Datashare 71

Microanalysis of carbonate cement $\delta^{18}O$ in a CO_2-storage system seal: Insights into the diagenetic history of the Eau Claire Formation (Upper Cambrian), Illinois Basin

Maciej G. Śliwiński, Reinhard Kozdon, Kouki Kitajima, Adam Denny, and John W. Valley

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APPENDIX 1: ANALYTICAL METHODS

Sample Preparation

Samples for in situ $\delta^{18}O$ analysis were cast into 25-mm-diameter epoxy mounts (Buehler EpoxyCure), taking care to position areas of interest within a 5-mm radius of the geometric center; this was done to minimize any potential fractionation effects associated with a sample's position relative to the focusing axis within the analysis chamber (Kita et al., 2009; Valley and Kita, 2009). Several grains of a running standard (end-member dolomite UW6220, $\delta^{18}O$ = 22.60‰ Vienna standard mean ocean water [VSMOW], −8.1‰ Vienna Peedee belemnite [VPDB]; Śliwiński et al., 2015) were embedded in the center of each mount, which was then polished to a 0.25-µm finish using oil-based polycrystalline diamond suspensions (Buehler MetaDi Supreme) and Allied TECH-Cloth pads. Care was taken to keep polishing relief between mineral phases of contrasting hardness (e.g., carbonate cements in quartz-rich sandstones) to less than a few micrometers. Prior to analysis, sample mounts were cleaned with deionized water and ethanol and coated with carbon (25-nm thickness) to make sample surfaces electrically conductive.

Oxygen Isotope Analyses by Secondary Ion Mass Spectrometry

In situ $\delta^{18}O$ measurements were performed using a CAMECA IMS 1280 large-radius multicollector ion microprobe at the Wisconsin Secondary Ion Mass Spectrometer (WiscSIMS) Laboratory (Department of Geoscience, University of Wisconsin–Madison). The sample data presented here were collected during four analytical sessions throughout the course of 1 yr: two 10-µm-diameter spot-size sessions (session S1, September 23–25, 2013, and session S7, May 13–16, 2014) and two 3-µm spot-size sessions (session S4, February 24–27, 2014, and session S8, May 22–25, 2014). The full data set is provided in Appendices 4 and 5. The analytical conditions employed were the same as those described in Śliwiński et al. (2015).

The analytical accuracy of oxygen–isotope ratio measurements by secondary ion mass spectrometry (SIMS) is affected by instrumental mass fractionation (referred to here as "SIMS $\delta^{18}O$ bias"; Hervig et al., 1992; Kita et al., 2009; Valley and Kita, 2009), a component of which is systematically related to the chemical composition and crystal structure of a sample. A calibration scheme for correcting SIMS $\delta^{18}O$ bias for carbonate mineral compositions along the dolomite–ankerite solid solution series was reported by Śliwiński et al. (2015) and employed here for reducing sample data. The calibration relates the magnitude of SIMS $\delta^{18}O$ bias to the Fe number [=Fe/(Mg + Fe) molar ratio] of dolomite–ankerite using the three-parameter Hill equation (e.g., review of Goutelle et al., 2008), which elegantly describes empirical relationships of the "component concentration" versus "measured effect" type in systems that behave nonlinearly and reach saturation; it is characterized by two curve-shape parameters (n and k) and an analytical session-specific calibration scaling factor ($bias^*_{max}$). Although it is common in SIMS analyses for the magnitude of instrumental $\delta^{18}O$ bias to vary from session to session, the overall distribution of calibration standard data points in relation to one another remains remarkably consistent, with the values of both Hill shape parameters (n and k) remaining invariant for the IMS 1280 instrument and tuning protocols at the WiscSIMS lab. Thus, it is best in every analysis session to analyze a series of standards between dolomite and ankerite to construct a working curve, but even if only two standards from the dolomite–ankerite solid solution series are measured (end-member dolomite in addition to one ankerite from the opposite end of the series), a calibration curve can still be established, albeit with a slight increase in the analytical uncertainty (by an additional ~0.3‰). The analytical precision is typically ±0.3‰ (two standard deviations [2SD]) for 10-μm-diameter sample spot analyses and ±0.7‰ (2SD) for 3-μm spots, based on the spot-to-spot reproducibility (number of analysis [n] = 8) of a running standard (end-member dolomite, UW6220) that "brackets" each set of 10 sample analyses. The accuracy of sample analyses is, in part, determined by the calibration residual, which is a measure of how well the SIMS $\delta^{18}O$ bias correction scheme reproduces standard data in relation to the certified reference material (RM) NBS-19; for 10-μm spot-size sessions, the residual is constrained to 0.3‰ for a suite of 13 dolomite–ankerite standards, whereas it is within 0.4‰ when performing analyses using a 3-μm spot (Śliwiński et al., 2015).

Measured isotope ratios are reported using the conventional δ notation expressed in per mil relative to the VSMOW and VPDB $\delta^{18}O$ scales.

Chemical Analysis (by Electron Probe Microanalysis)

To correct each in situ carbonate $\delta^{18}O$ analysis for SIMS instrumental bias, it is necessary to have knowledge of the cation composition of the sample material sputtered from each sample pit. Chemical analyses in the immediate vicinity of each SIMS pit (detailed below) were performed by electron probe microanalysis (EPMA) using a CAMECA SX-51 at the Cameron Electron Microprobe Laboratory (Department of Geoscience, University of Wisconsin–Madison).

The electron microprobe was operated at 15 keV and 10 nA; care was taken to minimize beam damage to carbonate samples by performing analyses with the electron beam preferentially defocused to a 5-μm diameter where possible. However, the narrow thickness of certain compositional zones at times necessitated the use of a 2-μm-diameter beam. Monte Carlo simulations using Casino software (v2.41; Drouin et al., 2007) indicate that under these conditions, a 2-μm-diameter beam produces an interaction volume in dolomite and ankerite with a surface footprint approximately 3–4 μm in diameter. Thus, to avoid any potential edge effects, EPMA analyses were performed at least 5 μm away from 3-μm SIMS pits (using a 2-μm electron beam) and approximately 10 μm away from 10-μm SIMS pits (using a 5-μm electron beam). Characteristic x-ray intensities were measured for 10 s on each spectral peak and on two background positions (one on either side of each peak). During the course of a point analysis, the intensities of characteristic x-rays fluorescing from electron beam-sensitive materials can drift; this is corrected by a feature in Probe for EPMA software (Donovan et al., 2007) called TDI (time-dependent intensity), where data plotted in "measured x-ray intensity" versus "time" space are first detrended before the application of ZAF corrections (i.e., corrections for sample matrix effects, based on mean atomic number [Z], x-ray absorption [A], and x-ray fluorescence [F]).

The electron microprobe was standardized with the following RMs: Delight Dolomite (RM for Ca, analyzed using a pentaerythritol [PET] crystal, and RM for Mg, using a thallium acid phthalate [TAP] crystal), Callender Calcite (alternate RM for Ca), USNM 460 Siderite (RM for Fe, using a lithium fluoride [LiF] crystal), rhodochrosite (RM for Mn, using a LiF crystal), and strontianite (RM for Sr, using a TAP crystal). Data were collected during five analytical sessions throughout the course of a year (Fall 2013–Summer 2014). Based on replicate measurements (n = 5–10) of the above RMs during each session, the elemental concentrations determined for each of the cations are precise to within 2.5% relative (relative standard deviation), whereas deviations from accepted values are constrained to within 5% relative.

Sample Imaging by Scanning Electron Microscope

Extensive characterization of carbonate cements in sandstone samples by backscattered electron (BSE) and cathodoluminescence (CL) imaging (using a Hitachi S3400-N scanning electron microscope [SEM]) was employed to identify areas of interest prior to in situ $\delta^{18}O$ analyses by SIMS and then again after SIMS analysis to verify that sample pits were indeed placed where intended. High-resolution secondary electron images were acquired prior to SIMS analysis to identify characteristic features on sample surfaces (e.g., cracks, cavities, etc.) to aid in navigating and to allow for triangulating target positions in the reflected light optics of the SIMS sample viewer; secondary electron imaging was used again after analysis to assess the overall quality of each sputtered SIMS pit by revealing its surface texture. Data points were flagged and excluded if pits were found to partially overlap epoxy or showed any of the following features: cracks, epoxy, cavities (larger than ~1–2 μm), inclusions of other minerals, or any "shelves" or "ledges" that detract from an otherwise regular appearance of the pit sputtered by the ion beam. Cathodoluminescence imaging was employed to identify and to image the earliest formed, commonly luminescent generations of carbonate cement. Following the method of Reed and Milliken (2003), a broadband, short-wavelength (ultraviolet-blue range) filter was employed to avoid streaking in SEM–CL images that results from carbonate phosphorescence.

Bulk Mineralogy and Clay Speciation Analyses by X-Ray Diffraction

Five Eau Claire Formation shale samples from different burial depths across the Illinois Basin were submitted to ActLabs (Ancaster, Ontario, Canada) for clay mineral analysis by x-ray diffraction. A part of each powdered sample was mixed with 10 wt. % corundum powder and loaded into a standard back-fill holder. Corundum was used as an internal standard to determine the x-ray amorphous content of the samples. The abundances of the crystalline mineral phases were determined using the Rietveld refinement method, which is based on reproducing an observed diffraction pattern through modeling with crystallographic parameters. A part of each sample was dispersed in distilled water and clay minerals in the less than 2-μm fraction separated by gravity settling of particles in suspension. Oriented slides of the less than 2-μm fraction were prepared by placing a part of the suspension onto a glass slide. To identify expandable clay minerals, the oriented slides were analyzed after (1) air drying, (2) saturation with ethylene glycol, and (3) subsequent heating at 375°C (~710°F) for 1 hr. The semiquantitative amounts of the different clay minerals in the less than 2-μm fraction were determined based on calculations of basal-peak areas.

The x-ray diffraction analysis was performed on a Panalytical X'Pert Pro diffractometer equipped with a Cu x-ray source and an X'Celerator detector. The operating conditions were as follows: 40 kV and 40 mA, range 4°–70° 2θ for random powder mounts and 3°–35° 2θ for oriented clay mineral preparations, step size 0.017° 2θ, time per step 50.165 s, fixed divergence slit (1/4°), and sample rotation 1 rev/s.

The abundances of illite and smectite in clay mineral separates can be assessed using Środoń's (1984) intensity ratio (IR). This parameter compares x-ray IRs of the illite 001 and 003 diffraction peaks measured in oriented clay mounts before and after glycolation and is very sensitive to the presence of swelling (smectite) layers (IR = $[001/003]_{\text{air dried}}/[001/003]_{\text{glycolated}}$). Swelling has occurred if IR > 1.0; values less than approximately 1.5 are generally consistent with less than 15% smectite (Środoń, 1984).

