Journal of Env. Geogr. Vol. II. No. 3-4. (2009) pp. 37-47

FLOODS AND WEATHER IN 1342 AND 1343 IN THE CARPATHIAN BASIN

Kiss, Andrea[1]

[1]University of Szeged, Department of Physical Geography and Geoinformatics. 6722 Egyetem u. 2, Szeged, Hungary

Abstract

Concerning weather, weather-related extremes and catastrophic consequences, 1342 was an extraordinary year in most parts of Central Europe, even in such an extraordinary decade as the 1340s. Accounting with the seven flood events (including one Danube flood) mainly of great magnitude, at present 1342 is the most important known flood year of medieval Hungary. Moreover, in this year extraordinary weather conditions, such as a mid-autumn snowcover were also reported. However, in the eastern parts of the Carpathian basin not only 1342 but also 1343 was a significant flood year with six reports on flood events occurred in the upper and upper middle sections of the Tisza catchment.

In the present study, an overview of these events is provided, based on the information preserved in the most typical contemporary, well-dated source type of medieval Hungary, namely charters. The aim of the study is, on the one hand, to draw attention to the flood and weather-related evidence found in charters, and to provide a methodological background for further evaluation and utilisation of this source type in historical weather and flood research, through the very typical example of the years of 1342 and 1343. On the other hand, another aim is to discuss and analyse the unique nature of these two years in medieval Hungary, and (beyond the well-known year of 1342) to draw attention to the, up to now somewhat neglected, year of 1343.

DEEP SNOW, ICE FLOOD, EXTREME RAINFALL AND A DEVASTATING MILLENNIAL SUMMER FLOOD EVENT: 1342 (AND 1343) IN (WEST) CENTRAL EUROPE

1342 became famous for its hard winter with abundant snow and very rainy summer as well as autumn in Central Europe and beyond. These weather conditions caused in large parts of (Central) Europe three main flood waves: one in February, a second one in April and a third one in July. Out of these three flood waves the summer flood happenned to be an extreme, millennial flood event with disasterous consequences which, together with the next year's unfavourable wet weather conditions (mild winter, cool and wet spring, wet summer), caused great hunger and famine in most of the German areas by 1343 and 1344 (Glaser R. 2008). Although two of the flood waves, namely the February and April floods caused great damages in the Czech areas, there is no report available about any damages concerning the summer of 1342 (Brázdil R. – Kotyza O. 1995). Moreover, in the area of the eastern Alps none of the three floods had so disasterous effects as in other parts of West Central Europe (Rohr Ch. 2007).

About the 1342 weather and floods a concise overview of the international literature was presented by Brázdil and Kotyza (1995). Another, detailed overview of the 1342 events, from various viewpoints including causes, damages and other consequences, was provided by Rohr (2007), as well as by Glaser (2008). Large-scale geomorphological and landscape-change consequences of the disasterous summer flood event were studied by Bork and his colleagues (e.g. 1998). In contrast with the great attention turning towards the events of the year 1342, there is not much available about 1343 in the scientific literature. Almost all information about the somewhat special, unusually wet character of this year and its possibly also hard consequences were only detected in Germany. In this case, together with the catastrophic events of the previous year, the unfavourable weather conditions were also blamed for the famine concerning the southern German areas (Glaser R. 2008). Some other evidence, however, might suggest that the Danube in Bavaria caused problems also in other times during these two years, since flood damages were reported at the monastery of Oberaltaich concerning autumn 1342 and spring 1343 (Rohr Ch. 2007).

What happenned in the Carpathian basin in the same time? The special character of the 1340s and 1342 in the Carpathian basin was partly emphasised by Kiss (1996, 1999). Nevertheless, on the basis of an enlarged database of legal documentary evidence (charters), a new, more complete overview and analysis can be presented.

CHARTERS: AN UNIQUE WELL-DATED MEDIEVAL LEGAL EVIDENCE

Concerning these two extraordinary years, information about the events occurring in the Hungarian kingdom, which covered almost the entire Carpathian basin – including the present-day areas of Hungary, Slovakia, and parts of Ukraine, Romania, Serbia, Croatia, Slovenia and Austria – is mainly available in legal documentation, namely charters (see Kiss A. 1996, 1999). Characteristic advantages and disadvantages of this type of weather and flood documentation lie in their legal character: the main aim of preparing these documents was to document and preserve the most important points, objectives of the legal process as a proof of ownership patterns for the future (often for centuries). Consequently, flood or weather circumstances are mentioned only if they

obstructed the completion of the legal procedure during field survey. In other (less frequent) cases, flood/weather circumstances obstructed travel and thus legal procedure/trial had to be postponed and this fact (together with circumstances) had to be reported to the higher authorities or permission to be asked for postponing/prolongation of procedure. Occasionally, weather-related information (e.g. proof of a late harvest) can be detected in other cases, such as witnessed illegal harvesting or using force during (well-dated) harvesting time etc.

Clear advantages of charter evidence are, compared to most types of medieval documentary evidence, their exact and highly reliable dating (legal-administrative documentation), the punctuality of location and the several elements, main environmental conditions of the area, often described in the main text body. Disadvantages are that the date(s) of observation is not necessarily the date of the beginning and the end date of the flood event, but only a day or days of the ongoing flood and weather events. Moreover, the beginning and end dates of flood events/weather phenomena and their main (e.g. material, human) consequences are mainly unknown. In this sense, a major difference from (western or other) narrative evidence is that in charters mainly flood appears as a natural hazard while in narratives flood is mainly reported because of its catastrophic consequences. Similarly, the area a charter usually refers to is often restricted to a small location and thus, in the majority of cases little is known about medium- or large-scale patterns.

Except for one case (town burning down in 1342), all weather- and flood-related information concerning the years of 1342 and 1343 has survived in charters. The spatial distribution of reported weather and flood events of 1342 and 1343 is presented in *Fig. 1*. The present analysis provides us with fragmentary picture on what happenned in 1342-1343 in the Carpathian basin, not only related to weather, but also flood events: data available only for those dates and in those cases, areas when and where legal procedure took place and later weather- and/or flood-related information was included in the charter. Thus, we can presume that large-scale patterns would have shown a certainly more complex, and possibly even more 'serious' picture, especially concerning flood events.

