Þingeyrar Soil Sampling

Field Survey Report 14th & 15th October 2014

Þingeyrar church and cemetery, Húnavatnssýsla vestri, Iceland.

Monasticism in Iceland

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1.1. INTRODUCTION

As part of a proposed PhD project investigating past land use in association with monastic sites in Iceland field work at Þingeyrar (Húnavanssýsla vestri) in northern Iceland sought to acquire a soil column with an intact stratigraphy that contained a suite of tephra layers deposited before during and after the medieval period. This is necessary in order to construct a robust chronological framework in which to place pollen and soil property sequences extracted from the soil column and is utilised to evaluate the character of past soil conditions and vegetation communities (Moore *et al*. 1991; Whittington & Edwards1994; Erlendsson *et al*. 2006; Edwards *et al*. 2011).

The fieldwork was commissioned by Dr Steinunn Kristjánsdóttir (Monasticism in Iceland Project) with the support of the Faculty of Life & Environmental Sciences, University of Iceland.

1.2. MONASTICISM IN ICELAND

From the 12th century a number of monasteries and nunneries were established in Iceland (Fig. 1). Some survived for only a short time while others survived into the 16th century whereupon the Icelandic Lutheran Reformation (c. AD 1541-1554) resulted in their dissolution (Karlsson 2000). Their function, operation and their social and environmental significance are, to date, poorly understood due to a lack of research (Kristjánsdóttir *et al*. 2014). Using palynology as the primary tool, this interdisciplinary project seeks to determine patterns of land use before, during and after the dominion of the monastic institutions and thereby allowing changes in land management practices e.g. woodland conservation (timber and fuel), grazing regimes and cereal cultivation to be discerned; especially with regard to the establishment and dissolution of Icelandic monasteries (Whittington & Edwards 1994; Erlendsson *et al*. 2006; Edwards *et al*. 2011). The results of the study are expected to inform about the nature of farming activities at monasteries and whether or not their accumulation of properties led to changes in farming strategies in the wider region, thus improving the understanding of patterns of post-settlement environmental change in Iceland.