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APPENDIX 2: ABBREVIATED CORE DESCRIPTIONS

Eau Claire Formation Interval, Illinois Basin

The purpose of the following is to provide a lithostratigraphic context to the samples that were collected and analyzed for this study. Sandstone beds within the predominantly silty–shaly Eau Claire Formation were sampled at three cored localities (refer to Figure 1 and Table 1 in main text) representing different sediment burial depths: (1) on the Wisconsin arch (sample SS-1, maximum burial depth <0.5 km (~1500 ft); see discussion in the Significance of Paleodepth-Related Differences in Carbonate Cement Δ^{18}O [Early–Late] section), (2) on the basin margin in northern Illinois (SS-2, maximum burial depth ~1 km [3500 ft]), and (3) in the central Illinois Basin (SS-3, maximum burial depth ~2 km [6500 ft]).

Historical coring to the basal Mt. Simon Sandstone of the Illinois Basin often did not aim for a recovery of the overlying Eau Claire Formation interval (R. Mumm, 2013, personal communication). Thus, only a relatively small number of cores exist with the Eau Claire Formation intact or present altogether, hindering a thorough characterization of the stratigraphy and limiting the wherewithal to laterally correlate specific lithofacies across the basin (Neufelder et al., 2012).

Legacy porosity and permeability data are provided where available.

Core C131467 (Dane County, Wisconsin; API Number: Not Applicable)

Depth of sandstone bed sampled for this study: 277.9 ft (84.7 m) (sample SS-1).

Aswasereelert et al. (2008) divided the Eau Claire Formation of west to southcentral Wisconsin into five distinct lithofacies (A–E; see table 1 therein) that represent different paleowater depths and depositional environments (outer shelf to shore face) of an epeiric shelf. Only the finer-grained, outer shelf facies (A and B) are present at this cored locality; an overview of the lithostratigraphy is shown in Figure A.1 (see figure 13 in Aswasereelert et al., 2008 for a more comprehensive description).

- Lithofacies A: This facies consists of mudstone and siltstone with minor, very thin-bedded (0.1–1 cm [~0.0625–0.375 in.]) sandstone beds. This designation was given to cored intervals comprised of at least one 1-ft (~30-cm) interval of very thin- (0.1–1 cm [~0.0625–0.375 in.]) to thin-bedded (1–10 cm) mudstone and/or siltstone.
- Lithofacies B: This facies consists of thin-bedded sandstone beds (1–10 cm [~0.375–4 in.], generally <5 cm [~2 in.]) with very thin siltstone and mudstone interbeds (0.1–1 cm [~0.0625–0.375 in.]).
- In southern Wisconsin, the Eau Claire Formation is an important regional aquitard (Aswasereelert, 2005; Aswasereelert et al., 2008).

Core C12996 (UPH-3) (Stephenson County, Illinois; API Number: 121772131700)

Depth of sandstone bed sampled for this study: 1217.3 ft (371 m) (sample SS-2).

The following lithostratigraphic overview pertains to core UPH-1 (API number: 121772131500), drilled approximately 4.5 mi (~7 km) north of the core sampled for this study (C12996/UPH-3). The depth of the sandstone bed sampled in core C12996/UPH-3 (1217.3 ft [371 m]) was correlated to within several feet with the depth of the equivalent bed in core UPH-1 (position indicated in Table A.1 at 1101 ft [335.6 m]) based on the following reference horizons: (1) the depth of the contact between the Mt. Simon and the Eau Claire Formations (UPH-1: 1165 ft [355.1 m]; UPH-3: 1308 ft [398.7 m]) and (2) the depth of unique carbonate beds (UPH-1: ~1046.7–1047 (319–319.1 m) and 1050.5–1051.5 ft [320.2–320.5 m]; UPH-3: ~1191.6 ft [363.2 m]).

Core C4006 (Champaign County, Illinois; API Number: 120190012800)

Depth of sandstone bed sampled for this study: 3857 ft (1175.6 m) (sample SS-3).

The sources of the following information are core descriptions from a well folder, provided by the Geological Records Unit of the Illinois State Geological Survey.

The Eau Claire Formation interval (3305–3993 ft [1007–1217.1 m]) was cored from 3751–3992 ft (1143.3–1216.8 m). The core is no longer complete; it has been reduced to "chips" that represent approximately 15% of the original core material. Table A.2 below provides a summarized overview of the lithologies present and the range of porosity and permeability values for the different depth intervals (measurements performed by Core Laboratories, Inc., Oklahoma City, Oklahoma, 1959). The position of the sandstone bed sampled for this study (sample SS-3, 3857 ft [1175.6 m]) is indicated.

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Table A.1. Core UPH-1

Depth (ft [m])	Interval Thickness	Lithology
846–851 (257.9–259.4)	5 ft (1.5 m)	Sandstone with shale streaks
851–864 (259.4–263.3)	13 ft (4 m)	Shale
864–926 (263.3–282.2)	62 ft (18.9 m)	Interbedded siltstone–shale (centimeter scale)
926–927 (282.2–282.5)	1 ft (0.3 m)	Sandstone, heavily iron stained (thoroughly maroon)
927–930 (282.5–283.5)	3 ft (0.9 m)	Interbedded siltstone–shale (centimeter scale)
930–933 (283.5–284.4)	3 ft (0.9 m)	Sandstone, heavily iron stained (thoroughly maroon)
933–974 (284.4–296.9)	41 ft (12.5 m)	Clean sandstone
974–986 (296.9–300.5)	12 ft (3.7 m)	Shale and very shaly siltstone
986–993 (300.5–302.7)	7 ft (2.1 m)	Clean sandstone
993–1035 (302.7–315.5)	42 ft (12.8 m)	Sandstone with siltstone interbeds (centimeter–decimeter scale) and shale streaks
1035–1040 (315.5–317)	5 ft (1.5 m)	Clean sandstone
1040–1041 (317–317.3)	1 ft (0.3 m)	Carbonate (dolomite) bed
1041–1046 (317.3–318.8)	5 ft (1.5 m)	Sandstone, heavily dolomitized? (not clean in appearance)
1046.7–1047 (319.0–319.1)	0.3 ft (0.1 m)	Carbonate (dolomite) bed
1047–1048.5 (319.1–319.6)	1.5 ft (0.5 m)	Sandstone, heavily dolomitized? (not clean in appearance)
1048.5–1049.5 (319.6–319.9)	1 ft (0.3 m)	Carbonate (dolomite) bed; several inches of siltstone and/or shale near bottom
1049.5–1050.5 (319.9–320.2)	1 ft (0.3 m)	Sandstone, heavily dolomitized? (not clean in appearance)
1050.5–1051.5 (320.2–320.5)	1 ft (0.3 m)	Carbonate (dolomite) bed
1051.5–1054 (320.5–321.3)	2.5 ft (0.8 m)	Sandstone (not clean in appearance); some shale streaks
1054–1075 (321.3–327.7)	21 ft (6.4 m)	Mixed sandstone and siltstone with shale laminations
1075–1094 (327.7–333.5)	19 ft (5.8 m)	Mostly clean sandstone with some shale streaks and gray sandstone beds
1094–1107 (333.5–337.4)	13 ft (4 m)	Clean sandstone*
1107–1136 (337.4–346.3)	29 ft (8.8 m)	Mixed clean gray sandstone with some siltstone laminations and shale streaks
1136–1142 (346.3–348.1)	6 ft (1.8 m)	Interbedded sandstone, siltstone, and shale
1142–1165 (348.1–355.1)	23 ft (7 m)	Sandstone (not clean in appearance); some shale streaks

*Sandstone bed sampled at depth of 1217.3 ft (371 m) (sample SS-3) in core C12996/UPH-3, equivalent in this core (UPH-1) to a depth of approximately 1101 ft (335.6 m).

Table A.2. Core C4006

Interval Identification	Depth (ft [m])	Interval Thickness	Depth (ft [m])	Lithology	Porosity (%)	*K*max (mD)	*K*90 (mD)	*K*vert (mD)
Core 4	3751–3801 (1143.3–1158.5)	50 ft (15.2 m)	–	Black shale	8.4–10.3	<0.1	–	<0.1
Core 5	3810–3823 (1161.3–1165.3)	13 ft (4 m)	–	Interbedded shale and siltstone	3.3–8.9	<0.1–16	<0.1–3.5	<0.1
Core 6	3823–3847 (1165.3–1172.6)	24 ft (7.3 m)	–	Missing	–	–	–	–
Core 7	3847–3870 (1172.6–1179.6)	23 ft (7 m)	–		3.5–8.9	<0.1–4.1	<0.1–3.8	<0.1–0.2
Core 7	3847–3870 (1172.6–1179.6)	23 ft (7 m)	3847–3856 (1172.6–1175.3)	Interbedded shale and siltstone in beds up to 3 in. thick (~50:50)	4.8–7.7	<0.1–0.1	<0.1	<0.1
Core 7	3847–3870 (1172.6–1179.6)	23 ft (7 m)	3856–3863 (1175.3–1177.4)	Interbedded sandstone and shale in beds 3–12 in. thick; shale represents approximately 20% of interval and is concentrated in beds 1–6 in. thick*	3.5–7.7	<0.1–4.1	<0.1–3.8	<0.1–0.2
Core 7	3847–3870 (1172.6–1179.6)	23 ft (7 m)	3863–3870 (1177.4–1179.6)	Silty sandstone with thin wavy shale streaks; 90% sandstone, 10% shale	5.5–8.9	<0.1–1.4	<0.1–1.2	<0.1–0.1
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)						
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3870–3880 (1179.6–1182.6)	Silty sandstone as above	5.6–10.3	<0.1–13	<0.1–13	<0.1–4.8
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3880–3896 (1182.6–1187.5)	Interbedded siltstone and sandstone; shaly zone in lower 2 ft	5.5–10.9	<0.1–3.7	<0.1–2.6	<0.1–3.6
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3896–3910 (1187.5–1191.8)	Mostly sandstone	5.5–10.2	<0.1–31	4.9–29	<0.1–10
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3910–3925 (1191.8–1196.3)	Interbedded siltstone and sandstone	5.8–7.6	<0.1–18	<0.1–17	<0.1–4.2
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3925–3933 (1196.3–1198.8)	Mostly sandstone	6.2–9.2	0.1–28	0.1–25	<0.1–5.5
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3933–3940 (1198.8–1200.9)	Interbedded siltstone and sandstone; numerous shale layers 0.125–0.5 in. thick	4.3–5.8	<0.1–2.5	<0.1–2.4	<0.1–2.5
Core 8	3870–3940 (1179.6–1200.9)	49 ft (14.9 m)	3940 (1200.9)	Mostly sandstone	7.4–10.7	1.0–2.9	0.9–2.2	<0.1–0.8

Abbreviations: *K*max = maximum permeability of core measured in the horizontal direction; *K*vert = permeability of core measured in the vertical direction; *K*90 = permeability measured after 90° rotation from the direction of *K*max.
*Sandstone bed sampled at depth of 3857 ft (1175.6 m) (sample SS-3).

