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Documentary evidence of historical floods and extreme rainfall events in Sweden 1400–1800

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Abstract. This article explores documentary evidence of floods and extreme rainfall events in Sweden in the pre-instrumental period (1400–1800). The survey shows that two sub-periods can be considered as flood-rich, 1590–1670 and the early 18th century. The result related to a low degree of human impact on hydrology during the period, suggests that climatic factors, such as lower temperatures and increased precipitation connected to the so-called Little Ice Age rather than large-scale atmospheric circulation patterns, should be considered as the main driver behind flood frequency and magnitude.

1 Introduction

The purpose of this article is to give an overview of major historical flood events in Sweden in the pre-instrumental period (1400–1800) based on documentary sources. A few data concern Finland. Focus will be on river floods driven by rainfall (summer and autumn) and snowmelt (spring). First, a general presentation of the basic orographical and hydrological features of Sweden will be given, followed by a presentation and critical evaluation of available sources in terms of reliability and validity. An indexation on magnitude will be given and an attempt to identify flood-rich and flood-poor sub-periods will be made. A catalogue of floods and extreme rainfall events 1400–1800 is found in Table A1, and a catalogue of possible flood-related harvest failures 1200–1600 is found in Table B1. The study intends to align with prevalent recommendations in methodology and observation periods in order to enhance the possibilities of synoptic reconstruction, calibration and general conclusions on flood regimes in Europe in the pre-instrumental period.

2 Basic orographical and hydrological characteristics

The Scandinavian mountain range (with a maximum altitude of 2469 m above sea level) runs in a north–south direction on the western side of the Scandinavian Peninsula. The continental divide largely coincides with the border between Sweden and Norway. Most rivers in Sweden flow down on the eastern slopes of the mountain range in a southeasterly direction through the largely flat lands into the Bothnian Sea and the Gulf of Bothnia. In south-central Sweden a number of large lakes are found – Vänern, Vättern, Mälaren and Hjälmaren – which catch waters to constitute the main basins of large catchment areas (see Fig. 1). In the southernmost part of the country the modestly elevated Småland highlands, with a maximum altitude of 377 m, is the source of a number of smaller rivers that run both into the Baltic Sea to the east and the south and into the Kattegatt–Skagerrak of the North Sea in the west.

The most important catchment areas are Dalälven, Norrström, Göta älv and Motala ström (see Fig. 1). Dalälven is Sweden's longest river with a total extension of 520 km. The total catchment area is 28 954 km^2. Lake Mälaren constitutes a basin collecting water from a wide range of smaller rivers, totalling a catchment area of 22 650 km^2, all flowing into the Baltic Sea at Stockholm. The main outlet is Norrström, north of the Old Town of Stockholm, which has given the name of the entire catchment area. Sweden's largest lake, Vänern, catches waters running down from the higher altitudes in the province of Värmland as well as in Norway and lets its waters continue to the North Sea by the Göta älv River. At its mouth, the second largest city of modern Sweden, Gothenburg, is located, though only founded as late as 1628. The total area of the catchment is 50 229 km^2. The Motala ström catchment area with 15 481 km^2, is constituted by

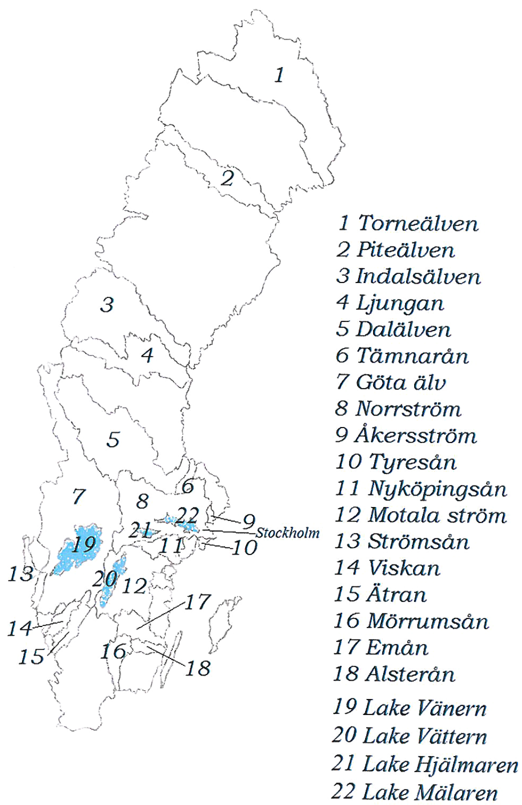

Figure 1. Catchment areas and major lakes in Sweden mentioned in the text.

the waters running from Lake Vättern to the Baltic Sea at Norrköping.

The geographical distribution of hydrological data in documentary sources mirrors the economic geography of medieval and early modern Sweden. Population density was highest in southern Sweden where consequently agriculture, the most important economic activity and especially sensitive to variations in hydrological patterns, was concentrated. Mining, the second most important economic activity, was concentrated in the less populated areas of Bergslagen in the provinces of Västmanland and Dalarna in the areas north and west of Lake Mälaren. Already in the Bronze Age rich mineral resources were found here, giving rise to an early mining activity which used the streaming rivers as a source of power for the roasting and smelting of the raw ore. The mining area predictably became an important zone for the Swedish economy. The rivers are often subject to intense spring floods when the snow in the mountains to the northwest melts rapidly. The seasonality of floods in the mining area is therefore concentrated to the spring season and is explained by a combination of snow storage in the mountains and the rate of melting in the spring. Lake Mälaren was originally a bay of the Baltic Sea but was separated from it and transformed into a lake by the continuous postglacial rebound around 1000 BC. The outlet was for long confined to Södertälje and the two narrow canals Norrström and Söderström in Stockholm, founded around AD 1250 and later to become the capital of Sweden. The combination of these three factors – the importance of mining to the Swedish economy, the location of the mines near rivers subjected to spring floods and the location of Sweden's most prominent early city – produce a number of hydrological data in contemporary historical sources.

Although many catchment areas in Sweden are quite large (15–50 000 km^2), most rivers in south-central Sweden are, with a few exceptions, not suitable for navigation due to their small size and the presence of rapids. It led authorities at an early point to explore the possibilities of building canals and locks, but such projects were never carried out on any significant scale before the 19th century (Meyersson, 1943; Bring, 1911). Also dredging projects were few and limited before the 19th century. The only systematic dredging of Swedish rivers seems to have been a consequence of increased log driving, predominantly in the northern provinces and in the first half of the 18th century (Ahlbäck and Albertsson, 2006; Wik, 1950). Serious alterations of runoff through engineered modifications only occurred in the second half of the 20th century with the development of hydropower plants in the north. The hydrological events prior to the 19th century are therefore to a large extent the result of natural factors. The hydrologically most vulnerable point was the city of Stockholm. It is located at the outlet of Lake Mälaren, where a floodgate was constructed already before the 16th century to control the spring-flood water and where most works of this kind were carried out (see e.g. Almquist, 1903, 241 pp.; Handl. rör. Skand. hist. 19, 1834, 183 pp.; Almquist, 1913, p. 82). In the early 15th century some dredging works were carried out at the outlet of Södertälje and again in the late 17th century but had little impact on the hydrology of the lake (Bring, 1924).

