XMapTools, an example of software development and distribution in the academic world and beyond

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The last half century has seen an almost exponential increase in the amount of geochemical data generated, which is used to support models and interpretations. The development of computer code, embedded in spreadsheets or data reduction software as well as modeling programs, has played a critical role in the evolution of several Earth Science disciplines, including petrology. This continues today as new challenges emerge with the application of machine learning algorithms for big data analysis. We need, more than ever, an effective strategy as a community to share data, pieces of code and computer programs that can be useful to other.

In this contribution, I will describe the main steps I took and challenges I encountered as an early-career scientist who developed and maintained XMapTools, a software solution for the reduction of mapping data. I will discuss the importance of data and program sharing, the evolution of XMapTools to an open-source and collaborative model and the importance of data compatibility. A critical aspect is the possibility to build bridges between programs using wrappers and application programming interface (API). The petrological modeling program Bingo-Antidote [2] is an example of program using data generated by XMapTools and Gibbs energy minimizations performed by Theriak [3].

References:

[1] Lanari, Laughton, Tedeschi, & Markmann (2023). *Zenodo*, DOI:10.5281/zenodo.7656958.

[2] Duesterhoeft, E. & Lanari, P. (2020). Journal of metamorphic Geology, 38, 527-551.

[3] de Capitani, C., & Brown, T. H. (1987). *Geochimica et Cosmochimica Acta*, *51*, 2639–2652.