Supplementary Materials

Measurements of Bicarbonate in Water Containing Ocean-Level Sulfate Using a Simple Multi-Pass Optical Raman System

Chetan Shende, Stuart Farquharson *, Duncan Farquharson and Carl Brouillette

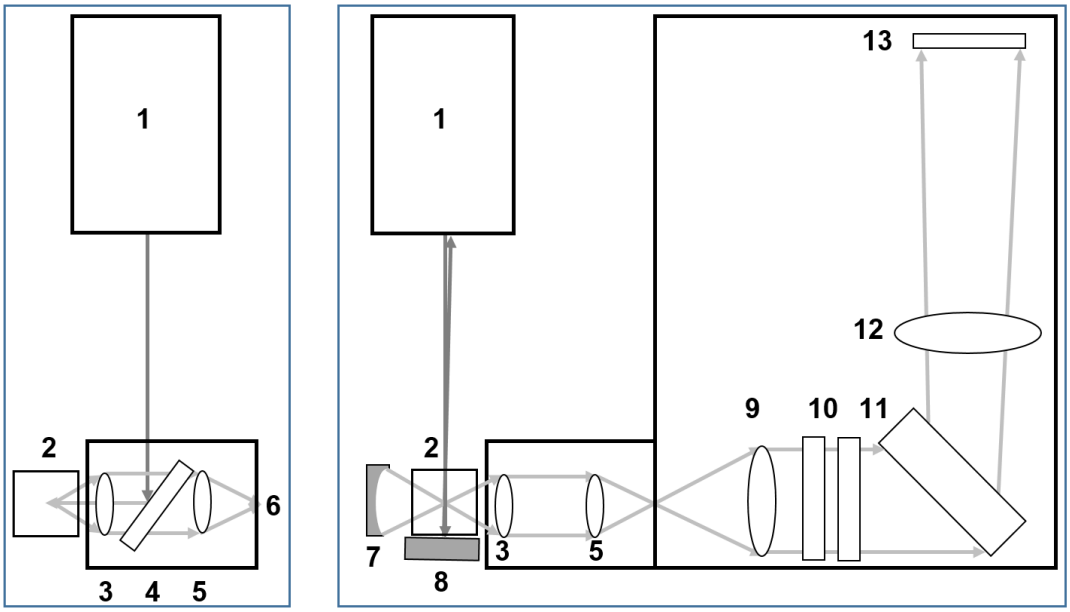

Figure S1. Top view illustration of (**a**) the original 180° excitation/collection optics and (**b**) modified 90° excitation/collection optics used with the Raman spectrometer. Components: (1) 532 nm laser, (2) quarts sample cuvette, (3) laser focusing/Raman collection lens, (4) long pass filter, (5) Raman focusing lens and slit, (7) concave mirror opposite (3) spectral collection lens, (8) flat mirror reflecting the laser back through the sample, (9) collimating lens, (10) two long pass filters, (11) transmission diffraction grating, (12) focusing lens, and (13) thermoelectric cooled Si detector.

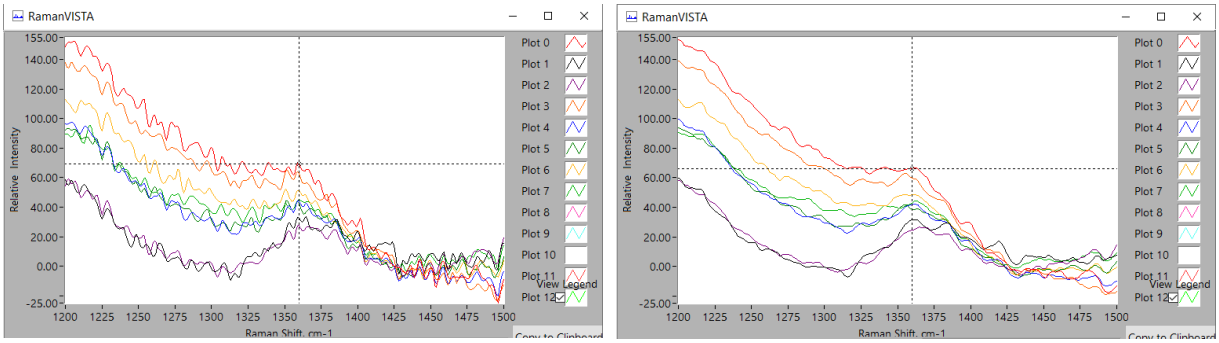

Figure S2. Raman spectra for 8 repeat measurements of 50 ppm bicarbonate from Series 2 (**a**) after subtracting the 2650 ppm sulfate in water spectrum and (**b**) after smoothing using Real-Time Analyzers, Inc. software.