Consequently, the human impact on river streambeds and floodplains has been limited during the period in concern here. The pressure of urbanization, population increase, deforestation, and other land use changes as well as surface alterations and irregularities in channel alignment can be considered to be negligible due to the sparse population of Sweden and the low-intensity utilization of rivers. Hypothetically, climate, i. e. precipitation and temperature, would be the main driver behind any observable flood regime change before 1800 (Glaser et al., 2010; Wetter et al., 2011). Exceptionally, other natural factors than climate explain floods. For example, according to locals changes in the water levels of Lake Vänern were due to winds over the large lake surface rather than floods in the tributary rivers or drought (Elvius, 1751–1752, p. 39).

3 The documentary sources

The present study has been mainly based on printed letters, diaries, travel notes, annals and chronicles, as well as secondary sources such as regional topographical descriptions. Some data have been found in the Swedish National Archives (Riksarkivet) in Stockholm. There are also some compilations of general weather data from the 18th century (Ferner, 1756; Falkengren, 1781; Ekman, 1783). Further data could still be found e.g. for the 18th century in newspapers but it is argued here that the main trends would not change substantially. The survey covers the period up to 1800, approximately a century before the beginning of systematic instrumental hydrographic measurements (Lindström and Alexandersson, 2004). The period has been chosen in order to avoid complications in the analysis due to the increased interference of anthropogenic factors in the 19th century.

As for most of Europe, the amount of documentary sources in Sweden is meagre for the Middle Ages but increases dramatically from ca. 1520 due to successful centralization efforts of the central authorities by King Gustavus Vasa (1523–1560) as well as fortunate preservation circumstances (Retsö and Söderberg, 2015a). Thus, for the 12th and 13th centuries, most climatological and parameteorological proxy data are found in chronicles and annals, written long after the events were described and most often of Danish or north German origin. This type of source material is notoriously difficult to use for historical reconstruction, but with specified methodology it is not useless especially concerning spectacular and severe events like floods (Wetter et al., 2011; Retsö and Söderberg, 2015b). Geographical specificity is not very great – in earlier sources it is confined to general terms (Sweden, Norway, Denmark). The earliest mentioning of a hydrological extreme found in Scandinavian sources possibly relevant for Sweden is from a Danish annal written sometime after 1288, which states that the year 1195 was characterized by "extreme wetness" (*yuerwætis vædher*) (Jørgensen, 1930, p. 179). The only primary sources of a uniform kind from the Swedish Middle Ages are the diaries of the Birgittine monastery in Vadstena and the Franciscan order of Visby (Gejrot, 1996; Odelman and Melefors, 2008), but they contain very little of hydrological data.

The quantitative increase of documentary sources in general after 1520 also implies greater reliability since the number of independent data also increases and the basic requirements for documentary sources such as nearness in time and space and neutrality are better complied with, as well as the specific requirements on data for the study of long-term structures and parameteorological phenomena such as floods, namely, regularity, frequency, uniformity, high time resolution and geographical specificity (Bell and Ogilvie, 1978; Brázdil et al., 2005, 2010). In addition, the degree of detail as to the causes and impact on society is greater. There are several uniform individual records produced by the same person (e.g. Brahe, 1920; Hausen, 1880; Lewenhaupt, 1903), whole individual letter suites (e.g. Sjöberg, 1911, 1915; Wijkmark, 1995), and a number of institutional records such as letters from bailiffs and civil servants throughout the country (Retsö, 2002; Almquist 1868, 1875, 1877, 1893, 1902, 1903, 1913; Styffe, 1893; Edén, 1905; Ahnlund, 1930).

Hydrological data are limited to statements on extreme flood events or general characterizations of an entire year. The approach chosen here is the threshold approach (Hall et al., 2014), i.e. only floods and rainfall events that have been perceived by contemporaries to be beyond normality have been included. Concerning floods, the sources tell us about two cases: floods due to excessive precipitation and extreme spring floods. However, it is most often impossible to assess the magnitude of floods in quantitative terms. Some exceptions are the floods at Uppsala in 1622, at Söderköping in 1684 – for which the only known floodmark has been found (Broocman, 1760, p. 149) – at Holmen in 1646, at Ekby 1709, and at Stockholm and Uppsala in 1780.

The magnitude is normally described in vague qualitative terms, e.g. as the worst "in living memory" (*mannaminne*). It is argued here that such implicit comparisons with previous floods are indications of perceived absolute magnitude and not relative to real magnitude. The threshold approach inevitably involves an element of interpretation based on an analysis of terminology, the basic understanding of which may have varied somewhat over time and between persons but has nevertheless been mainly constant. For example, "severe spring flood" (*svår vårflod*) must have meant a spring flood above normal expectations, and the same is the case with "much wetness" (*mycket väta*).

The data used have thus been restricted to such data that can be confirmed to be reliable and valid and above the threshold of perceived normality. A commonly recommended 3-scale indexation of the magnitude is used here, based on the criteria of duration, spatial extension and material damage/human casualties (Sturm et al., 2001; Llasat et al., 2005; Glaser et al., 2010; Wetter et al., 2011): (1) floods on a regional scale with little material damage and/or short duration, (2) floods of significant regional or supra-regional magnitude with considerable material damage and/or average duration, and (3) floods of regional or supra-regional magnitude with disastrous material damage and/or long duration. Following Hall et al. (2014), the survey intends to identify flood-rich periods in order to facilitate cross-continental comparisons. Due to lack of reliable data at this stage no attempt will be made to assess discharge. All dates are adjusted according to the Gregorian calendar (New Style), introduced in Sweden in 1753.

4 Results

With all these prior observations of the source material, the result of the survey is as follows. A total of 157 floods or extreme rainfall events have been found for the period 1400–

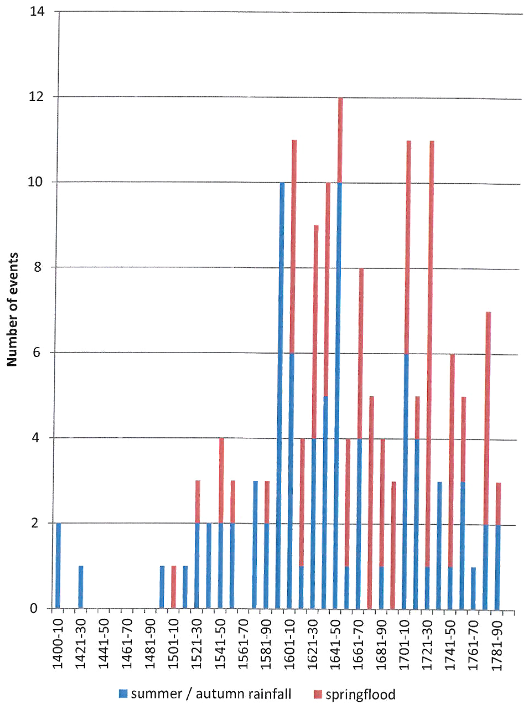

Figure 2. Decadal frequency of floods and extreme rainfall events in Sweden, 1400–1800, according to documentary sources.