A FRAGMENTARY PICTURE? WEATHER REPORTS FROM 1342 AND 1343

Only sporadic information is directly available concerning the weather of 1342: these data preserved in charter evidence. Amongst this evidence, a reference can

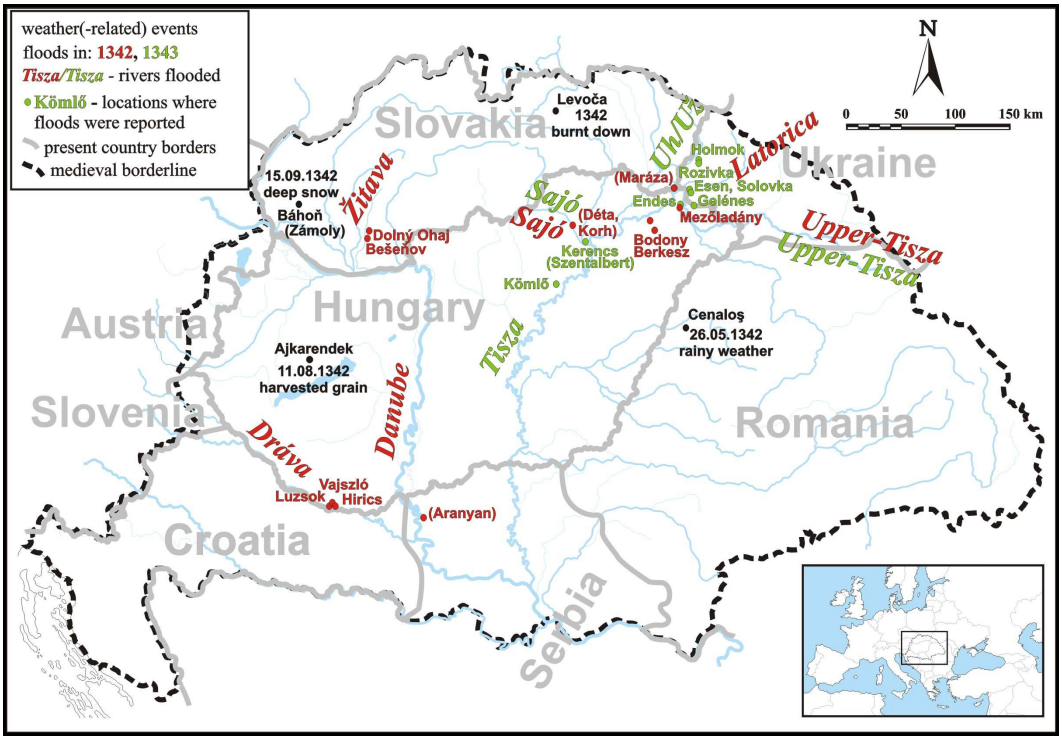

Fig. 1 Floods and weather events (or related information) documented in 1342-1343 in the Hungarian kingdom (described here together with the Croatian kingdoms). Deserted settlements are determined with brackets

be found in a charter concerning rainy weather (’*et quia eadem die pluuiosum tempus asseruisset*’), reported on 26 May in 1342 (Nagy I. 1884), due to which reason the field survey of *Chalanus*, located in historical Bihar county (today Cenaloş in Romania), could not be carried out on that day (see *Fig. 1*).

On 11 August in 1342 during the perambulation of *Rendec* (today Ajkarendek) landed posession at the boundries of *Ayca* (Ajka) and *Louuld* (today Kislőd/Városlőd), located in the central Transdanubia along the Torna river (DL 66126; Piti F. 2007a; see *Fig. 1*), the owners of some arable lands prohibited others to take the harvests from their arable lands and also to take the already harvested shooks of grain (’*de quindecim iugeriis fruguum quindecim capecias similiter prohibuissent quas in eadem terra seminatas inuenissent*’). Although no medieval harvest date series are yet available for this region or for Hungary, a significant amount of data can be found for the early modern period in the somewhat cooler and wetter Szombathely (ca. 205 m a.s.l.), located approximately 80 km west to Rendek (ca. 250-280 m a.s.l.). In the 17th and 18th centuries, the share of harvesters, fixed towards the end of the harvest (of mainly wheat and rye), usually occurred around mid- and late July, sometimes earlier (Szombathely town council protocols, Vas county archives V/102a). Late harvest(-ending)s could occur in early August (e.g. 5 August in 1675 and 1696, 6 August in 1700, 7 August in 1697, 9 August in 1705), too. In our present mid-14th century case, by 11 August one part of the crops have been already harvested, but still kept on the field, while another part was still waiting for harvesting. Even if harvesting lasted probably longer in the 14th century than in the 17th century (see Belényesy M. 1956), this means a rather late harvest time (especially if taking the 10-day difference between Julian and Gregorian calendars also into account), which presumably refers to cool late spring, early and mid-summer conditions.

On 15 September in 1342 (Nagy I. 1884, Piti F. 2007a) a perambulation of the doubted boundary-line between *possessio Bahun* (today Báhoň in Slovakia) and *possessio Zamul* (later deserted land) took place (medieval Pozsony county; see Házi J. 2000). Nevertheless, because of the hard times (or the difficult weather conditions) and the magnitude of snow (!), it was not possible to perambulate the boundaries, and measure the area of lands (’*propter temporis gravitudinem et nivei magnitudinem reambulantes determinative mensurare non potuissent*’). Original dating of the perambulation is clearly defined ('*in predictis octavis festi Nativitatis beate virginis*'), and based on the earlier course of the legal debate (previous meeting: 1 August; later meeting: 8 November) no very different (much earlier or later) dating is possible. As such, we can presume that in the areas of present western Slovakia the perambulators witnessed in a lowland area (ca. 150-180 m a.s.l.) extraordinary weather conditions with a significant amount of snow at a very early date, namely in mid-September.

According to the (contemporary) *Georgenberger Chronik*, referring to the town of *Lewtscha* (today Levoča in Northeast-Slovakia) one of greatest reported (medieval) fires occurred in 1342 (Szentpétery I. 1938: ’*Anno dni MCCCXLII …. Czu der selbin czeit ist dy stat Lewtscha verprant, vnd also sein auch dy altin prife des lanids des meiste teil verprant.*’). Although applying different words, the same information was included in Caspar Hain’s 17th-century regional chronicle (Bal J. et al. 1910-1913), based on (local) archival evidence. Since no more data is available (e.g. in which part of the year the fire occurred), even if it is clear that weather conditions had to be at least partly responsible for this disasterous event (e.g. strong wind, drought and/or hot/very frosty, cold weather), no firm conclusions can be drawn on prevailing weather conditions.

The scarcity of known weather events, remained to us reported in the Carpathian basin, does not allow us to draw further conclusions. Nevertheless, the report on a potentially quite late harvest in the Mid-Transdanubia, and the extraordinary mid-September deep snow in the lowland areas of present western Slovakia suggest generally preavailing cool conditions for late spring-summer and around early-mid autumn in 1342. No weather-related reports are yet known concerning 1343. What makes these two years really special is the unusually great amount of flood reports, reflecting on the possibly extraordinary (wet) weather conditions and especially intensive large-scale cyclonic activity.

