as a Function of Soil Genesis and Land Use*. F Bartoli, P Buurman, B Delvaux, M Madeira (eds.) 2003. Geoderma 117. Special issue

*Ymir – internal RALA/AUI database*, mostly published in Icelandic – some used in The Soils of Iceland and elsewhere.

OA publications are listed and many pdfs' available on his website: moldin.net; <https://www.moldin.net/books-and-peer-reviewed-papers.html>

### **Note on sites.**

OA has invested considerable time re-locating the sites (some are actually a bit old). It was actually much more difficult and costly than anticipated when agreed on the trip : ). In some places there have been changes, new roads, gravel pits etc. – so exact same location was not always an option, but alternative locations were found in those cases.

Amount of data varies – and we tried to make the most relevant data in this field guide.

### **Notes on descriptions.**

Descriptions are from many sources, so they are not standardized. Some are translated from Icelandic by students.

“b suffix” for buried horizons is often not used (everything is buried under something else in these soils that form in aeolian parent materials with a steady influx of dust for 9000 yrs). Numbering for changes in PM varies between data sources. Will be explained further during the trip.

### **Disclaimer on WRB proficiency.**

OA studied under Gerald Nielsen in Montana (genesis and classification professor – but a <sup>137</sup>Cs radioactive cesium study) and Larry Wilding and Tom Hallmark (also genesis and classification professors). Developed proficiency in Soil Taxonomy and classification philosophy in general – and enjoyed it. This was long time ago. Now OA is not so much a classification person anymore, and definitely not in WRB – so please be patient.

### **The Icelandic system.**

Was developed during the COST-622 time to provide a simple soil map of Iceland at the highest level for use in global soil databases etc. It was developed with notice of Icelandic perception of different soils. Has functioned quite well for many purposes. Is explained in detail in “The Soils of Iceland”. The use of the soil type “Vitrisols” (several subgroups) is the most important item (see below). Poorly drained Andosols are divided into Gleyic and Histic Andosols (based on %C). Dryland soils under vegetation are simply Brown Andosols.

### **On Gleyic Andosols**

OA and Otto Spaargaren (good friend) collaborated considerably during the COST-622 time (on volcanic soils in Europe – see the COST publications on Andosols), and with Paul Quantin and others. One thing we agreed on and he took up with other WRB people was that Andosols can be gleyic – the andic properties dominate (just as Andosol can have up to 25% C – andic properties still dominate by far, i.e. Gleyic Andosols). The key was consequently changed. But now we see that the key was not taken “all the way” as Gleysols key out before Andosols. Which OA does not agree with (for what it is worth).

### **Tephra layers: The T horizon.**

Thick tephra layers, buried in the aeolian materials and showing much less weathering than the adjacent horizons have sometimes been labelled as T horizons (in stead of C). Or as adjective: 2Bw-T or 2C-T. This is quite meaningful for soil descriptions in Iceland (for local use). Is suggested in OA/Wilding/Hallmark 1995 and elsewhere.

**Some issues OA would like to bring up.**

*Vitrisols*. The most important one regards the barren deserts in Iceland and the concept of Vitrisols – special documents for that. Otto Spaargaren, Larry Wilding, John Kimble and others encouraged OA to write a proposal for Vitrisols. Correspondence with Hari Eswaran. It was never finished (OA became an administrator at a crucial time).

Other issues regarding WRB and Iceland are (please form opinions after you see the Icelandic conditions and (of course) with an open mind:

The dominance of andic properties over gleyic – Andosols rather than Gleysols.

*Aridic*. Definition in light of Icelandic barren areas – deserts. Interesting.

*Depth requirements*. Especially uneven soil depths in Iceland – the soils form in aeolian materials – a mat of dust. Also sandy deposits over rough lava surfaces etc (Vitrisols and Anodosol). The properties are the same but classifications change abruptly on the landscape (and depths not really known, very undulating or uneven bedrock, hummocky landscapes (thufur) etc. Not a problem in Soil Taxonomy.

*Desert pavement* Iceland has an interesting combination of aeolian, fluvial and cryoturbation (rock uplifting) to form gravelly surfaces similar to other desert pavements.

MAYBE MORE LATER

### Stóra Ármót (Ymir)

Few km NE of Selfoss at the experimental farm Stóra-Ármót. The lower part has a different feel (much slower dust accumulation before the Settlement).

Profile Stóra Ármót			
Depth [cm]	Horizon	Color	
0 – 17	A1	7.5 YR 3/2 dark brown	Silt loam. Weak fine granular structure. Very friable. Many very fine and fine roots. No mottles. Clear wavy boundary to:
17 – 31	A2	10 YR 3/2 very dark grayish brown	Silt loam. Weak medium granular structure. Friable. Many very fine and fine roots. Not mottles. Clear wavy boundary to:
31 – 50	Bw1	10 YR 3/3 dark brown	Silt loam. Very weak coarse subangular blocky structure. Friable. 1% coarse fragments. Few very fine and fine roots. No mottles. Clear wavy boundary to:
50 – 65	Bw2	10 YR 4/4 dark yellowish brown	Clay loam. Very weak coarse subangular blocky structure. Friable. 2% few medium distinct mottles. Few fine roots. Faint layers of reddish and blackish color slightly stratified. Abrupt wavy boundary to:
65 – 90	Bw3	5 YR 3/4 dark reddish brown	Silt loam. Very weak coarse subangular blocky structure. Friable. 20% distinct mottles (2.5 YR 3/6). Soil may show evidence of rhyolitic and basaltic tephra. Abrupt irregular boundary to:
90+	R		No description





**Hella (COST 622)**

Date of description: 28-08-1999

Authors: A.G. Jongmans, F. van Oort, and O. Arnalds

Location: South Iceland, Hella, 600m NE of the farm Ytri-Tunga, 30m from the north-end of a 2 gr. old ditch, depth about 2.5m.

Altitude: 50 m

GPS co-ordinates: x 529400, y 7082600

Classification: WRB (2001): Thaptohisti-Vitric Andosol (Umbric and Pachic)

ST (1999): Ashy, amorphous Eutric Pachic Fulvicryand

FitzPatrick (2006): Vte55~B-P-Is#Fmc16~B-P-Is5#Vte - Vitrosol

**Soil Climate;** Cryic/ Frigid temperature regime; Udic moisture regime; annual rainfall: 1150 mm, mean annual temperature 4.50 C, mild winters but cool summers, 4-5 month growing season; became wetland with two drier and warmer periods when Birch forest dominated

**Landform:** Flat, with low gently sloping hills in between **Land element:** Glacial plain, South Lowlands

**Position:** Middle slope **Micro topography:** Hummocky level area

**Land use/Vegetation:** Moderately grazed by horses; grass cover > 90%; *Festuca rubra*, *Poa pratensis*, and

*Descampsia* sp. **Human influences:** Very noticeable environmental change about the Settlement 1125 yrs ago, increased aeolian deposition resulted in higher mineral content in the sediments and lighter soil colours. Profile is situated in a 2 yrs old ditch, 2.5 m deep **Parent material:** 2.5-3m thick aeolian, tephra and organic materials. Site is near Mt Hekla and much influenced by volcanic activity in Hekla and Katla.

**Effective soil depth:** Moderately deep **Erosion:** None **Drainage class:** Somewhat poorly drained. **Internal drainage:** Saturated for long periods, moderately, slow hydraulic conductivity (?) **Moisture conditions:** Moist

**SOIL HORIZON DESCRIPTION:**

Ah: 0-55 cm; dark reddish brown (5YR 3/3); loam; the horizon has a high organic matter content; locally pockets of angular, fine gravelly and sandy material; disturbed stratification, the entire horizon shows features of cryoturbation:

2C: 55-60 cm; a basaltic ash layer of 5 cm, very dark grey to black (2.5YR 2.5/0) with a loamy sand texture; friable; common fine to medium roots; clear and wavy to:

3H: 60-95 cm; dark brown (7.5YR 3/3); stratified horizon consisting of plant remnants; friable; common fine and medium roots; occurrence of discontinuous fine bands of basaltic ash; clear and wavy to:

3C: 95-100 cm; very dark greyish brown (10YR 3/2), with light spots of sand grains, light yellowish brown (10YR 6/4); no macro structure; friable; few fine roots; abrupt and wavy to:

4H: 100-230 cm; very dark grey to black (5YR 2.5/1.5); stratified horizon consisting of organic material with aeolian mineral and basaltic pyroclastic (black (2.5YR 2/0)) layers with a loamy sand texture and ranging in thickness from 1-10 cm; at 160 cm some mineral layers up to 2 cm consisting of lighter coloured rhyolitic material; organic material and ash layers are friable; at 120 and 170 cm wood remnants of birch up to 20-30 cm in size.



## Geitasandur near Gunnarsholt (if weather and time allow)

**Gunnarsholt** is the headquarters of the Icelandic Soil Conservation Service. Established in 1907 to battle encroaching sand. Area now largely grasslands and heathlands where everything was black sand before 1930. All forested with birch before the Settlement (8<sup>th</sup> century). The I-SCS is one of the oldest (perhaps oldest) soil conservation institutes in the world.

### Geitasandur.

We will look at a large restoration experiment (40 x 1ha plots, 10 treatments – 4 replicates) on sandy-gravelly surface. Long term research on ecosystem development and succession from the sand to a forest.

Soil formation – how the soils change in character and classification– carbon sequestration and other aspects. Data below.

The experiments confirm relatively rapid carbon accumulation in the soils.

Will end as a birch forest in the future (50-100 years?)