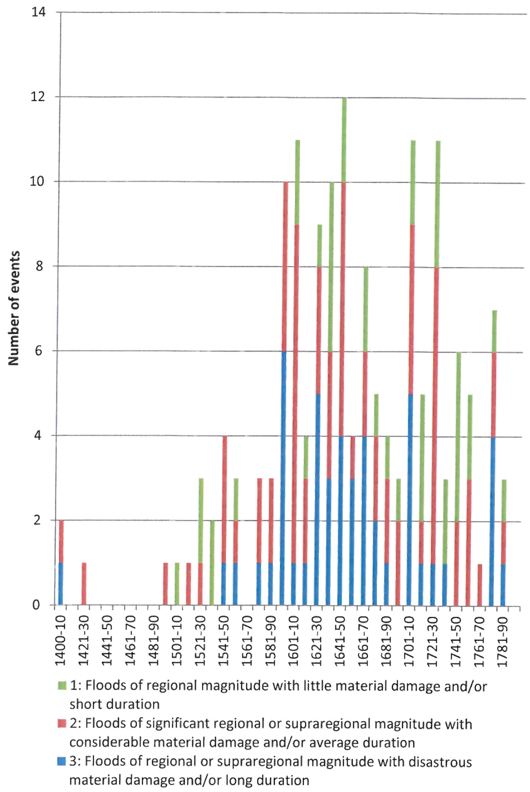

Figure 3. Documentary evidence of floods and extreme rainfall events in Sweden, 1400–1800, with levels of magnitude.

1800, of which 107 can be unambiguously defined as floods (see Table A1). Catchments particularly hit by floods were Norrström, Göta älv and Dalälven (see Fig. 1).

There is no clear picture of flood frequency during this period. Yet, the data are clearly sufficient to make a preliminary identification of flood-rich and flood-poor periods (see Figs. 2 and 3). There is a clear tendency to more frequent floods in the 17th and 18th centuries in general. Especially two periods stand out as particularly flood-rich: 1591–1670 with two intermediate sub-periods with fewer floods in the 1610s and the 1650s, and the early 18th century. On a decadal timescale the highest number of floods is found in the 1640s (12 events), the 1700s and the 1720s (11 each), followed by the 1630s (10) and the 1620s (9). Years of significantly severe floods were 1649 (6 events), 1622 and 1780 (5 each), and 1596, 1640, 1661, 1677, 1707, 1709 and 1728 (4 each). Particularly serious was the flood in the province of Östergötland in August 1649 (the so-called *Olsmässofloden*). According to one assessment considerably more than 100 mm, perhaps as much as 200–300 mm of rain may have fallen over certain locations in the southern and central parts of Östergötland in a few days (Alexandersson and Vedin, 2001). The flood in May 1650 seems to have been equally serious; the situation caused the authorities to initiate works to widen the outlet at Stockholm and also to investigate the possibilities to widen the outlet through the Södertälje Canal. The same happened in the spring of 1661 and the authorities sped up the work at Södertälje (Bring, 1924, p. 16).

As for magnitude, 32 % of all events were of the third category (floods of regional or supraregional magnitude with disastrous material damage and/or long duration), and 44 % of the second category (floods of significant regional or supraregional magnitude with considerable material damage and/or average duration) (Fig. 3). The impression of the period 1591–1670 as one of dramatic hydrology is substantiated by the fact that almost one-sixth, or 27, of all third category events occurred during that period.

5 Discussion

5.1 Comparison with flood-rich and flood-poor periods in continental Europe

The result does not neatly coincide nor with tendencies in flood frequency or particular events observed in continental Europe (compare e.g. Wetter et al., 2011; Benito et al., 2003; Glaser et al., 2010; Glaser and Stangl, 2004; Elleder, 2013; De Kraker, 2006). For example, both Brázdil et al. (1999) and Schmocker-Fackel and Naef (2010) found few floods in northern Switzerland in the first half of the 16th century but there was a flood frequency peak in 1560–1590, whereas a first peak in Sweden is found only in the following 2 decades. As for the 17th century, there was a low in Switzerland until the first decades of the 18th century (Pfister, 1999; Schmocker-Fackel and Naef, 2010). The latter half of the century was again a period of high frequency, which only partially coincides with the documentary data from Sweden. There are no traces of similarities with Sweden on single extreme years in the same region (Wetter et al., 2011) or in central Europe at a larger scale (Glaser et al., 2010). There are only slight similarities with the flood chronology of Spain, in particular for the Llobregat and Tagus catchments in the extended period 1580–1620 (Llasat et al., 2005; Benito et al., 2003).

5.2 Relation to quantity of source data

The first question to address is whether this can be explained by a deficiency in the Swedish source material. It is held here that more documentary sources could doubtlessly improve the picture in its details but not substantially change the general pattern. For example, the increase in reliable flood data in the 17th and 18th centuries is not entirely a reflection of a total increase in documentary sources. Indeed, the total quantity of preserved documentary sources rises considerably already in the 1520s but the rising frequency of floods does not occur until the 1590s. It can thus be concluded that the data most probably reflect a real increase in flood events towards the late 16th century. Consequently, it can also be presumed that floods really were more rare in the source-poor late Middle Ages. As has been pointed out by Wetter et al. (2011), it is highly improbable that spectacular events like major floods would pass unnoticed by chroniclers.

5.3 Comparison with North Atlantic Oscillation (NAO) reconstructions

The meteorological/climatological causes behind these Swedish flood data require further research to be identified. In a number of studies the great variability in flood frequencies in Europe has been explained by large-scale atmospheric circulation patterns, particularly on a decadal timescale (Schmocker-Fackel and Naef, 2010; Casanueva et al., 2014). In particular, the NAO together with other, related atmospheric circulation patterns is normally seen as the main explanation for climatic variability in northern Europe (Lindholm et al., 2009), especially winter precipitation in the NAO positive phases (Hurrell and Van Loon, 1997; Barker et al., 2004; Casanueva et al., 2014) as well as for river discharges, snow accumulation and flooding (Prudhomme and Genevier, 2011).

However, there is no clear connection between the existing NAO reconstructions and flood frequency in Sweden. In one reconstruction (Luterbacher et al., 1999) a few winter NAO indices coincide with flood peaks in Sweden (early 18th century, the 1770s and perhaps also the 1740s), while in others the picture is somewhat different (see e.g. Luterbacher et al., 2002; Glueck and Stockton, 2001). For example, while it would seem that a tendency to a 10–12 years cycle, a timescale which is close to one of the suggested NAOs (Hurrell and Van Loon, 1997; Cook et al., 1998), could be seen in the Swedish sources between 1620 and 1661 there is no sign of it after that. Similarly, one NAO winter index reconstruction (Cook et al., 2002) identifies a positive phase until about 1640 whereafter it went into a neutral or negative phase which would not be able to explain the flood peaks in Sweden in the following decades. If the chronology of Swedish flood events is compared with the NAO index found in Luterbacher et al. (2002), then no correlation at all can be seen. According to expectations, the NAO would have a marked influence on precipitation and streamflow, particularly in its positive mode when westerly winds bring moist and warm air over Scandinavia. NAO is also expected to have a stronger effect in the winter than in the summer, and a stronger effect in northern Sweden than in the south (Uvo, 2003). However, the documented floods are slightly more frequent in negative NAO phases (83 events) than in positive NAO phases (64 events). Furthermore, floods related to the winter season, i.e. spring floods, are about as many (70) as those related to the summer season (77). There is no clear tendency in either high altitude or high latitude catchments (defined as catchments no. 1–5 and 7–8 in Fig. 1): the number of events (106) in the former catchments is indeed greater than the number of events (34) in the low latitude/altitude catchments but exhibits a perfectly equal distribution between positive and negative NAO phases (53 events each).

