

# Wine, vacherin and volcanoes: impacts of the 17th century large volcanic eruptions

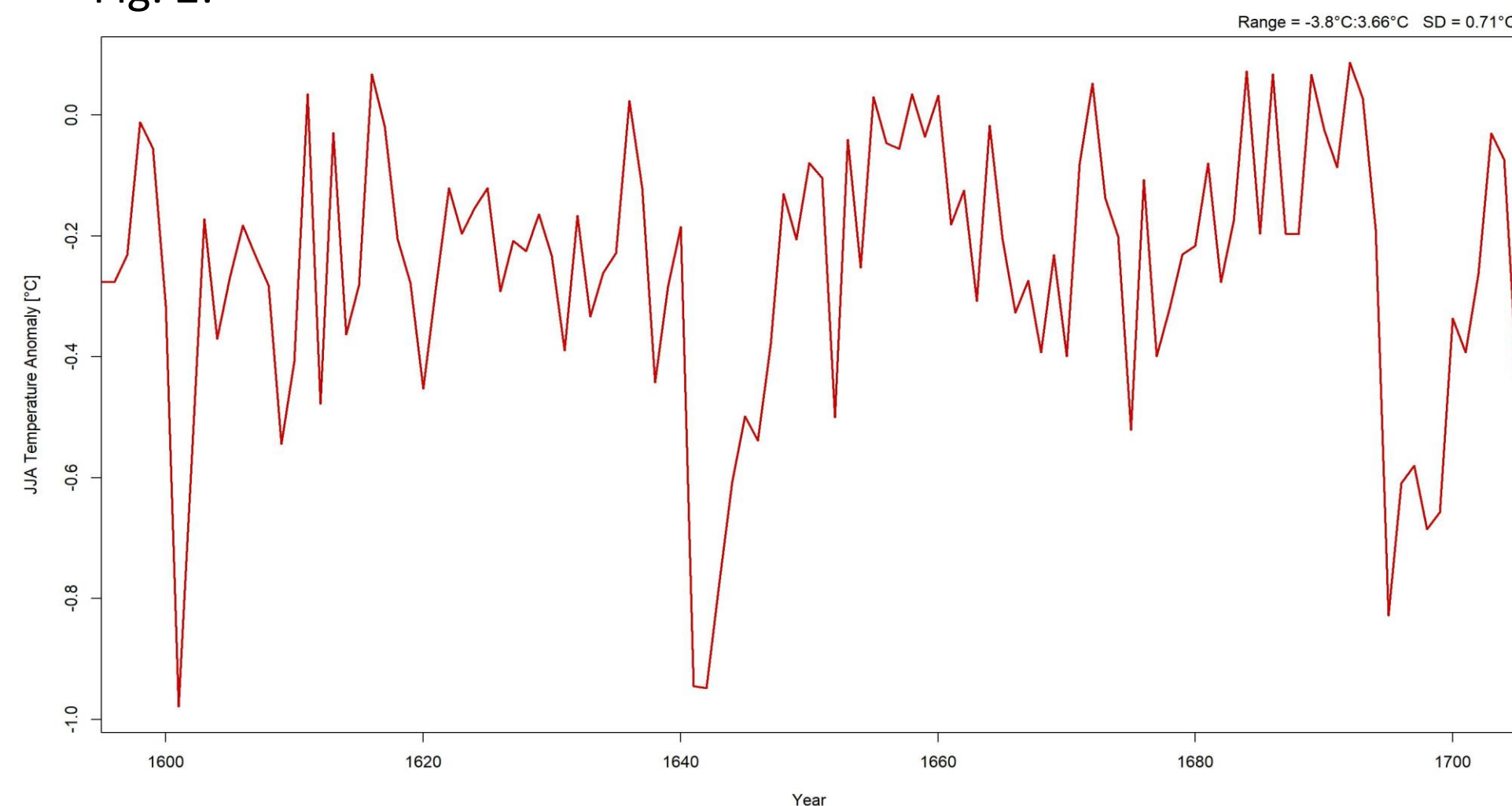
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Historical Institute and OCCR | VICS Workshop 2023