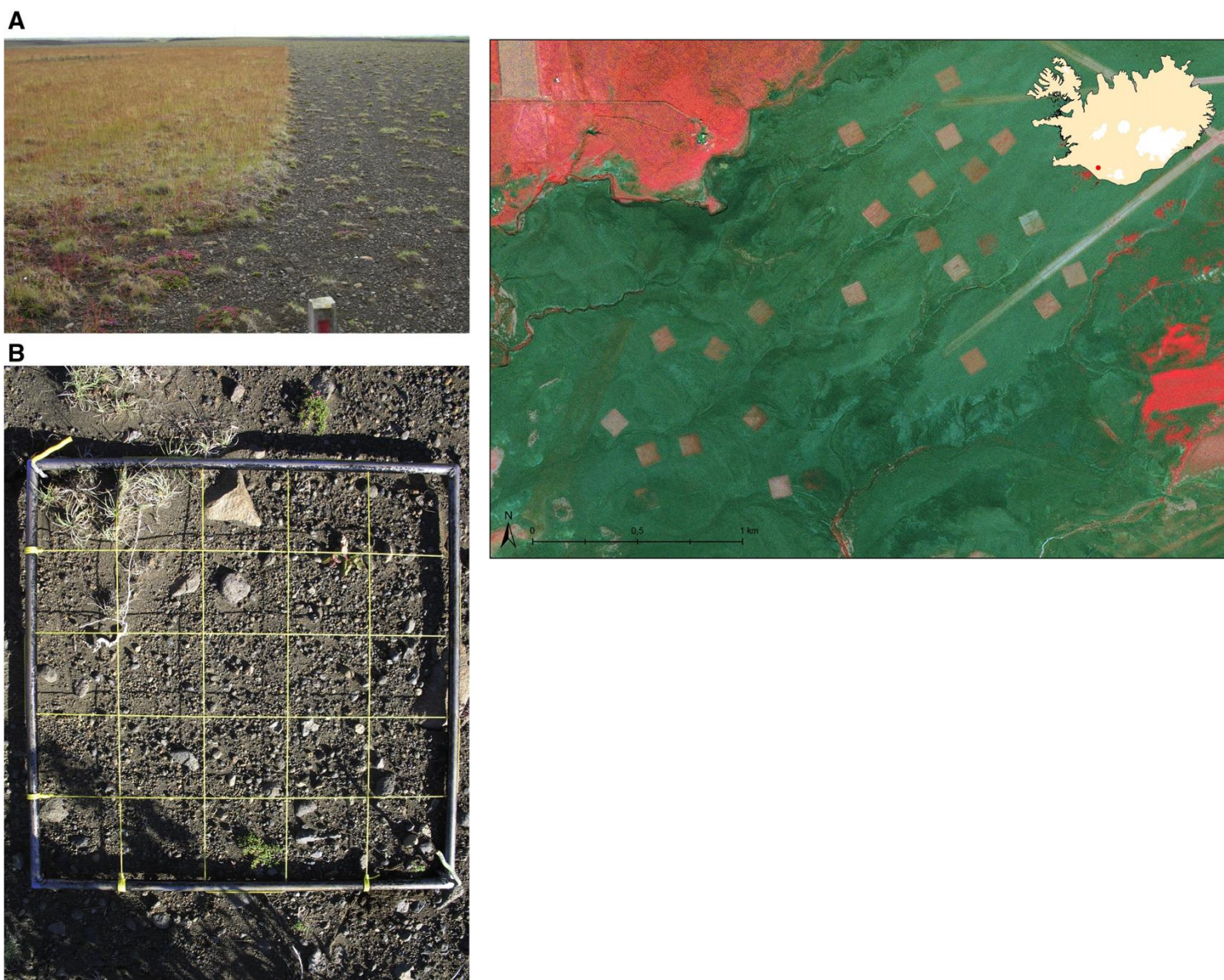
Some things to consider (also in association with other “desert” soils in Iceland).

### Hardpan

Hopefully have time to look at thick extremely dense hardpans. Formation is not fully understood, nor is the parent material.

Depth	Treatment	Si <sub>ox</sub>	Al <sub>ox</sub>	Fe <sub>ox</sub>	Clay	Al <sub>pyr</sub>	Fe <sub>pyr</sub>
%							
0–5 cm	1-CTRL	1.36	1.22	2.08	10.3	0.070	0.061
	3-GR	1.39	1.25	2.16	10.6	<b>0.081</b>	<b>0.068</b>
	7-GR-TR	1.30	1.20	2.09	10.1	<b>0.087</b>	<b>0.073</b>
5–10 cm	1-CTRL	1.67	1.55	2.57	12.7	0.072	0.066
	3-GR	1.76	1.62	2.69	13.4	0.068	0.061
	7-GR-TR	1.67	1.57	2.61	12.8	0.069	0.065

Year	Depth	treatment	C	N	C:N ratio	pH (H <sub>2</sub> O)	pH (KCl)
%							
2005	0–5 cm	1-CTRL	0.28	0.029	9.8	6.83	5.48
		3-GR	<b>0.61</b>	<b>0.044</b>	<b>14.1</b>	<b>6.27</b>	<b>5.12</b>
		7-GR-TR	<b>0.65</b>	<b>0.050</b>	<b>13.0</b>	<b>6.23</b>	<b>5.11</b>
	5–10 cm	1-CTRL	0.32	0.035	9.3	7.20	5.66
		3-GR	<b>0.41</b>	<b>0.040</b>	<b>10.3</b>	<b>6.91</b>	<b>5.44</b>
		7-GR-TR	<b>0.43</b>	<b>0.042</b>	<b>10.2</b>	<b>6.95</b>	<b>5.47</b>
2007	0–5 cm	1-CTRL	0.25	0.023	11.1	7.10	5.46
		3-GR	<b>0.70</b>	<b>0.043</b>	<b>16.1</b>	<b>6.63</b>	<b>5.12</b>
		7-GR-TR	<b>0.71</b>	<b>0.044</b>	<b>16.2</b>	<b>6.63</b>	<b>5.12</b>
	5–10 cm	1-CTRL	0.32	0.028	11.5	7.46	5.70
		3-GR	<b>0.42</b>	<b>0.032</b>	<b>13.2</b>	<b>7.15</b>	<b>5.43</b>
		7-GR-TR	<b>0.44</b>	<b>0.033</b>	<b>13.5</b>	<b>7.19</b>	<b>5.45</b>



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Carbon accumulation in Icelandic desert Andosols during early stages of restoration

Olafur Arnalds\*, Berglind Orradottir, Asa L. Aradottir

**Mýrdalur** (OA/Wilding/Hallmark) Vitric Haplocryand (medial over ashy)

Thick Andosols, quite high in oxalate values, iron. We find hardpans and thixotrophy in the profile or nearby.

**Location;** Mýrdalur in South Iceland, in Heiðardalur, about 2 km east of the farm along the dirt trail, 50 m west of the trail, first eolian remnant after crossing a small stream. Pit on the west face of the remnant.

**Physiographic position:** Foothlope a slope of 4° with SSE aspect at about 85 m elevation.

**Parent material:** Eolian-andic materials overlying glacial till and talus.

**Drainage:** Well drained. **Land use:** Open range for sheep grazing.

**Vegetation:** Grassland/moss plant community with *Agrostis* spp., *Poa* spp. and *Festuca* spp., *Carex bigelowii*, *Thymus arcticus*, *Poligonum viviparum*, *Galium mormanii*, *Eupisetum arvense*, and *Alchemilla alpine*.

**Remarks:** sampled and described in a pit placed in an erosion scarp of a remnant island about 10 x 20 m in size. Erosive wind direction is parallel to the contour of the slope and long axis of the remnant. Erosive wind direction was indicated by wind scar direction in the soil and pumice accumulation on leeward side of remnant. A root mat is 5-6 cm thick. Soil temperature at 68 cm was 11°C. The pH of first 4 horizons was 6.5 but when powder was added, color showed pH of 4.5.

Below C6 light colored for 3 cm; 1 cm greenish tephra layer; 2 cm light colored soil; 2 cm reddish black tephra layer; 2 cm light colored soil; 3cm reddish black tephra layer; 5 cm light colored soil; 1 cm light colored tephra layer; 4 cm light colored soil; coarse black and greenish ash layer; till is at least 1.5 cm below this point.

**Pedon 2, Myrdalur (MY), medial over ashy Vitric Haplocryand.**

Horizon	depth (cm)	pH			OC	Oxalate			P-retention
		H <sub>2</sub> O	KCl	NaF		Al	Fe	Si	
A1	0-8	5.6	5.1	10.1	4.9	2.8	6.1	2.5	97
A2	8-16	5.7	5.2	10.3	3.3	2.7	5.8	2.5	97
A3-(t1)	16-36	5.9	5.3	10.2	2.6	2.8	5.5	2.5	98
A4-(t1)	36-51	6.0	5.4	10.2	2.1	2.5	5.3	2.9	96
A5-(t1)	51-71	6.2	5.5	10.2	2.1	2.8	5.0	3.1	98
Bw1-T	71-74	6.4	5.6	10.2	0.9	1.5	2.8	1.9	-
Bw2	74-91	6.3	5.6	10.1	2.7	2.8	5.6	3.6	98
BC-T	91-111	6.3	5.6	10.2	2.4	2.1	3.9	2.0	95
CB	111-124	6.4	5.7	10.5	6.2	2.7	6.0	2.3	98
C1-(t4)	124-171	6.4	5.7	5.8	2.0	2.8	5.5	3.0	98
C2	171-181	6.5	5.7	9.8	3.3	5.3	8.1	2.4	93
C3-T?	181-196	6.5	5.7	9.8	0.6	2.2	4.3	2.5	-
C5-T	???	5.9	5.7	-	1.0	2.2	4.1	2.6	-

Profile Mýrdalur			
Depth (cm)	Horizon	Color	
0-8	A1	5YR 3/3	Mucky loam. Weak fine and very fine granular structure. Very friable. Many fine roots. Few fine tephra gravels. Clear smooth boundary.
8-16	A2	5YR 3/3	Loam. Weak fine and very fine granular structure. Very friable. Many fine roots. Few fine tephra gravels. The horizon rests on a thin 2 cm black ash layer (T1) of loamy sand texture. Abrupt wavy boundary.
16-36	A3-(t1)	5YR 3/3	Loam. Weak medium subangular blocky to moderate fine granular structure. Friable. Many fine roots. Horizon rests on thin 5-10 mm thick black tephra layer (T2) of loamy sand texture. Abrupt wavy boundary.
36-51	A4-(t1)	5YR 3/3	Loam. Weak medium subangular blocky to moderate fine granular structure. Friable. Common fine roots. Few fine tephra gravels. Horizon rests on a thin 1-2 cm thick black tephra layer (T3) of loamy sand texture. Abrupt wavy boundary.
51-71	A5-(t1)	5YR 3/3	Loam. Weak medium subangular blocky to moderate granular structure. Friable. Common fine roots. Few fine tephra gravels, which are consolidated tephra. Abrupt wavy boundary.
71-74	Bw1-T	5YR 2/1	Loamy sand. Structure-less massive. Friable. Common fine roots. T4, ranges in thickness from 2-3 cm. Abrupt wavy boundary.
74-91	Bw2	5YR 3/3	Loam. Weak coarse subangular blocky structure. Friable. Common fine roots. Few fine tephra gravels. Horizon rests on a thin 1-2 cm thin black ash layer (T5) of loamy sand texture. Abrupt wavy boundary.
91-111	BC-(t6)	5YR 3/4	Loam. Weak very coarse platy structure. Slightly brittle. Few fine roots. Horizon contains six thin 1-3 cm black tephra layers (T6-T11) of loamy sand texture. Horizon rests on a 1 cm thick black tephra layer of loamy sand texture. Matrix is slightly thixotropic. Abrupt wavy boundary.
111-124	CB	5YR 3/3*	Silt loam. Weak very coarse platy structure. Slightly brittle. Few fine roots. Slightly thixotropic. Horizon rests on a black tephra layer 1-2 cm thick, which is pumiceous (T12). Abrupt wavy boundary.
124-171	C1-(t4)	5YR 3/4	Silt loam. Weak bedding planes. Slightly brittle. Very few fine roots. Horizon has 4 interleaved tephra layers (T13-16) 3-5 cm thick that comprise about half of the horizon. Tephra layers are loose loamy sands. Abrupt wavy boundary.
171-181	C2	5YR 4/4	Loam. Structure-less massive. Brittle. No roots. Abrupt wavy boundary.
181-196	C3-T?		Very brittle no roots. T17, coarse at the base and fining upward. Abrupt wavy boundary
196-199	C4	5YR 4/4	Silt loam. Slightly brittle. Slightly thixotropic. Abrupt wavy boundary
199-208	C5-T		Very brittle. T18. Abrupt wavy boundary.
208-238	C6-(T2)	5YR 4/4	Silt loam. Two black tephra layers (T19-T20) comprise all but 10 cm of layer. Tephra are brittle and extremely brittle.

