# The spatiotemporal distribution of Late Viking Age Swedish runestones: A reflection of the Christianisation process and its speed

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ABSTRACT

The Late Viking Age Swedish runestones are commonly acknowledged as early Christian monuments. Using geostatistical techniques and descriptive statistics, we systematically investigate the regional-to-local spatio-temporal patterns of 1302 ornamentally dated Swedish runestones regarding the timing and speed of the Christianisation process. After quantitative geostatistical analyses of the age distribution patterns of Swedish runestones, we evaluate whether the observed patterns correspond to the pace and pattern of Christianisation, as represented by the presence of mission bishoprics, early church sites, late pagan grave sites and royal estates. We identify seven distinct age groups of runestones and statistically significant regional-to-local spatiotemporal differences in the age and age spread of runestones. The oldest runestones, with the smallest age spread, are found in south-western medieval Sweden, and the youngest, as well as the largest age spread, in the north-east, respectively. We find that runestones are significantly older close to early ecclesiastical sites, regardless of the analytical level, and significantly younger near to late pagan graves. The results obtained are inconclusive as to whether runestones are older near royal estates. Our results support that the spatiotemporal patterns of runestone sites mirror the timing of the Christianisation process and that geostatistical approaches to larger archaeological or historical data sets can add new dimensions to the understanding of the spatial dimensions of past societal changes.

## 1. Introduction

### 1.1. Background

Runestones are among the visually most prominent remnants from the Scandinavian Viking Age (*c.* 790–1100 CE) (Jesch, 1994, 2001; Sawyer, 2000; Imer, 2007; Klos, 2009; Bianchi, 2010; Zilmer, 2010; Stern, 2013). Often decorated with crosses and/or prayers, they are also indicative of the Christianisation process (Lager, 2002, 2003; Zilmer, 2011; Williams, 2016). The majority – over 2800 – of the known Viking Age runic stone inscriptions are within medieval Sweden's borders, and concentrated in the eastern province of Uppland. In comparison, only c. 250 runestones and fewer than 100 are known within the borders of medieval Denmark and Norway, respectively (Table 1; Fig. 1a). They are mainly a Late Viking Age phenomenon – from the late tenth century to the early twelfth century – though about 70 are dated prior to *c.* 950 CE. The runestones functioned as memorial stones for deceased relatives (Jansson, 1987; Zachrisson, 1998; Sawyer, 2000) and likely served social or political purposes (Randsborg, 1980) and in particular may have attested statements or claims of inheritance rights (Sawyer, 1989, 2000), functioned as boundary markers (Larsson, 1990; Palm, 1992; Wilson, 1994; Johansen, 1997; Stille, 2014) and as a way to express Christianity (Lindqvist, 1915; Gardell, 1937; Palme, 1959; Segelberg, 1983; Gräslund, 1987; Herschend, 1994; Williams, 1999, 2016; Lager, 2002, 2003; Zilmer, 2011, 2012, 2013).

The Late Viking Age runestones have generally been considered a form of Christian monument ever since the publication of Liljegren (1832). Subsequently, von Friesen (1913, 1933) attempted to divide the runestones into age classes, arguing, together with Ljungberg (1938), that their spatiotemporal distribution represented the geographical patterns of the gradual spread of Christianity across Scandinavia. Since then, the consensus has been that the runestone tradition originated in Denmark, spread northward to Norway and north-eastward through Sweden (Section 1.2).

Segelberg (1983), Hultgård (1992), Williams (1996, 2016) and many others have emphasised the importance of the runestone material

as a source of the Christianisation process. Still, scholars have interpreted differently *how* the runestones reflect early Christianity. It has been noted that the end of the erection of runestones in a region approximately coincides with the construction of the first churches (Zachrisson, 1998) and that the custom ceased soon after Christianisation had advanced into an ecclesiastical organisation phase (Lager, 2002, 2003). Since von Friesen (1933) and Ljungberg (1938), it has been commonly held that the Late Viking Age runestones, especially the Swedish ones, reflect the spatiotemporal patterns of Christianisation. In areas with older runestones, Christianity was supposedly established earlier than in those with younger runestones. So far, however, this observation has not been quantitatively verified against different indicators of Christianisation.

It has been noted that the runestones' temporal (e.g. Zachrisson, 1998) and spatial (e.g. Herschend, 1994) dimensions are of equal importance, and to optimise their use as a source of societal change (including Christianisation), the runestone material should be studied as a whole (e.g. Sawyer, 1991, 2000). Following these recommendations, we present the first systematic, large-scale, quantitative, spatiotemporal study of the whole dated Swedish runestone material. We do so using geostatistical techniques within a Geographic Information System (GIS) framework and descriptive statistics to explore age distribution patterns, and we evaluate how they correspond to the pace and pattern of the Christianisation process. The study addresses two interlinked questions: (1) which statistically significant spatiotemporal patterns exist regarding the number, age and age spread of the dated

**Table 1**

The number of known and ornamentally dated runestones for each age class and country (following its medieval borders) and province. Not presented are runestones per province for Denmark and Norway (following their medieval borders) due to the low number. Abbreviations: Unornamented = UO; Bird's-eye view = B-e-v. The total number of ornamentally dated and undated (number in brackets) Viking Age runestones. Runestones with two styles are here counted as 0.5.