1342: THE MOST IMPORTANT FLOOD YEAR IN MEDIEVAL HUNGARY?

Due to its flood events of great magnitude (e.g. summer), the year of 1342 is accounted for in most of the contemporary European narratives. Up to date, no European narrative is known to mention that these or any other flood events in 1342 would have as well appeared in Hungary. The seven reported flood events of this year, presented here concerning Hungary, can be detected merely in domestic legal documentation: only charters preserved their memory (for locations, see *Fig. 2*).

The great winter flood in a broader context

The first known flood event of 1342 occurred in early February. At the (former) lower course of the Hejő

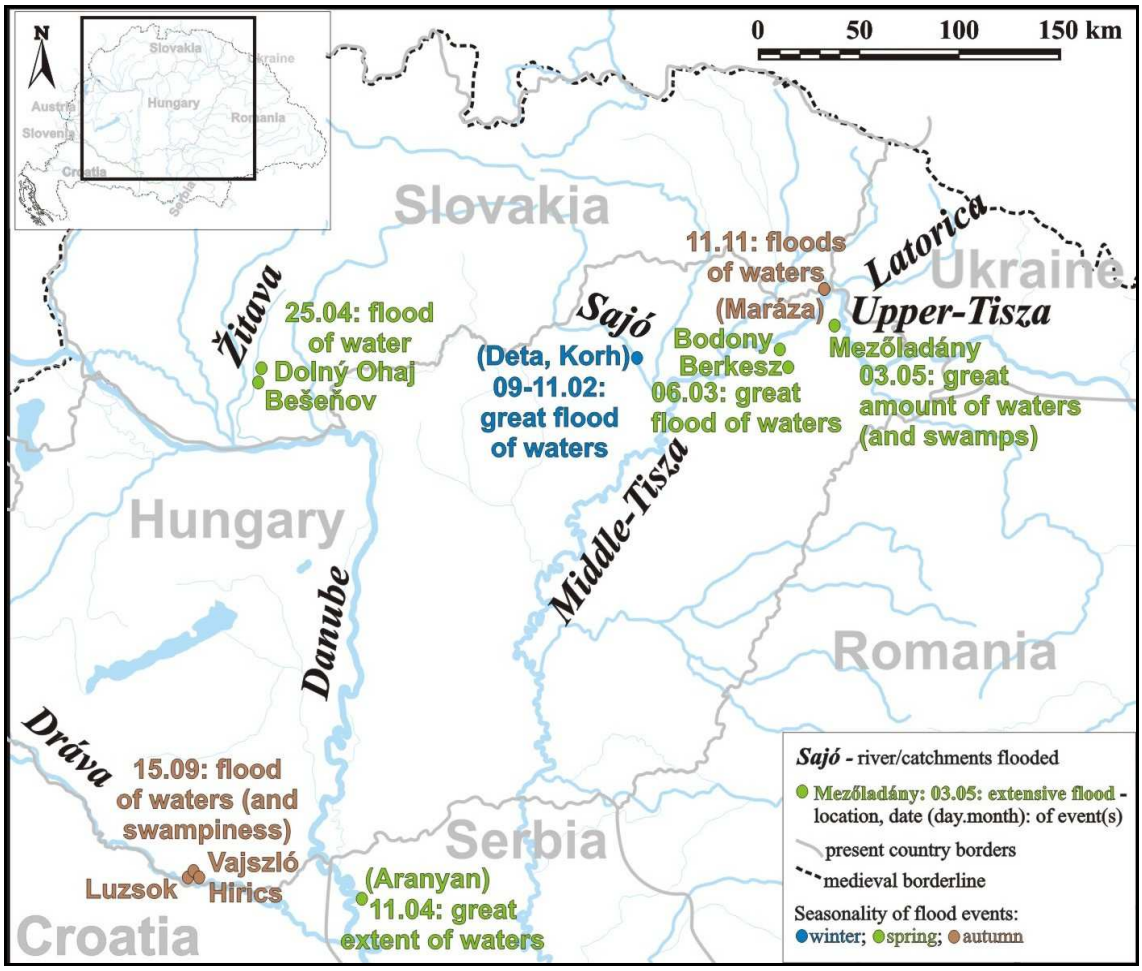

Fig. 2 Flood reports in the year of 1342 in the Hungarian kingdom. Note that the medieval borderline, running along the ridge of the Carpathians, also defines a geographical and hydrological boundary line (of major catchment areas – e.g. Tisza). Deserted settlements are signed with brackets

and Szinva waterflows, close to the Sajó river, the perambulation of the former *Deta* and *Korh* landed possessions (both were deserted later: Györffy Gy. 1987) in Borsod county was obstructed by a great flood event (’*nimia aquarum inundacio*’). A speciality of the description is that on 9 and 10 February perambulators could not even approach the areas, although they did make attempts. On the next day, on 11 February there was already no problem with reaching and surveying the area, but still they could not measure the debated landed portion, they could only estimate the size of the land (DL 75835, 3448, 40902; see also Piti F. 2007a).

For the February events good parallel can be the description of *Franciscus Pragensis*, who dedicated a long description for the great flood event: from his notes we can learn that on 1 February warm air masses arrived which were followed by rains. This mild weather, after the preceding hard winter conditions, melted the snow, broke up the ice, and caused great ice flood (Loserth J. 1875; for the analysis of Vltava, Elbe and Upper-Morava flood events, see Brázdil R. – Kotyza O. 1995). According to the Swiss Johann von Winterthur, flood flashed through the upper, alpine sections of the Danube on 2 February, and in the same time sea surge caused damages in Venice (Baethgen F. 1924).

Spring floods

On 6 March, the division of the landed possessions of Berkesz, Bodony and Harabur, located in historical Szabolcs county along the Tisza river (Csánki D. 1890; Németh P. 1997), was obstructed by the great flood of waters, which occurred in those areas (’*nimia aquarum inundacio*’) (DL 31242; see also Piti F. 2007a). Since Bodony was located at the Upper-Tisza, the great flood of waters could most probably refer to the Tisza and partly to its upper tributaries.

On 11 April great extent of waters was observed, at this time during the perambulation of Aranyan landed possession (today deserted land in Serbia close to Apatin; see Györffy Gy. 1987), in historical Bodrog county (Nagy I. 1884). In the text not the usual '*inundacio*(*nes*) *aquarum*/*aque*' appeared, but a broader information, namely the great amount and magnitude of waters, in the extensive floodplain of the Danube ('*abundancia et multitudo aquarum*') where the lands of Aranyan were located. The mentioned great waters make it probable that it was not the mere result of one flood (mainly of the Danube), but we might have to count with more than one flood waves, culminating in this low-lying, extensive floodplain, and probably also with the influence of the Drava river whose inflow is located south to the study area. Additionally, the appearance of inland excess waters, which in wet years often occur parallel or after flood events, is also quite probable. Moreover, as a factor obstructing the legal process, this great extent of waters probably also means a longer-term inundation in the area. The charter itself is important since the hydrological conditions of the area cannot be separated from that of the Danube (and also partly the Drava) and thus, the high water level, or flood level of the Danube.