Previous attempts have failed to establish an unambiguous connection between NAO, winter precipitation and floods, in general, particularly for northern Europe (Bouwer et al., 2006; Uvo, 2003; Casty et al., 2005). One reason for that is undoubtedly that NAO operates on a great variety of timescales and is interfered with by other local conditions as well as other circulation patterns (Jacobeit et al., 2003; Lavers et al., 2012). Also changes in flood frequencies are obviously the result of the workings of several driving forces at the same time but to different degrees at different times and places, particularly in colder climates as in Sweden. For example, it seems that NAO-related precipitation patterns east of the Scandinavian mountains, i.e. in Sweden, are overplayed by other climatic factors (Uvo, 2003; Linderholm et al., 2003). However, it is conspicuous that the great majority of the worst flood events have been recorded in catchments that are particularly subjected to spring floods fuelled by melting snow from high altitudes or latitudes (Norrström, Göta älv, Dalälven, Torneälven, Piteälven, Ljungan, Indalsälven) and where lake evapotranspiration is lower and water storage capacity higher (see Fig. 1). Furthermore, if the average winter temperature of Stockholm (Leijonhufvud et al., 2010) is taken as a proxy for a general meteorological pattern in southern and central Sweden, the frequency of floods has a clear correlation with cold and snowy winters. Although the correlation of winter precipitation with NAO is generally weaker in Sweden than on the Atlantic coast of Norway

(Uvo, 2003) and although temperature tends to increase under positive NAO, precipitation in the winter at northern latitudes would under all conditions and NAO modes come as snow and therefore generate a larger storage of water in the mountains. Thus, the melting of large amounts of snow in the spring would affect Sweden as well and thereby contribute to spring floods whose intensity would depend on the evolution of temperature in the spring.

Plausibly, a decline in evaporation due to decreasing mean temperatures, probably in connection with heavy winter precipitation in the form of snow and increased spring precipitation due to NAO, generated considerably higher levels of runoff, notably at higher altitudes (cf. Burt and Howden, 2013) where the wellsprings of most Swedish catchments are located. The combination of soil saturation, huge snow amounts and spring rain has been pointed out a an important trigger for spring floods (Wetter et al., 2011). This allows for the conclusion that the NAO can account for precipitation patterns, mainly in the winter, but not necessarily all flood peaks, whereas climate plays the main role for the frequency of floods. The peaks in Sweden's flood history would then be characterized as cases of "complex extremes" (Benestad and Haugen, 2007), involving both temperature and precipitation. In some cases, the correlation between snow-rich winters and spring floods is explicit in contemporary sources; for example, the winters of 1543, 1544, 1601 and 1780 and the following disastrous spring floods. This correlation between flood frequencies and the so-called Little Ice Age has also been noted for other areas of Europe (Brázdil et al., 1999; Pfister, 1999; Glaser, 2008).

5.4 Medieval floods and harvest failures without stated causes

There are no unambiguously reliable data on floods in Swedish medieval sources before the 15th century. In Danish and German chronicles reports are found of heavy raining and/or floods in 1287, 1315, 1336, 1347, 1357 and 1381 that could possibly have affected Sweden (Holder-Egger, 1880, p. 546; Rørdam, 1873, p. 318, 589, 592 pp.; Langebek, 1772, p. 303; Langebek and Suhm, 1786, p. 532), but the only indication in Swedish sources is a blunt general statement about "evil and wet weather" in 1313 in the Erik chronicle, written in the 1330s (Jansson, 2003, p. 148). It should be noted that there are no indications in Swedish medieval sources, as in central Europe, for floods in the 1340s or in 1501 (cf. Rokoengen et al., 2001; Brázdil et al., 2005; Rohr, 2007; Kiss, 2009; Elleder et al., 2013). It is also uncertain whether the statements in Danish chronicles are relevant for Sweden. The same is the case with the report in Heinrich of Balsee's chronicle on a flood in northern Germany in December 1374 (Crull, 1878, 165 pp.).

In many cases the magnitude of floods in the early modern period is related to the damage on crops (see e.g. Jämtl. räk., 1564–1571, 38 pp.; Sommarström, 1935, p. 285; Ekström, 1949, p. 417; Lindblom, 1793, p. 121; Strömbeck, 1993, p. 170). Some medieval data tell about severe harvest failures and famine without stating the causes (see Table B1). At the present stage no details can be found to support that these extreme events were caused by floods and undoubtedly some of them are connected to drought. But it is also clear that several of them may have been caused by floods. Already Emmanuel Le Roy Ladurie warned about the difficulty to establish a strict causal connection between climate and crop failures unless the precise cause is stated or the data can be supported by other contemporary data (Le Roy Ladurie, 1971, 275–6 pp.). The purpose of presenting the Swedish data here is to furnish a point of departure for future research and comparative analyses that can shed more light on the matter.

6 Conclusions

Two periods stand out as particularly flood-rich in the pre-instrumental period in Sweden according to documentary records: 1591–1670 and the early 18th century. In particular, there are clusters of floods in the 1640s, the 1700s and the 1720s. One-third of all events were floods of regional or supra-regional magnitude with disastrous material damage and/or long duration, and half of them occurred in the period 1591–1670.

The spatial scale of spring floods and their temporal concentration in clusters suggest causality on a large timescale, i.e. meteorological conditions connected with the Little Ice Age rather than atmospheric circulation patterns such as the North Atlantic Oscillation (NAO) and a reflection of regional response to climatic variability. NAO could very well explain winter precipitation patterns as well as the flood peaks between 1591 and 1650 but only in combination with a Little Ice Age cooling, which in turn is the more plausible explanation for the peaks in the early 18th century. Given the high degree of continuity in demographic and economic conditions in the 1400–1800 period, it therefore seems reasonable to conclude that among the potential drivers of flood regime change are the changes in precipitation and temperature, i.e. climatic change, that mainly account for the long-term variability of historical floods in this period. Although there is a natural time lag in relation to temperature, there is a clear correlation between the seasonality and the chronology of spring floods, on the one hand, and, on the other, rapid and late melting of larger snow storages in combination with spring precipitation from ca. 1600. This is further confirmed by the observable spatial coherence of major flood events.

Appendix A

Table A1. Documentary evidence of floods and extreme rainfall events in Sweden 1400–1800 (bf – before).