## INTRODUCTION

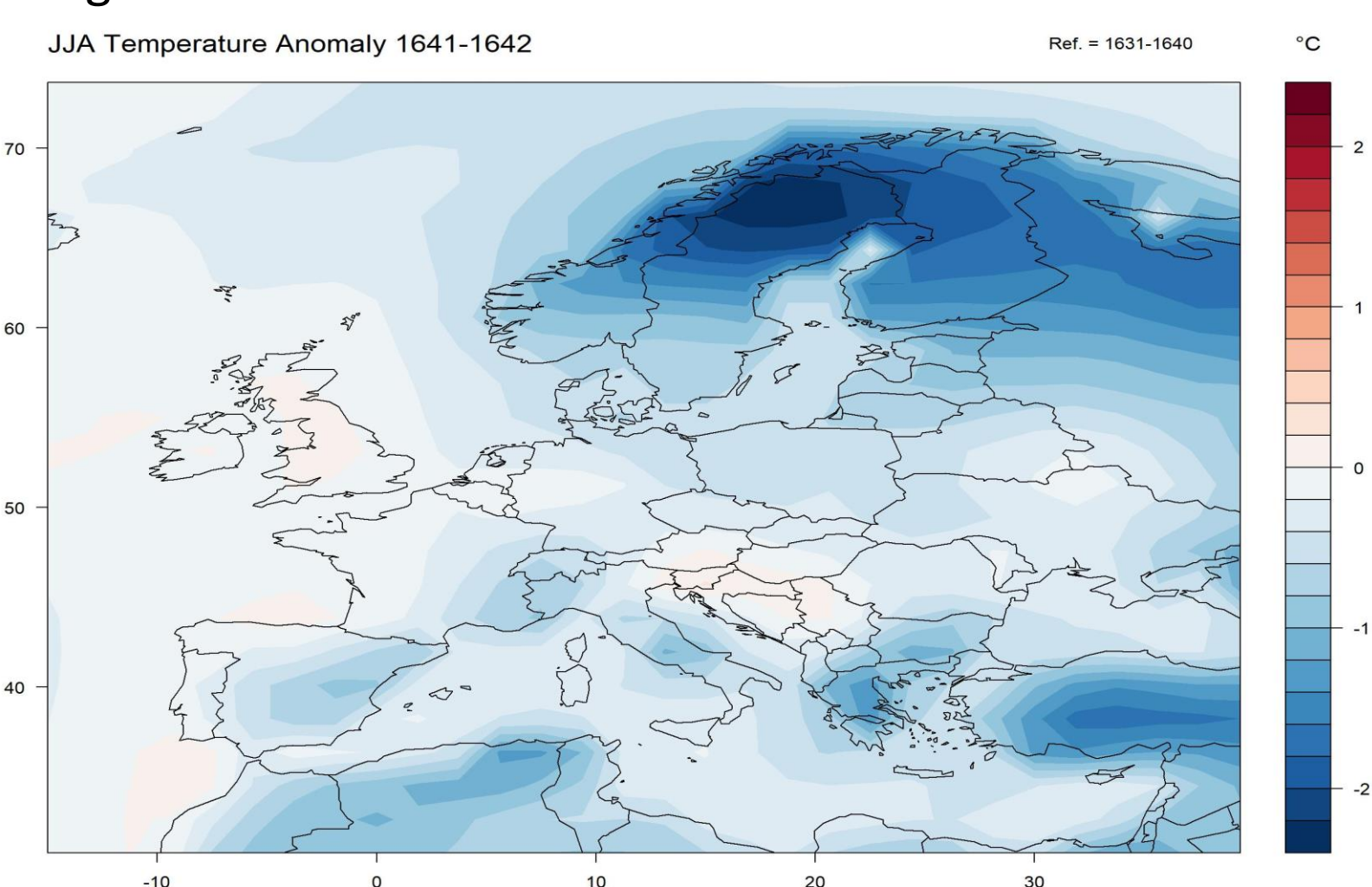
On December 26, 1640, **Mount Parker** in the Philippines started erupting, with a **major eruption on January 4, 1641**. Volcanic sulfate is detectable in Greenland ice cores from February 1641 on, peaking in March 1642.<sup>[1]</sup> According to Stoffel et al.<sup>[1]</sup>, the years 1641 and 1643 stand out as the 13<sup>th</sup> and 17<sup>th</sup> **coldest years of the last 1500 years** in the Northern Hemisphere (Fig. 1 and Fig. 2). In Europe, a summer cooling occurs over Fennoscandia and to a lesser degree also over other regions, such as Switzerland. As one of the three main eruptions in the 17<sup>th</sup> century it is vital to analyze what an impact the eruption of 1641 had.

Fig. 2:



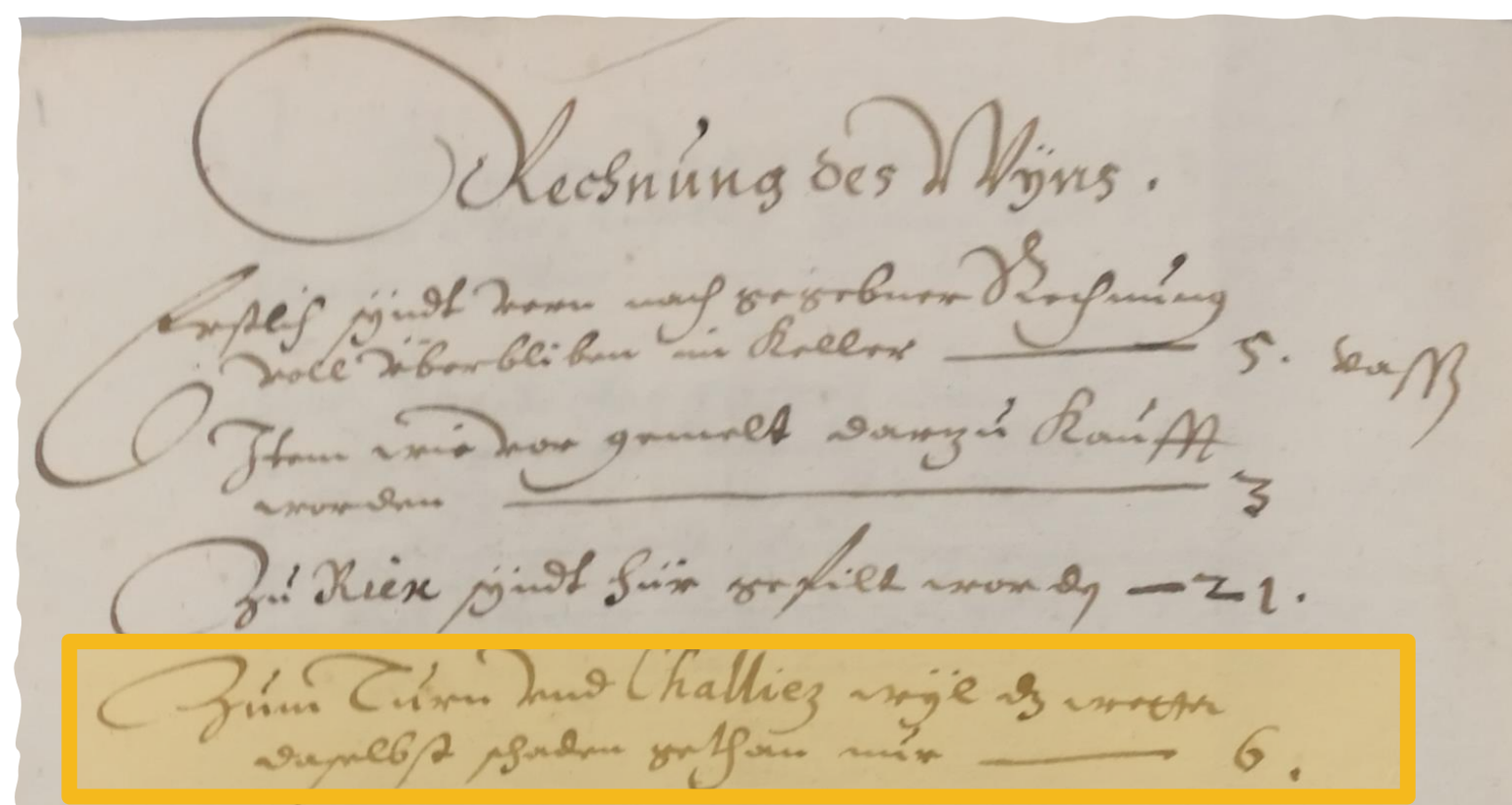
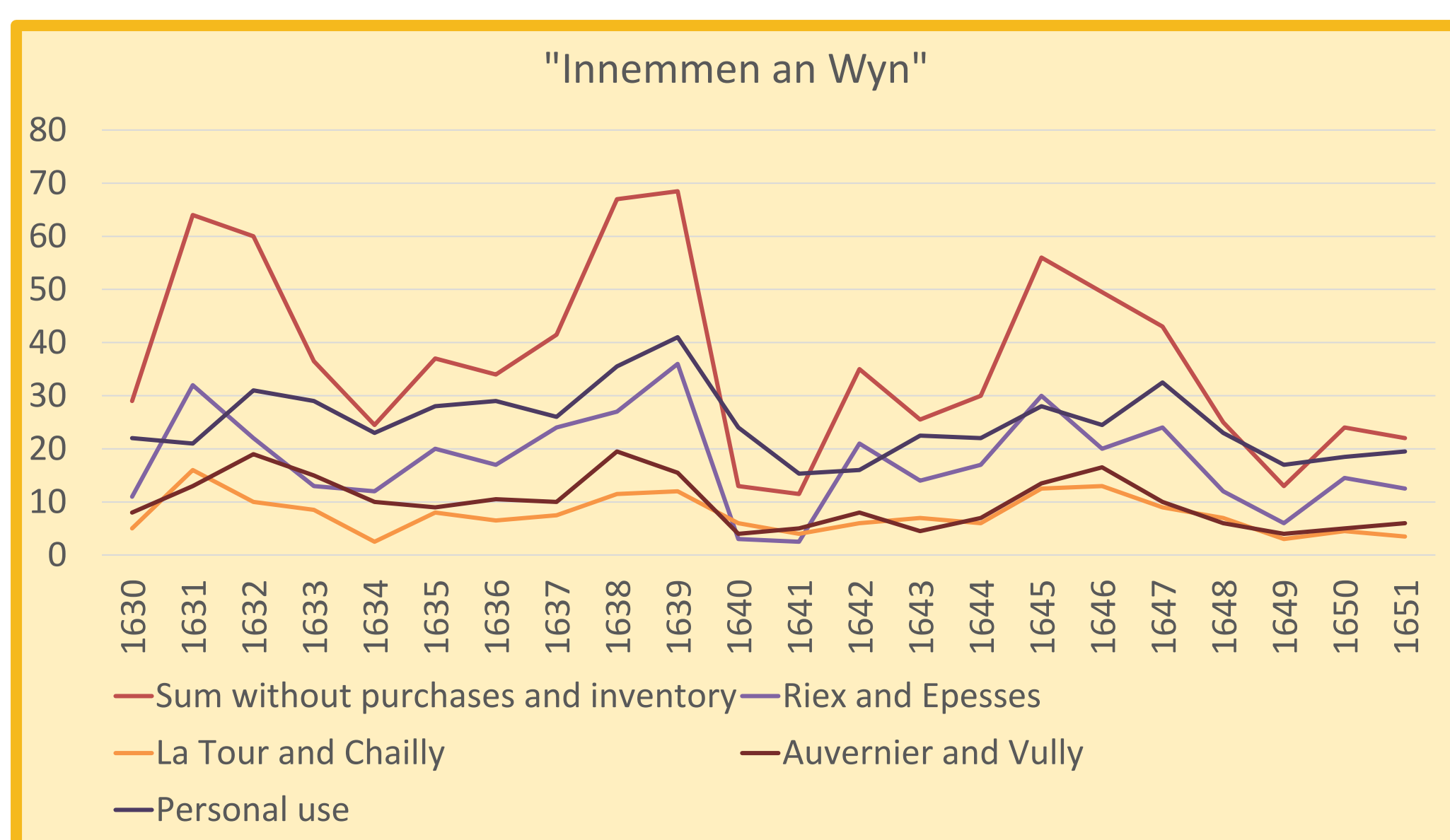
Data for fig. 1 and 2 are taken from global climate reconstruction ModE-RA. ModE-RA is an updated version of the assimilated data set EKF400v2 (Valler et al., 2022).<sup>[5]</sup>