Dated to the beginning of April flood, caused by the melting of great amount of snow, is mentioned by the Cistercian monk, Johann von Viktring, which affected the waterflows of Europe, and according to the description, the result was catastrophic (Schneider F. 1910; for more analysis, see: Rohr Ch. 2007). However, due to the little difference in time, the Danube flood in South-Hungary cannot be the continuation of the West-Central European flood event. As there is no significant waterflow coming to the Danube between its upper and lower Carpathian-basin sections, there should have been at least one flood event of the Danube in March at the upper sections of the Carpathian basin. There is a good possiblity that a flood wave at that time was already coming from the west; this case shows parallels to another (waves of) flood event, occurred in June of 1402 (see 27 June in Hungary: DL 78505; 29 June in Austria: Pertz G. H. 1851).

Still in the same month, at the end of April in 1342, another flood event ('*inundacio aque*') obstructed perambulation and land measurements along the Zsitva river (Žitava in Slovakia). On 25 April the perambulation of a land portion between the landed possessions of Ohaj and Besenyő (today Bešeňov and Dolný Ohaj in Slovakia) had to be stopped close to the river due to the flood (Nagy I. 1884).

During a perambulation, taking place on 3 May at the northeastern sections of the Middle-Tisza, the swamps and the uninhabited lands caused by the great amount of waters ('*propter paludes et terras inhabitabiles propter multitudinem aquarum*') is mentioned as an obstructing environmental circumstance which did not allow perambulators to proceed with the survey (DL 105741; see also Piti F. 2007a). The landed possession of *Ladan*, mentioned in the charter, is the present-day Mezőladány (Németh P. 1997), located at the main course of the Tisza river in historical Szabolcs county. Since Mezőladány is located in the immediate neighbourhood of the river, partly surrounded by wetlands (oxbows: former Tisza-beds), the documentation of such wetlands in itself does not necessarily mean current hydrological problems, i.e. unusually much water in the area. The fact that some of the lands, exactly because of the great extent of waters, could not be reached (or even occupied by water) and some of the lands could not be measured suggests actual problems. Namely that the extent of waters was presumably (much) larger than usual in the area. What is more, lands were mentioned to be uninhabited because of the great extent of waters, which – similar to the Danube case in April – might easily also mean the (long-lasting) presence of inland excess waters in the area.

Summer signal: missing or not?

As we could see already at the beginning of the paper, perhaps the greatest flood event of the Middle Ages, with immense magnitude and damages, occurred in some parts of Europe. This, however, does not seem to appear in medieval Hungarian documentary evidence. One likely reason, as always, can be that it was simply not documented in the charter materials due to the fact that no legal procedure took place at that time in the problematic areas or documentation disappeared with time. Nevertheless, the lack of documentation can also mean that there was in fact no such significant summer flood event in the Carpathian basin at all. In West Central Europe one of the greatest known flood series occured around 21-24 July (Brázdil R. – Kotyza O. 1995; Rohr Ch. 2007; Glaser R. 2008). This, however, was less characteristic in the eastern alpine region or in the Czech lands (Brázdil R. – Kotyza O. 1995; Rohr Ch. 2007).

As appears in the next case, even if the mid-summer signal is missing, a wet late summer-early autumn period may be responsible for a flood event reported in the southwestern part of the Carpathian basin.

Autumn flood(s)?

The early autumn (15 September) flood observation, close to the Drava river at the landed possessions of Vajszló, Hirics and Luzsok, can be taken as an indicator

of a late summer or early autumn flood. The debated landed portion among the above-mentioned villages was inundated, and due to the swampiness and flood of waters (’*propter paludinositatem et inundacionem aquarum*’) – although the perambulation could be carried out –, exact land measurements had to be replaced by simple estimation (Nagy I. 1887). The summer origin of this flood event is even more probable, counting with Central and Western European parallels, especially if we presume that this inundation of waters was in direct connection with the Drave river and thus its alpine catchment. However, the flood also could be (at least partly or entirely) the result of inland excess waters.

The rest of the autumn did not pass away without a flood event either. On 11 November along the Tisza river (again at the northeastern part of the middle section), in medieval Zemplén county, a land measurement could not take place because of the ongoing floods (’*propter aquarum inundaciones mensurare nequivissent*’) or an inundation as a result of series of flood events (Nagy I. 1887). Areas of the medieval *Maraza* landed possession (Maráza: later deserted, see Csánki D. 1890) are today located in the neighbourhood of Vel'ké Trakany and Čierna (in Slovakia) along the Tisza but also close to the Latorica river. Since in the catchment area of the Latorica river secondary (autumn) precipitation and flood maximum is especially important (Hajósy F. 1954), there is quite a good chance that the waters in flood were both the Tisza and the Latorica, and maybe also other waterflows in the area.

Mid- or late-autumn flood events are usually connected to the arrival of warm air masses rich in precipitation, driven by southern, southwestern winds from the Mediterrannean. It is interesting to mention that great flood damages in Padova and other parts of Lombardia were documented by the contemporary chronicler Johann von Winterthur, which floods were caused by great November rains, accompanied by lightenings and thunders (Baethgen F. 1924).

ANOTHER IMPORTANT FLOOD YEAR: 1343

While in most of the western literature 1342 is emphasised as a major year of floods, 1343 gained up to now very little attention, even if contemporary authors of western narratives, for example Johann von Winterthur, did spend quite much space to describe floods of this year. The year of 1343, apart from its special geographical extension (described below), shows rather interesting characteristics in the Carpathian basin.