Year	Date	Location	River	Catchment	Index	Type	Source	Comment
1400	after 26 July	Söderköping	Storån	Storån	2	rainfall	Fant (1818) p. 95, Paulsson (1974) p. 289, 398 pp.	great flood caused by sudden, violent raining; people fled the town in fear of a Deluge; knee-high water inundated cemeteries and streets; bridges and mills destroyed
1405	7 August	(Denmark, Sweden)	–	–	3	rainfall	Rørdam (1873) p. 555	continuous raining from early August to Christmas
1421	summer	Vadstena	Lake Vättern	Motala ström	2	rainfall	Gejrot (1996) p. 174f	"so great quantities of rain that corn rotted . . . followed by plague"
1495	7 November	Stockholm	(Norrström)	Norrström	2	rainfall, sea flood	Fant (1818) p. 68	great storm and sea flood destroyed several ships in the harbour
1506	April	Arboga	Arbogaån	Norrström	1	snowmelt	Sjödin (1937) p. 205	unusually great spring flood, "a thousand men could not go against it"
1513	July	(Sweden)	–	–	2	rainfall	Retsö (2002) p. 148	the greatest rainfall in 6–8 years
1523	January	Markaryd			1	snowmelt	Larsson (2002) p. 69f	great inundations hindered warfare
1526	autumn	Västergötland Province	–	Göta älv	1	rainfall	Almquist (1868) 74 pp.	much rain and wetness
1530	summer	Uppsala bishopric	NA	Norrström	2	rainfall	Almquist (1877) p. 207	very wet summer and autumn, crops endangered
1533	5 August	Sala	NA	Norrström	1	rainfall	Riksarkivet, Kammararkivet, Bergsbruk, Sala gruva 1533–1537	great torrential rain, miners refused to enter the mines due to the excessive water
1534	8 September	Sala	NA	Norrström	1	rainfall	Riksarkivet, Kammararkivet, Bergsbruk, Sala gruva 1533–1537	great torrential rain, miners refused to enter the mines due to the excessive water
1543	summer	(Sweden)	–	–	2	rainfall	Ekman (1783) p. 143	very wet and cold summer
1544	summer	(Sweden)	–	–	2	rainfall	Forssell (1884) Appendix A p. 157	very wet and cold summer
1549	23 April	Uppsala	Fyrisån	Norrström	2	snowmelt	Almquist (1902) 13/4 1549	spring flood flushed away a mill dam
1550	bf 21 May	Lake Mälaren	–	Norrström	3	snowmelt	Almquist (1903) 241 pp., Handl. rör. Skand. hist. 19 pp., 183 pp.	great spring flood causing "mighty great damages on fields and meadows"
1557	bf 15 May	Lake Mälaren	–	Norrström	3	snowmelt	Almquist (1913) p. 82	great spring flood and rapidly rising water levels due to large quantities of ice and snow melting causing great damages on meadows, dams, bridges and mills
1559	July	(Västmanland Province)	–	Norrström	2	rainfall	Dalin (1760–1761) p. 485	great rainfall; all hay flushed away
1560	9 July	Arboga	Arbogaån	Norrström	1	torrential rain	Ekström (1949) p. 265	sudden torrential rain causing such a darkness that the priest needed a light in the middle of the day and people thought Doomsday was at hand
1571	summer	Ragunda	Indalsälven	Indalsälven	2	rainfall	Jämtl. räk. (1564–1571) 38 pp.	small harvest due to great wetness
1573	summer	Linköping		Motala ström	3	rainfall	Granlund (1876) p. 45	the cathedral at Linköping damaged by rain
1580	summer	(south Västergötland Province)	Viskan, Ätran	Viskan, Ätran	2	rainfall	Österberg (1971) p. 219	"terrible wetness", peasants unable to pay taxes
1581	spring	Gliehammaren	–	Norrström	2	snowmelt	Noraskogs arkiv (1889–1891) p. 173	water wheel damaged beyond repair
1589	autumn	Skerike	Svartån	Norrström	3	rainfall	Ekström (1949) p. 78	great wetness destroyed the crops
1589	summer	Romfartuna	Lillån	Norrström	2	rainfall	Ekström (1949) p. 663	damages on crops due to wetness
1595	bf 7 July	Finland	–	–	2	rainfall	Sommarström (1935) p. 285	bad harvest and rotten hay due to excessive rains
1595	summer	(Sweden)	–	–	2	rainfall	Brahe (1920), p. 15	unprecedented extreme rains
1596	10 August	Örslösa	Söneån	Göta älv	3	rainfall	Silvén-Garnert and Söderlind (1980) p. 158f	great deluge-like rainfall, flushing away bridges, water covering fields and meadows destroying crops and killing goats and sheep
1596	ca. 25 June–ca. 25 July	(northern Södermanland Province)	–	Norrström	2	rainfall	Lewenhaupt (1903) p. 109	raining almost every day for 1 month
1596	summer	Orsa	Oreälven	Dalälven	3	rainfall	Ekström (1949) p. 417	"severe wetness destroyed the harvest"

Table A1. Continued.

Year	Date	Location	River	Catchment	Index	Type	Source	Comment
1596	July	Lönneberga, Ålem	Silverån, Alsterån	Emån, Alsterån	3	rainfall	Hallendorff (1902) p. 77, Edman (1985) p. 72	flood caused by heavy rainfall; all meadows covered by water so that they looked like lakes; bad damages on hay and corn crops, and animals died of food shortage, hay flushed away from meadows and the crop failure created hunger among peasants
1597	22 May	Ålem	Alsterån	Alsterån	3	torrential rain	Edman (1985) p. 72	torrential rain brought by northerly winds; all crops flushed away and the fields looked like lakes
1597	27 June	Ålem	Alsterån	Alsterån	3	torrential rain	Edman (1985) p. 72	torrential rain for 24 hours; corn plants drowned in water and crops flushed away
1600	summer	(Östergötland Province)	–	–	2	rainfall	Wennberg (1947) p. 197 no. 3	crops partly destroyed by wetness
1600	20 September–10 October	Ålem	Alsterån	Alsterån	3	rainfall	Lindblom (1793) p. 121	continuous raining for 3 weeks from 20 September, harvests ruined
1601	April	Ålem	Alsterån	Alsterån	3	snowmelt	Edman (1985) p. 75, Collmar (1960) p. 85, Utterström (1955) p. 29	great spring flood caused by sudden warmth following a severe winter with much snow; all bridges and most mills destroyed, next year's seeds destroyed
1602	summer	Fresta, Hammarby	–	Norrström	2	rainfall	Strömbeck (1993) p. 170	excessive rains destroyed most of the harvest
1602	summer, autumn	Ålem	Alsterån	Alsterån	2	rainfall	Edman (1985) p. 76, Collmar (1960) p. 85, Palme (1942) p. 391	"mighty severe autumn wetness" damaged hay crops and other crops
1603	bf 25 February	Kumogård, Birkkala (Finland)	Kumo älv	Kumo älv	1	snowmelt	Waaranen (1864) 9, 12 pp.	"superfluous water", "waterflow and unnatural wetness"
1604	spring	Nykroppa	Kroppaälven	Göta älv	2	snowmelt	Furuskog (1924) p. 80	water dams busted by spring flood, requiring 354 days of work to repair
1606	spring	Lillfors	Storfors-älven	Göta älv	2	snowmelt	Furuskog (1924) p. 83	water dam busted by spring flood; it took 4 weeks to repair it
1607	autumn	Ålem	Alsterån	Alsterån	2	rainfall	Edman (1985) p. 84	"extreme autumn wetness"
1608	May	Ålem	Alsterån	Alsterån	2	rainfall	Edman (1985) p. 84	"two mighty great waterfloods in May and in August" with much damages on hay and corn crops
1608	August	Ålem	Alsterån	Alsterån	2	rainfall	Edman (1985) p. 84	"two mighty great waterfloods in May and in August" with damages on hay and corn
1610	16–18 March	Visby, Gotland	–	–	2	rainfall	Strelow (1633) p. 298	"severe flood", water high in the streets
1610	spring	(Sweden)	–	–	1	snowmelt	Ekman (1783) p. 149	great waterflood
1613	spring	(Dalarna Province)	–	Dalälven	1	snowmelt	Sillén (1865) p. 84	"strong waterflow"
1614	autumn	Växjö	–	Mörrumsån	2	rainfall	Ahnlund (1930) p. 363	harvest "badly damaged" by rain
1617	spring	Kuivakangas	Torne älv	Torne älv	3	snowmelt	Olofsson and Stille (1965) p. 213	The Särkilax chapel floated away with the spring flood
1618	spring	Uppsala	Fyrisån	Norrström	2	snowmelt	Falkengren (1781)	"much damage" by spring flood
1622	spring	Löfsta, Uppsala	Fyrisån	Norrström	3	snowmelt	Swederus (1911) p. 238, Falkengren (1781)	dams damaged at the Löfsta mill and in Uppsala town, ice blocks thrown up on the main square
1622	spring	Norrköping	Norrköpings ström	Motala ström	3	snowmelt	Helmfrid (1959) p. 21	all water dams swept away by the spring flood
1622	spring	Piteå	Pite älv	Pite älv	3	snowmelt	Olofsson and Stille (1965) p. 273	dams at Piteå sawmill damaged
1622	1 August	Stockholm	–	Norrström	2	rainfall	Ahnlund (1920) p. 40f	much rain, breaking down the corn
1622	bf 28 October	Gothenburg	Göta älv	Göta älv	2	rainfall	Cronholm (1864) p. 67	the harbour damaged by much rain
1623	ca. 30 June	eastern Värmland	–	Göta älv	2	rainfall	Hausen (1880) p. 270	a statement on a severe spring flood in 1663 says that an equally destructive flood took place 40 years earlier
1625	bf 5 April–10 May	Säter	Dalälven	Dalälven	3	snowmelt	Edén (1905) 206 pp., Wittrock (1919) p. 57, Wolontis (1936) p. 63, Falkengren (1781)	spring flood unusually violent, destroying the mint at Säter on 10 May, nine people went missing
1626	bf 28 April	Nyköping	Nyköpings-ån	Nyköpingsån	1	snowmelt	Wittrock (1919) p. 74f	the copper minting hindered by spring flood
1628	summer	(Sweden)	–	–	3	rainfall	Ekman (1783) p. 136, Falkengren (1781)	very rainy summer, flooded fields and meadows, damaged harvests
1632	bf 28 October	Stockholm	(Norrström)	Norrström	1	rainfall	Styffe (1893) p. 504	"continuous wetness"
1632	summer	Öland	–	–	1	rainfall	Ilmoni (1849) p. 185, Sillén (1865) p. 84, Ahlqvist (1825) p. 295	continuous raining