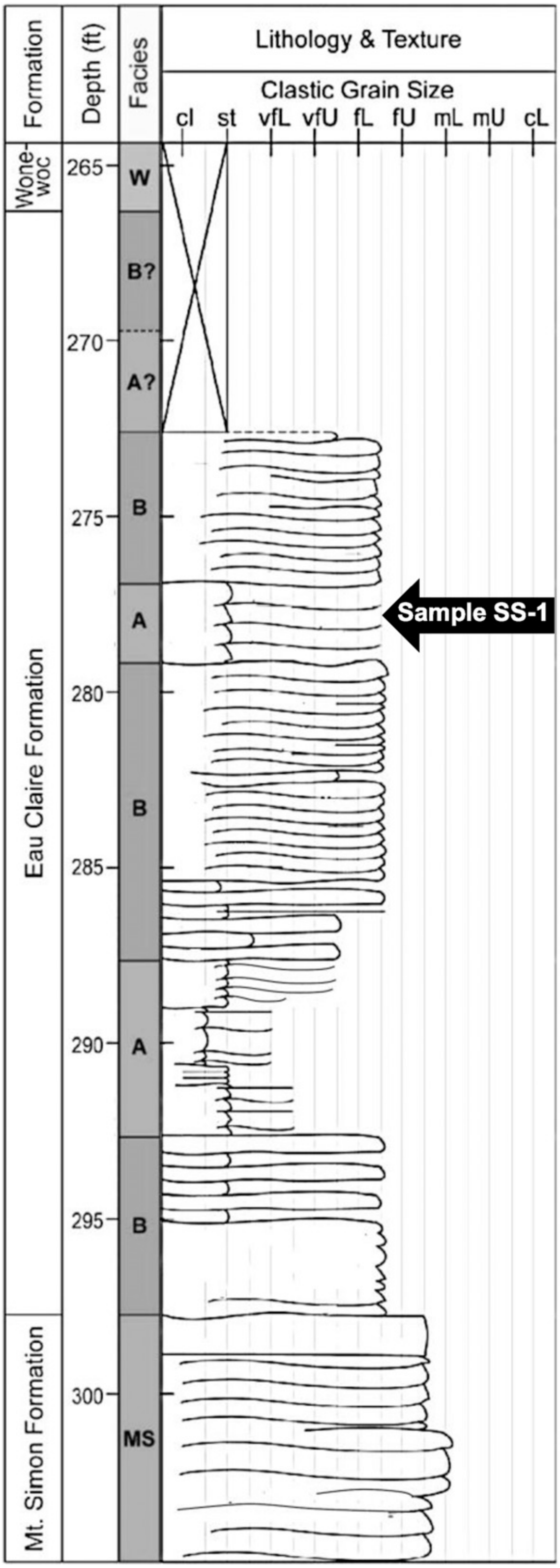


Figure A.1. Lithostratigraphy of core C131467 (Dane County, Wisconsin). Modified after Aswasereelert et al. (2008).

APPENDIX 3: PETROGRAPHIC DOCUMENTATION OF ALL SAMPLE REGIONS ANALYZED BY SECONDARY ION MASS SPECTROMETRY, WITH INDIVIDUALLY ANNOTATED ANALYSES PITS

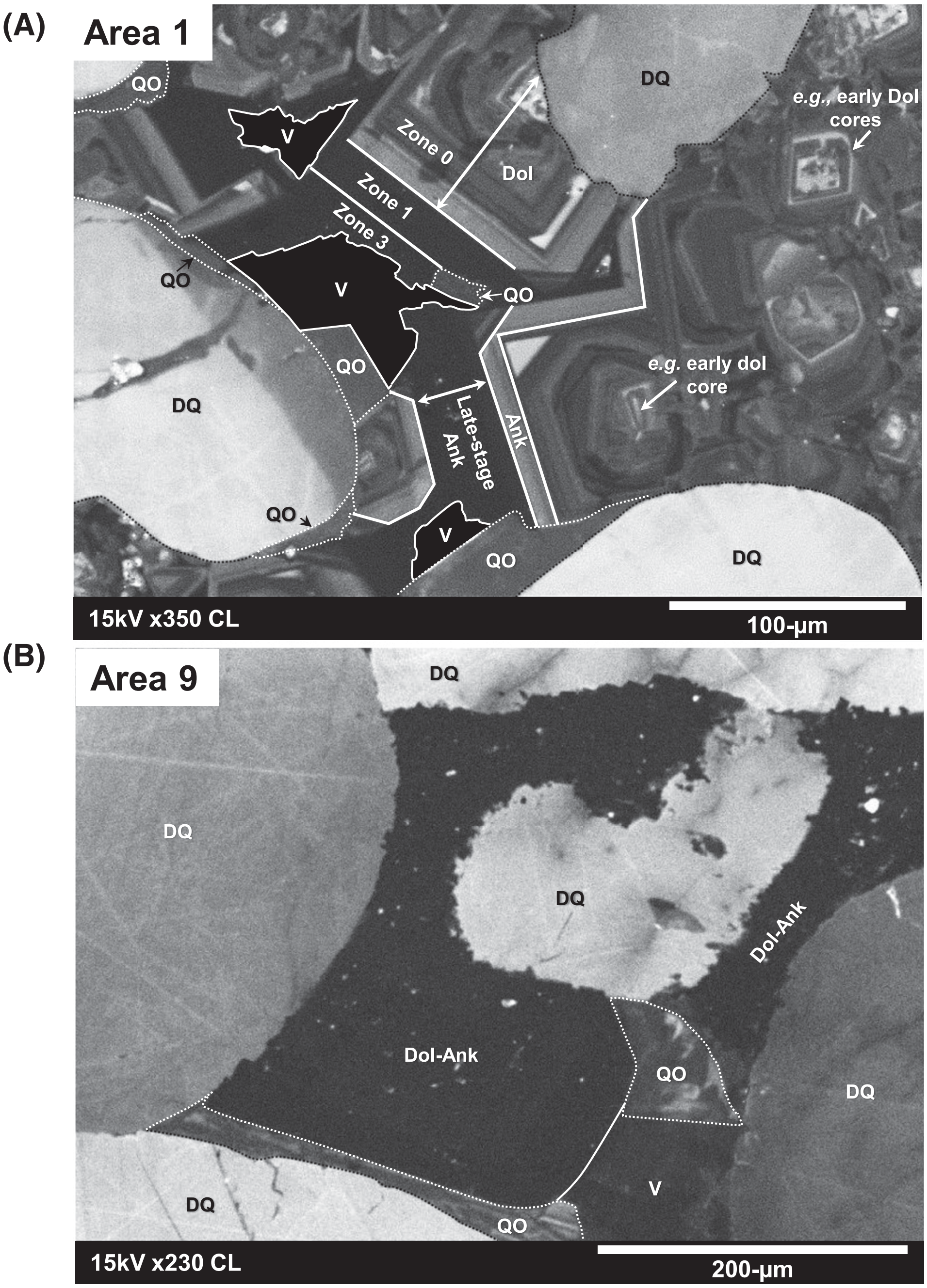


Plate 1. (A) Shaly sandstone sample SS-2 (northern Illinois): cathodoluminescence–scanning electron microscopy (CL–SEM) image that corresponds to the backscattered electron (BSE) image of Figure 4A in the main text (see also Plate 4A herein). (B) Shaly sandstone sample SS-3 (central Illinois): CL–SEM image that corresponds to the BSE image of Figure 4D in the main text (see also Plate 4A herein). Ank = ankerite; Cal = calcite; DF = detrital K-feldspar; Dol = dolomite; DQ = detrital quartz; OF = overgrowth K-feldspar; QO = quartz overgrowth; V = void space.

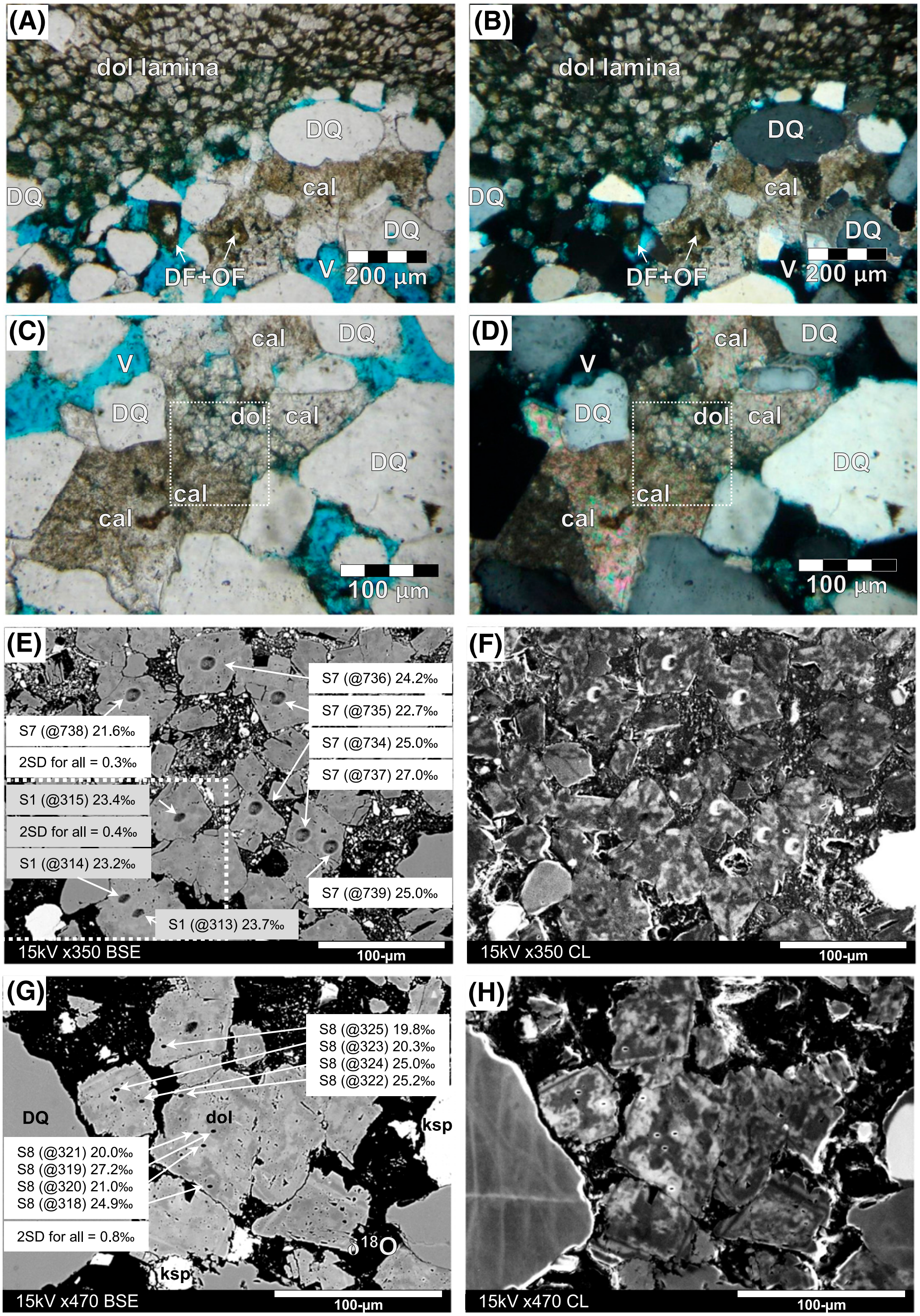


Plate 2. Characteristic morphologies of calcite and dolomite cements in shaly sandstone sample SS-1 (Wisconsin arch). (A, C) Photomicrographs in plane-polarized light with (B, D) corresponding cross-polarized light images. (E, G) Backscattered electron (BSE) images with annotated secondary ion mass spectrometry (SIMS) analysis pits ($\delta^{18}O$ Vienna standard mean ocean water [VSMOW]) and (F, H) corresponding cathodoluminescence (CL) images. Each analysis pit has a unique designation, such as "S8 (@205)," followed by the SIMS bias-corrected $\delta^{18}O$ (VSMOW) value and the two standard deviations (2SD) value in parentheses; the "S8" is an analytical session designator, whereas the "(@205)" is a unique sample pit identification number for the corresponding session. Refer to Table 2 in the main text and Appendices 1 and 2. Cal = calcite; DF = detrital K-feldspar; Dol = dolomite; DQ = detrital quartz; ksp = K-feldspar (DF+OF); OF = overgrowth K-feldspar; V = void space.