Fig. 1:

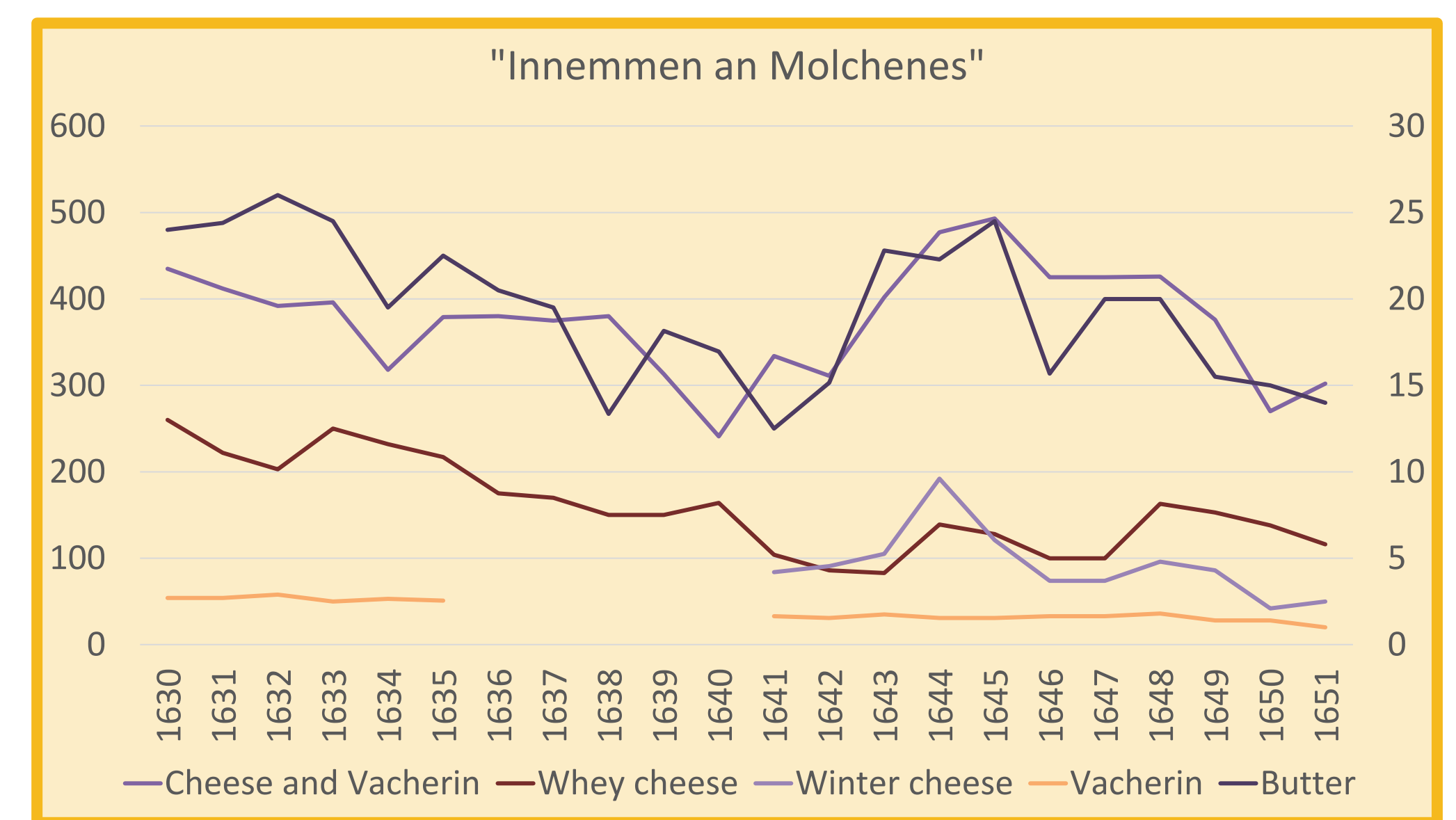


## SOURCES: HÔPITAL DES BOURGEOIS DE FRIBOURG

The municipal **Hôpital des Bourgeois de Fribourg** is first mentioned in 1249. Not only the sick were cared for in the hospital, but also the weak, abandoned children, orphans, old people and beggars, the needy and travelers; the **entire public welfare system** was thus centralized in the hospital. Leading up to the 16<sup>th</sup> century the hospital was included in many testaments and accumulated by a big amount of land and revenue; already in 1445, the institution was the **richest taxpayer in the city of Fribourg** with 40,000 pounds.<sup>[3]</sup> Their **account books** range from 1423 to 1789. In addition to monetary data, they contain **four types of documentary proxy data** on the harvest and yield of **wine, grain, dairy products and livestock**. They are thus valuable sources for determining direct or indirect local or regional climate anomalies. Colloquially and suiting to its composition, this series of staple food data is called the **Apéro-proxies**.

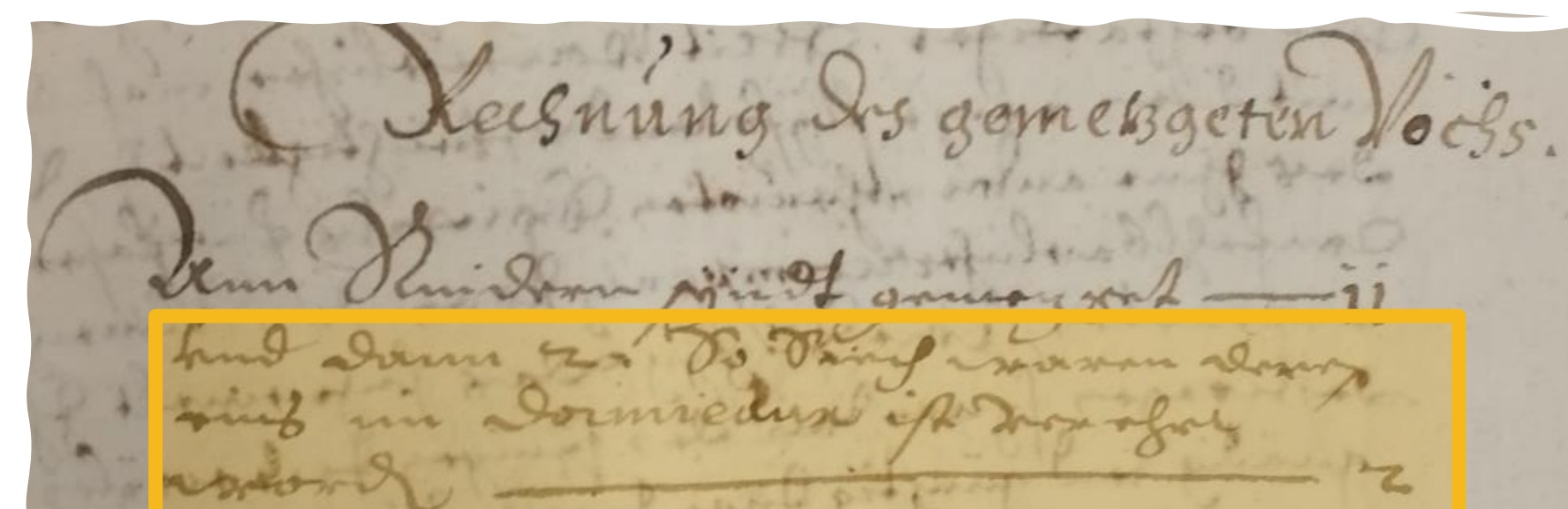


Account for the wine harvest of 1641-1642, lake Geneva: "La Tour und Chailly; because the weather did damages only 6 [barrels]" (AEF HB A3 213)