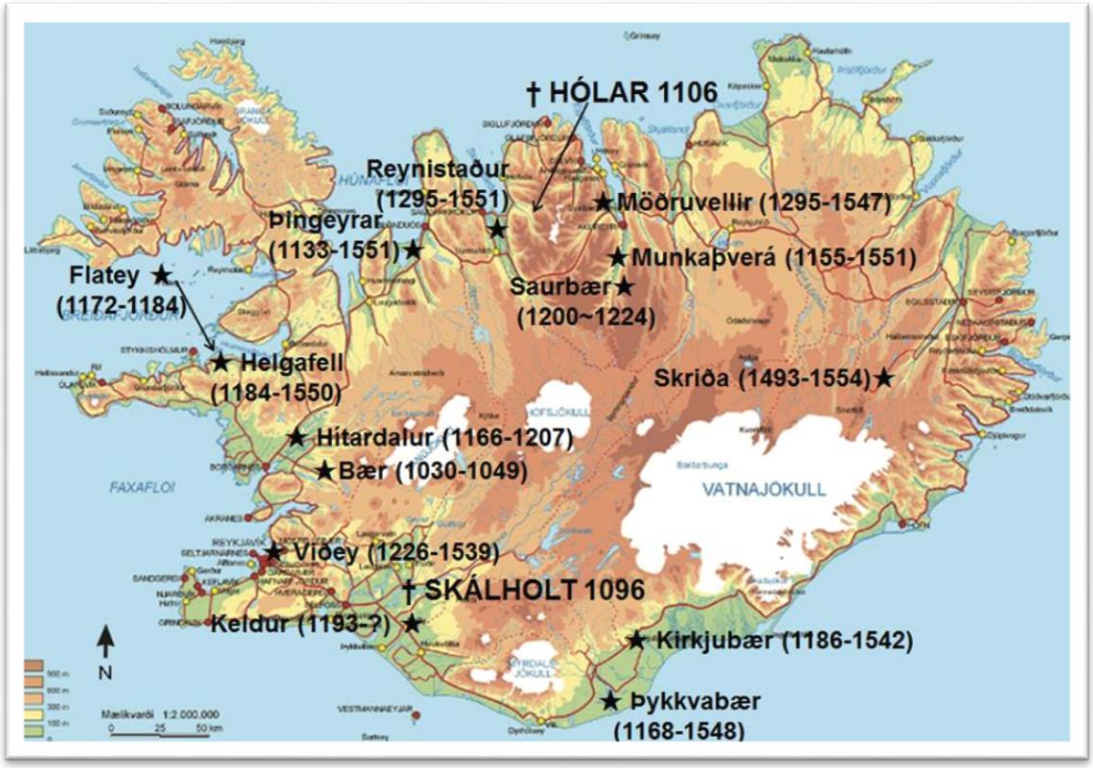

Fig. 1: Monastery sites in Iceland.

2. METHODOLOGY

2.1. Site selection

Þingeyrarklaustur was established c. AD 1133 and dissolved during the Lutheran Reformation in Iceland (AD 1551). Þingeyrarklaustur was the earliest of the monasteries established in Iceland and survived for 418 years; longer than any other monastery in Iceland (Kristjánsdóttir *et al*. 2014).[1] The early date and longevity of the institution provide the basis for selecting this site for palynological investigation.

2.2. Area of search

Pollen is best preserved in sediments situated within anaerobic environments i.e. wetlands (Moore *et al*. 1991). An initial desktop assessment of the Þingeyrar area via aerial photography identified an extensive area of drained wetland to the northeast and southeast of the site thought to be the former location of the monastery, south and east of the present church (Fig. 2). A further area of search was identified through on site discussion at Þingeyrar with the tenant farmer, Helga Thoroddsen. Helga described an area to the west by the shores of Hóp that had formerly been used for turf cutting (it is unknown if this was for fuel or construction) (Fig. 2).

[1] Bær, established in c. AD 1030, failed to endure more than 19 years.