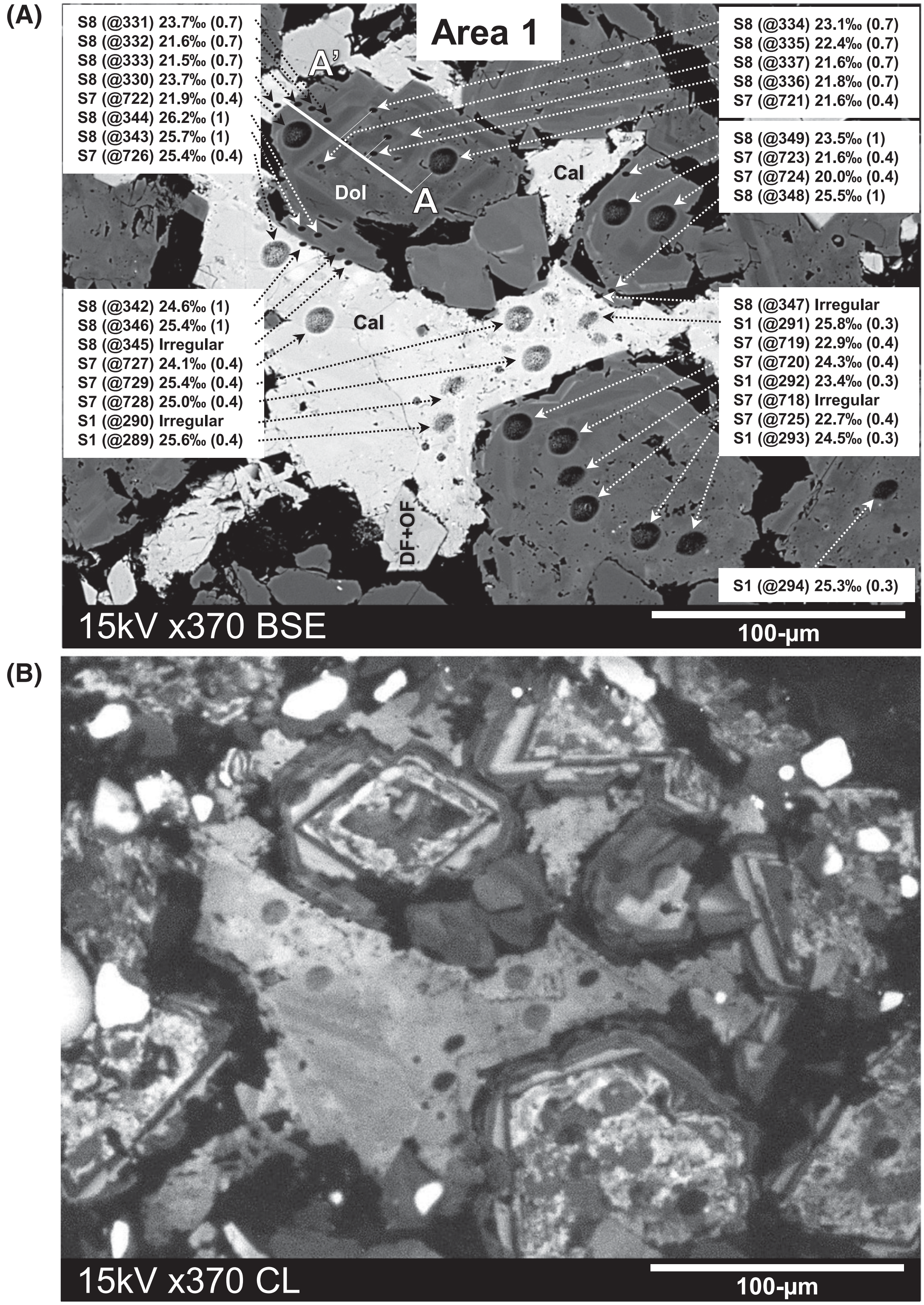


Plate 3. Shaly sandstone sample SS-1 (Wisconsin arch). (A) Backscattered electron (BSE) image of a representative sample region where the $\delta^{18}O$ Vienna standard mean ocean water (VSMOW) of carbonate cements (calcite and dolomite) was analyzed in situ by secondary ion mass spectrometry (SIMS). (B) Corresponding cathodoluminescence (CL) image. Each analysis pit has a unique designation, such as “S8 (@205),” followed by the SIMS bias-corrected $\delta^{18}O$ (VSMOW) value and the two standard deviations value in parentheses; the “S8” is an analytical session designator, whereas the “(@205)” is a unique sample pit identification number for the corresponding session. Refer to Table 2 in the main text and Appendices 1 and 2. Cal = calcite; DF = detrital K-feldspar; Dol = dolomite; OF = overgrowth K-feldspar.

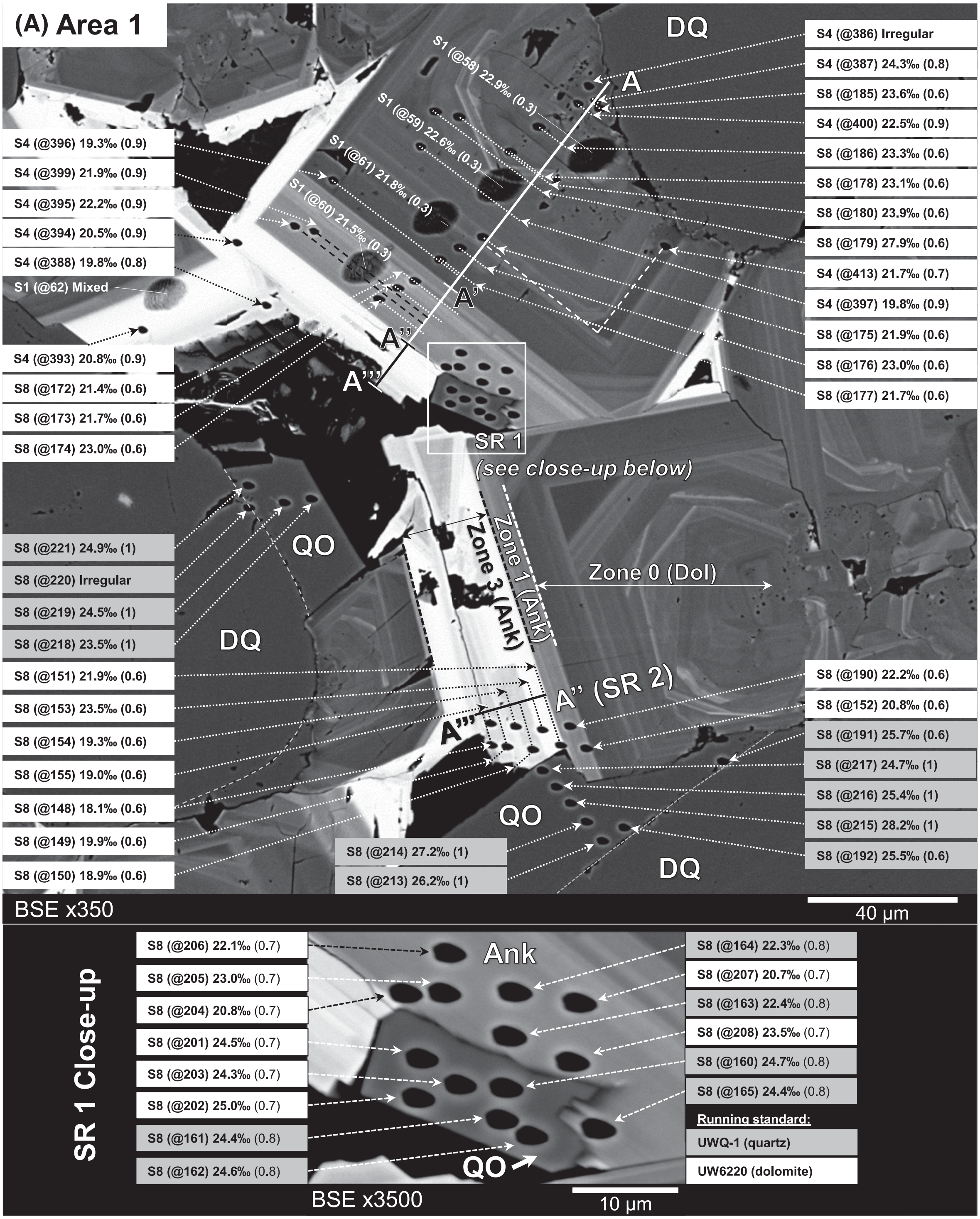
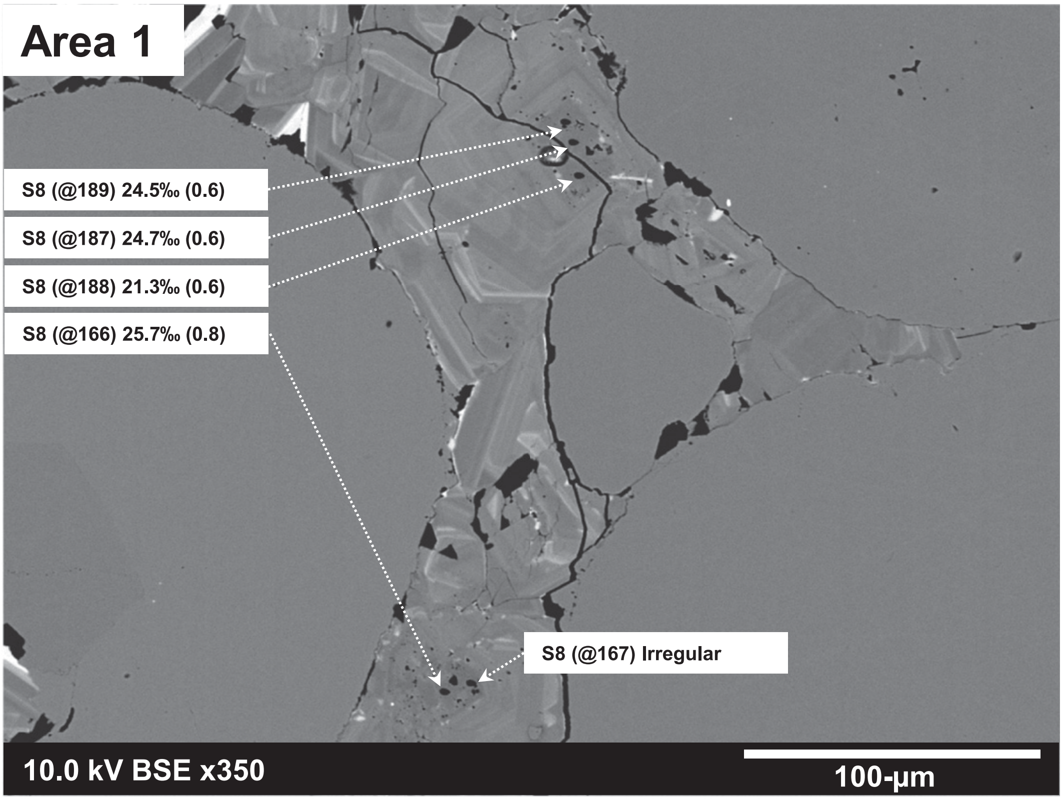