**Mýrdalssandur (OA/John Kimble USDA-NRCS)**

**Typic Vitricryand** (OA/Kimble/Wilding et al. not happy with Soil Taxonomy here)

Large unstable glacio-fluvial sandy floodplain. Pedon taken in flood deposits (ca 300 000 m<sup>3</sup>/sec flow- colossal!) formed during the 1918 Katla volcano eruption (underneath the glacier above).

**Andisols of Deserts in Iceland**

Soil Science Society of America Journal 65:1778–1786 (2001).

O. Arnalds\* and J. Kimble

<b>Pedon 6. Myrdalssandur. CE 1918–flood, tephra</b>											
Horizon	N <sub>2</sub> O	CaCl <sub>2</sub>	NaF	OC†	Extractable bases				Summation bases	CEC‡ pH7	P recovery
					Ca	Mg	Na	K			
		pH		g kg <sup>-1</sup>	cmol kg <sup>-1</sup>						
A	0–4	7.5YR 2.5/0		glsa		weak fine granular			v friable		abrupt wavy
C1	4–8	7.5YR 2.5/0		glsa		single grain					abrupt smooth
C2	8–13	7.5YR 2.5/0		glsa		single grain					abrupt wavy
C3	13–25+	7.5YR 2.5/0		glsa		single grain					
<b>Pedon 6. Myrdalssandur. CE 1918–flood, tephra</b>											
A	6.8	5.9	9.8	0.9	0.9	0.7	0.1	0.1	1.8	3.1	32
C1	6.9	6.0	9.8	0.5	1.3	0.8	0.1	0.1	2.3	3.2	35
C2	6.7	5.9	9.6	0.2	1.2	0.8	0.1	0.1	2.2	2.7	17

SEE also the data table!

### Skeiðarársandur (9-6-2002)

Profile Skeiðarársandur			
Depth	Horizon	Color	
0-7 cm	C		Sand. Structure less loose. ½ cm desert payment. Grains 20% 2-40 mm. Boundary very abrupt wavy. Not sampled.
7-16 cm	2A	5 YR 2,5/1	Loamy sand. Structure less loose. Grains 5% 2-20 mm. Very few roots. Boundary very abrupt wavy.
16-18 cm	3C	7,5 Y 2/0	Loamy sand. Structure less loose. No coarse fragments. Very few roots. Boundary very abrupt wavy.
18-45	4C	5 YR 5,5/1	Sand. Structure less loose. No coarse fragments. Very few roots.
45-50+	5C		

Profile taken in front of the Skeiðarár glacier in an area of frequent glacier floods. Profile in deposits of the 1996 hyper-even flood (6 yrs old!). (50 000 m<sup>3</sup>/sec)

Vegetation: vegetation cover 2%.

Erosion: severe erosion.

Parent material: sand, boulders, silt and ash fragments from underneath the glacier.

Drainage: very well drained.



Skeiðarársandur profile and its surroundings



## Viðborð II (10-6-2002)

Profile Viðborð II (English translation of an Icelandic description made by a student)			
Depth	Horizon	Color	
0-8 cm	O	10 YR 2/2	Weak medium and fine granular structure. Little to medium decomposed material. Boundary clear wavy.
8-16 cm	A1	5 YR 3/2	Silt loam. Very weak fine to medium granular structure. Very friable. Many fine to medium roots. Fine and common distinct medium to coarse mottles. Color of mottles 2,5 YR 4/6. Boundary clear wavy
16-23 cm	2O1	10 YR 3/4	Little to medium decomposed material. Common fine roots cutting the histic layer. Common medium to coarse mottles. Color of mottles 2,5 YR 4/6. Tephra layer (T) at bottom, 1 cm discontinuous (7,5 YR 2/0). Boundary clear wavy.
23-38 cm	2O2	10 YR 3/2	Structure weak and fine platy. Medium to <b>many</b> decomposed material. Common fine roots cutting through histic layer. Common medium to coarse mottles. Color of mottles 2,5 YR 4/6. The tephra layer of Öräfajökull 1362 is found at bottom, 0-3 cm, color 2,5 YR 6/2. Boundary abrupt wavy.
38-48 cm	2O3	5,5 YR 3/3	Medium decomposed material. Tephra layer at bottom, 0-2 cm, loamy sand, color 7,5 YR 2/0. Boundary abrupt wavy.
48-78 cm +	3Bw	10 YR 3/1	Clay loam. Weak fine to medium sub angular blocky. Very friable.

Profile taken on a tertiary basalt mountain ledge. OA/RG/BÓ.

Location: N 64°20,366"

W 15°24,216"

Altitude: 37 m over sea level (GPS)

Vegetation: grassland (*Carex* and *Agrotis* 30%, *Juncus* and *Equisetum*). Hummocky land with hummocks up to 20 cm in height.

Erosion: probably pasture land but no erosion.

Drainage: poorly drained.

Remarks: groundwater at 60 cm depth and slope at 3° S/W. (See also profile description of Viðborð I)

**Viðborð II**

### Hornafjörður (10-6-2002)

Quite an interesting soil, as a fully vegetated wetland soil is forming from pure sand.

Profile: Hornafjörður (Translated from Icelandic)			
Depth	Horizon	Color	
0-3 cm	O	10 YR 3/1	Sandy loam. Decomposed material. Many very fine roots. Boundary very abrupt smooth.
3-8 cm	C1	2,5 Y 3/0	Sand. Single grain structures less. Grains 5% 2-20 mm. Very fine few roots. Boundary abrupt wavy.
8-20 + cm	C2	2,5 Y 3/0	Sand. Single grain structures less. Grains 20% 2-20 mm. Very few fine roots. Boundary abrupt wavy.

Profile taken from a former glaci-fluvial floodplain now protected from flooding.

Location: N 64°21,507" Altitude: 37 m over sea level.

W 15°20,565"

Altitude: 9m over sea level (GPS)

Vegetation: *Junctus arcticus* 20%, *Salix phylicifolia* 10%.

Drainage: water level at 17 cm depth. Not well drained.

Parent material: glaciofluvial materials – sand from a glacial river that used to flood during summer.

Remark: the land recovered after a bridge was built over the Hornafjörður riverbed.

Surroundings of Hornafjörður profile



**Breiðdalur (12-6-2002)**

The site no longer exists due to road construction and gravel mining, but similar site was selected.

Profile: Breiðdalur			
Depth	Horizon	Color	
0-11cm	O/A1?	5 YR 3/2	Silt loam. Weak medium granular structure. Very friable. Boundary wavy.
11-26 cm	A	5 YR 3/2	Silt loam. Very weak medium sub angular blocky. Parting 2: very weak medium granular structure. Very friable. Common fine and very fine roots. Crio. Tephra layer "a" at bottom (1-3 cm) not sampled. Boundary very abrupt wavy.
26-37 cm	Bw1	7,5 YR 3/4	Silt loam. Weak medium sub angular blocky structure. Common fine and very fine roots. Medium mottles forming strings (2%). Tephra layer 1362 at bottom (0-1cm). Not sampled. Crio. Boundary very abrupt wavy.
37-47 cm	Bw2	10 YR 3/2 Color of mottles: 10 YR 4/8	Clay loam. Weak sub angular blocky. Very friable. Moderately few and fine roots. Distinct mottles forming tongs (1-3 mm). Crio. Boundary very abrupt wavy.
47-70 cm	Bw3	10 YR 3/4	Silty clay loam. Weak medium sub angular blocky. Friable. Very few medium mottles (1%). Few and very few roots. Crio. Boundary very abrupt wavy.
70-82 cm	Bw4	10 YR 3/3	Silty clay loam. Weak medium sub angular blocky structure. Friable. Few fine and very fine roots. Very few medium mottles (4%). Boundary very abrupt wavy.
82-100 cm	2Bw1	Grey: 2,5 YR Yellow: 2,5 YR 6/4 Red: 2,5 4/8	Gravelly clay. Weak fine granular structure. Friable. Fine and very fine roots. Some clay coding. Mottles (30%). Rounded gravel (70%). Boundary very abrupt wavy.
100-120 cm+	2Bw2	10 YR 4/1	Clay loam. Medium moderately sub angular blocky structure. Friable. Very few fine roots. Rounded gravel 10% 2-20 mm. The horizon is formed by a gray mass with 5% red and yellow mottles.

Profile taken in a valley bottom.

Location: N65°20,62"  
W14°29,849"

Altitude: 130m over sea level (GPS)

Vegetation: hummocky and dry vegetation cover yet, wet at some parts. Hummocks of 20-40cm height. Composition of grassland: *Betula mana*, *Bistorta vivipara*, *Empetrum nigrum*, *Salix herbacea*, and *Cladonia arbuscula*. Pasture land.

Erosion: no erosion

Drainage: somewhat poorly drained.

Ash layers found: Öräfajökull 1362 and "a" 1480.