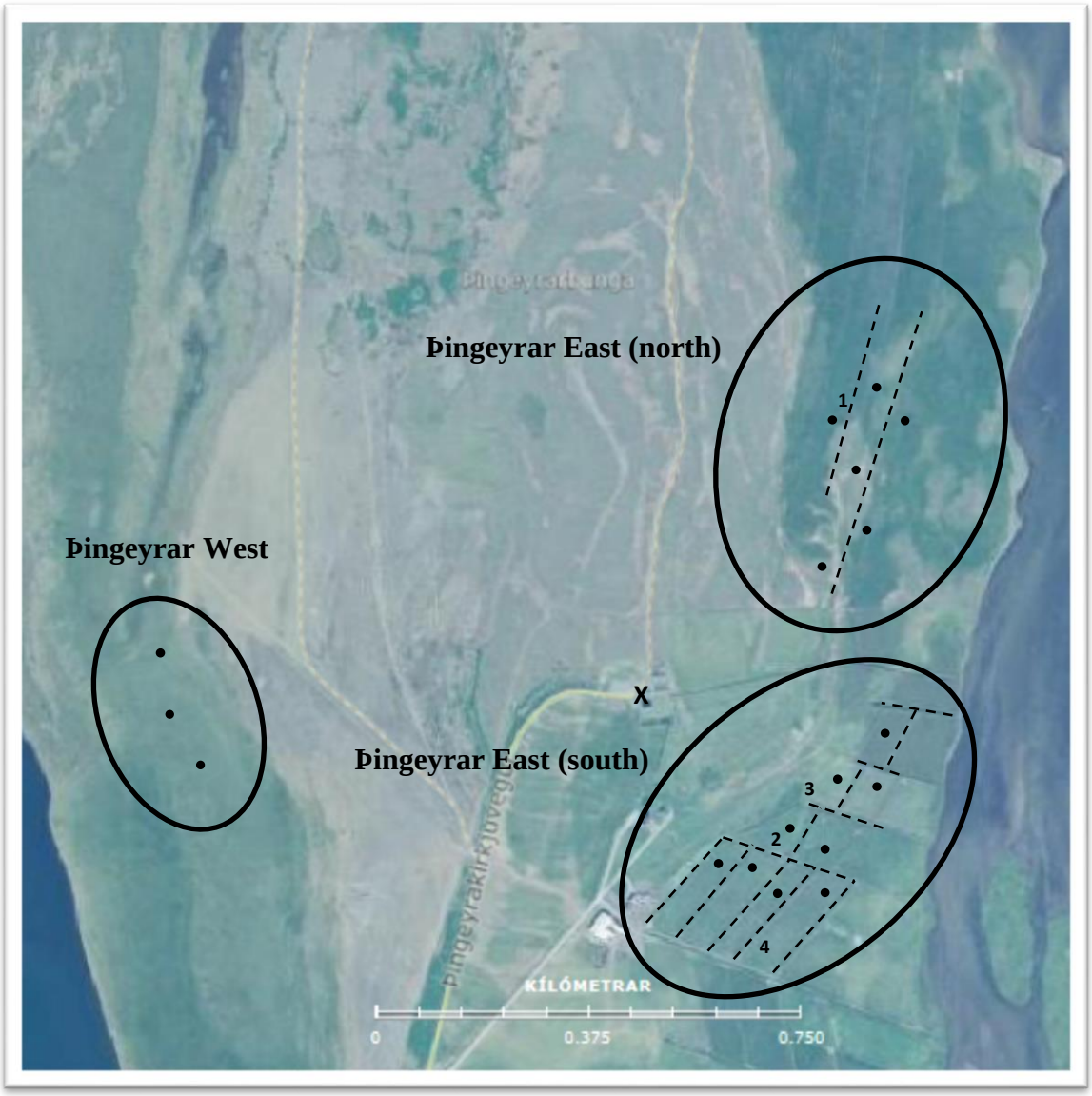

Fig. 2: Þingeyrar area of search indicating the ditch network surveyed and the approximate locations of core sampling sites. Numbered stratigraphic sequences are described in the Section 3. The X denotes the location of the present church.

2.3. Tephrochronology

A further criterion necessary for the reconstruction of past environments is the ability to construct a chronological framework. In Iceland, the favoured method is the use of tephra derived from dateable volcanic eruptions (Thorarinsson 1944; Vilhjálmsson 1990; Hafliðason *et al*. 2000; Larsen & Eiríksson 2008). Dateable tephras expected in the region under investigation include Katla AD 1721 (Larsen 2000), Hekla 1 AD 1104, Landnám c. AD 871$^{+/-2}$ (Grönvold *et al*. 1995; Dugmore *et al*. 2000), Hekla 3 c. 1000 BC, Hekla 4 c. 2300 BC (Thorarinsson 1944; Thorarinsson & Larsen 1977; Eiríksson *et al*. 2000), and Saksunarvatn c. 10,000 BP (Andrews *et al*. 2002). A recent survey of tephra sequences from two archaeological contexts at Trumbsvalir, located c. 200-300 m north of the church of Þingeyrar (Fig. 2), confirmed the presence of the Hekla 1, 3 & 4 tephra's and the Landnám tephra in the locale (Sigurgeirsson 2014) (Fig. 3).