Plate 4. Shaly sandstone sample SS-2 (northern Illinois). (A) Backscattered electron (BSE) image of a representative sample region (Area 1) where the $\delta^{18}O$ Vienna standard mean ocean water (VSMOW) of all dolomite–ankerite cement generations was analyzed in situ by secondary ion mass spectrometry (SIMS). Refer to Plate 1A for corresponding cathodoluminescence (CL) image. (B) The BSE and (C) corresponding CL images of early dolomite cement and the placement of 3-µm SIMS spots within the innermost crystal cores. (D) The BSE image of a supplementary, representative region (Area 2) where dolomite–ankerite cements were analyzed. Each analysis pit has a unique designation, such as "S8 (@205)," followed by the SIMS bias-corrected $\delta^{18}O$ (VSMOW) value and the two standard deviations value in parentheses; the "S8" is an analytical session designator, whereas the "(@205)" is a unique sample pit identification number for the corresponding session. Refer to Table 2 in the main text and Appendices 1 and 2. Ank = ankerite; Dol = dolomite; DQ = detrital quartz; QO = quartz overgrowth; Sr = subregion.

(B)



(C)

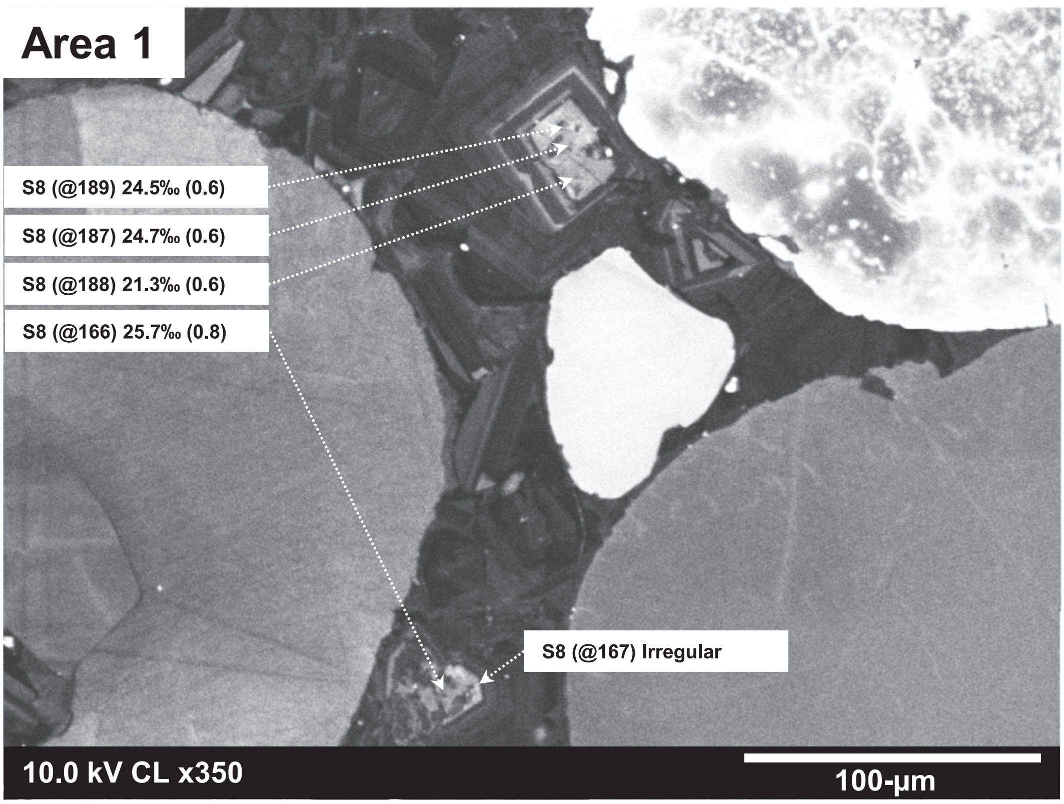


Plate 4. Continued.

(D)

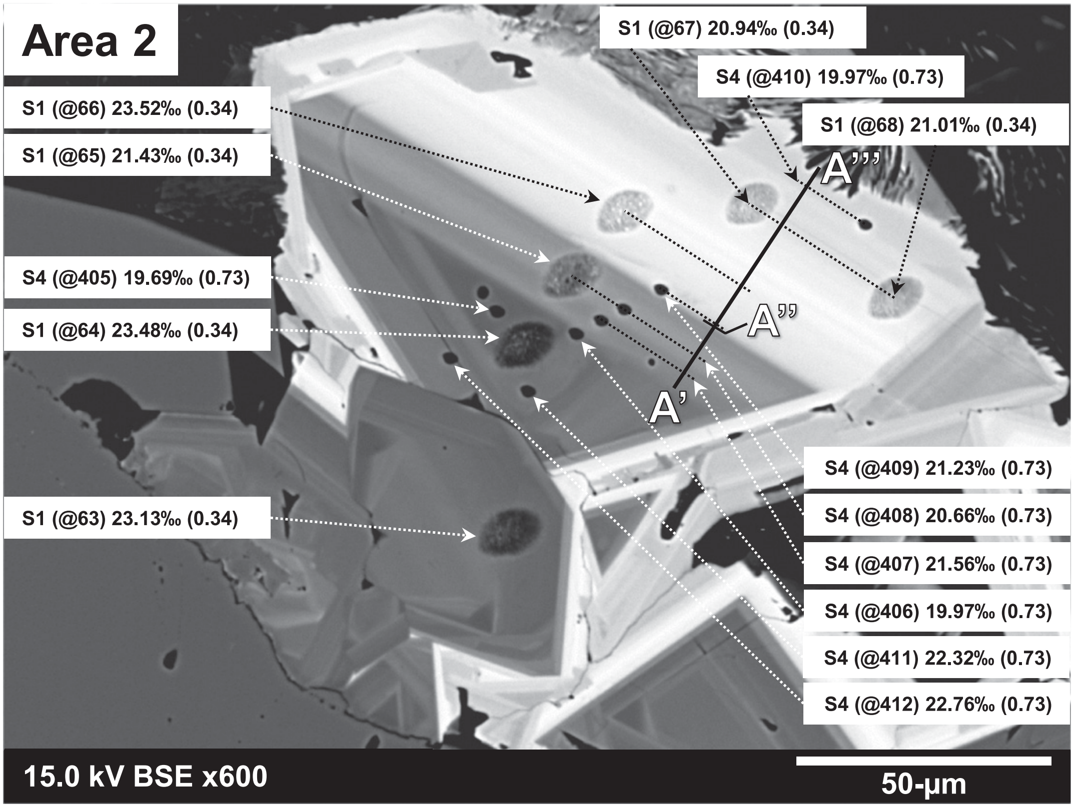


Plate 4. Continued.

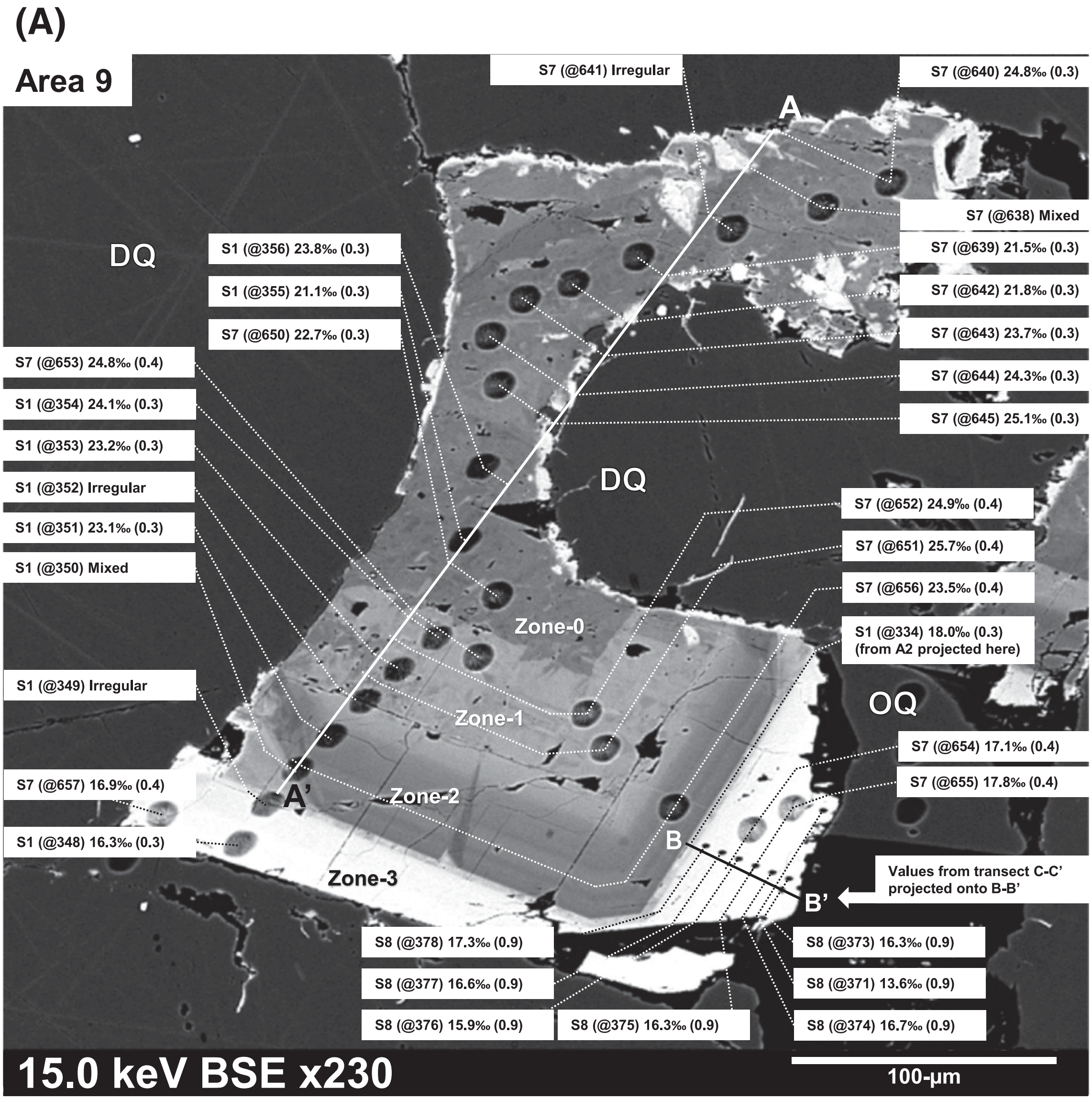
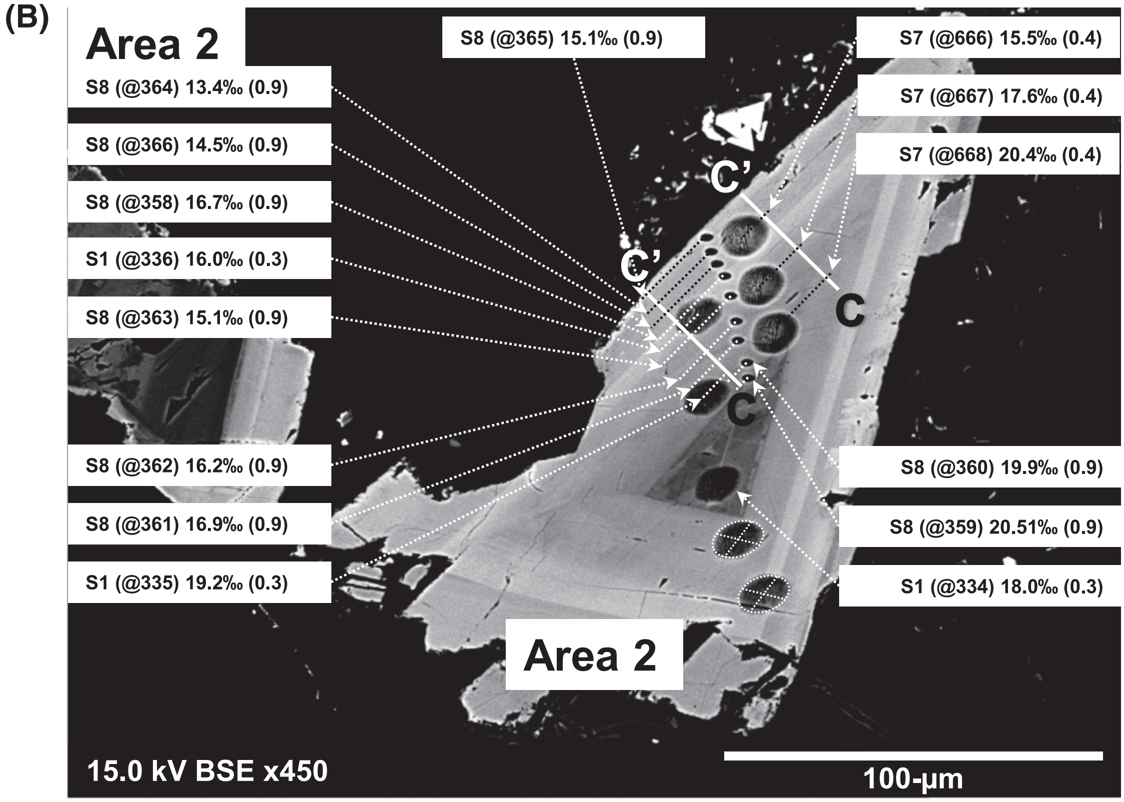