Table A1. Continued.

Year	Date	Location	River	Catchment	Index	Type	Source	Comment
1632	July	northern Sweden	–	–	1	rainfall	Olofsson and Stille (1965) p. 311	cold and wet
1633	summer	Öland	–	–	2	rainfall	Sillén (1865) p. 84	continuous raining, famine and dear times
1633	summer	(Sweden)	–	–	3	rainfall	Ekman (1783) p. 136	rainy summer with poor harvests in the south and harvest failures in the north
1638	spring	Västerbotten	–	–	3	snowmelt, rainfall	Göthe (1929) p. 67, Falkengren (1781), Riksregistraturet 19/3 1639	spring flood and raining destroyed fields and meadows
1640	spring	Sala	Sagån	Norrström	2	snowmelt	Edén (1905) p. 267	great spring flood stopped silver mining for 1 month
1640	spring	–	Lake Mälaren	Norrström	1	snowmelt	Bring (1924) p. 16	unusually high water levels on lakes
1640	bf 28 May	Kopparberget	Faluån	Dalälven	2	snowmelt	Edén (1905) p. 269 f	water dams have barely been saved from the spring flood which is expected to last another 14 days
1640	28 June	Karlstad	Klarälven	Göta älv	3	snowmelt	Hausen (1880) p. 53	mighty high water levels on the lakes; boats could be rowed across the fields
1641	summer, autumn	northern Sweden, northern Finland	–	–	2	rainfall	Wittrock (1948) p. 311, Lundkvist (1986)	“rain almost every day” during the summer, damaging the harvests seriously
1646	10–18 December	Holmens bruk	Motala ström	Motala ström	2	rainfall	Helmfrid (1959) p. 67	the water in Motala ström began to rise rapidly around 10 December, to a level only 30 cm below the furnaces on 18 December
1647	19 July	Väsby	–	Norrström	2	rainfall	Edén (1905) p. 245	mines filled with water after great and continuous rainfall, causing a stop for mining for 14 days
1648	–	(Sweden)	–	–	1	rainfall	Hausen (1880) p. 135	very wet year
1649	spring	Baggetorp	–	Norrström	2	snowmelt	Edén (1905) p. 183	mill dam destroyed by spring flood
1649	spring	Stockholm	(Norrström), Lake Mälaren	Norrström	3	rainfall	Tigerstedt (1888) p. 45, Bring (1924) p. 16	“much wetness and continuous raining” caused harvest failure and poverty among peasants; Lake Mälaren high above its banks
1649	summer, autumn	(Västergötland, Öland)	–	–	3	rainfall	Hausen (1880) p. 143	“so much water that the ears of the corn could not be seen”
1649	7 August and following	(Östergötland)	–	Motala ström	3	rainfall	Ilmoni (1849) p. 196, Rydberg (1997), Alexandersson and Vedin (2001)	the “Olsmässa flood”: severe floods all over the province, mills, dams, houses, fences, crops and trees flushed away, cattle and people died, destroyed harvests for 3 years afterwards
1649	autumn	(Dalarna Province)	–	Dalälven	3	rainfall	Ilmoni (1849) p. 196	inundations all over the province
1649	bf 16 October	Stockholm	(Norrström)	Norrström	2	rainfall	Sjöberg (1911) p. 16	“horrible weather … it has rained and is still raining tremendously … this city [of Stockholm] must be the potty of the sky”
1650	bf 19 May	–	Lake Mälaren	Norrström	2	snowmelt	Handl. rör. Skand. hist., Vol. 9, p. 394, Lilienberg (1891) p. 35	rapidly rising water levels in the lake, damaging the surroundings
1650	autumn	–	Lake Mälaren	Norrström	1	rainfall	Bååth (1916) p. 234	rising water levels
1656	bf 21 May	Avesta	Dalälven	Dalälven	3	snowmelt	Norberg (1956) p. 32 no. 33	“a tremendous spring flood with so much water that some who live near the river have seen their beds floating inside their houses”
1658	bf 24 November	Småland Province	–	–	3	snowmelt	Holm (1906) p. 346	much snow in November melted and became a flood so great that bridges were destroyed and the water “stood above the back of the horse”
1659	summer	Stola	Lake Vänern	Göta älv	2	rainfall	Sjöberg (1911) 146, 149 pp.	“great wetness”
1660	spring	Skedvi, Säter, (Stora) Tuna	Dalälven	Dalälven	3	snowmelt	Riksarkivet, Bergskollegium, huvudarkivet, Bergverksrelationer EII:a vol. 2 fol 172, 175, 177	three mines and all water wheels severely damaged by violent spring flood
1661	spring	Skedvi, Säter, (Stora) Tuna	Dalälven	Dalälven	3	snowmelt	Riksarkivet, Bergskollegium, huvudarkivet, Bergverksrelationer EII:a vol. 2 fol 175	all water wheels severely damaged by violent spring flood
1661	early spring	Stockholm	Norrström, Söderström	Norrström	3	snowmelt	Bring (1924) p. 16	extremely high water due to large quantities of snow and ice melting, covering the Munkbro bridge and entering houses; other bridges and the new lock threatened by the water

Table A1. Continued.