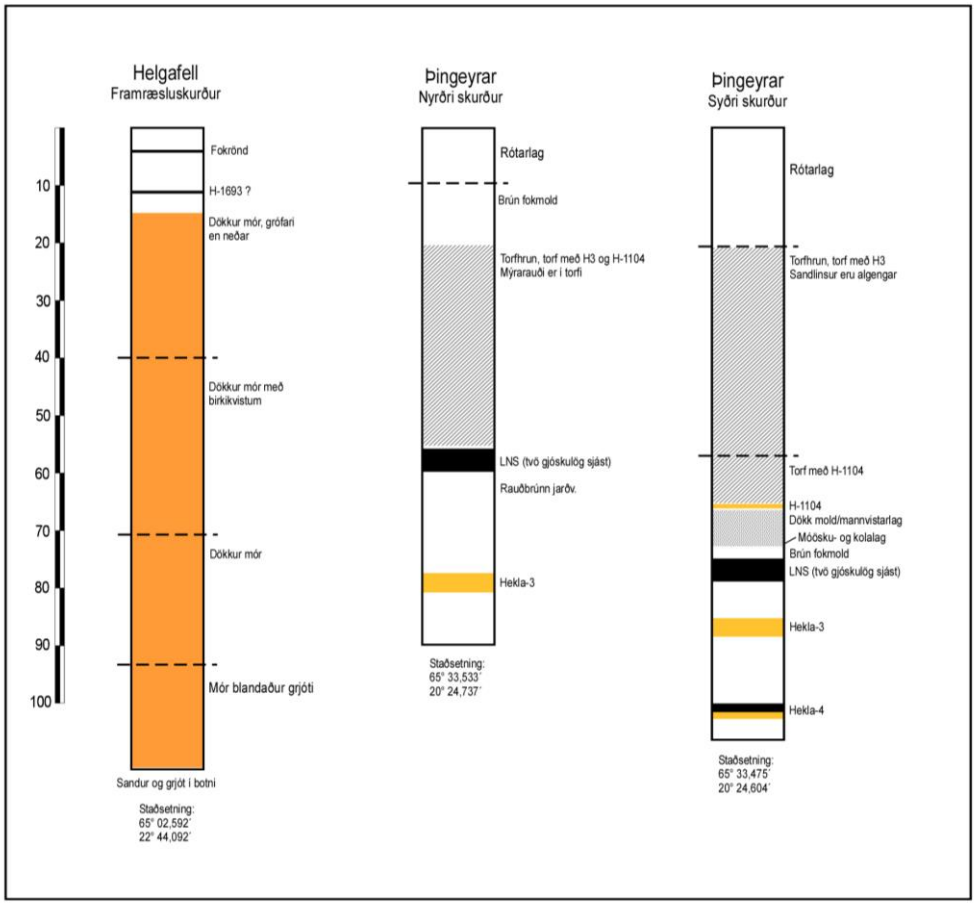

Fig. 3: Tephra layers from archaeological contexts at Þingeyrar (Sigurgeirsson 2014).

2.4. Sampling Method

Soil sampling was randomly conducted across three identified areas of search. Exposed stratigraphies were sought for in the existing drainage network, with ditch banks cleaned as required. When a soil profile was found to contain an intact soil and tephra stratigraphy, a soil column was acquired, packed and placed in storage for future laboratory analysis. The identification of tephra is speculative and will require confirmation under laboratory conditions.

3. RESULTS

Areas of search and numbered sampling sites are identified Fig. 2.

3.1. Þingeyrar West (Hóp shore)

Random coring of a wet area on the Hóp shore west of the church of Þingeyrar revealed a sand and gravel substrate. Only a single tephra was identified in the soil column; a black, basaltic, tephra (Katla AD 1721) at c. 15 cm depth across all 3 coring sites. Due to the homogeneity of the vegetated surface and substrate, it was decided that no further cores were required from this area.

3.2. Þingeyrar East (north)

3.2.1 Þingeyrar Sample Site 1 (ISN93: N65° 33.594: W20° 23.854)

The surface vegetation and root layer extends to a depth of 10 cm. A thin, black, basaltic tephra is situated at 9.5 cm (Katla AD 1721). A large section of dark, undisturbed peat spans a depth of 10-61 cm. This peat section is truncated by three tephras, nominally identified as Hekla 1 (19-23 cm), Hekla 3 (40-41 cm) and Hekla 4 (48-51 cm). A further tephra may be present at 54 cm (possibly from Snæfellsjökull). Lake sediments (grey clay) dominate at 61-80 cm. Another possible, unidentified, tephra is situated at 62.5 cm (Fig. 4).

3.3. Þingeyrar East (south)

A time consuming search of an extensive area to the south east of the church and monastic site revealed that while the lower soil sequence was relatively intact, the upper soil sequence was characteristic of a disturbed soil. This was a consistent feature of all the ditch stratigraphy's and soil cores in this area.

3.3.1. Þingeyrar Sample Site 2 (ISN93: N65° 33.126: W20° 23.913)

The surface vegetation is dominated by *Deschampsia cespitosa* (*Achillea millefolium* also present). The root network extends to a depth of 10 cm. Otherwise, the soil is loose, fibrous and characteristic of re-deposited windblown soils to a depth of 20cm. From 20-38 cm the soil is dry, organic and fibrous perhaps indicative of a dried peat. Small patches of pale, rhyolitic, tephra are apparent amid the soil matrix 10-38 cm, perhaps derived from a Hekla eruption. A dark, silt rich, peat soil dominates at 38-49 cm interrupted at 44 cm by the Hekla 3 tephra. A further tephra arises at 49-51 cm, nominally identified as Hekla 4. A dark, peat section is prevalent 51-90 cm, divided at two points; 58-62 cm a red, iron dominated band possibly a consequence of a Katla eruption; 74-76 cm a light clay band, possibly indicative of an open water habitat. The Saksunarvatn tephra 90-100 cm sits atop a glacial till of angular rock and clay (Fig. 5).