Plate 5. Shaly sandstone sample SS-3 (central Illinois). (A) Backscattered electron (BSE) image of a representative sample region (Area 9) where the $\delta^{18}O$ Vienna standard mean ocean water (VSMOW) of dolomite–ankerite cements was analyzed in situ by secondary ion mass spectrometry (SIMS). Refer to Plate 1B for corresponding cathodoluminescence image. (B, C) Additional regions analyzed (Areas 2 and 6, respectively). Each analysis pit has a unique designation, such as "S8 (@205)," followed by the SIMS bias-corrected $\delta^{18}O$ (VSMOW) value and the two standard deviations value in parentheses; the "S8" is an analytical session designator, whereas the "(@205)" is a unique sample pit identification number for the corresponding session. Refer to Table 2 in the main text and Appendices 1 and 2. Ank = ankerite; Dol = dolomite; DQ = detrital quartz; OQ = quartz overgrowth.



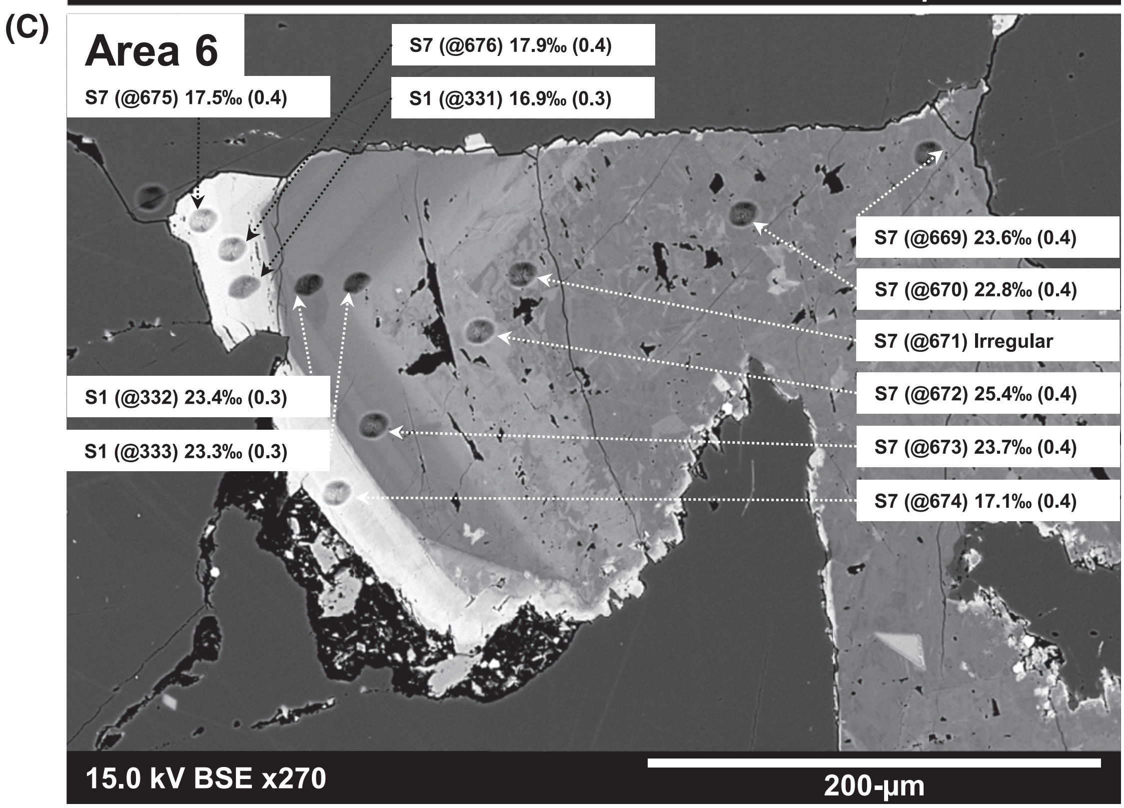


Plate 5. Continued.

APPENDIX 4: COMPLETE SECONDARY ION MASS SPECTROMETRY DATA TABLE: 10-μM SPOT-SIZE SESSIONS

SIMS session S7 (10-μm spot-size): 13-16th May, 2014

Calibration standard mount: WI-STD-80

SIMS pit quality	Notes	File	Comment	$\delta^{18}O$ (‰, VSMOW)	2SD	$\delta^{18}O$ bias (‰, VSMOW)	$\delta^{18}O$ raw	$\delta^{18}O$ (2SE)	^{16}O (E9 cps)	IP(nA)	Yield (E9cps/nA)	date	time	X microns	Y microns	DTFA-X	DTFA-Y	$^{16}O^{1}H/^{16}O$	Sample spot Fe# (Dol-Ank)	Sample spot Ca# (Cal-Dol)
		20140513@240.asc	UWC-3 Grain 4				8.02	0.39	1.937	1.190	1.628	5/14/2014	20:31	869	726	-21	-8	0.000878209	-	-
		20140513@241.asc	UWC-3 Grain 1				7.88	0.36	1.915	1.174	1.631	5/14/2014	20:34	-45	596	-21	-9	0.000916312	-	-
		20140513@242.asc	UWC-3 Grain 2, Cs-res= 183				7.74	0.42	2.045	1.234	1.657	5/14/2014	20:40	192	-365	-19	-10	0.000890493	-	-
		20140513@243.asc	UWC-3 Grain 3				7.66	0.51	2.060	1.244	1.656	5/14/2014	20:44	796	-330	-19	-9	0.000877657	-	-
			average and 2 SD	12.49		-4.61	**7.82**	**0.31**												
		20140513@244.asc	UWQ-1 grain 1				6.79	0.24	1.522	1.241	1.226	5/14/2014	20:49	484	1811	-26	-7	0.000319328	-	-
		20140513@245.asc	UWQ-1 grain 2				7.06	0.44	1.518	1.238	1.226	5/14/2014	20:53	338	2527	-26	-4	0.000293101	-	-
		20140513@246.asc	UWQ-1 grain 2				6.81	0.25	1.515	1.234	1.228	5/14/2014	20:57	198	3378	-28	-2	0.000306439	-	-
		20140513@247.asc	UWQ-1 grain 4				6.84	0.46	1.507	1.228	1.227	5/14/2014	21:00	10	4385	-29	4	0.000293573	-	-
			average and 2 SD	12.33		-5.39	**6.87**	**0.25**												
				*bias**(STD-UW6220)		4.62														
				Prop. error (2SE):		0.26														
		20140513@248.asc	UW6220 dolomite Grain 1				12.40	0.28	2.180	1.219	1.788	5/14/2014	21:05	-1488	759	-22	-9	0.000880465	-	-
		20140513@249.asc	UW6220 dolomite Grain 3				12.17	0.36	2.167	1.213	1.786	5/14/2014	21:09	-2532	1518	-23	-7	0.000918037	-	-
		20140513@250.asc	UW6220 dolomite Grain 4				12.61	0.31	2.138	1.205	1.775	5/14/2014	21:12	-3954	1202	-24	-9	0.000883065	-	-
		20140513@251.asc	UW6220 dolomite Grain 2				12.48	0.32	2.128	1.194	1.782	5/14/2014	21:16	-2908	591	-22	-8	0.00090259	-	-
			average and 2 SD	22.60		-9.96	**12.41**	**0.37**												
				*bias**(STD-UW6220)		0.00														
				Prop. error (2SE):		0.23														
		20140513@252.asc	UWAnk1 Grain 3				13.86	0.17	2.210	1.176	1.879	5/14/2014	21:23	-1215	-2275	-16	-10	0.001079286	-	-
		20140513@253.asc	UWAnk1 Grain 5				13.76	0.17	2.181	1.162	1.878	5/14/2014	21:27	-1221	-4085	-14	-13	0.001118702	-	-
		20140513@254.asc	UWAnk1 Grain 2				13.95	0.18	2.188	1.162	1.883	5/14/2014	21:31	-1853	-4040	-14	-12	0.001080029	-	-
		20140513@255.asc	UWAnk1 Grain 3				14.13	0.22	2.163	1.154	1.874	5/14/2014	21:37	-1359	-2446	-14	-10	0.001093807	-	-
			average and 2 SD	15.88		-1.92	**13.93**	**0.32**												
				*bias**(STD-UW6220)		8.12														
				Prop. error (2SE):		0.28														
		20140513@256.asc	UWC-3 Grain 4				8.09	0.47	1.864	1.151	1.619	5/14/2014	21:41	712	849	-19	-11	0.001160749	-	-
		20140513@257.asc	UWC-3 Grain 1, Cs-res=184				7.62	0.43	1.961	1.187	1.651	5/14/2014	21:46	-70	377	-17	-11	0.000970959	-	-
		20140513@258.asc	UWC-3 Grain 2				7.99	0.44	1.948	1.187	1.641	5/14/2014	21:50	-38	-300	-16	-11	0.001118142	-	-
		20140513@259.asc	UWC-3 Grain 3				7.64	0.38	1.951	1.187	1.643	5/14/2014	21:53	962	-300	-16	-11	0.00096037	-	-
			average and 2 SD	12.49		-4.60	**7.83**	**0.48**												
			bracket average and 2SD	12.49		-4.60	**7.83**	**0.38**												
				*bias**(STD-UW6220)		5.41														
				Prop. error (2SE):		0.23														