## WINE

## CHEESE

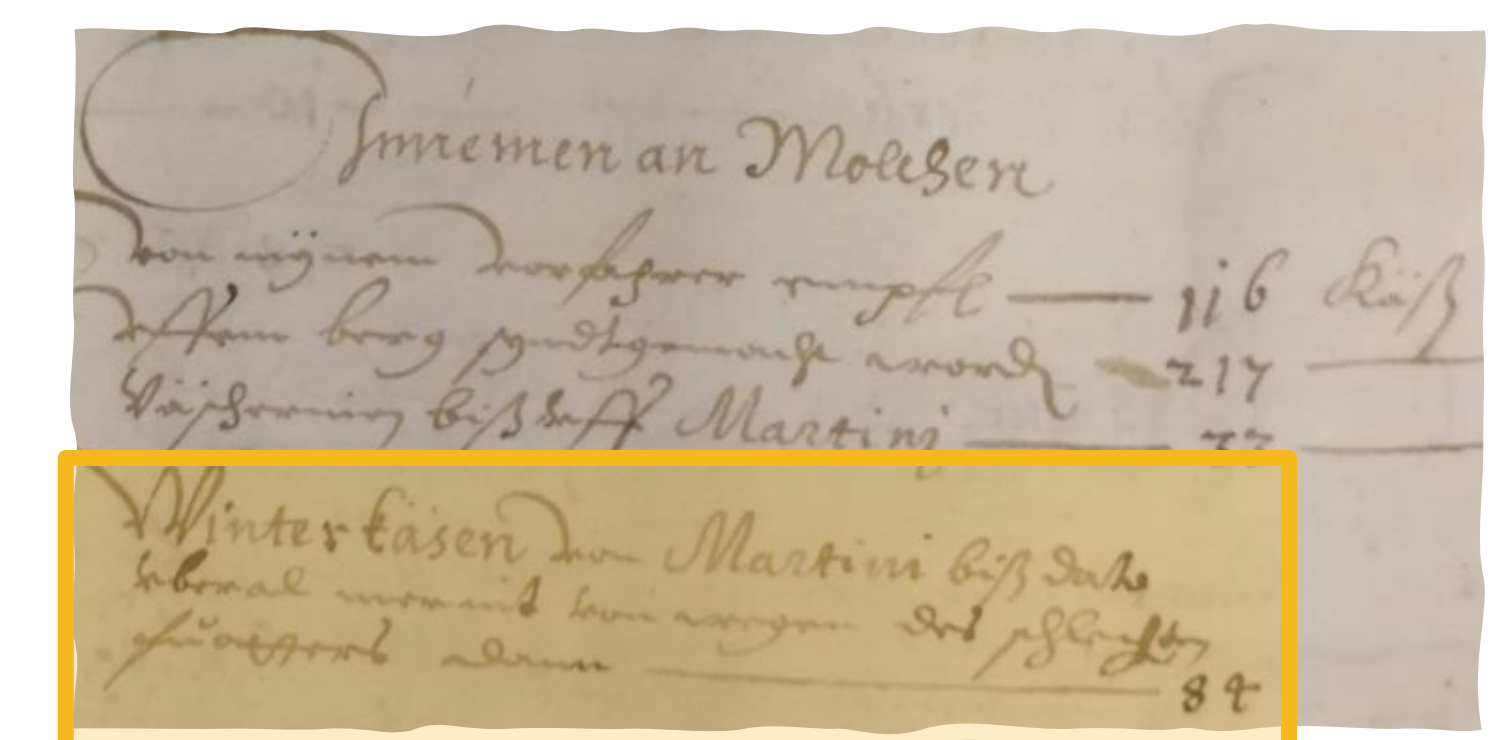


Account for livestock of 1640-1641, Fribourg: "Cattle slaughtered were ... and then 2 were so sick of which one was eaten (?) in the hospital" (AEF HB A3 212)