| Style group Age (c.) | UO 970–1020 | B-e-v 1010–50 | Pr1 1010–40 | Pr2 1020–50 | Pr3 1045–75 | Pr4 1070–1100 | Pr5 1100–30 | Total number |
|---|---|---|---|---|---|---|---|---|
| Denmark | 171 | 3 | 1 | 1.5 | 2.5 | 1 | – | 180 (251) |
| Norway | 33 | – | – | – | – | – | – | 33 (91) |
| Sweden | | | | | | | | |
| Gästrikland | 2 | – | – | 6 | – | 2 | – | 10 (23) |
| Gotland | – | – | – | 1.5 | 5 | 9.5 | – | 16 (80) |
| Hälsingland | 3 | – | 1.5 | 1.5 | – | – | – | 6 (18) |
| Medelpad | – | – | 1 | 1 | 1 | – | – | 3 (18) |
| Närke | 3 | 2 | 1 | 1.5 | 2.5 | 2 | – | 12 (30) |
| Öland | 6 | – | 1 | 7 | 13.5 | 8.5 | – | 36 (160) |
| Östergötland | 70 | 31 | 2.5 | 8.5 | 7.5 | 1.5 | – | 121 (452) |
| Småland | 29 | 2 | 0.5 | 1.5 | 3 | 4 | – | 40 (138) |
| Södermanland | 24.5 | 86.5 | 17.5 | 44.5 | 44.5 | 11.5 | 1 | 230 (435) |
| Uppland | 42 | 46.5 | 34.5 | 81 | 147.5 | 310.5 | 57 | 719 (1328) |
| Värmland | 2 | – | – | – | – | – | – | 2 (3) |
| Västergötland | 65 | 19.5 | 7.5 | 0.5 | 0.5 | – | – | 93 (159) |
| Västmanland | – | 6 | 2 | 0.5 | 2.5 | 4.5 | – | 15.5 (28) |
| Total | 450.5 | 196.5 | 70 | 156.5 | 230 | 355 | 58 | 1516.5 (3214) |
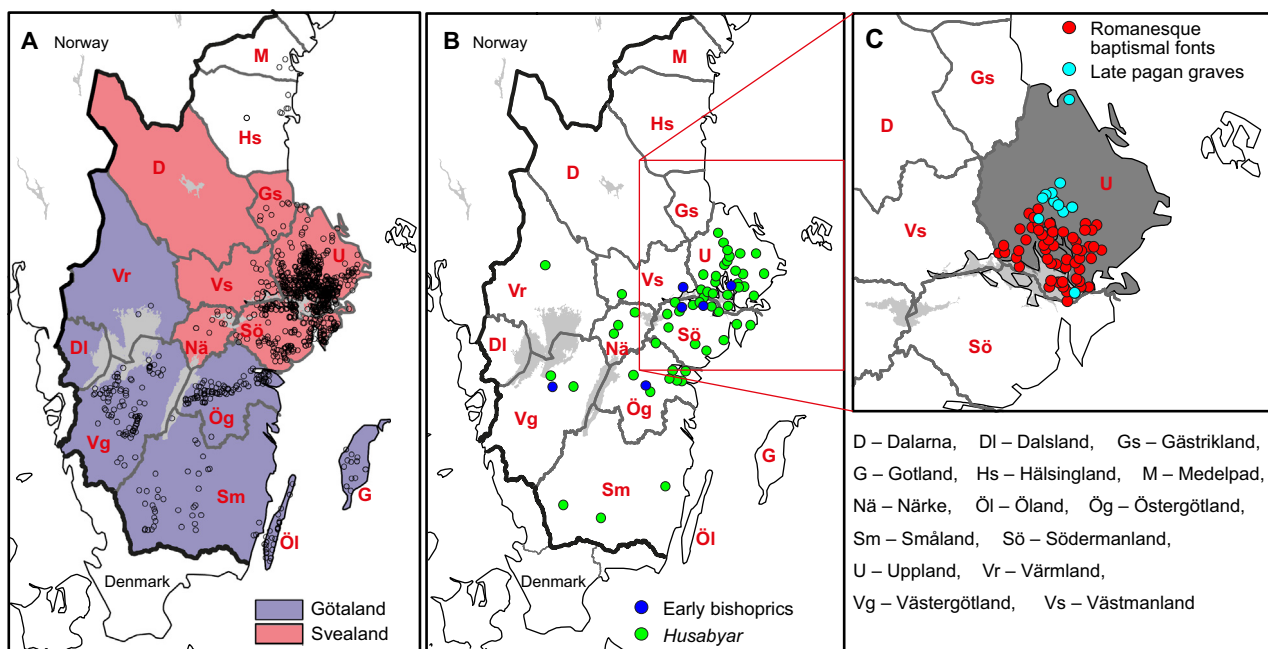


**Fig. 1.** Medieval Sweden with its provinces following their modern boundaries and the location of (A) the 1302 ornamentally dated runestones (black circles), (B) early bishoprics (blue dots) and royal estates (*husabyar*) (green dots) and (C) Romanesque baptismal fonts (red dots) and late pagan graves (turquoise dots) in the province of Uppland (shaded in gray). Abbreviations for the provinces are provided below (C). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)