SIMS $\delta^{18}O$ *bias* correction model for sample compositions along the dolomite-ankerite solid solution series

Standard	Fe# = [Fe/(Mg+Fe)]	*bias**(STD-UW6220)
UW6220 dolomite	0.004	0.00
UWAnk1	0.522	8.12

$$bias*(\mathrm{STD{-}UW6220}) = \frac{(bias*_{max})x^n}{k^n + x^n}$$

Session-specific constants:

$bias*_{max}$	9.238
n	1.2
k	0.10

x = Fe# [= Fe/(Mg+Fe) molar ratio] of analyzed sample spot

SIMS $\delta^{18}O$ *bias* correction model for sample compositions along the calcite-dolomite solid solution

Standard	Ca/(Mg+Ca) molar ratio	*bias**(STD-UW6220)
UW6220 dolomite	0.501	0
UWC-3 calcite	0.976	5.41

*bias**(STD-UW6220) = 11.389*x* -5.706

x = Ca/(Mg+Ca) molar ratio] of analyzed sample spot

Data lines 20140513@577-633: sample data that is not the subject of this manuscript (ADM CCS#1 5513.2 aka DVW#1 5513.2')

Sample mount: C4006 3857'

SIMS pit quality	Notes	File	Comment	$\delta^{18}O$ (‰, VSMOW)	2SD	$\delta^{18}O$ bias (‰, VSMOW)	$\delta^{18}O$ raw	$\delta^{18}O$ (2SE)	^{16}O (E9 cps)	IP(nA)	Yield (E9cps/nA)	date	time	X microns	Y microns	DTFA-X	DTFA-Y	$^{16}O^{1}H/^{16}O$	Sample spot Fe# (Dol-Ank)	Sample spot Ca# (Cal-Dol)
		20140513@634.asc	C4006 3857 UW6220 dol				12.08	0.33	2.323	1.270	1.829	5/16/2014	0:39	-943	1105	-19	11	0.001976297	-	-
		20140513@635.asc	C4006 3857 UW6220 dol				11.89	0.34	2.313	1.269	1.823	5/16/2014	0:42	-943	1085	-18	12	0.002036046	-	-
		20140513@636.asc	C4006 3857 UW6220 dol				12.07	0.30	2.296	1.266	1.814	5/16/2014	0:46	-943	1065	-18	13	0.002085866	-	-
		20140513@637.asc	C4006 3857 UW6220 dol				12.12	0.28	2.291	1.262	1.815	5/16/2014	0:49	-943	1045	-17	13	0.002115155	-	-
			average and 2 SD	22.60		-10.33	**12.04**	**0.21**												
Regular	Exclude; 'inclusion' of sig. more Fe-rich ank	20140513@638.asc	C4006 3857 A9 Spot 1	-	-	-	19.99	0.35	2.359	1.262	1.869	5/16/2014	0:56	-541	4821	-2	10	0.003107776	-	-
Regular		20140513@639.asc	C4006 3857 A9 Spot 2	21.52	0.31	-4.81	16.60	0.25	2.397	1.256	1.908	5/16/2014	1:00	-611	4808	-3	9	0.002293944	0.140	-
Regular		20140513@640.asc	C4006 3857 A9 Spot 3	24.82	0.31	-4.81	19.89	0.23	2.358	1.252	1.884	5/16/2014	1:05	-517	4829	-3	10	0.002914299	0.140	-
Irregular	Exclude; pit overlaps crack(s)	20140513@641.asc	C4006 3857 A9 Spot 4	-	-	-	18.77	0.21	2.346	1.246	1.883	5/16/2014	1:09	-577	4816	-2	9	0.003312042	-	-
Regular		20140513@642.asc	C4006 3857 A9 Spot 5	21.81	0.31	-4.81	16.89	0.22	2.355	1.242	1.896	5/16/2014	1:13	-639	4800	-3	9	0.002610076	0.140	-
Regular		20140513@643.asc	C4006 3857 A9 Spot 6	23.67	0.31	-4.81	18.75	0.27	2.342	1.236	1.895	5/16/2014	1:17	-656	4798	-3	9	0.002541469	0.140	-
Regular		20140513@644.asc	C4006 3857 A9 Spot 7	24.31	0.31	-4.81	19.39	0.23	2.342	1.234	1.897	5/16/2014	1:21	-671	4783	-3	9	0.002678145	0.140	-
Regular		20140513@645.asc	C4006 3857 A9 Spot 8	25.11	0.31	-4.81	20.18	0.20	2.316	1.230	1.883	5/16/2014	1:25	-667	4764	-3	9	0.002568852	0.140	-
		20140513@646.asc	C4006 3857 UW6220 dol				11.89	0.33	2.168	1.210	1.792	5/16/2014	1:28	-924	1117	-20	14	0.002362652	-	-
		20140513@647.asc	C4006 3857 UW6220 dol				12.39	0.28	2.140	1.202	1.780	5/16/2014	1:33	-924	1097	-19	15	0.002435731	-	-
		20140513@648.asc	C4006 3857 UW6220 dol (Cs res --> 211)				12.04	0.37	2.275	1.261	1.805	5/16/2014	1:38	-924	1077	-19	14	0.002275048	-	-
		20140513@649.asc	C4006 3857 UW6220 dol				12.10	0.32	2.292	1.270	1.804	5/16/2014	1:41	-924	1057	-18	14	0.0022789	-	-
			average and 2 SD	22.60		-10.26	**12.10**	**0.42**												
			bracket average and 2SD	22.60		-10.29	**12.07**	**0.31**												

Regular	1 µm cavity	20140513@650.asc	C4006 3857 A9 Spot 9	22.71	0.39	-4.71	17.89	0.25	2.423	1.281	1.891	5/16/2014 1:46	-677	4687	-2	7	0.00254489	0.140	-
Regular		20140513@651.asc	C4006 3857 A9 Spot 10	25.73	0.39	-3.46	22.19	0.25	2.404	1.280	1.878	5/16/2014 1:51	-640	4625	1	9	0.002502465	0.236	-
Regular		20140513@652.asc	C4006 3857 A9 Spot 11	24.91	0.39	-3.46	21.36	0.20	2.420	1.280	1.891	5/16/2014 1:56	-646	4641	0	8	0.002631153	0.236	-
Regular		20140513@653.asc	C4006 3857 A9 Spot 12	24.79	0.39	-3.46	21.25	0.18	2.397	1.276	1.879	5/16/2014 2:01	-684	4663	-2	7	0.002725245	0.236	-
Regular		20140513@654.asc	C4006 3857 A9 Spot 13	17.07	0.39	-2.27	14.76	0.22	2.359	1.272	1.854	5/16/2014 2:06	-572	4600	1	6	0.002929692	0.475	-
Regular		20140513@655.asc	C4006 3857 A9 Spot 14	17.77	0.39	-2.32	15.41	0.23	2.330	1.267	1.838	5/16/2014 2:12	-588	4591	1	7	0.002578089	0.460	-
Regular		20140513@656.asc	C4006 3857 A9 Spot 15	23.47	0.39	-4.42	18.95	0.23	2.342	1.260	1.858	5/16/2014 2:17	-619	4604	2	8	0.002394663	0.157	-
Regular		20140513@657.asc	C4006 3857 A9 Spot 16	16.94	0.39	-2.37	14.52	0.25	2.405	1.250	1.924	5/16/2014 2:21	-806	4614	-3	8	0.00314304	0.441	-
Regular		20140513@658.asc	C4006 3857 A9 Spot 17 OQ	26.21	0.39	-5.63	20.43	0.32	1.537	1.241	1.238	5/16/2014 2:25	-821	4601	-4	7	0.000465719	N/A	N/A
Regular		20140513@659.asc	C4006 3857 A9 Spot 18 OQ	20.68	0.39	-5.63	14.94	0.35	1.459	1.236	1.181	5/16/2014 2:30	-528	4596	-3	6	0.00046527	N/A	N/A
Regular		20140513@660.asc	C4006 3857 A9 Spot 19 OQ	22.68	0.39	-5.63	16.93	0.36	1.496	1.230	1.216	5/16/2014 2:35	-527	4617	-2	11	0.000470701	N/A	N/A
Regular		20140513@661.asc	C4006 3857 A9 Spot 20 OQ	22.36	0.39	-5.63	16.61	0.41	1.498	1.219	1.229	5/16/2014 2:38	-527	4637	-2	11	0.000487629	N/A	N/A
		20140513@662.asc	C4006 3857 UW6220 dol				12.22	0.31	2.131	1.203	1.771	5/16/2014 2:42	-902	1132	-21	16	0.002323669	-	-
		20140513@663.asc	C4006 3857 UW6220 dol				12.49	0.27	2.113	1.200	1.761	5/16/2014 2:45	-902	1112	-21	17	0.002341435	-	-
		20140513@664.asc	C4006 3857 UW6220 dol (Cs res --> 212)				12.19	0.34	2.255	1.260	1.789	5/16/2014 2:52	-902	1092	-21	14	0.002186834	-	-
		20140513@665.asc	C4006 3857 UW6220 dol				12.06	0.34	2.264	1.266	1.788	5/16/2014 2:56	-902	1072	-20	15	0.002201421	-	-
			average and 2 SD	22.60		-10.13	**12.24**	**0.36**											
			bracket average and 2SD	22.60		-10.20	**12.17**	**0.39**											
Regular		20140513@666.asc	C4006 3857 A2 Spot 1	15.48	0.37	-2.23	13.22	0.19	2.422	1.278	1.896	5/16/2014 3:08	1552	3342	4	0	0.003005103	0.472	-
Regular		20140513@667.asc	C4006 3857 A2 Spot 2	17.63	0.37	-2.31	15.28	0.27	2.407	1.276	1.886	5/16/2014 3:12	1554	3329	4	-1	0.002602542	0.444	-
Regular		20140513@668.asc	C4006 3857 A2 Spot 3	20.41	0.37	-2.26	18.10	0.21	2.372	1.275	1.860	5/16/2014 3:15	1558	3314	5	-1	0.002754983	0.459	-
Regular		20140513@669.asc	C4006 3857 A6 Spot 1	23.61	0.37	-4.66	18.84	0.26	2.400	1.271	1.889	5/16/2014 3:22	1754	4242	2	7	0.002290889	0.140	-
Regular		20140513@670.asc	C4006 3857 A6 Spot 2	22.76	0.37	-4.66	17.99	0.33	2.376	1.267	1.875	5/16/2014 3:26	1674	4219	4	6	0.002285892	0.140	-
Regular	Mixed analysis[a]; exclude	20140513@671.asc	C4006 3857 A6 Spot 3	-	-	-	17.67	0.25	2.371	1.263	1.877	5/16/2014 3:30	1580	4191	3	6	0.002353653	-	-
Regular		20140513@672.asc	C4006 3857 A6 Spot 4	25.43	0.37	-3.43	21.91	0.25	2.360	1.258	1.875	5/16/2014 3:34	1560	4167	3	5	0.002511723	0.233	-
Regular		20140513@673.asc	C4006 3857 A6 Spot 5	23.68	0.37	-4.36	19.22	0.23	2.367	1.250	1.893	5/16/2014 3:39	1514	4126	2	5	0.002345711	0.157	-
Regular		20140513@674.asc	C4006 3857 A6 Spot 6	17.11	0.37	-2.26	14.81	0.20	2.365	1.245	1.900	5/16/2014 3:43	1499	4099	3	5	0.002608556	0.460	-
Regular		20140513@675.asc	C4006 3857 A6 Spot 7	17.52	0.37	-2.22	15.27	0.26	2.404	1.236	1.945	5/16/2014 3:47	1441	4218	4	8	0.002548695	0.475	-
Regular		20140513@676.asc	C4006 3857 A6 Spot 8	17.90	0.37	-2.26	15.60	0.23	2.347	1.232	1.904	5/16/2014 3:52	1453	4204	3	7	0.002529564	0.460	-
Irregular	Exclude; pit overlaps crack(s)	20140513@677.asc	C4006 3857 A6 Spot 9 OQ	-	-	-	14.57	0.27	1.515	1.223	1.239	5/16/2014 3:56	1421	4228	3	9	0.000468875	N/A	N/A
		20140513@678.asc	C4006 3857 UW6220 dol				12.18	0.42	2.218	1.210	1.833	5/16/2014 4:00	-988	1113	-17	12	0.00226776	-	-
		20140513@679.asc	C4006 3857 UW6220 dol				12.53	0.35	2.201	1.206	1.825	5/16/2014 4:04	-988	1093	-17	12	0.002306825	-	-
		20140513@680.asc	C4006 3857 UW6220 dol (Cs res --> 213)				12.11	0.34	2.321	1.261	1.840	5/16/2014 4:10	-988	1073	-17	10	0.002191431	-	-
		20140513@681.asc	C4006 3857 UW6220 dol				12.05	0.31	2.327	1.266	1.838	5/16/2014 4:14	-988	1053	-16	9	0.002172219	-	-
			average and 2 SD	22.60		-10.15	**12.22**	**0.43**											
			bracket average and 2SD	22.60		-10.14	**12.23**	**0.37**											