**Breiðdalur**

**Hamar (11-6-2002)**

Profile: Hamar			
Depth	Horizon	Color	
0-11 cm	A1	10 YR 2/1	Silt loam. Very weak fine granular structure. Very friable. Very fine and fine medium roots. Boundary abrupt smooth.
11-41 cm	A2	10 YR 2/2	Silt loam. Very weak fine granular structure. Very friable. Common very fine, fine and medium roots. Boundary gradual smooth.
41-75 cm	A3	10 YR 2/2	Silt loam. Very weak fine granular structure. Very friable. Common fine and medium roots. Boundary clear.
75-85 cm	Bw1	5 YR 3/2	Silt loam. Weak fine and sub angular blocky. Parting 2: Weak medium granular structure. Friable. Rocks 2-10 mm. Moderately few roots. Few fine distinct mottles (2,5 YR 3/4). Boundary clear smooth.
85-98 cm	Bw2	7,4 YR 3/4	Sandy clay loam. Weak and medium sub angular blocky structure. Friable. Very few fine and medium roots. Distinct and medium mottles forming strings (2,5 YR3/4)
98-109 cm	Bw3	7,5 YR 3/2	Clay loam. Weak and medium sub angular blocky structure. Friable. Very few roots. Distinct and medium mottles forming strings (2,5 YR 4/8). Boundary smooth.
109-133 cm	Bw4 (s?)	10 YR 4/2	Sandy clay loam. Firm. Very few roots. Distinct and prominent common med. to coarse mottles (15%). Color of mottles: 2,5 YR 4/6.
133-153 (+>15cm)	Bw5	10 YR 3/1	Clay. Moderate sub angular blocky structure. Friable. Tonguing mottles, 20% medium to coarse mottles (2,5 YR 4/8).

Profile taken in a rofabard, which was situated in a river channel. Slope: 5°.

Location: N 64°39,899"

W 14°33,434"

Altitude: 24m over sea level. (GPS)

Vegetation: vegetation cover unusually fertile (*Carex* and *Agrotis*).

Erosion: wind erosion.

Drainage: somewhat poorly drained.

Remarks: the soil is located on a tertiary basalt ledge which slants like its surface.

Hamar profile and its surroundings. Mottles tonges can also be seen in the bottom layers. The knife is 30 cm in length



**Fell (12-6-2002)**

The site no longer exists due to road construction and gravel mining, but similar site was selected.

Profile: Fell			
Depth	Horizon	Color	
0-10 cm	A	5YR3/2	Silt loam. Weak fine to medium granular structure. Many fine to many very fine roots. Crio. Boundary very abrupt wavy.
10-14 cm	2C	10YR5/3	Loamy sand. Loose structure less. Moderately few roots. Boundary wavy.
14-26 cm	3Bw1	5YR3/2	Loam. Moderately medium sub angular blocky structure. Moderately few roots. Crio. Boundary wavy.
26-31 cm	4C	10YR2/1	Sandy loam. Structure less loose. Friable. Moderately few roots. Boundary wavy.
31-43 cm	5Bw1	10Yr3/3 and 2,5YR3/2	Silt loam. Medium sub angular blocky structure. Friable. Boundary wavy.
43-75 cm	5Bw2	2,5YR3/6	Loam. Moderately fine and medium sub angular blocky. Friable. Very few roots. Coarse fragments: 2-20 mm. Boundary clear smooth.
75-83 cm +	5Bw3	7,5YR3/4.	Loam. Moderately fine and medium sub angular blocky. Friable. Very few roots. Coarse fragments: 2-20 mm. Not sampled.

Profile taken in tussocky ground NV of a gravel pit

Location: N 65°20,268"

W 14°29,840"

Altitude: 130 m over sea level (GPS)

Vegetation: dry tussocky land. A great deal of hummocks 15-40 cm in height. Slope 0°. *Betula nana*, *Salix herbacea*. *Bistorta vivipara*, *Carex lachenalii*. *Kobresia myosuroides*.

Erosion: no erosion.

Remarks: at this location the Austurland ash layers can again be identified.



**Fell profile and its surroundings.**



**Þjóðfell (Thodfell)**

A desert site with gravelly surface (“desert pavement”)

Pedon 4. Thjodfell. Lag gravel-till							
C	0-3	NA	gsa	single grain			
2Bw	3-10	10YR 3/2	lsa	weak fine granular/single grain	v friable	abrupt wavy	
3C	10-22+	10YR 4/2	glsa	structureless	friable	abrupt wavy	

SEE ALSO DATATABLE

Horizon	N <sub>2</sub> O	CaCl <sub>2</sub>	NaF	OC†	Extractable bases				Summation bases	CEC‡ pH7	P recovery
					Ca	Mg	Na	K			
	pH			g kg <sup>-1</sup>	cmol kg <sup>-1</sup>					%	
---	---	---	---	---	---	---	---	---	---	---	---
<b>Pedon 4. Thjodfell. Lag gravel-till</b>											
C	6.3	5.9	9.9	2.5	9.7	2.9	0.1	0.3	13.0	15.8	56
2Bw	7.1	6.3	9.9	4.0	12.6	4.1	0.2	0.3	17.2	19.6	63
3C	7.9	6.7	9.4	1.4	25.0	8.9	0.7	0.6	35.2	35.5	56

**Goðafoss (OA, Wilding, Hallmark) 29-7-1987**

Quite many soil monoliths have been taken from this site (including in Wageningen).

NOTE the new road is north of this old road, that is now poorly maintained.

This pedon is often referred to in chapter of soil development in "The Soils of Iceland".

<b>Goðafoss</b>			
cm	Horizon	Color	
0-4	A1	7.5YR 3/2	Mucky loam. Weak fine granular to weak fine platy structure. Very friable. Many fine roots. Clear smooth boundary.
4-12	A2	5YR 3/3	Mucky loam. Weak fine subangular blocky parting to weak fine granular structure. Very friable. Many fine roots. Clear smooth boundary.
12-20	A3	5YR 3/3	Loam. Weak fine subangular blocky parting to weak fine granular structure. Very friable. Many fine roots. Clear smooth boundary.
20-26	A4 - (t1)	7.5YR 3/2	Loam. Weak fine subangular blocky to weak fine granular structure. Very friable. Many fine roots. Includes thin black (10YR 2/1) tephra layer. Abrupt wavy boundary.
26-29	Bw1-T	10YR2/1	Loamy fine sand. Weak medium subangular blocky structure. Very friable. Common fine roots. Tephra layer 1477 AD? Abrupt wavy boundary.
29-41	Bw2-(t1)	5YR 3/2	Silt loam. Weak medium and coarse subangular blocky structure. Friable. Common fine roots. Pockets of a remnant yellowish red (5YR 5/6) tephra layer (H1?) incorporated in horizon, about 30 % (by volume) of horizon. Clear smooth boundary.
41-49	Bw3	5YR 3/3	Loam. Weak medium and coarse subangular blocky structure. Friable. Common fine roots. Abrupt wavy boundary.
49-57	Bw4-T	10YR 5/4	Silt loam. Many medium distinct strong brown (7.5YR 5/6) mottles. Weak medium platy to weak medium subangular blocky structure. Friable. Common fine roots. Many fine vesicular pores. Horizon is H3 tephra (2900 BP). Abrupt wavy boundary.
57-65	Bw5	5YR 4/4	Silt loam. Weak medium subangular blocky to medium granular structure. Friable. Common fine roots. About 10% (by volume) of horizon contains dark reddish brown (5YR 3/3) material from horizon below. Clear smooth boundary.
65-70	Bw6	5YR 3/2	Loam. Weak medium subangular blocky structure. Friable few fine roots. Lower boundary is irregular on a microscale with lobes of the underlying white tephra extending abruptly into the horizon. Pockets are slightly brittle. Abrupt wavy boundary.
70-73	Bw7-T	10YR 6/4	Silt loam. Many fine distinct strong brown (7.5YR 5/6) mottles. Weak medium platy structure. Friable. Few fine roots. Horizon is H4 tephra (4000 BP). Mottles occur along plate surfaces, root channels and vesicular pores. Abrupt wavy boundary.

Goðafoss			
cm	Horizon	Color	
73-91	Bw8-(t1)	5YR 4/6	Silt loam. Weak medium and coarse subangular blocky structure. Friable. Common fine roots. Dark reddish brown (5YR 3/3) pockets of loam-textured material are mixed in the horizon. A thin (1-2 cm) brown (10YR 5/3) tephra layer occurs in the horizon. Many fine vesicular pores. Clear wavy boundary.
91-101	2Bw9	5YR 3/4	Loam. Weak coarse subangular blocky structure. Slightly brittle. Firm. Few fine roots. Coarse fragments are gravel-sized and originate from below. Lower portion of horizon is olive brown (2.5YR 4/4) grading to the till below. 10% coarse fragments. Clear wavy boundary.
101-121	2C	5YR 4/2	Gravelly loam. Weak coarse platy structure. Friable. Few fine roots. Glacial till is relatively dense as fines are packed between coarse fragments (subrounded basalt gravels and cobbles). About 10% of horizon is gravels >2 cm. A few oxidized dark reddish brown (5YR 3/3) vertical planes extend through horizon. 25% coarse fragments.

Location: North Iceland, east of the Goðafoss waterfall, about 3 km east of the crossroads at Goðafoss. The location is on a summit of the ridge east of Goðafoss, 300 m south of the road, 100 m south of a gravel pit. The pedon is in a barren area, which is approximately 200 m<sup>2</sup>. The pedon is located at the north end of the barren area with pit facing south (escarpment).

Physiographic position: summit position, gently sloping (1°) with S aspect. About 260 m elevation.

Parental material: Eolian-andic material overlying glacial till.

Drainage: Well drained.