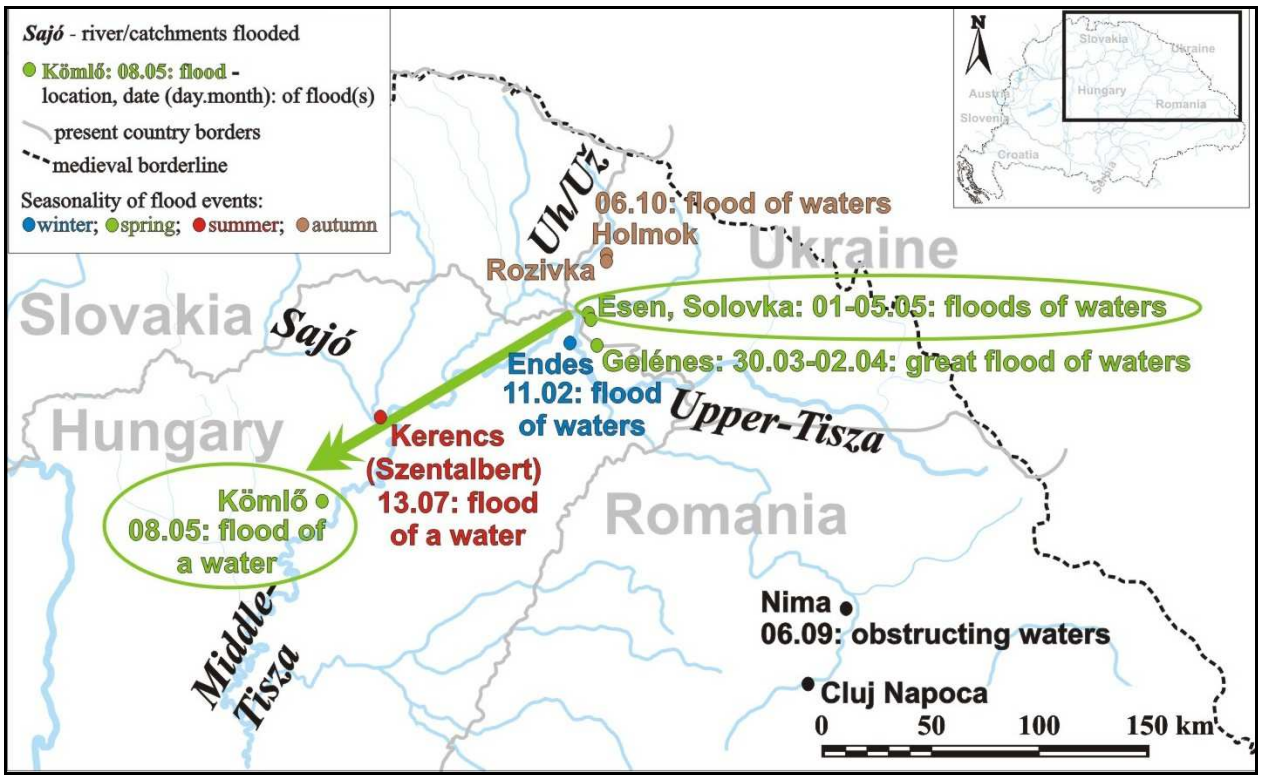

Fig. 3 Floods in the year of 1343. Green arrow shows the presumable connection between the two, early May cases: the Upper-Tisza flood waves reported on the Middle-Tisza (as one flood) with ca. one week delay

In medieval Hungary, the testimony of as many as six flood reports remained to us: all occurred in the northeastern parts of the Carpathian basin, in the upper and upper-middle parts of the Tisza catchment (for locations, see *Fig. 3*). As we will see, in the flood history of the Tisza catchment, the year of 1343 has rather great importance.

Winter flood of the Tisza river

The first winter case was observed on 11 February (and the days after) at the Tisza river. The perambulation, taking place around the medieval landed possession of *Endes* (as the northern neighbour of the above-mentioned Mezőladány) located in historical Szabolcs county along the Tisza river (Csánki D. 1890; today part of Mezőladány: Németh P. 1997), had to be stopped at a fishing place caused by the fact that perambulators could not cross due to a flood of waters (’*aquarum inundacio*’). Therefore, areas of the last sections of the planned perambulation were only estimated by ’eye-observation’ (DF 209593; see also Piti F. 2007b).

Spring floods

The next spring flood case was observed at the end of March and beginning of April, when, in order to introduce into the possession of a land in the former *Gelenes* (Gelénes; for location: Csánki D. 1890) in historical Szatmár county, not all the interested parties could reach the area because of an ongoing great flood event (’*nimia aquarum inundacio*’). Those, who were able to attend the legal process were waiting for the others between 30 March and 2 April, yet without any success (DL 85252; Piti F. 2007b).

Another spring flood was observed on 1 May and the following four days, during the perambulation process of *Zalouka* and *Esen* (Csánki D. 1890, Németh P. 1997; today Solovka and Esen in Ukraine) located in historical Szabolcs county close to the Tisza river. The debated land portion at the *Zomua*/*Zomaua* waterflow could not be surveyed due to floods of waters (’*inundaciones aquarum*’), and thus, the size of the land was only estimated (DF 233635, 233634; see also Piti F. 2007b). The affected lands are located in the immediate vicinity of the Tisza, so the waterflows and the area were clearly under the direct influence of the river.

Perhaps the same flood event on the Tisza river reached the landed possession of *Kumleu* (Kömlő) in historical Hevesújvár county in some days time and thus, maybe the effects of the same flood or those of a previous flood wave was reported. On 8 May, caused by the flood of water and great difficulties (’*propter inundacionem aque et densitatem gravaminum reambulare nequivisset*’), it was not possible even to start the perambulation or settle any of the landmarks, and thus, measurements of debated lands could not take place either (Nagy I. 1884).

As a parallel it has to be mentioned that, for example, Johann von Winterthur did mention concerning 1343 that there were great rains around Easter time. These great rains caused flood, and problems did as well continue in summer when, for example, the Rhein also flooded. Moreover, series of flood events, caused by rainfall, continued in September. Much rain and bad harvests, accompanied by floods and other problems, caused several problems: especially in the German areas high prices and hunger developed (Baethgen F. 1924).

Summer and autumn floods

The only known, clearly summer flood event occurred at the Sajó river, only some kilometers from the place where the river enters the Tisza. The unsuccessful perambulation process of Szentalbert and Kerencs landed possessions in Borsod county was due to a flood event (’*inundacio aque*’), observed on 13 July (Dedek L. C. 1924). Since the area where the flood was reported is located at the Sajó river, but very close to the inflow of the Hernád river, and also close to the Tisza, there is a good possibility that the Hernád, but probably also the Tisza were in flood or had high water levels in those days.

Although it is not a direct flood evidence, it is still worth mentioning that, related to a land purchase, on 6 September a number of old charters were transcribed by the convent of Kolozsmonostor (Cluj-Mănăştur; today part of Cluj Napoca in Romania) caused by the fact that the owner (*Pethew* from *Neema*; today Nima in Romania) of the landed possession (*Beeke* or *Beche*) did not dare to carry the originals with him. Among the reasons the dangers of roads and obstructive waters (’*propter viarum discrimina, aquarum impedimenta et hospitiorum incendia*’) were mentioned (DL 27829; see also Piti 2007b). The above-mentioned settlements are all located in Central Transylvania, in the vicinity or along the Kis-Szamos river (today Someşul Mic in Romania).