Year	Date	Location	River	Catchment	Index	Type	Source	Comment
1661	spring	Västland and Tolfta parishes	Tämnarån	Tämnarån	3	snowmelt	Landshövdingars skrivelse t K M:t, Uppsala län (RA)	great damage from spring flood that covered fields for a long time
1661	bf 17 August	Stockholm	(Norrström)	Norrström	2	rainfall	Sjöberg (1915) p. 270	"tremendously great wetness"
1662	autumn	Södermanland Province	–	Nyköpingsån	1	rainfall	Tilander (1968) p. 109	wet and flooded roads
1663	bf 10 April	Stockholm	(Norrström)	Norrström	1	snowmelt	Sjöberg (1915) p. 369	great spring flood
1663	July, esp. 20–21	eastern Värmland		Göta älv	3	rainfall	Hausen (1880) p. 270	terribly much rain on certain locations; heavy rainfall on 20–21 July "as if the sky had opened", followed by flood which destroyed bridges, dams, sawmills etc., the meadows were like lakes, the hay floated away and the water covered the crops, many pigs drowned
1664	14–16 September	Värmland Province		Göta älv	2	rainfall	Hausen (1880) 302, 303 pp.	heavy daily rain and storm with flood and rising river levels
1677	spring	Falun	Faluån	Dalälven	1	snowmelt	Hildebrand (1946) p. 331	material damages
1677	spring	Stöpsjöhyttan	Stöpsjön	Göta älv	2	snowmelt	Danielson (1974) 19 pp.	severe spring flood, damages at the furnace facilities
1677	spring	Njurunda	Ljungan	Ljungan	3	snowmelt	Hülphers (1780) p. 30	great flood, causing much damage
1677	5 June	–	Torne älv	Torne älv	3	snowmelt	Hellant (1747), Keksi (1936–1945), Olofsson and Liedgren (1974) p. 93, Fahlgren (1956) p. 48	great flood, causing much damage on buildings and killing cattle
1680	spring	Hännickehammaren	Stampbäc-ken	Göta älv	2	snowmelt	Furuskog (1924) p. 133	violent spring flood destroyed the furnace
1684	bf 27 April	Vaksala	Lillån	Norrström	2	snowmelt	letter from the peasants in Vaksala 17 April 1684, RA, Landshövdingens i Uppsala län skrivelser till K. M.:t	bridges destroyed by spring flood
1684	spring	Söderköping	Storån	Storån	3	snowmelt	Broocman (1760) p. 149	severe spring flood; the water rose to 0.5 m above the benches in the St. Laurentii church and 0.5 m above the floor, watermark on wall in church
1686	spring	Nordhallen, (Jämtland)	Indalsälven	Indalsälven	1	snowmelt	Hildebrand (1918) p. 115, Lundström (1912) p. 249	great spring flood
1686	bf 15 June	Lundby	–	Tyresån	2	rainfall	Wijkmark (1995) p. 436	continuous rain and storms for several days
1691	bf 1 March	Vaxholm	–	Åkersström	2	snowmelt	letter from the governor of Uppsala Province 19 February 1691, RA, Landshövdingens i Uppsala län skrivelser till K. M.:t	barrier damaged by spring flood
1697	bf 1 May	Nykvarn	Brants-hammarsån	Norrström	2	snowmelt	letter from the governor of Uppsala Province 4 April 1697, RA, Landshövdingens i Uppsala län skrivelser till K. M.:t	damages on ferry and mill
1697	spring	Rytterne	Åbäcken	Norrström	1	snowmelt	Hülphers (1793) p. 319	great spring flood
1703	6–7 July	Ydre	–	Motala ström	2	rainfall	Rääf (1875) p. 350	"great rainfall … hardly any spring flood could be greater than the flood that followed"
1705	27 May	Gotland	–	–	2	rainfall	Kellgren (1931) p. 18 f	"snowing all day followed by much rain and great waterflood", not so much damage on crops as on hay
1707	bf 2 January	Ljustorp, Medelpad	Ljustorpsån	Indalsälven	3	rainfall, snowmelt	Hülphers (1771) p. 112	enduring rain and great waterflood destroyed bridges and water dams
1707	summer	Rytterne	Åbäcken	Norrström	2	rainfall	Hülphers (1793) p. 321	"wet summer", hay and rye crops damaged
1707	summer	–	Lake Vänern	Göta älv	1	rainfall	Wallén (1910) p. 13	much raining
1707	summer, autumn	Gotland	–	–	2	rainfall	Kellgren (1931) p. 20	violent and enduring rain, wetness continued until New Year
1709	13 March	Ekby	Tidan	Göta älv	3	snowmelt	Bergstrand (1934) p. 188	severe winter followed by spring flood which almost reached the parish church (2 km from the river)

Table A1. Continued.

Year	Date	Location	River	Catchment	Index	Type	Source	Comment
1709	spring	Norrköping	Norrköpings ström, Lake Roxen	Motala ström	3	snowmelt	Ringborg (1920) p. 92, Stille (1903) p. 146 f	great spring flood causing poverty among peasants
1709	spring	Uppsala	Fyrisån	Norrström	3	snowmelt	Annerstedt (1912) p. 128	water dams completely ruined by great spring flood
1709	spring	Gotland	–	–	3	snowmelt	Kellgren (1931) p. 25	great spring flood causing much damage on sawmills and other mills
1710	May	Hälsingland Province	–	–	1	snowmelt	Hægermarck and Grape (1911–1949) p. 340	quite great but not enduring spring flood
1711	12, 13, 16 July	Hälsingland Province	–	–	1	rainfall	Hægermarck and Grape (1911–1949) p. 348	great flood caused by much rain; hay ruined, mill channels full, as in spring
1712	21 October–11 November	Hälsingland Province	–	–	2	rainfall	Hægermarck and Grape (1911–1949) p. 353	"the month of October all wet . . . continuous raining, wind and fog so that, contrary to the usual, creeks and rivers swelled even more than in the spring . . . caused much damage"
1714	15–16 September	Hälsingland Province	–	–	3	rainfall	Hægermarck and Grape (1911–1949) p. 360	in two days "fell so terribly much rain that all creeks, lakes, meadows were covered. No spring flood could be greater", great damages; bridges, millhouses, barns, boats destroyed and great slides of chunks of earth
1717	early May	Hälsingland Province	–	–	1	snowmelt	Hægermarck and Grape (1911–1949) p. 366	unusually great spring flood
1720	24–30 October	Hälsingland Province	–	–	1	rainfall	Hægermarck and Grape (1911–1949) p. 380	much rain on 24 and even more on 27, and again on 28–30 October; rising sea level
1721	spring	Västerbotten Province	–	–	2	snowmelt	Lundmark (1990) p. 155	great spring flood ruined fishing of the season
1724	20 April	Örebro	Svartån	Norrström	2	snowmelt	Linder (1916) p. 25	the excessive water submerged poles in the harbour
1724	spring	Långared	Säveån	Göta älv	2	snowmelt	Bergstrand (1954) p. 24	great spring flood causing inundations
1725	summer	Västergötland Province	–	Göta älv	2	rainfall	Bergstrand (1934) p. 154	extremely rainy summer
1728	spring	Mora southwards	Dalälven	Dalälven	3	snowmelt	Norberg (1956) p. 325	great spring flood damaged all bridges between Mora and the provincial border
1728	spring	Järbo	Jädraån	Dalälven	2	snowmelt	Norberg (1958–1959) p. 243	iron furnace destroyed by spring flood
1728	spring	Jämtland Province	–	Indalsälven	1	snowmelt	Hasselberg (1930)	high waters due to spring flood
1728	spring	Njurunda	Ljungan	Ljungan	1	snowmelt	Hülphers (1780) p. 30	great spring flood
1729	spring	Jämtland Province	–	Indalsälven	1	snowmelt	Hasselberg (1930)	high waters due to spring flood
1730	spring	Säter	Dalälven	Dalälven	2	snowmelt	Ericsson (1970) p. 73	the mill severely damaged by spring flood
1730	spring	Holmen	Hällestadsån	Motala ström	2	snowmelt	Helmfrid (1954) p. 109, Ericsson (1970) p. 73	water dam at Säter damaged by spring flood
1733	August	Hälsingland Province	–	–	3	rainfall	Hægermarck and Grape (1911–1949) p. 380	continuous rain day and night throughout the month of August; swamps and meadows filled with water and streams and creeks greater than in spring floods so that one could travel over them in boats; hay and corn destroyed. High sea level
1740	summer	–	Lake Vänern	Göta älv	1	rainfall	Wallén (1910) p. 13	"wet year"
1740	summer	southern and southeastern Sweden	–	–	1	rainfall	Utterström (1957), Vol. 2 p. 429	"much wetness"
1743	spring	Jämtland Province	–	Indalsälven	1	snowmelt	Hasselberg (1930)	high waters due to spring flood
1743	28 May	Avesta	Dalälven	Dalälven	2	snowmelt	Norberg (1956) p. 683	river bridge broken down by great spring flood and storm
1743	May	Avesta	Dalälven	Norrström	2	snowmelt	Norberg (1956) Vol. 2 p. 683	river bridge destroyed by spring flood
1745	spring	Uppland	–	Norrström	1	snowmelt	Utterström (1957) p. 430	great spring flood
1745	spring	(Västergötland Province)	–	Göta älv	1	snowmelt	Utterström (1957) Vol. 2 p. 430, Ny journal (1776–1813) p. 33	great spring flood
1745	15 July	Stöde	Indalsälven	Indalsälven	1	torrential rain	Nordenström (1894) p. 43	"great rain on the 14th, as if the sky had opened with a great rainflood"
1753	13 August	Stöde	Indalsälven	Indalsälven	1	rainfall	Nordenström (1894) p. 44	great flood caused by rain
1754	August	Uppsala	Fyrisån	Norrström	2	rainfall	Ferner (1756) 287 pp.	wet; much hay and corn destroyed by wetness
1755	spring	Stöde	Indalsälven	Indalsälven	1	snowmelt	Nordenström (1894) p. 44	great spring flood