3.3.2. Þingeyrar Sample Site 3 (ISN93: N65° 33.173: W20° 23.875)

The surface vegetation is dominated by a cropped sward of grass, forbs (inc. *Achillea millefolium*) and moss. The root system extends to 5 cm. A loose, fibrous soil is found from 5-20 cm. A slightly more consolidated soil sits below at 20-30 cm. atop a thin band of peat (30-32 cm). A thinner, ferrous band underlies (32-33 cm) the peat layer. From 33-46 cm a light, reddish, fibrous soil suggests an *in-situ*, dried out, peat section. A silty-peat (46-58 cm) featuring lenses of grey sand overlies a band of dark peat (58-71 cm) the latter divided by a ferrous tephra layer at 60-61 cm. Between 71-87 cm there is a sequence of clay and silty-peat bands resting above the black Saksunarvatn tephra (87-102 cm). The base (102-111 cm) is characterised by grey, laminated clays of lake origin which in turn lies upon a bed of gravel (111 cm) (Fig. 6).

3.3.3. Þingeyrar Sample Site 4 (ISN93: N65° 33.023: W20° 23.936)

The root layer extends to a depth of 12 cm. This heterogeneous soil features spots of dark and light tephra, the latter perhaps belonging to Hekla 1. An unstratified, yellowish-brown, (very) silty-peat at 12-24 cm overlies a dark, undisturbed, peat (24-40 cm). A possible band of Hekla 4 is situated at 40-43 cm. A dark, undisturbed and extremely woody-peat is dominant from 43 cm to 110 cm (Fig. 7).

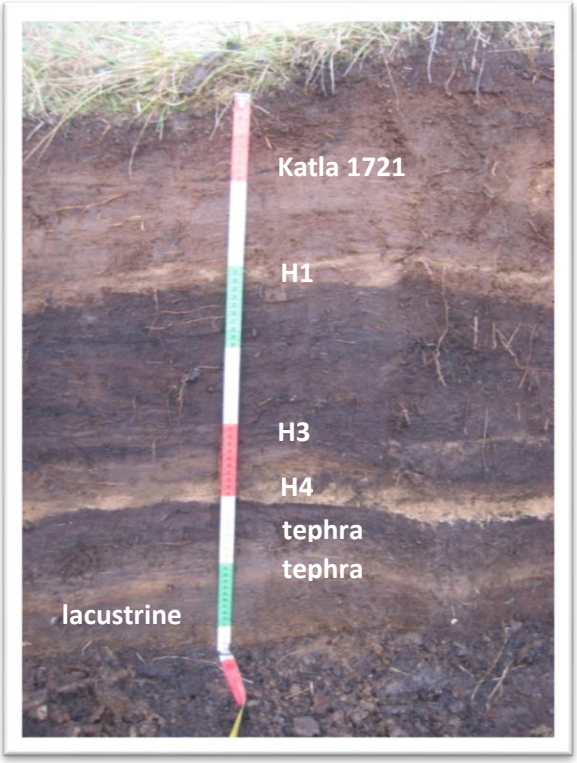

Fig. 4: Þingeyrar sample site 1.

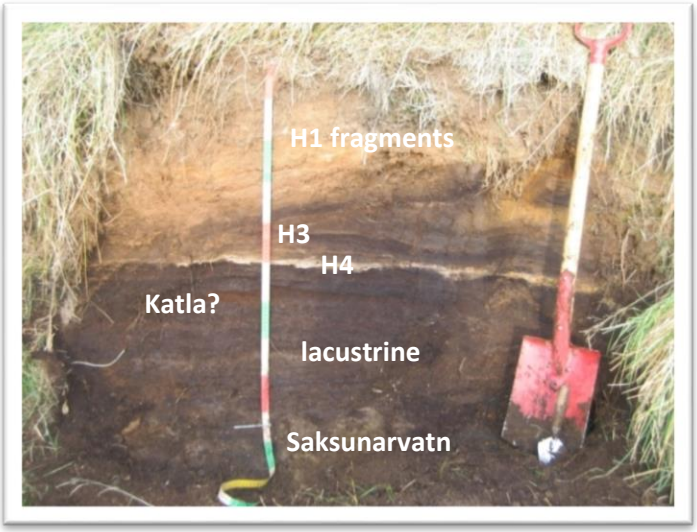

Fig. 5: Þingeyrar sample site 2.