On 6 October at the landed possessions of Homok and Ketergény (today Holmok and Rozivka in Ukraine) in historical Ung county a debated land portion could not be measured, only estimated, due to a flood event (DL 69670; see also Piti F. 2007b). The mentioned lands are located in the catchment area of the Ung (today Už) river, in which area October as a secondary flood maximum is rather pronounced in the 20th century, and clearly shows the arrival of Mediterranean humid air masses (see e.g. Hajósy F. 1954).

The spatial and seasonal distributions of the 1343 flood events suggest that we talk about an especially

important flood year when ongoing flood events were observed in each season, at the upper and upper-middle parts of the Tisza catchment. Whereas floods of 1342 affected both main catchment areas, namely those of the Danube and the Tisza rivers, all six reports referring to 1343 reflect on the flood events of the (upper and upper middle sections) of the Tisza catchment. Thus, concerning the eastern parts of the Carpathian basin 1343 has at least the same or even more importance than 1342.

HOW SPECIAL WERE THESE TWO YEARS AMIDST THE KNOWN FLOOD RECORDS OF MEDIEVAL HUNGARY?

In late medieval Hungary the decade of the 1340s was rather special: far the greatest amount of flood events is known from this decade. Out of the twenty one presently-known flood events, thirteen occurred in these two years of 1342 and 1343 (*Fig. 4*). In general, most of the flood events, for which we have reports, occurred in the Tisza catchment or on the Tisza river itself: out of the five Danube-catchment flood events of the 1340s, three were witnessed in 1342; out of the two Danube floods of the decade one with a great extent of waters took place in 1342, and another (great) one in 1344 (*Fig. 4a*). Typically, almost all great flood events occurred in the more continental eastern river catchment of the Tisza. Seasonality patterns are also interesting and typical: in this case the overwhelming importance of (great) spring flood events have to be emphasised. Winter floods were reported in every second, third year; every year between 1342-1344. Interesting is the fact that only one summer flood is known from the whole decade (*Fig. 4b*).

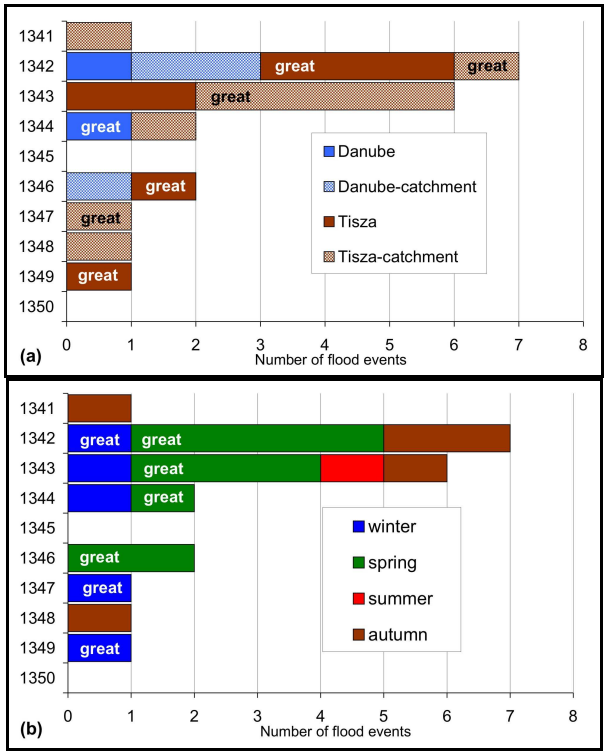

Fig. 4 Floods reported in the 1340s according to major catchment areas (*a*), and seasonality of flood events (*b*) (for detailed information, see Kiss 2010; submitted)

As we could see, accounting with numbers of the two years subject to discussion, floods were reported seven times in 1342, while six floods in different places were witnessed in 1343. As such, 1342 and 1343 are the most prominent flood years known in the later Middle Ages. Other 'famous' flood years, according to our present knowledge, were with four-four mentionings in 1399 and presumably in 1440, three-three in 1338 and probably also in 1346, 1454 and 1499, respectively (see *Fig. 5*).

In 1342, one winter flood (Tisza catchment), four individual spring floods (two-two in both catchments), and two autumn floods (one-one in both catchments) were reported, and there is a complete lack of summer floods documented (*Figs. 2* and *6*). Therefore, except for winter when flood event was reported only in the Tisza catchment and summer when flood signal is lacking as such, spring and autumn flood events affected both main catchment areas of the Carpathian basin. Both the winter and two spring floods were great in magnitude, while both the Danube in early April and the (Upper-)Tisza in early May were surrounded by a large extent of inundated areas, in which case not only flood but also the appearance and negative effects of inland excess waters were rendered.

Concerning numbers, 1343 is a flood year of upmost importance in the Tisza catchment and the eastern part of the Carpathian basin. Floods occurred in all seasons, but reported exclusively in the Tisza catchment: one-one in winter, summer and autumn; while three separate reports are available for spring Tisza floods. Out of the three spring floods two refer probably to the same flood wave(s) on different sections of the river, with approximately one week difference. In 1343 (only) one event was reported as a great (Tisza) flood (see *Figs. 3* and *6*). Similarly 1342 and also to the whole 1340s, Tisza floods in 1343 were exclusively reported on the lower parts of the Upper-Tisza and the uppermost sections of the Middle-Tisza, and thus, no evidence is available referring to most of the middle and lower sections of the river and its catchment area.

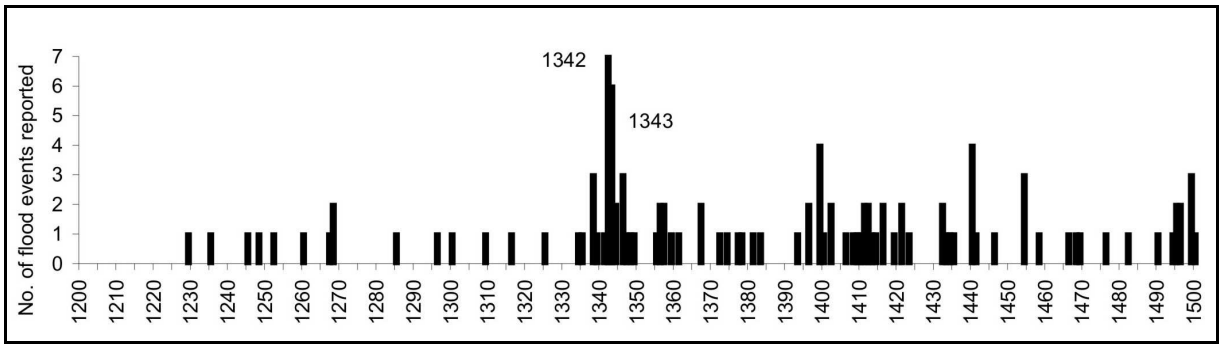

Fig. 5 Annual distribution of known flood reports in late medieval Hungary (a developing database – Kiss 2010 in prep.). Note the outstanding amount of flood events reported in 1342 (7) and 1343 (6)

