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Compressing the data lifecycle: Can laboratories be a bridge to open data in the stable isotope research community?

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Archival and sharing of data is increasingly emphasized as a critical component of the science endeavor and lies at the heart of the 'big data' revolution. As traditionally structured, however, this process is arduous and protracted. The data lifecycle begins with project conception and extends through data collection, analysis, and publication prior to archival. In this model, archival becomes an afterthought and added workload on the researcher, and the archived products are often incomplete or poorly structured, reflecting the outcomes of a specific research project rather than the nature of the samples and observations themselves.

Widespread reliance on centralized laboratories and a limited suite of analytical equipment in fields such as stable isotope biogeoscience offers potential to 'compress' the data lifecycle. All laboratories utilize some type of formal or informal data management system. Data generated in the lab are formatted and organized during the analysis and post-analysis data reduction process, offering the ability to 'capture' data in a standardized format at this early stage of their lifecycle. Early capture ensures that data are preserved with minimal information loss and reduces investigator workload in later stages of the research workflow. It maximizes data security and can support a variety of models for open data and open science, depending on investigator preference.

I will describe a model system developed for direct capture and distribution of water isotope data from analytical laboratories, and how the implementation of the system provides benefits to lab clients, lab managers, and the broader research community. In addition, I will discuss cultural and technical challenges related to the development and adoption of such a system, and describe design decisions made in an attempt to address these. I hope to illustrate the potential benefits of such an approach in advancing data sharing and security in stable isotope biogeosciences, stimulate discussion of future efforts in this domain, and solicit partners who are interested in extending on the work presented here to explore the potential of the lab-centric model to condense the data lifecycle and support the growth of open science in our field.