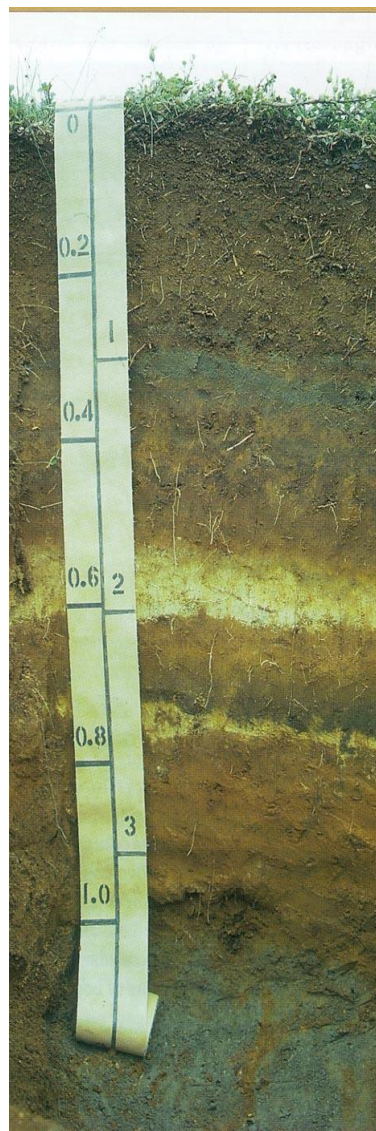
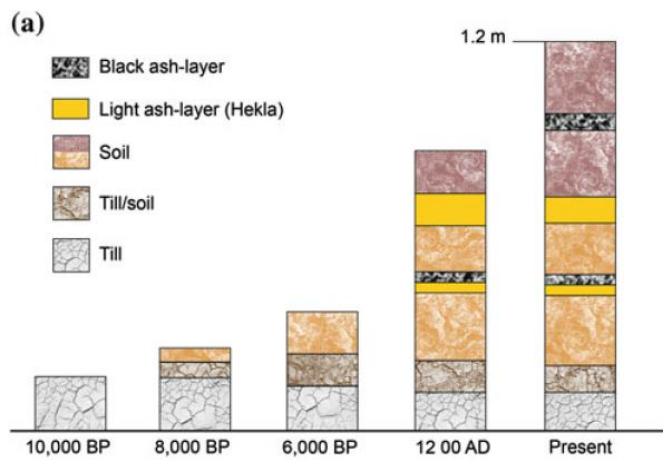
Land use: Open range for sheep grazing (a common).

Vegetation: Heath vegetation with *Betula nana*, *Empetrum nigrum*, *Salix herbacea*, *Polygonum viviparum*, *Kobresia myosuroides*, *Juncus trifidus*, *Equisetum* sp., *Carex bigelowii*, *Graminae* sp. and *Salix callicarpaea*.

Horizon	pH			Organic C g kg <sup>-1</sup>	Exchangeable bases cmol <sub>c</sub> kg <sup>-1</sup>	CEC	BS† %	Oxalate			PO <sub>4</sub> retention %
	H <sub>2</sub> O	KCl	NaF					Al	Fe	Si	
<b>Goðafoss pedon</b>											
A1	5.9	5.5	10.4	90	28.0	40.6	69	28	43	25	97
A2	6.5	—	10.2	50	18.1	32.0	57	25	42	25	95
A3	6.3	5.4	10.2	46	25.3	39.7	64	24	38	25	95
A4	6.3	5.7	10.1	66	26.0	26.8	97	17	30	17	86
Bw1-T	6.6	5.8	10.0	12	8.3	9.2	90	10	14	11	—
Bw2	6.7	5.9	9.9	71	36.4	43.7	83	22	45	23	99
Bw3	6.7	5.8	10.2	51	33.7	42.2	80	29	53	34	98
Bw4-T	6.7	6.1	10.6	14	8.5	10.7	80	11	6	11	66
Bw5	6.6	5.9	10.4	41	25.8	40.5	64	32	45	28	96
Bw6	6.6	5.8	10.1	21	16.1	25.2	64	22	32	20	98
Bw7-T	6.6	6.0	10.1	14	9.8	13.8	71	15	12	14	—
Bw8	6.7	5.9	10.3	44	30.0	44.3	68	59	68	35	98
2Bw9	6.6	5.8	10.1	13	15.2	25.9	59	31	45	27	94
2C	6.7	5.5	9.8	1	12.4	13.7	90	10	18	9	47

† Exchangeable bases at pH 7 and cation-exchange capacity (CEC) at pH 8.2 expressed as a percentage.

## Goðafoss



**Goðafoss till (29-7-1987)**

Depth (cm)	Horizon	Color	
0-7	Bw	10YR 4/3	Sandy loam. Weak medium subangular blocky to weak fine granular structure. Very friable. Few fine roots. Pockets of brown (7.5YR 4/4) material smear the upper portion of the horizon. 5% coarse fragments. Clear irregular boundary.
7-30	C1	2.5YR 4/2	Sandy loam. Weak fine platy structure. Friable. Very few fine roots. Common medium vesicular pores. Coarse fragments are both gravels and cobbles. 5% coarse fragments. Gradual smooth boundary.
30-55	C2	2.5YR 3/2	Sandy loam. Moderate fine platy structure. Firm. No roots. Coarse fragments are both subrounded gravels and cobbles. Till is composed of both massive and vesicular basalt. 5% coarse fragments.

Location: same as Goðafoss, except in the middle of the barren area that has resulted from erosion along escarpment.

Physiographic position: summit position, nearly level; about 260 m elevation.

Parental material: glacial till.

Drainage: moderately well drained.

Land use: open range for grazing by sheep (a common).

Vegetation: mostly barren.

Remarks: the soil is covered with a gravel armor consisting of 80% gravels, 0.2-7 cm in diameter together with cobbles. The gravels exhibit a weak polygonal pattern about 30 cm in diameter.

**Möðruvellir wet, drained (2-7-2001) (ÝMIR)**

Depth [cm]	Horizon	Color	
0 – 30	A1	7.5 YR 5/6 strong brown	Loam. Very weak fine granular structure. Very friable. Many very fine to medium roots. No mottles. Abrupt wavy boundary to:
30 – 55	2O1	10 YR 4/3 brown/ dark brown	Loam. Very weak thin platy structure. Friable. Many very fine and fine roots. No mottles. Abrupt wavy boundary to:
55 – 83	2O2	5 YR 3/2 dark reddish brown	Silt loam. Weak fine and medium subangular blocky structure. Friable. Many very fine and fine roots. No mottles. Stratification visible with different colors. Clear wavy boundary to:
83 – 98	2O3	5 YR 2.5/2 dark reddish brown	Silt loam. Very weak thin platy and very weak fine and medium subangular blocky structure. Friable. Yellowish undecomposed organic matter. No mottles. Abrupt wavy boundary to:
98 – 104	3C	10 YR 7/4 very pale brown	Sandy loam. Very weak subangular blocky structure. Firm. Very few fine roots. Few faint mottles. Tephra layer H3. Clear wavy boundary to:
104 – 145	4O1	10 YR 2.5/1 black	Very weak thin platy and weak fine subangular blocky structure. Few very fine and fine roots. Tephra layer in bottom, 1-2cm, 10 YR 6/4, light reddish brown. Abrupt wavy boundary to:
145 – 180	4O2	5 YR 2.5/1 black	Weak thin platy structure. Few very fine and fine roots. Abrupt wavy boundary to:
180 – 200	4O3	5 YR 2.5/1 black and 5 YR 4/4 reddish brown	Weak thin platy and weak medium subangular blocky structure. Very few very fine and fine roots. Faint reddish mottles around roots (oxidized). Abrupt wavy boundary to:
200 – 260	4O4	5 YR 2.5/1 black	Weak thin platy and weak medium subangular blocky. Very few very fine roots. Up to 2cm stems. Clear wavy boundary to:
260 – 300	4O5	5 YR 2.5/1 black	Very weak thin platy and very weak medium subangular blocky structure. Very few very fine roots. Up to 6cm stems. No mottles. Abrupt wavy boundary to:
300 – 350+	4O6	5 YR 2.5/1 black	Very weak thin platy and very weak medium subangular blocky structure. Very few very fine roots. Up to 6cm stems. No mottles. Abrupt wavy boundary to:

Profile taken at side of manmade ditch

Location: N 65°45'49.2"  
W 18°14'31.7"

Altitude: 24m GPS

Vegetation: grassland

Erosion: Surface slightly disturbed.

Drainage: presently somewhat poorly drained, formerly very poorly drained

Parent material: The thickest profile on properly peat.

**Möðruvellir II**



**Möðruvellir I (2-7-2001)**

Profile Möðruvellir I			
Depth [cm]	Horizon	Color	
0 – 20	A1		Loam. Very weak fine and medium granular structure. Very friable. Many fine and medium roots. No mottles. Clear wavy boundary to:
20 - 35	A2		Loam. Very weak medium granular and very weak fine and medium subangular blocky structure. Very friable. Common fine and medium roots. No mottles. Clear wavy boundary to:
35 – 43	Bw1		Silt loam. Very weak medium subangular blocky structure. Very friable. Common fine and medium roots. Tephra layer of 1cm thick. Abrupt wavy boundary to:
43 – 50	Bw2		Loam. Very weak medium subangular blocky structure. Very friable. Common fine and medium roots. No mottles. Rhyolitic tephra layer, H1/H3?. Clear signs of cryoturbation with horizon tonguing down in to the next horizon. Abrupt wavy boundary to:
50 – 71	Bw3		Silt loam. Very weak medium subangular blocky structure. Friable. Moderate few fine and medium roots. No mottles. Tephra layer at bottom, 2cm thick, faint, yellowish. Abrupt wavy boundary to:
71 – 100	Bw4		Silt loam. Very weak medium subangular blocky structure. Friable. Very few fine roots. 10% 0.2-5cm coarse fragments. Abrupt wavy boundary to:
100 – 110+	Bw5/2C		Silt loam. Very weak medium subangular blocky structure. Friable. Very few fine roots. No mottles.

Profile taken on an escarpment (man made) above a large gravel pit.

Location: N 65°45'46.0"  
W 18°14'50.6"

Altitude: 85m GPS

Vegetation: Grassland. Grasses > 90%.

Erosion: Could be disturbed.

Drainage: Well drained.

Parent material: Eolian and tephra materials above alluvial-late glaciation form deposits.

Remarks: Level land. Next to hayfield (other side of the fence). Could have fertilizer influence from hayfield.

**Möðruvellir I**

## Glaumbær (2-7-2001)

Profile Glaumbær			
Depth [cm]	Horizon	Color	
0 – 14	A1	7.5 YR 3/2 dark brown	Silt loam. Very weak fine and medium granular structure. Very friable. Many fine roots. No mottles. Clear wavy boundary to:
14 – 24	A2	7.5 YR 4/2 dark brown	Silt loam. Very weak fine granular and very weak medium subangular blocky structure. Friable. Common fine roots. No mottles. Abrupt wavy boundary to:
24 – 40	Bw1	10 YR 3/1 (black ash) very dark gray and, 10 YR 5/3 (light ash) brown	Silt loam. Very weak medium subangular blocky structure. Very friable. Moderate few fine roots. No mottles. Tephra layer, H4? Abrupt wavy boundary to:
40 – 58	Bw2	7.5 YR 4/2 dark brown	Clay loam. Very weak medium subangular blocky structure. Very friable. Moderate few fine roots. No mottles. Abrupt wavy boundary to:
58 – 79	Bw3	7.5 YR 4/2 dark brown	Clay loam. Very weak medium subangular blocky structure. Very friable. Very few fine roots. No mottles. Clear wavy boundary to:
79 – 120+	Bw4/2C	10 YR 3/1 very dark gray	Silt loam and gravel. Very weak medium subangular blocky structure. Very friable. No roots. 5% faint to distinct coarse mottles, 2.5 YR 3/4, dark reddish brown.