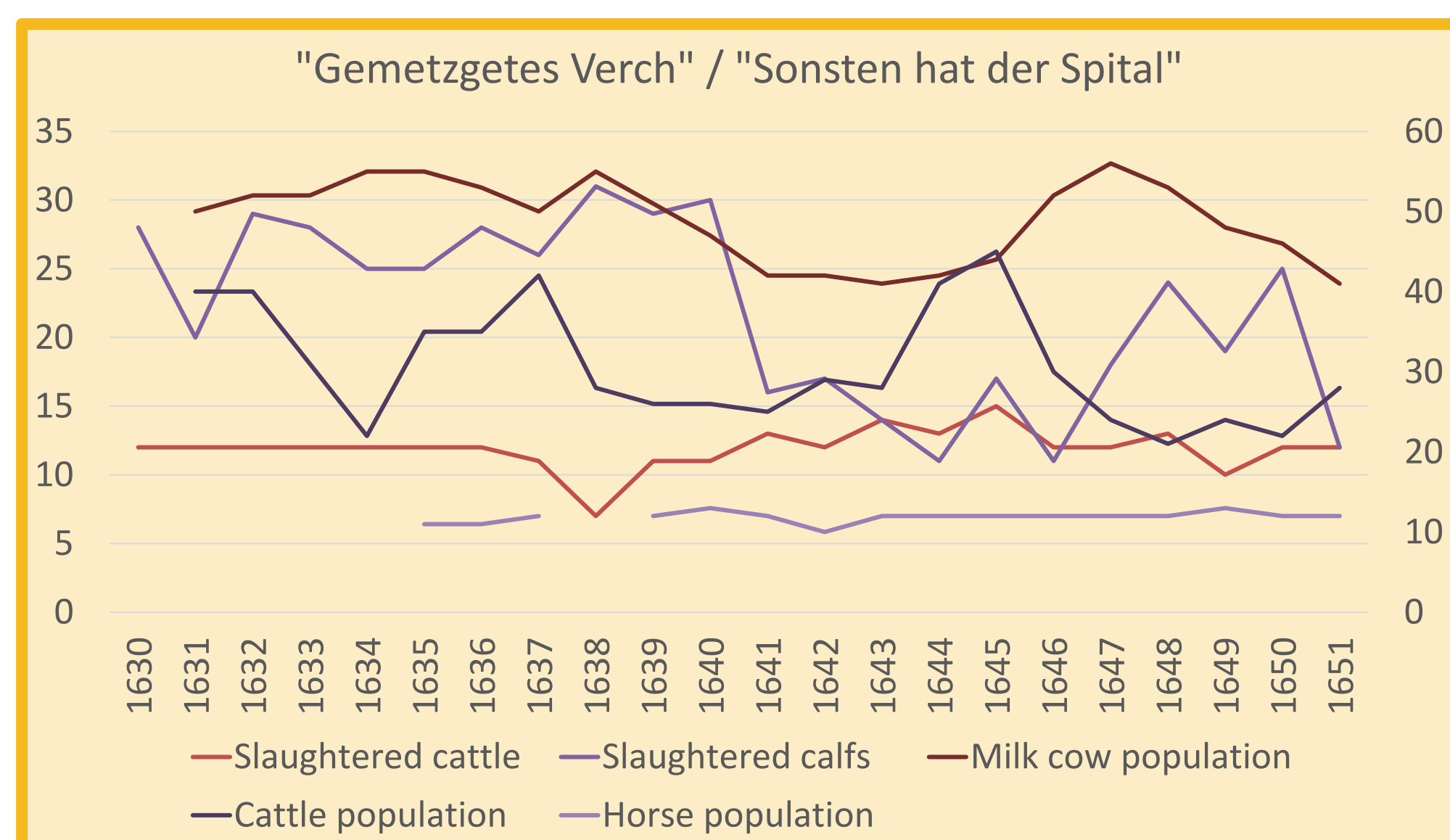


## MEAT

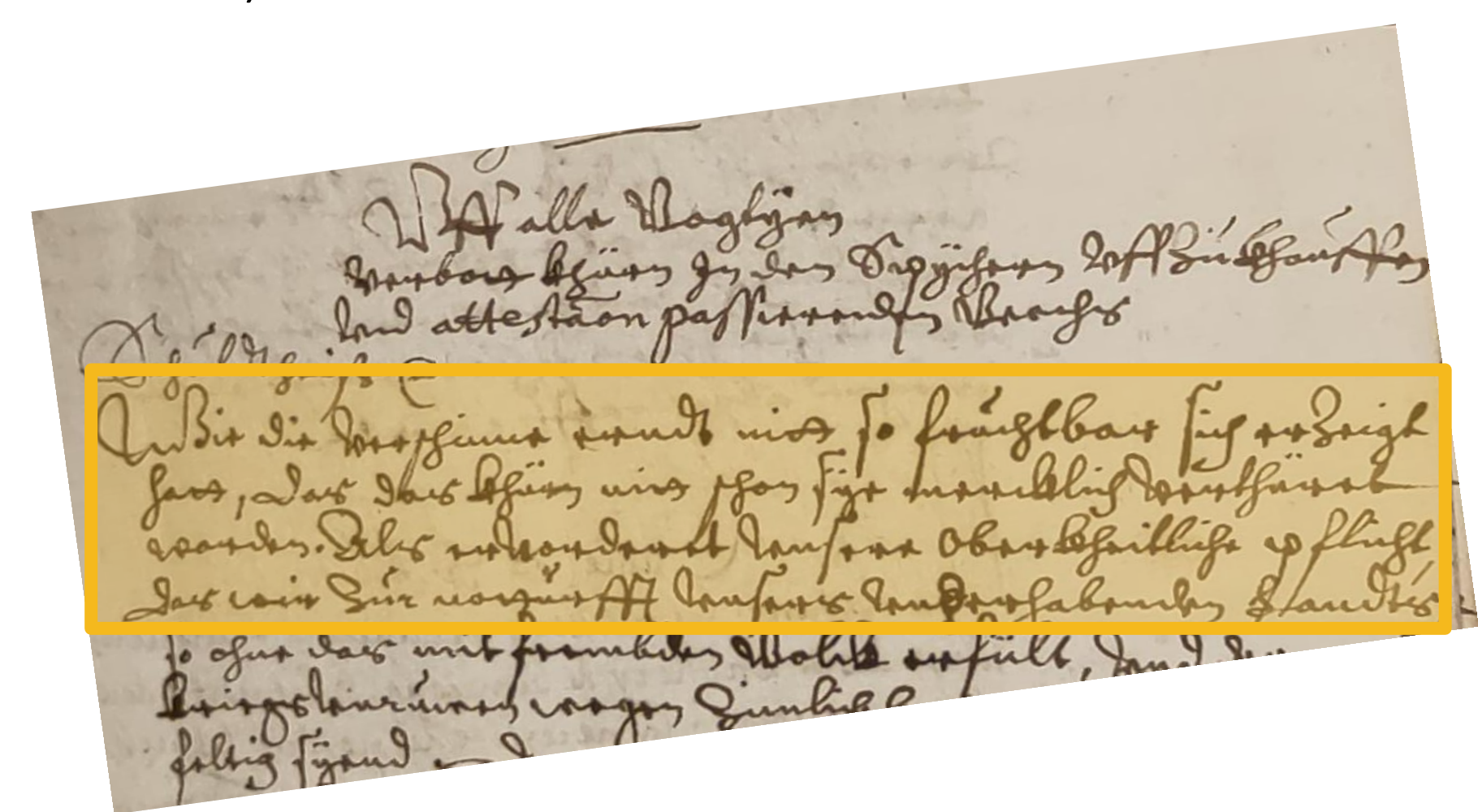
## GRAIN



Account for cheese of 1640-1641, Fribourg: "Winter cheese from November 11 up to today everywhere not much because of the bad fodder" (AEF HB A3 212)



Book of mandates, 26. August 1641, Fribourg: "As the latest harvest didn't prove so fruitful and the the grain already increased in price, our duty bound by authority we have to [act] ..." (AEF Mandatenbuch 4)



## CONCLUSION

Whereas **severe global impacts** have been linked to the Parker eruption in 1641, such as the Late Ming Dynasty Megadrought in China,<sup>[2]</sup> the rebellion of October 1641 in Ireland, or the grave hunger period in Fennoscandia,<sup>[4]</sup> possible impacts in Switzerland are less defined. In a comparative approach using both a qualitative and quantitative analysis, it could be depicted that the years of **1641 to 1642** were affected by **bad weather and harvests**; less wine was produced due to weather damages, "sick" cattle had to be slaughtered and other livestock produced less cheese in winter. **However**, these anomalies have to be put into a **broader socio-economic and political context**. Local authorities tried mitigating a bad grain harvest, when the grain price was already high due to non climatic impacts, such as the Thirty Years' War. In Fribourg the bad harvests of 1641/1642 were perceived in the accounting books of the **Hôpital des Bourgeois de Fribourg** even though they didn't lead to famine or social unrest.