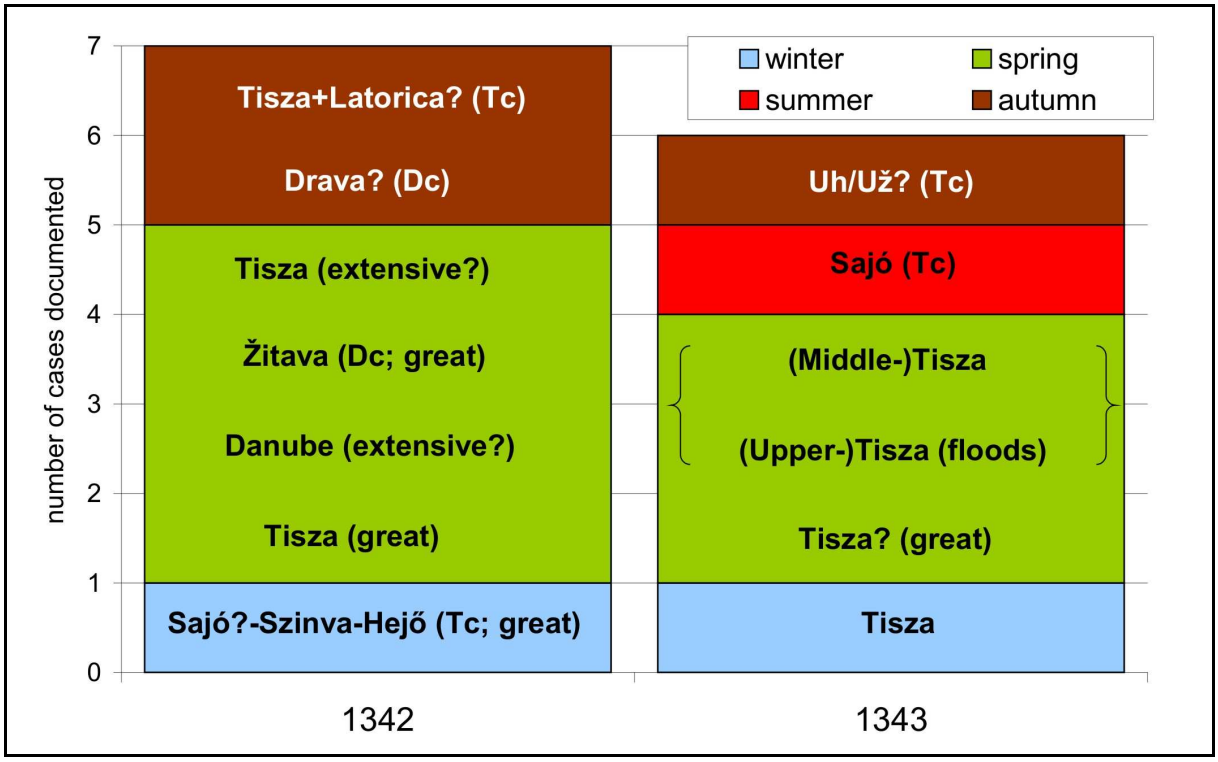

Fig. 6 Seasonal distribution of 1342-1343 flood events according to rivers and catchments (Dc=Danube catchment, Tc=Tisza catchment). For locations and areas affected, see *Figs. 1-3* above

Typical common characteristics of the two years are the unusually great number of flood events, both separated and spreaded in space and time, and also the great importance of spring floods, in both years rather evenly distributed in time. Another similarity is that the flood events in most cases occurred on or in the closest vicinity of the two (or three: also accounting with the Drava river) major rivers of the Carpathian basin, and only in two-two cases medium- or small-size rivers/river catchments were affected (*Fig. 6*).

Comparing the two greatest flood years, apart from the clear difference concerning the catchment areas affected (1342: Danube and Tisza; 1343: only Tisza), an important other difference is that most of the floods reported in 1342 were marked as great or extensive in magnitude: it is true for all winter and spring floods detected in this year, either occurred on the Tisza or the Danube catchments. Whereas in 1342, both in case of the Danube (early April) and in case of the (Upper-)Tisza in early May, the extent water surfaces might suggest the existence of inland excess waters, only the word '*inundatio*' was used in 1343 in the flood cases mentioned related to the Tisza catchment. Nevertheless, in the number of flood events reported, in the eastern parts of the Carpathian basin, namely in the catchment

area of the Tisza river, 1343 has at least the same or even more importance than the year of 1342.

CONCLUSIONS AND OUTLOOK

Prevailing wet character of weather can be detected in Central Europe in 1342, which on the one hand led to three devastating flood waves in 1342, and presumably also at least two in 1343. In the latter year not only in Central Europe, but reports are also available referring to northern Italy. Moreover, extraordinary cool and wet weather and floods resulted in need and hunger in the German territories and Austria in 1343 and 1344.

With reference to the Carpathian basin, no directly weather-related information is yet available concerning 1343. In 1342, most probably generally preavailing cool and maybe also wet late spring–summer conditions caused the presumably late grain harvest in West-Hungary. The mid-September snow report in present-day West-Slovakia provides us information for presumably extraordinary cold weather in early autumn of 1342, when in the same time flood was observed in the southwest, in the immediate vicinity of the Drava river. The great amount and magnitude of flood events might suggest a precipitation surplus in winter, spring and late-summer and autumn in 1342. Based on the large number of flood events, covering each season, wet character of 1343 can also be rendered.

1342 and 1343 are clearly the most important flood years reported in medieval Hungary. The seven flood events in 1342 are relatively evenly distributed between the two main catchment areas, all six flood reports refer only to the events occurred in northern, northeastern parts of the Tisza catchments. Most of the flood events in 1342 were either great in magnitude or could be connected to great extent of waters. Another speciality is that, similar to the Czech lands and Austria, the famous millennial 1342 summer flood event, causing great damages in West Central Europe, cannot be really detected in the Carpathian basin. In contrast, in 1343 floods were observed along the Tisza river and in the Tisza catchment in all four seasons. In 1342, both along the Danube and the Tisza rivers, at least concerning spring time, we presumably should count with great extension of inland excess waters, which waters perhaps still caused problems in 1343.

Among future tasks related to this subject, it could be important to find more parallels with the neighbouring areas and other parts of Europe. Concerning large-scale patterns, a complex analysis of these unique flood years on an European level (e.g. Mediterranean cyclonic activities included) might also be an interesting direction of research. Moreover, another relevant task could be to detect possible short- and medium-term economic and social effects of this anomaly in the Hungarian kingdom.