Profile taken at manmade ditch for pipeline.

Location: N 65°35'35.1"  
W 19°30'14.4" Altitude: 61m GPS

Vegetation: Grassland.

Erosion: Naturally and possibly man disturbed (erosion - .. making).

Drainage: somewhat poorly drained

Remarks: Description and samples very taken in haste! H3 and H1 mixing, but still natural. Raining cats and dogs.



**AUÐKÚLUHEIÐI** NW Iceland

Date of description: 27-08-1999

Authors: A.G. Jongmans, F. van Oort and O. Arnalds

Location: Central North Iceland, Audkuluheidi

Altitude: About 400 m

GPS co-ordinates: x 5551000, y 7251900

Classification: WRB (2001): Dystric Vitric Andosol

ST (1999): Ashy, amorphous Typic Vitricryand

FitzPatrick (2006): Fmb3~Luc8~Umd10~Vtk5#Vtj33#Vtf~l-scl – Litic Vitrosol

Soil Climate: Cryic temperature regime, Udic moisture regime. Mean annual rainfall 800 mm; mean annual temperature 1.0°C, mild winter, frost 6-9 months in soil; snow cover 3-7 months

Topography: Gently rolling Landform: Upland glacial plain Land element: Slope Position: Bottom Slope: Nearly level

Micro topography: Hummocky area, hummocks 10-30 cm high and 0.5-2 m<sup>2</sup> in size, but considerable variation in shapes and sizes.

Land use/Vegetation: Communal grazing land for sheep; 80% vegetation cover. Heath with about 50% *Racomitrium* moss, with *Betula nana*, *Empetrum*, *Vaccinium* heath and *Kobresia* sp.; vegetation strongly influenced by land use.

Parent material: Glacial moraine under 50-100 cm thick aeolian and volcanic ash Effective soil depth: Moderately deep

Erosion: Water and wind erosion, dominantly active in historical times. Drainage class: Well drained.

Internal drainage: Frost cracks on surface, rarely saturated; moderately hydraulic conductivity

External drainage: Slow run-off Moisture conditions: Moist

Stoops G, M Gérard, O Arnalds. 2008. A micromorphological study of Andosol genesis in Iceland. In: Kapur, S., A. Mermut, and G. Stoops (eds). *New Trends in Micromorphology*. Springer, Heidelberg, pp 67-90

**Soil Horizon Description:**

O: 0-3 cm; partially decomposed organic materials; abrupt and smooth to:

Ah1: 3-11/19 cm; dark brown (7.5YR 3/3); sandy loam; moderate fine to medium platy; friable; many fine to medium roots; from 12-16 cm irregular bright dark yellowish brown (10YR 4/5) spots, 1 cm; abrupt and wavy to:

Ah2: 11/19-21/27 cm dark reddish brown (5YR 3/3); sandy loam; no macro structure; very friable; no biopores detectable; common fine roots; abrupt and tonguing to:

Bw1: 21/27-26/34 cm; brown to dark brown (7.5YR 4/4); sandy loam; no macro structure; very friable; few fine pores; common fine roots; abrupt and tonguing to:

2Bw2: 26/34-37/42 cm: yellowish brown (10YR 5/5); bright discontinuous tephra layer, slightly weathered; sandy loam; moderate fine platy structure; friable; common fine roots; occurrence of cryoturbation features, presence of material from the over- and under-laying horizons; abrupt and wavy to:

3Bw: 3/4C: 37/42-59/62 cm; 70 % Bw 7.5YR 3/5; 30% 4C, glacial till material, dark yellowish brown (10YR 4/4); loam; few fine gravel, sub rounded, up to 3 cm, slightly weathered; no macro structure; friable; few, fine roots; abrupt and smooth to:

4C: >59/62 cm; glacial till; dark yellowish brown (10YR 4/4); sandy clay loam; fine gravel to boulders, sub rounded, partly weathered; layers of 2 cm consisting of 3Bw material, distributed inclined to the soil surface as a result of cryoturbation; no macro structure; friable; few fine roots in the upper 10 cm.



**ÓS – near Hvammstangi NW Iceland**

Date of description: 26-08-1999

Authors: A. G. Jongmans and F. van Oort, O. Arnalds

Location: NW Iceland, (farm on Route N 1, 200m west of Hvammstangi road intersection)

**Altitude:** 40m **GPS co-ordinates:** x 504800, y 724850.

**Classification:** WRB (2001): Orthidystri-Vitric Andosol

ST (1999): Ashy, amorphous Eutric Pozchic Fulvicryand

FitzPatrick (2006): Apd5~Umd12#(Mea-Umd)33~Luc3#Ana8~Vtk9#Mbd – Gleyic Andosol

**Soil Climate:** Cryic/Frigid temperature regime, Udic moisture regime. Annual rainfall 550 mm; mean annual temperature 2.5°C, mild winter, cool summer. **Topography:** Gently rolling **Landform:** Glaciated upland

Land element: Slope, west facing Position: Middle slope Slope: Gently sloping Form: complex

Micro topography : Hummocky area; hummocks are somewhat steep, 20-50 cm high and 0,5-1.5 m<sup>2</sup> in size, but shapes and sizes are variable.

Land use/Vegetation: Typical "half drained", strongly disturbed vegetation; > 80% grass cover with *Carex* species, (*Taraxacum*, *Polygonum*) and other flowers.

Human influences: Shallow ditch (1.5m deep, 20 yrs old) about 12m from the pit.

Parent material: Bedrock is about 10 000 yrs old glacial tilt, mostly basaltic. On the top of it are about 1 m thick aeolian and tephra deposits, mostly basaltic but with distinctive rhyolitic tephra layers. Soil has formed in aeolian and tephra sediments.

Effective soil depth: Moderately deep Rock outcrops: none Erosion: Currently little to no erosion.

Drainage class: Somewhat poorly drained. Internal drainage: Saturated for extended periods due to frost blockage, moderately hydraulic conductivity External drainage: Slow run-off

Groundwater: No flooding but covered with snow 2-6 months per year. Very deep groundwater 100-150 cm

Moisture conditions: Moist

**Soil Horizon Description:**

O: 0-5 cm; dark reddish brown (5YR 3/2); dominantly partly decomposed organic material; some mineral particles are present; very weak fine granular structure; clear and smooth to:

Ah: 5-17 cm; dark reddish brown (5YR 3/3); loam; weak, fine sub angular blocky/granular structure; friable; pores are not detectable; common very fine and fine roots; abrupt and wavy to:

AC: 17-35/50 cm; dark reddish brown (2.5YR 3/4); organic clay loam; few, fine, angular basaltic gravel, fresh and slightly weathered; weak very fine sub angular blocky structure; friable; no pores detectable; common very fine and fine roots; altered basaltic tephra spots, 5YR 2.5/1, in the top of the horizon; abrupt and wavy to:

2BC: 35/50-65 cm; dark reddish brown (5YR 3/2), and dark reddish brown (5YR 2.5/2); stratified horizon; organic clay loam; moderate fine platy structure; friable; few fine to medium iron mottles, brown to dark brown (7.5YR 4/4); common, fine to coarse roots; smooth to:

3BC: 65-73 cm; brownish yellow (10YR 6/6) and yellowish brown (10YR 5/4); organic loam; no macro structure; friable; common fine and medium roots; few, distinct iron mottles, red (2.5YR 5/8); smooth to:

3CB: 73-82 cm; stratified horizon, consisting of H4 tephra from Hekla (4000 yrs BP) having two colours: lower part yellowish brown (10YR 5/4), upper part (3 cm) very dark grey to black (5YR 2.5/1); thickness of the individual layers range from 0.5-4 cm; light coloured tephra: loam; dark coloured tephra: organic clay loam; moderate fine platy structure; friable; common fine and medium and few coarse roots; very few, fine and medium iron mottles, red (2.5YR 5/8); abrupt and smooth to:

4Bw: 82-90/100 cm; dark reddish brown (5YR 3/3); organic clay loam; few coarse partly altered basaltic gravel and stones; weak, fine sub angular blocky; friable; common fine roots; few, medium, distinct iron mottles, red (2.5YR 5/8), dominantly concentrated along pores and stones; abrupt and wavy to:

4B/Cg: > 90/100 cm; dark grey (5Y4/1); clay; many coarse gravel to boulders, sub angular, altered; no macro structure; friable; common, medium and coarse, prominent iron mottles, red (2.5YR 4/8), dominantly concentrated around pores and stones; few fine roots;



**Þingvellir (21-7-1987)**

Profile Þingvallasveit			
(cm)	Horizon	Color	
0-12	A1	7,5YR 3/2	Silt loam. Weak very fine granular structure. Very friable. Many fine pores. Many fine roots. Clear smooth boundary.
12-28	A2	5YR 3/3	Silt loam. Weak medium subangular blocky to weak fine granular structure. Very friable. Many fine pores. Many fine roots. Clear smooth boundary.
28-61	Bw1	5YR ¾	Silt loam. Weak coarse subangular blocky to weak very coarse platy structure. Very friable. Many fine pores. Common fine roots. Clear smooth boundary.
61-68	Bw2	10YR 4/3	Silt loam. Weak coarse subangular blocky to moderate coarse platy structure. Friable. Many fine pores. Common fine roots. Abrupt smooth boundary.
68-87	2Bw3	10YR 4/2 *	Silt loam. Moderate very coarse platy structure. Friable. Few fine roots. Occasional vertical fractures noted. Abrupt smooth boundary.
87-142	2C	10YR 4/1 **	Silt loam. Moderate medium platy to strong fine platy structure. Firm. Very few fine roots. Structure is inherited from parent material. Mottles along root channels and some bedding planes. Very occasional vertical planes.

\*few mottles 10YR 4/4

\*\*few mottles 10YR 5/4 and common mottles 7.5YR 4/4

**Location:** On old Þingvallavegur road about 2 km SW of the 36-360 intersection. The site is 15 m N of the road in a gully cut.

**Physiographic position:** Footslope on gently rolling glacial till plain with 3° slope with a SSE aspect at about 200 m elevation.

Parent material: Eolian-andic loess overlying glacial till.

Drainage: Moderately well drained.

Land use: Open range for sheep grazing (a common).