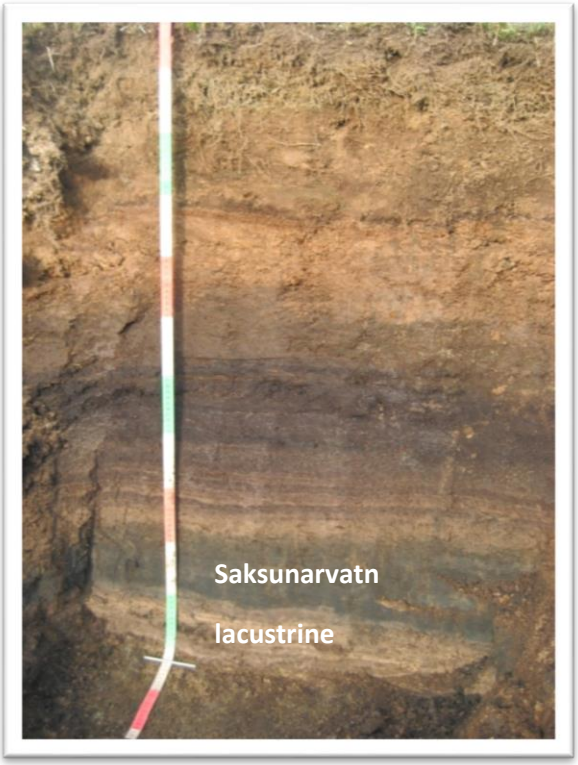

Fig. 6: Þingeyrar sample site 3.

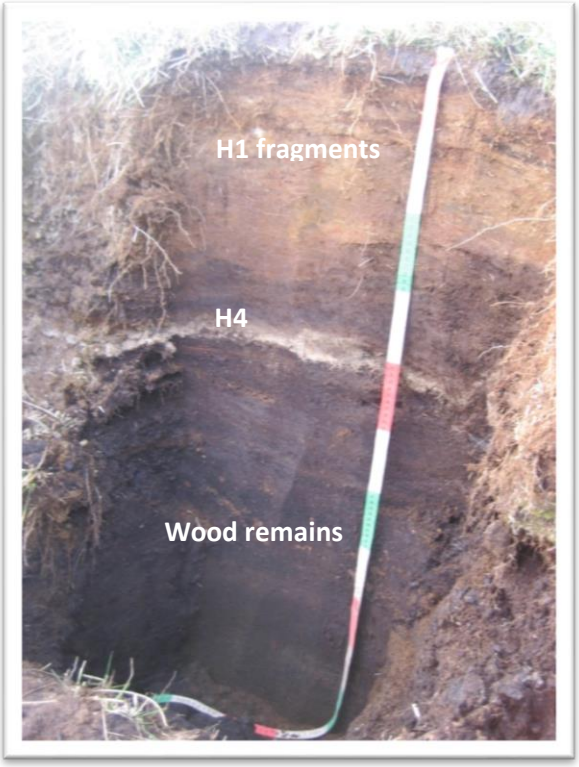

Fig. 7: Þingeyrar sample site 4.

4. DISCUSSION

A soil monolith was taken from Þingeyrar Sample Site 1 (ISN93: N65° 33.594: W20° 23.854). The stratigraphy was deemed suitable for analysis due to its undisturbed character, anaerobic context and the presence of four, readily identifiable (in the field), tephras. The period under investigation is situated between Hekla 3 (c. 1000 BC) and Katla (AD 1721) with Hekla 1 (AD 1104) located in-between the two. This suite of three tephra's potentially allows for good chronological resolution. The presence of Hekla 4 (c. 2300 BC) lends itself to strengthening the interpolation as do the as yet unidentified tephra's below Hekla 4. The sample is now in cold storage at the Faculty of Life & Environmental Science, University of Iceland, Reykjavík, awaiting laboratory analysis.