Acknowledgements

The author wishes to express her thanks to Ferenc Piti and György Szabados (Hungarian Academy of Sciences, Hungarian Medieval Studies Research Group, Szeged, Hungary), Kathleen Pribyl (School of Environment and Technology, University of Brighton, UK), and to Christian Rohr (Dept. of History, University of Salzburg, Austria) for their useful suggestions. The present research is supported by the EU project (FP-6) called 'Millennium'.

References

Belényesy M. 1956. A földművelés Magyarországon a XIV. században. *Századok* 90/4-6: 517-555

Bork H.-R. – Bork H. – Dalchow C. – Faust B. – Piorr H.-P. – Schatz T. 1998. Landschaftsentwicklung in Mitteleuropa: Wirkungen des Menschen auf Landschaften. Gotha: Klett-Perthes, 328 p

Brázdil R. – Kotyza O. 1995. History of Weather and Climate in the Czech Lands I (Period 1000-1500). Zürcher Geographische Schriften 62, Zürich, 1995. pp. 114-115, 168

Csánki D. 1890. Magyarország történelmi földrajza a Hunyadiak korában. Budapest: Magyar Tudományos Akadémia, pp. 475, 511, 513-514, 525

Glaser R. 2008. Klimageschichte Mitteleuropas. 1200 Jahre Wetter, Klima, Katastrophen. Darmstadt: Primus Verlag, pp. 66, 76, 84-85, 88-89, 225, 230-231

Györffy Gy. 1987. Az Árpád-kori Magyarország történeti földrajza. Vol. 1. Budapest: Akadémiai Kiadó, pp. 706-707, 770, 783

Hajósy F. 1954. Adatok a Tisza vízgyűjtőjének csapadékviszonyaihoz. Budapest: Akadémiai Kiadó, p. 24

Házi J. 2000. Pozsony vármegye középkori földrajza. Pozsony [Bratislava]: Kalligram, pp. 169-170

Kiss A. 1996. Some weather events from the fourteenth century (1338-1358). *Acta Climatologica Universitatis Szegediensis* 30: 61-69

Kiss A. 1999. Some weather events in the fourteenth century II. (Angevin period: 1301-1387). *Acta Climatologica Universitatis Szegediensis* 32-33: 51-64

Kiss A. (2010). Az 1340-es évek árvizei, vízállás-problémái és környezetük, különös tekintettel az 1342. és 1343. évekre. Submitted to: Almási T. – Szabados Gy. – Révész É. (eds.). *Fons, skepsis, lex*. Szeged: SZTE Történeti Segédtudományok Tanszék-Szegedi Középkorász Műhely, pp. 181-193

Kiss A. (2010). Floods and long-term water-level changes in late medieval Hungary. PhD dissertation at the Central European University, Budapest. in prep.

Rohr Ch. 2007. Extreme Naturereignisse im Ostalpenraum. Naturerfahrung im Spätmittelalter und am Beginn der Neuzeit. Köln-Weimar-Wien: Böhlau Verlag, pp. 202, 226-228, 448

Primary sources and charter/regesta editions

Baethgen F. 1924. Monumenta Germaniae Historica. Scriptores rerum Germanicarum. Nova series. Chronica

Iohannis Vitodurani. Berlin: apud Weidmannos, Tomus 3, pp. 189, 195, 200-201, 203-207, 213, 215-216, 238

Bal J. – Förster J. – Kauffman A. 1910-1913. Hain Gáspár lőcsei krónikája. Lőcse [Levoča]: Reiss Józs. T. könyvnyomó intézete, Vol. 1, p. 13

Dedek L. C. 1924. Monumenta Ecclesie Strigoniensis. Strigonii: Typis descripsit Gustavus Buzárovits, Vol. 3, pp. 473-475, 505

DL, DF (Hungarian National Archives, Archival documents of Medieval Hungary): 3448, 27829, 31242, 40902, 68845, 69670, 75835, 78505, 85252, 105741, 209593, 233634, 233635

Loserth J. 1875. Fontes Rerum Austriacarum. Oesterreichische Geschichts-Quellen. Königsaaler Geschichts-Quellen / Domherr Franz von Prag. Vol. 1: Scriptores Vol. 8 Vienna: Karl Gerold's sohn, Cap. 4: pp. 568-570

Nagy I. 1884. Anjoukori oklevéltár / Codex diplomaticus Hungaricus Andegavensis. Budapest: Magyar Tudományos Akadémia, Vol. 4, pp. 219-223, 226-232, 252-255, 282-291, 341-343

Nagy I. 1887. Anjoukori oklevéltár / Codex diplomaticus Hungaricus Andegavensis. Budapest: Magyar Tudományos Akadémia, Vol. 5, pp. 66-78, 278-282

Németh P. 1997. A középkori Szabolcs megye települései. Nyíregyháza: Ethnica, pp. 39-40, 70, 72, 117-118, 171-172

Pertz G. H. 1851. Monumenta Germaniae Historica. Scriptores. Continuatio Claustroneoburgensis V. Hannoverae: Impensis Bibliopolii Aulici Hahniani, Tomus 9, p. 736

Piti F. 2007a. Anjou-kori oklevéltár / Documenta res Hungaricas tempore regum Andegavensium illustrantia Vol. 26: 1342. Budapest-Szeged: Szegedi Középkorász Műhely, pp. 70-74, 81-82, 202-203, 210-212, 307-308, 336-337

Piti F. 2007b. Anjou-kori oklevéltár / Documenta res Hungaricas tempore regum Andegavensium illustrantia Vol. 27: 1343. Budapest-Szeged: Szegedi Középkorász Műhely, pp. 90-91, 240-242, 271-272, 413-414, 450-451, 486-488

Schneider F. 1910. Monumenta Germaniae Historica. Scriptores rerum Germanicarum in usum scholarum separatim editi. Iohannis Abbatis Victoriensis Liber certarum historiarum. Teil 2. Hannoverae-Lipsiae: Impensis Bibliopolii Hahniani, Tomus 36/2, pp. 225-226

Szentpétery I. 1938. Scriptores rerum Hungaricarum. Budapest: Academia Litter. Hungarica atque Societate Histor. Hungarica, Vol. 2, pp. 273-287: Chronicon, quod conservatur in Monte S. Georgii / Georgenberger Chronik. p. 284

Szombathely town council protocols, Vas county archives V/102a: years of 1675, 1696, 1697, 1700, 1705

Zahn J. 1865. Anonymi Leobiensis Chronicon. Gräz: Leuschner&Lubensky k.k. Univers.-Buchhandlung, p. 44