Vegetation: Moss heath vegetation type with *Racomitrium* moss dominating. Other common species at the site are *Calluna vulgaris*, *Empetrum nigrum*, *Poa vivipara*, *Carex bigelowii*, *Festuca* spp., *Luzula spicata*, *Salix phylicifolia*, *Salix herbacea*, *Thymus arcticus* and *Vaccinium uliginosum*.



## Þingvellir



Table 4. Selected chemical properties of the pedons studied.

Horizon	pH			Organic C g kg <sup>-1</sup>	Exchangeable bases cmol <sub>c</sub> kg <sup>-1</sup>	CEC	BS† %	Oxalate			PO <sub>4</sub> retention %
	H <sub>2</sub> O	KCl	NaF					Al	Fe	Si	
<u>Thingvallasveit pedon</u>											
A1	5.7	5.4	11.0	79	9.9	31.9	31	31	50	22	99
A2	6.1	5.7	10.7	76	13.1	44.6	29	45	65	27	99
Bw1	6.0	5.6	10.8	74	10.1	43.8	23	56	71	25	99
Bw2	6.0	5.7	11.1	42	6.5	32.3	20	55	35	27	98
2Bw3	6.1	5.6	10.5	21	4.4	24.8	18	34	26	28	99
2C	6.0	5.5	10.3	8	2.8	11.8	25	22	21	21	—

## Korpa I (22-6-2001)

[cm]	Horizon	Colour	
0 – 17	A	7.5 YR 3/2 dark brown	Silt loam. Very weak medium granular structure and very weak subangular blocky. Friable. Many fine and very fine roots. 2% medium faint mottles. Abrupt wavy boundary to:
17 – 23	2O	5 YR 2.5/2 dark reddish brown	Silt loam/ medium decomposed organic matter. 2% medium faint mottles. Wavy horizon of 3 cm. Top of old surface with hummocky relief. Abrupt wavy boundary to:
23 – 53	2A	5 YR 3/4 dark reddish brown	Silt loam. Very weak medium subangular blocky. Common fine roots. 5% distinct medium and coarse mottles (2.5 YR 3/6). Thin reddish (2.5 YR 3/6) oxidized layer at lower boundary. Clear wavy boundary to:
53 – 77	2Bw1	5 YR 3/4 dark reddish brown	Silt loam. Very weak medium subangular blocky. Moderate few fine roots. 5% distinct mottles (10 YR 3/6) at 56 cm K1357 (?), black loamy sand. Clear wavy boundary to:
77 – 120	2Bw2	10 YR 2/2 very dark <i>greyish</i> brown	Clay loam. Very weak medium subangular blocky. Few fine roots. 2% white diatoms (10 YR 7/3). Gradual wavy boundary to:
120 – 165+	3O	10 YR 3/2 very dark greyish brown	Clay loam. Very friable. Medium subangular blocky. Many fine and very fine roots. Continuous layers of 1-2cm of diatoms (10 YR 5/3) at least in the general section of 120cm. Lower part (>1m) later birch period → 3cm thick old trunks.

Profile taken at research station of RALA.

## Korpa I



### Korpa II (22-6-2001)

Profile Korpa II			
[cm]	Horizon	Colour	
0 – 15	A1	5 YR 4/2 dark reddish grey	Silt loam. Very weak medium granular and subangular blocky structure. Very friable. Many fine roots. Abrupt wavy boundary to:
15 – 36	A2	7.5 YR 4/4 brown/dark brown	Silt loam. Very weak medium and coarse subangular blocky structure. Friable. Common fine roots. 10% distinct fine and medium red mottles. Abrupt wavy boundary to:
36 – 50	Bw1	7.5 YR 4/4 brown/ dark brown and 10 YR 5/2 greyish brown	Clay loam. Very weak medium and coarse subangular blocky structure. Friable. Few fine roots. 10% distinct fine and medium red mottles. Abrupt wavy boundary to:
50 – 80	Bw2	5 YR 4/4 reddish brown and 10 YR 5/1 grey (diatoms)	Clay loam and clay. Very weak medium and coarse subangular blocky structure. Friable. Very few fine roots. 1% fine and medium mottles. **. Abrupt wavy boundary to:
80 – 95	2Bw1	5 YR 4/4 reddish brown	Sandy loam. Very weak medium and coarse subangular blocky structure. Very friable. Very few fine roots. 80% fine and medium red mottles. 15% 0.2-5cm gravel. Clear wavy boundary to:
95 – 120+	2Bw2	5 YR 4/6 yellowish red and 10 YR 5/3 brown	Sand loam. Very weak medium and coarse subangular blocky structure. Very friable. No roots. 50% fine and medium red mottles. 40% 0.2-10cm gravel. ...coarse fragments.

\*\*3 layers of grey material and 2 layers of reddish material:

1. 4cm grey
2. 10cm reddish
3. 4cm grey
4. 7cm reddish
5. 5cm grey



horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>	Mel Indx
<b>1 Stóra Ármót</b>													
A1	0-17	6.2	11.2	7.6	2.96	4.63	1.63	5.28	51	0.6			
A2	17-31	6.3	11.3	5.82	3.35	5.11	1.77	5.9	69	0.59			
Bw1	31-50	6.3	11.6	5.37	5.09	7.45	2.78	8.81	57	0.57			
Bw2	50-65	6.1	11.8	5.24	5.08	5.83	0.86	8	75	0.7			
Bw3	65-90	6.1	11.6	6.27	5.75	5.16	2.54	8.33	-	0.35			
<b>2 Hella</b>													
A A1	0-55	5.7	9.7	10.02	2.28	1.13	1.10	2.85		0.7	87	0.44	2.38
C 2C	55-60	sampl	lost										
H 3H	60-95	5.1	8.5	19.86	9.62	0.64	0.6	1.94			40	0.57	
C 3C	95-100	5.6	7.8	2.41	0.82	0.37	0.29	1.01		0.34	53	0.14	
2H 4H	100-230	4.2	9.2	12.95	2.06	0.72	0.71	2.42			96	0.96	
<b>3 Geitasandur Land Restoration Experimental Site (not a formal pedon)</b>													
2a	2-8	6.9		0.38	1.23	2.14	1.35			~1			
3Bw	8-40	7.3		0.27	2.61	4.11	2.62			~1.1			
4C	40-50+			0.03	1.14	1.73	1.53						
<b>4 Mýrdalur</b>													
A1	0-8	5.6	10.1	4.9	2.8	6.1	2.5	5.85	44		97		
A2	8-16	5.7	10.3	3.3	2.7	5.8	2.5	5.6			97		
A3	16-36	5.9	10.2	2.6	2.8	5.5	2.5	5.55		0.7	98		
A4	36-51	6.0	10.2	2.1	2.5	5.3	2.9	5.15	25	0.68	96	0.2	
A5	51-71	6.2	10.2	2.1	2.8	5.0	3.1	5.3			98		
Bw1-T	71-74	6.4	10.2	0.9	1.5	2.8	1.9	2.9					
Bw2	74-91	6.3	10.1	2.7	2.8	5.6	3.6	5.6	32	0.71	98	0.2	
BC	91-111	6.3	10.2	2.4	2.1	3.9	2.0	4.05			95		
CB	111-124	6.4	10.5	6.2	1.7	6.0	2.3	5.7			98		
C1	124-171	6.4		2.0	2.8	5.5	3.0	5.55	39		98		
C2	171-181	6.5	9.8	3.3	5.3	8.1	2.4	9.35		0,68	93	0.3	
C3-T	181-196	6.5	9.8	0.6	2.2	4.3	2.5	4.35		0,8		0.1	
C5-T	199-208	5.9		1.0	2.2	4.1	2.6	4.25					

horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>
<b>5 Mýrdalssandur Desert</b>												
A	0-4	6.8	9.8	0.09	0.57	1.48	0.54	1.31	9.6		32	0.1
C1	4-8	6.9	9.8	0.05	0.4	1.15	0.42	0.98	7.0		35	
C2	8-13	6.7	9.6	0.02	0.22	0.8	0.25	0.62	25.4		17	
<b>6 Skeiðarársandur Desert</b>												
C	0-7											
2A	7-16	7.2	9.0	0.05	0.42	0.8	0.54	0.82	6.42			
3C	16-18	7.4	8.4	0.09	0.21	0.41	0.28	0.41	7.07			
4C	18-45	7.4	9.1	0.02	0.32	0.61	0.46	0.62	5.26			
5C	45-50+	7.0	8.4	0.01	0.19	0.36	0.28	0.37				
<b>7 Viðborð</b>												
O	0-8	6.1	10.0	13.8	1.09	4.57	0.81	3,4	51	0.11		
A1	8-16	5.9	10.7	9.7	1.57	3.48	0.92	3.3	24	0.59		
2O1	16-23	5.5	10.6	11.0	1.17	1.32	0.54	1.8	24	0.2		
2O2	23-38	5.4	10.6	13.4	1.16	1.48	0.59	1.9	23	0.22		
2O3	38-48	5.5	10.4	7.2	1.02	1.81	0.68	1.9	9	0.45		
2Bw	48-78	5.3	11.0	7.5	2.80	1.07	1.91	3.3	48	0.48		
<b>8 Hornafjörður</b>												
O	0-3	6.3	8.6	16.04	0.33	0.64	0.29	0.65	12			
C1	3-8	7.3	8.5	0.09	0.34	0.69	0.38	0.69	5			
C2	8-20	7.4	8.2	0.03	0.33	0.55	0.38	0.60	5			
<b>9 Breiðdalur</b>												
O	0-11	5.8	11.2	9.29	2.0	2.9	0.86	3.4	49			
A	11-26	6.0	11.6	7.23	2.36	3.7	1.08	4.2	38	0.58		
Bw1	26-37	6.1	11.9	8.16	3.75	4.91	1.68	6.2	56			
Bw2	37-47	6.2	11.9	7.21	3.91	5.02	1.98	6.4	98			
Bw3	47-70	6.2	12	10.11	5.43	1.86	2.45	6.4	81	0.4		
Bw4	70-82	6.2	12	10.55	5.7	1.64	2.46	6.5	103			
2Bw1	82-100	6.1	12	5.45	5.14	1.44	2.29	5.9	56			
2Bw2	100-120	6.2	11	0.71	0.88	0.74	0.34	1.2	20			

horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>	bases
<b>10 Hamar</b>													
A1	0-11	5.8	11.2	4.13	1.3	2.11	0.65	2.3	13	0.78			
A2	11-41	6.2	11.4	2.29	1.48	2.48	0.85	2.7	17				
A3	41-75	6.5	11.2	1.51	1.3	2.15	0.81	2.4	11				
Bw1	75-85	5.5	11.2	3.63	1.73	2.92	0.99	3.2	13				
Bw2	85-98	5.2	11.3	8.43	3.0	5.23	1.8	5.6	72	0.34			
Bw3	98-109	4.9	11.3	6.61	4.75	5.35	2.79	7.4	76				
Bw4	109-133	4.7	11.3	2.02	2.32	1.72	1.29	3.2	23				
Bw5	133-155	5.0	11.1	2.36	3.24	2.36	2.13	4.4	57	0.6			
<b>11 Fell</b>													
A	0-10	6.8	11.0	4.23	2.11	3.05	1.93	3.6	20	0.65			
2C	10-14	7.0	10.9	2.56	2.14	1.67	1.01	3.0	33				
3Bw	14-26	7.0	11.1	5.03	2.53	3.72	2.32	4.4	25	0.72			
5Bw1	31-43	7.1	11.3	2.75	3.53	4.48	3.24	5.8	40				
5Bw2	43-75	6.9	11.6	3.63	7.04	8.64	5.1	11.4					
5Bw3	75-83	6.9	11.4	1.82	4.01	5.78	2.0	6.9					
<b>12 Þjóðfell (Thjodfell) Desert</b>													
2Bw	3-10	7.1	9.9	0.25	1.12	1.76	0.81	2	6.4		63	<0.1	17
3C	10-22+	7.9	9.4	0.40	1.11	2.14	0.63	2.18	8.8		56	<0.1	35

horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>	bases
<b>13 Goðafoss</b>													
A1	0-4	5.9	10.4	9.0	2.8	4.3	2.5	4.95	40.3	-	97		28
A2	4-12	6.5	10.2	5.0	2.5	4.2	2.5	4.6			95		18.1
A3	12-20	6.3	10.2	4.6	2.4	3.8	2.5	4.3	27.4	0.6	95		25.3
A4	20-26	6.3	10.1	6.6	1.7	3.0	1.7	3.2			86	0.4	26
Bw1 -T	26-29	6.6	10.0	1.2	1.0	1.4	1.1	1.7					8.3
Bw2	29-41	6.7	9.0	7.1	2.2	4.5	2.3	4.45	36.7		99		36.4
Bw3	41-49	6.7	10.2	5.1	2.9	5.3	3.4	5.55			98		33.7
Bw4-T	49-57	6.7	10.6	1.4	1.1	6.0	1.1	4.1			66		8.5
Bw5	57-65	6.6	10.4	4.1	3.2	4.5	2.8	5.45			96		25.8
Bw6	65-70	6.6	10.1	2.1	2.2	3.2	2.0	3.8			98	0.2	16.1
Bw7-T	70-73	6.6	10.1	1.4	1.5	1.2	1.4	2.1					9.8
Bw8	73-91	6.7	10.3	4.4	5.9	6.8	3.5	9.3	59.3	0.58	98	0.3	30.0
2Bw9	91-101	6.6	10.1	1.3	3.1	4.5	2.7	5.35					15.2
2C	101-121	6.7	9.8	0.1	1.0	1.8	0.9	1.9	7.4	1.47	94		12.4
											47		
<b>14 Goðafoss TILL (Gravel Surface)</b>													
Bw	0-7	6.5	10.3	0.8	2.1	2.9	1.7	3.55	12.7		93	0.2	
C1	7-30	6.7	10.0	0.2	1.3	1.9	1.0	2.25	8.6		58	0.1	
C2	30-55	6.8	9.9	0.1	0.9	1.6	0.9	1.70	6.5		44		



horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>	bases
<b>15 Möðruvellir „Drained“ Wetland</b>													
A1 (O1)	0-30	5.4	9.4	14.56	1.8	7.75	1.54	5.67	60.8	0.21			
2O1	30-55	4.8	9.8	12.5	1.59	0.8	0.89	1.99	73.7	0.39			
2O2	55-83	5.8	10.7	7.43	1.74	0.65	1.07	2.07	64.9	0.44			
2O3	83-98	5.4	10.4	10.04	1.25	0.65	0.7	1.58	104.8	0.2			
3C-T	98-104	5.6	10.9	1.38	0.45	0.07	0.4	0.48	10.7				
4O1	104-145	4.6	8.6	35.41	1.13	1.24	0.27	1.75	250	0.18			
4O2	145-180	5.1	8.7	37.65	1.29	1.36	0.27	1.97	269	0.17		2.38	
4O3	180-200	5.2	9.0	34.84	1.23	1.36	0.55	1.91	139	0.13			
4O4	200-260	5.1	9.3	28.04	1.47	0.76	0.53	1.85	205	0.16		2.05	
4O5	260-300	5.2	10.0	27.25	1.91	0.68	0.95	2.25	302	0.17			
4O6	300-350	5.1	7.4	41.82	0.61	0.99	0.21	1.1	288	0.15			
<b>16 Möðruvellir Dryland</b>													
A1	0-20	6.4	9.9	4.83	3.19	4.98	1.82	5.68		0.44		0.31	
A2	20-35	7.0	10.3	2.21	3.92	5.55	2.39	6.7		0.65		0.20	
Bw1	35-43	6.8	10.2	2.7	3.47	5.04	2.07	5.99		0.57			
Bw2	43-50	6.9	10.3	2.31	3.17	3.53	1.69	4.93		0.49			
Bw3	50-71	6.9	10.6	2.44	5.51	7.71	3.56	9.36		0.53			
Bw4	71-100	7.1	10.6	1.54	5.19	7.67	3.42	9.02		0.52			
Bw5/2C	100-110	7.4	9.9	0.28	0.76	1.77	0.53	1.64					

horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>	Mel Index
<b>17 Glaumbær</b>													
A1	0-14	6.4	10.2	6.2	2.68	4.01	1.21	4.68	48	0.52		0.45	
A2	14-24	6.6	10.4	6.99	2.66	3.6	1.22	4.46	95	0.64		0.47	
Bw1	24-40	6.7	11.1	2.61	1.53	0.34	0.53	1.7	32			0.35	
Bw2	40-58	6.6	10.4	9.32	4.68	1.01	1.53	5.18	139	0.5			
Bw3	58-79	6.6	10.2	6.99	5.97	1.12	2.27	6.53	102				
Bw4/2C	79-120	7.0	9.8	0.61	0.86	0.55	0.45	1.13	8				
<b>18 Auðkúluheiði</b>													
A1 Ah1	0-3/9	7.1	9.6	6.59	1.88	1.41	0.98	2.59			90	0.4	
A2 Ah2	3/9-19	6.7	9.4	5.68	1.96	1.35	1.07	2.65		0.7	92	0.34	2.12
Bw1	19-24	6.1	9.7	4.16	2.69	1.55	1.54	3.47			95	0.29	2.24
2Bw	24-34	5.1	9.2	2.05	1.54	0.74	0.9	1.91		0.76	78	0.13	
3Bw/C	34-55	5.1	9.2	2.82	2.95	1.87	1.99	3.89			96	0.2	
4C	55+	xx	7.7	0.31	0.77	0.76	0.53	1.15			48	0.03	
<b>19 (COST N7) Ós</b>													
O	0-5	6.3	7.8	19.87	1.08	1.24	0.37	1.72			75	0.39	
A1 Ah1	5-17	5.8	7.9	16.65	1.44	1.43	0.49	2.16		0.38	80	0.54	1.66
A2 2Ah2	17-43	6.0	10.0	12.99	2.14	6.12	0.9	5.2		0.53	93	0.83	1.61
A3 2Ah3	43-65	5.7	10.4	17.4	2.38	0.63	0.74	2.7		0.65	95	1.16	2.1
Bw1 3Bw1	65-73	5.8	10.5	6.68	2.91	0.64	1.09	3.23			92	0.83	
Bw2 3Bw2	73-82	5.6	10.1	11.85	2.57	1.13	0.99	3.14			94	1.05	
Bw3 4Bw3	82-95	5.7	10.6	8.83	5.21	0.78	2.2	5.6			98	1.08	
B/Cg 4B/Cg	95+	5.3	8.0	0.54	0.32	0.61	0.19	0.63			51	0.02	

horizon	depth cm	pH H <sub>2</sub> O	pH NaF	%C	Al <sub>ox</sub>	Fe <sub>ox</sub>	Si <sub>ox</sub>	(Al+ ½Fe) <sub>ox</sub>	15 bar H <sub>2</sub> O	BD	P ret	Al <sub>pyr</sub>	bases
<b>21 Thingvellir (OA/Wilding/Hallmark)</b>													
A1	0-12	5.7	11.0	7.9	3.1	5.0	2.2	5.6	44-77		99		
A2	12-28	6.1	10.7	7.6	4.5	6.5	2.7	7.75	44-77		99	0.5	
Bw1	28-61	6.0	10.8	7.4	5.6	7.1	2.5	9.15	34-73		99		
Bw2	61-68	6.0	11.1	4.2	5.5	3.5	2.7	7.25	34-73		98		
2Bw3	68-87	6.1	10.5	2.1	3.4	2.6	2.8	4.7	34-73		99		
2C	87-142	6.0	10.3	08	2.2	2.1	2.1	3.25	43				
<b>22 Korpa I</b>													
A	0-17	5.4	10.9	10.12	3.25	3.52	1.69	5.01	89	0.37			
2O	17-23	5.1	10.7	12.14	3.17	3.9	1.68	5.11	134				
2A	23-53	5.4	11.1	8.98	3.24	5.01	1.79	5.74	80	0.37			
2Bw1	53-77	5.4	11.1	14.35	3.94	2.84	2.09	5.36	135	0.25			
2Bw2	77-120	5.4	10.9	8.57	3.6	2.77	1.99	4.98	80	0.35			
3O	120-165	5.6	11.1	6.6	4.04	3.75	2.32	5.92		0.31			
<b>Korpa II</b>													
A1	0-15	5.9	11.5	8.44	3.82	4.82	1.66	6.23	81				
A2	15-36	6.1	11.8	6.86	5.85	3.10	2.79	7.4	100	0.43			
Bw1	36-50	6.2	11.4	8.51	4.62	2.63	2.07	5.94	156	0.3			
Bw2red	50-80	6.3	11.3	6.99	4.57	2.15	2.3	5.65	37	0.38			
Bw2grey	50-80	6.4	11.2	2.76	1.7	0.95	0.95	2.17	122	0.38			
2Bw1	80-95	6.4	11.0	1.26	0.62	1.24	0.4	1.24	17				
2Bw2	95-120	6.5	10.4	0.6	4.5	2.24	3.09	5.62	24				