The absence of undisturbed or unmodified soils and tephra sequences in upper sections of Þingeyrar Sample Sites 2-4 is worthy of further comment. In effect, there is a hiatus between the upper strata and the lower strata with the intermediary sequence disrupted or obliterated, replaced by re-deposited soils in the latter instance. This suggests a significant degree of environmental change at Þingeyrar at some point in the past. The most striking contrast between strata is observed at Þingeyrar Sample Site 3 where the undisturbed lower strata appear to originate at the beginning of the Holocene (111-58 cm) while the upper strata (58-5 cm) is comprised of a mix of windblown deposits and dried-out peats. At Þingeyrar Sample Site 2, an upper strata of re-deposited windblown material extends to a depth of 20 cm. The soil sequence (20-49 cm) immediately below is disturbed, its peats dried out, and it truncates the Hekla 3 tephra (44 cm). It is only the strata below the Hekla 4 tephra that remains intact i.e. peat older than 2,300 BC. All strata above 24 cm at Þingeyrar Sample Site 4 are disturbed to some degree. The stratigraphy of the peat section below (24-40cm) appears intact but Hekla 3 is absent. An intact Hekla 4 (40 cm) tephra suggests all lower sections are older than 2300 BC including strata featuring extremely woody-peat implying that woodland was a dominant feature of the landscape at Þingeyrar during the mid-to-late Holocene.

The hiatus between the pre-historic peat deposits and later eroded/re-deposited windblown soils may be consistent with historical accounts of sandstorms in Húnavatnssýsla in the 18th century (Magnússon & Vídalín 1931-33, pp. 247-251)[2]. In particular, both the homefield and range land of Geirastaðir, the farm immediately adjacent and north of Þingeyrar, is described as subject to regular and large influxes of windblown sand. Similarly, an enclosure called Trumbsvalir within the property of Þingeyrar (north), is described as surrounded by sands and subject to inundation. Re-deposited windblown sand is most obvious at Þingeyrar in the upper strata for Þingeyrar East Sample Site 2 (Fig. 5). A survey of accounts of other farms neighbouring Þingeyrar further inland say nothing of erosion which might suggest that the sand at

[2] Friðþór Sófus Sigurmundarsson, Faculty of Life & Environmental Sciences, University of Iceland has suggested that there may also be earlier accounts of sand erosion and windblown re-deposition at Þingeyrar for the 16th century.

Geirastaðir and Trumbsvalir is derived from their coastal context and/or localised erosion of the sparse vegetation overlying Þingeyrasandur (Magnússon & Vídalín 1931-33, pp. 251-272). However, there is at least one account of aeolian re-deposition of sand at Breiðabólstaðir in the interior of Vatnsdalur. The sand is derived from the riverbed and is described as ruining turf cuttings (pp. 257-259). A similar problem may be apparent at Þingeyrar East for Sample Sites 3 & 4 which both feature dried out peats and silty peats in the upper strata for each profile respectively (Figs. 6 & 7).

It is important to note that turf and peat cutting for construction and fuel may also be responsible for the hiatus in the soil profile for Þingeyrar. Given the extent of the area surveyed at Þingeyrar east (c. 0.5 km^2), this would suggest a large area of cuttings. This is not unprecedented. Aerial photographs from Ingjaldshóll, Snæfellsnes, show an extensive area of cuttings (c. 0.3 km^2).[3] Surface features derived from turf and peat cuttings survive at Geirastaðir (c. 0.03 km^2)[4] and at Leysingarstaðir (c. 0.03 km^2)[5], the neighbouring farms at Þingeyrar. However, other than the absence of the upper sequences of the soil stratigraphy at Þingeyrar, there is no specific evidence of cuttings there. Nonetheless, it remains possible that the construction, maintenance and servicing (fuel) of a monastic complex could have destroyed the upper soil stratigraphy at Þingeyrar with later agricultural improvement obscuring any surface features attributable to peat cutting such as those visible on the neighbouring farms.

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[3] Grid ref: ISN93, 64°54, 437 N, 23° 50,092 W
[4] Grid ref: ISN93, 65°34, 184 N, 20° 24,092 W
[5] Grid ref: ISN93, 65°31, 984 N, 20° 25,503 W

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