## REFERENCES

[1] Stoffel, M., Corona, C., Ludlow, F., Sigl, M., Huhtamaa, H., Garnier, E., Helama, S., Guillet, S., Crampsie, A., Kleemann, K., Carminisch, C., McConnell, J., and Gao, C.: Climatic, weather, and socio-economic conditions corresponding to the mid-17th-century eruption cluster, *Clim. Past*, 18, 1083–1108, <https://doi.org/10.5194/cp-18-1083-2022>, 2022.

[2] Chen, K., Ning, L., Liu, Z., Liu, J., Yan, M., Sun, W., et al. (2020). One drought and one volcanic eruption influenced the history of China: The late Ming Dynasty mega-drought. *Geophysical Research Letters*, 47, e2020GL088124. <https://doi.org/10.1029/2020GL088124>.

[3] Utz Tremp, K. (2003). Das Archiv des Bürgerspitals Freiburg (ohne Urkunden) : eine Bestandsübersicht. *Freiburger Geschichtsblätter*, 80, 155-171. <http://doi.org/10.5169/seals-391880>.

[4] Huhtamaa, H., Stoffel, M., and Corona, C.: Recession or resilience? Long-range socioeconomic consequences of the 17th century volcanic eruptions in northern Fennoscandia, *Clim. Past*, 18, 2077–2092, <https://doi.org/10.5194/cp-18-2077-2022>, 2022.

[5] Valler, V., Franke, J., Brugnara, Y., Brönnimann, S. An updated global atmospheric paleo-reanalysis covering the last 4000 years. *Geosci Data J.* 2022; 9: 89–107. <https://doi.org/10.1002/gdj3.121>.

**u<sup>b</sup>**

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