Table A1. Continued.

Year	Date	Location	River	Catchment	Index	Type	Source	Comment
1756	11 June	Stöde	Indalsälven	Indalsälven	2	snowmelt	Nordenström (1894) p. 44	great spring flood, water rising above the fields
1759	ca. 15 June	Stöde	Indalsälven	Indalsälven	2	rainfall	Nordenström (1894) p. 45	rain flood greater than this year's spring flood
1763	20 July	Stöde	Indalsälven	Indalsälven	2	rainfall	Nordenström (1894) p. 45	rain flood destroying hay harvest
1777	summer	Västergötland Province	–	Göta älv	2	rainfall	Bergstrand (1934) p. 154	continuous rains, few persons could remember anything similar
1778	31 March	Söderköping	Storån	Storån	3	rainfall	Ny journal (1776–1813) p. 115	great rainfall, flooding the river which covered seven bridges, waters entered church and streets
1780	March	Västmanland Province	Lake Mälaren	Norrström	2	snowmelt	Utterström (1957) p. 435	unprecedented great spring flood following a severe, snow-rich and long winter
1780	March	Stockholm	(Norrström)	Norrström	3	snowmelt	Ny journal (1776–1813)l p. 231	great spring flood in creeks and streams, unprecedented water levels of the Lake Mälaren, rising up to 4 ft. higher than usual
1780	May	Uppsala	Fyrisån	Norrström	3	snowmelt	Ny journal (1776–1813) p. 163	great spring flood following an "unnaturally" snow-rich winter; the waters rose to the windows of the houses and into the gardens which were destroyed
1780	early May	Nordmarks hytta	Nordmarks-älven	Göta älv	3	snowmelt	Danielson (1974) p. 38f	the iron furnace at Nordmark destroyed by sudden and great spring flood
1780	spring	Jämtland Province	–	Indalsälven	1	snowmelt	Hasselberg (1930)	high waters due to spring flood
1782	autumn	Närke Province	–	Norrström	2	rainfall	Ny journal (1776–1813) p. 224	1 entire month of continuous raining
1785	autumn	Uddevalla	Bäveån	Strömsån	3	rainfall	Ny journal (1776–1813) p. 33	extreme autumn rains rose the waters of the river to the highest in 40 years; four bridges, six grainmills and other facilities destroyed
1788	March	Norrköping	Norrköpings ström	Motala ström	1	snowmelt	Ny journal (1776–1813) p. 88	great spring flood with some damage

Appendix B

Table B1. Documentary data on harvest failures related to Sweden, 1200–1600, without specified cause.

Year	Location	Source	Comment
1283	Denmark	Rørdam (1873) p. 587	"a severe dear time"
1291	Sweden	Sylvius (1678) p. 211	"dear times"
1310	Denmark	Strelow (1633) p. 154	"such a dear time that has not hitherto been known"
1314	Sweden	Sylvius (1678) p. 279	"great famine in Sweden"
1319	Denmark	Rørdam (1873) p. 589	"a severe dear time"
1360	Denmark	Langebek (1772) p. 220	great food shortage
1375	Gotland	Strelow (1633) p. 180	"dear times on corn and fish"
1442	Finland	Hausen (1921) no. 2512, 2517, 2521, 2528, 2529, 2535	harvest failure on hops and rye
1445	Vadstena	Riksarkivet A21 fol. 89r.-v.	a letter from May 1447 speaks of food shortage and two consecutive years of harvest failures
1446	Vadstena	Riksarkivet A21 fol. 89r.-v.	a letter from May 1447 speaks of food shortage and two consecutive years of harvest failures
1455	Sweden, Östergötland	Gejrot (1996) 286, 292 pp., Styffe (1870) no. 44, Fant (1818) 173, 175 pp., Cod. dipl. lub. (1893), 9 no. 328, Ropp (1883) 378, 383 pp.	"famine ravaged in all of Sweden so violently that many died of starvation, and many of the plague", "so great was the famine this year [1457] and in the past two years in Sweden and Östergötland that nobody among the living could remember such starvation"
1456	Sweden, Östergötland	Gejrot (1996) p. 292 f	"so great was the famine this year [1457] and in the past two years in Sweden and Östergötland that nobody among the living could remember such starvation"
1457	Sweden, Östergötland	Gejrot (1996) p. 292 f	"so great was the famine this year [1457] and in the past two years in Sweden and Östergötland that nobody among the living could remember such starvation"
1470	Finland	Hausen (1890) no. 625	"a greatly difficult year" referring to 1470
1542	Finland	Almquist (1893) p. 292 f	"quite small harvest"
1568	Västergötland	Riksarkivet Riksregistraturet (1569) 5/4 1569	"small harvest in Västergötland, the subjects are destitute and impoverished"
1571	Östergötland	Riksarkivet Riksregistraturet (1572) 11/5 1572	"people in Östergötland are in misery and in need of seed and assistance"
1586	Uppland, Västmanland and other provinces	Riksarkivet Riksregistraturet (1587) 5/4 1587	"bad harvest last year"
1587	Uppland, Kalmar, Småland, Finland, northern Sweden	Riksarkivet Riksregistraturet (1588) 15/2 1588, 2/4 1588	"hard and dear times", "bad harvest last year [1587]"
1588	northern Sweden and Finland	Hildebrand (1899) p. 811	"small harvest, particularly in northern Sweden and Finland

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