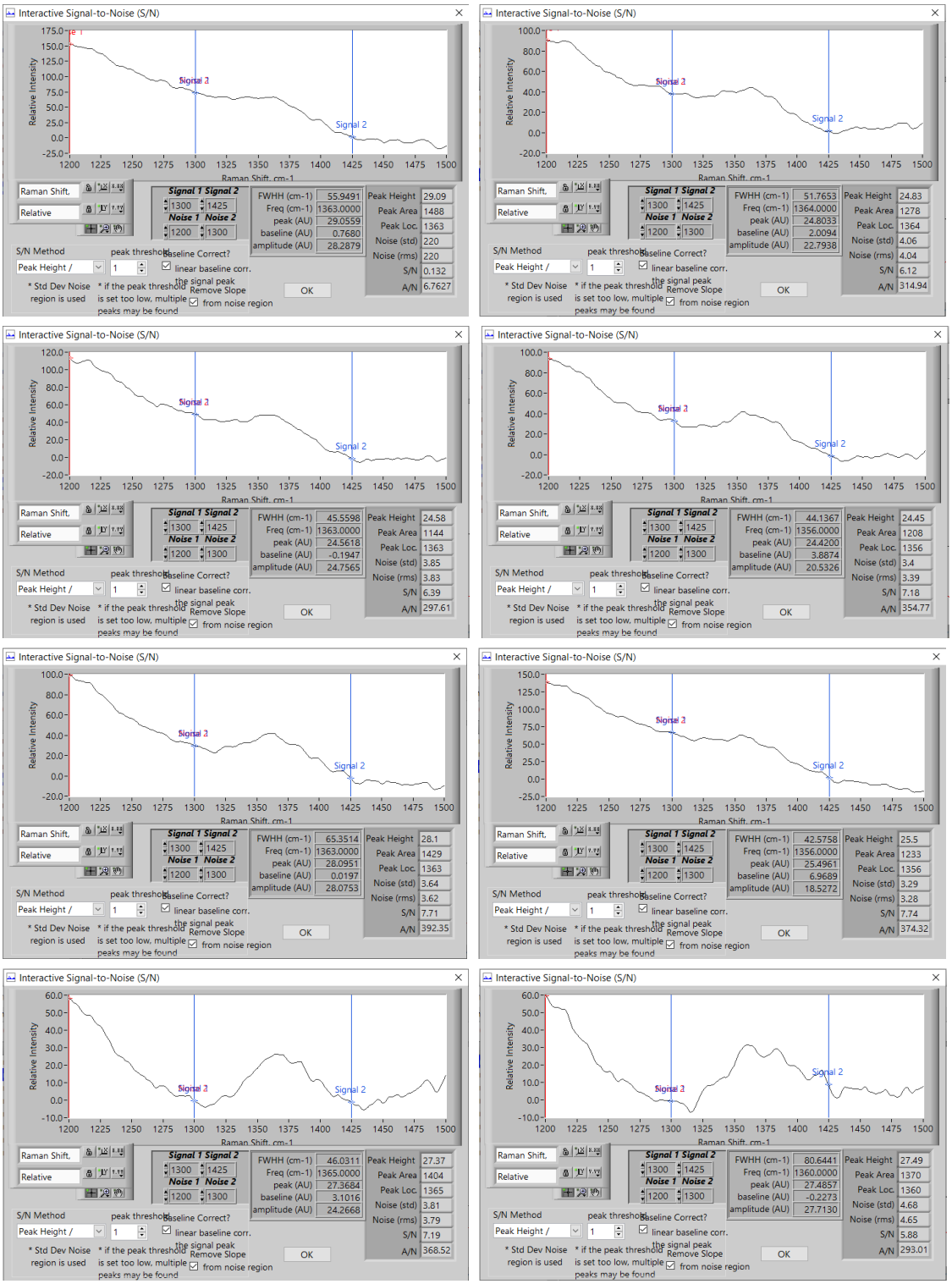

Figure S3. Real-Time Analyzers, Inc. software used to determine simple peak height at 1360 cm^{-1} for the 8 measurements of 50 ppm bicarbonate. Note all limits were set from 1300 to 1425 cm^{-1} to demonstrate automated analysis.