



Optimization of post-run corrections for water stable isotope measurements by laser spectroscopy

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Light stable isotope analyses of hydrogen and oxygen of water are used in numerous aquatic studies from various scientific fields. The advantage of using stable isotope ratios is that water molecules serve as ubiquitous and already present natural tracers. Traditionally, the samples were analyzed in the laboratory by isotope ratio mass spectrometry (IRMS). Within recent years these analyses have been revolutionized by the development of new isotope ratio laser spectroscopy (IRIS) systems that are said to be cheaper, more robust and mobile compared to IRMS. Although easier to operate, laser systems also need thorough calibration with international reference materials and raw data need correction for analytical effects. A major issue in systems that use liquid injection via a vaporizer module is the memory effect, i.e. the carry-over from the previous analyzed sample in a sequence. This study presents an optimized and simple post-run correction procedure for liquid water injection developed for a Picarro water analyzer. The Excel(TM) template will rely exclusively on standard features implemented in MS Office without the need to run macros, additional code written in Visual Basic for Applications (VBA) or to use a database-related software such as MS Access or SQL Server. These protocols will maximize precision, accuracy and sample throughput via an efficient memory correction. The number of injections per unknown sample can be reduced to 4 or less. This procedure meets the demands of faster throughput with reduced costs per analysis. Procedures were verified by an international proficiency test and traditional IRMS techniques. The template is available free for scientific use from the corresponding author or the journals web site (van Geldern and Barth, 2012).

References

van Geldern, R. and Barth, J.A.C. (2012) Limnol. Oceanogr. Methods 10:1024-1036 [doi: 10.4319/lom.2012.10.1024]