Data lines 20140513@682-713: sample data that is not the subject of this manuscript (C131467 294.5')

Sample mount: C131467 277.9' A1

		20140513@714.asc	C131467 277.9 A1 UW6220 dol				12.61	0.37	2.408	1.269	1.897	5/16/2014 6:41	-184	-2553	-8	18	0.000835021	-	-
		20140513@715.asc	C131467 277.9 A1 UW6220 dol				12.30	0.35	2.416	1.271	1.900	5/16/2014 6:44	-184	-2573	-8	17	0.000765759	-	-
		20140513@716.asc	C131467 277.9 A1 UW6220 dol				12.22	0.36	2.414	1.271	1.898	5/16/2014 6:47	-184	-2593	-8	15	0.000704546	-	-
		20140513@717.asc	C131467 277.9 A1 UW6220 dol				12.36	0.46	2.413	1.272	1.897	5/16/2014 6:51	-184	-2613	-8	13	0.0006629	-	-
			average and 2 SD	22.60		-10.00	**12.37**	**0.33**											
Irregular	Exclude; Kspar intergrowth(s)	20140513@718.asc	C131467 277.9 A3 Spot 1	-	-	-	13.53	0.35	2.362	1.271	1.858	5/16/2014 6:55	-2736	2928	-9	11	0.003211922	-	-
Regular		20140513@719.asc	C131467 277.9 A3 Spot 2	22.90	0.35	-8.94	13.76	0.42	2.365	1.270	1.863	5/16/2014 6:59	-2759	2965	-9	11	0.000773054	0.018	-
Regular		20140513@720.asc	C131467 277.9 A3 Spot 3	24.32	0.35	-9.78	14.30	0.34	2.348	1.265	1.856	5/16/2014 7:03	-2740	2955	-10	12	0.001696763	0.004	-
Regular		20140513@721.asc	C131467 277.9 A3 Spot 4	21.62	0.35	-8.57	12.86	0.30	2.358	1.265	1.865	5/16/2014 7:07	-2773	3071	-9	12	0.00080971	0.024	-
Regular		20140513@722.asc	C131467 277.9 A3 Spot 5	21.86	0.35	-8.63	13.04	0.37	2.339	1.263	1.852	5/16/2014 7:11	-2831	3085	-8	14	0.000495807	0.023	-
Regular		20140513@723.asc	C131467 277.9 A3 Spot 6	21.59	0.35	-7.69	13.73	0.29	2.353	1.258	1.870	5/16/2014 7:16	-2708	3044	-9	13	0.000513198	0.040	-
Regular		20140513@724.asc	C131467 277.9 A3 Spot 7	20.01	0.35	-8.34	11.50	0.29	2.341	1.256	1.864	5/16/2014 7:20	-2694	3040	-9	13	0.000477148	0.028	-
Regular		20140513@725.asc	C131467 277.9 A3 Spot 8	22.68	0.35	-9.18	13.29	0.19	2.346	1.249	1.878	5/16/2014 7:24	-2712	2916	-9	13	0.002030022	0.014	-
Regular		20140513@726.asc	C131467 277.9 A3 Spot 9 Cal	25.44	0.35	-4.74	20.58	0.48	2.021	1.246	1.622	5/16/2014 7:28	-2842	3043	-8	14	0.00208856	-	0.965
Regular		20140513@727.asc	C131467 277.9 A3 Spot 10 Cal	24.05	0.35	-4.74	19.20	0.45	2.008	1.242	1.617	5/16/2014 7:32	-2828	3013	-9	13	0.000729301	-	0.965
Regular		20140513@728.asc	C131467 277.9 A3 Spot 11 Cal	24.99	0.35	-4.82	20.05	0.43	2.002	1.236	1.619	5/16/2014 7:36	-2748	2992	-9	13	0.001187715	-	0.958
Regular		20140513@729.asc	C131467 277.9 A3 Spot 12 Cal	25.37	0.35	-4.82	20.43	0.50	1.992	1.230	1.620	5/16/2014 7:40	-2754	3008	-9	13	0.002704909	-	0.958
		20140513@730.asc	C131467 277.9 UW6220 dol				12.35	0.31	2.295	1.219	1.882	5/16/2014 7:44	-163	-2558	-2	18	0.000468533	-	-
		20140513@731.asc	C131467 277.9 UW6220 dol				12.70	0.37	2.283	1.216	1.877	5/16/2014 7:47	-163	-2578	-2	16	0.000529109	-	-
		20140513@732.asc	C131467 277.9 UW6220 dol (Cs res --> 216)				12.47	0.35	2.425	1.269	1.912	5/16/2014 7:53	-148	-2591	-3	14	0.000427054	-	-
		20140513@733.asc	C131467 277.9 UW6220 dol				12.22	0.34	2.426	1.269	1.912	5/16/2014 7:57	-148	-2611	-3	12	0.000416608	-	-
			average and 2 SD	22.60		-9.94	**12.44**	**0.41**											
			bracket average and 2SD	22.60		-9.97	**12.40**	**0.35**											
Regular		20140513@734.asc	C131467 277.9 A5 Spot 1	24.96	0.27	-9.19	15.55	0.40	2.374	1.268	1.872	5/16/2014 8:02	-2189	4326	-6	32	0.001108577	0.013	-
Regular		20140513@735.asc	C131467 277.9 A5 Spot 2	22.69	0.27	-9.31	13.17	0.37	2.367	1.266	1.869	5/16/2014 8:06	-2168	4414	-7	34	0.00120266	0.011	-
Regular		20140513@736.asc	C131467 277.9 A5 Spot 3	24.20	0.27	-9.37	14.61	0.45	2.378	1.268	1.875	5/16/2014 8:10	-2222	4444	-6	34	0.001710375	0.010	-
Regular		20140513@737.asc	C131467 277.9 A5 Spot 4	27.03	0.27	-9.06	17.72	0.24	2.372	1.268	1.870	5/16/2014 8:14	-2153	4305	-6	33	0.000875986	0.015	-
Regular		20140513@738.asc	C131467 277.9 A5 Spot 5	21.63	0.27	-9.13	12.30	0.40	2.358	1.269	1.858	5/16/2014 8:19	-2280	4423	-6	34	0.001001629	0.014	-
Regular	1 µm cavities	20140513@739.asc	C131467 277.9 A5 Spot 6	25.00	0.27	-9.06	15.71	0.42	2.366	1.271	1.861	5/16/2014 8:23	-2132	4292	-6	34	0.000970656	0.015	-
		20140513@740.asc	C131467 277.9 UW6220 dol				12.48	0.41	2.406	1.268	1.897	5/16/2014 8:27	-130	-2582	-4	15	0.000499053	-	-
		20140513@741.asc	C131467 277.9 UW6220 dol				12.53	0.34	2.397	1.268	1.890	5/16/2014 8:30	-130	-2602	-4	14	0.000459223	-	-
		20140513@742.asc	C131467 277.9 UW6220 dol				12.46	0.30	2.399	1.268	1.893	5/16/2014 8:34	-125	-2622	-4	12	0.000384362	-	-
		20140513@743.asc	C131467 277.9 UW6220 dol				12.47	0.37	2.395	1.268	1.888	5/16/2014 8:37	-125	-2642	-4	11	0.000362379	-	-
			average and 2 SD	22.60		-9.89	**12.49**	**0.06**											
			bracket average and 2SD	22.60		-9.91	**12.46**	**0.27**											

SIMS session S1 (10-µm spot-size): 23-25th September, 2013

Calibration standard mount: WI-STD-80

20130923@23.asc	WI-STD 80 UWC-3, Grain 2				9.12	0.31	1.875	1.137	1.649	9/23/2013 18:44	-453	874	-5	2	1.853E-03	-	-
20130923@24.asc	WI-STD 80 UWC-3, Grain 2				9.31	0.36	1.860	1.132	1.643	9/23/2013 18:47	-446	844	-3	3	1.757E-03	-	-
20130923@25.asc	WI-STD 80 UWC-3, Grain 2				9.30	0.32	1.846	1.127	1.638	9/23/2013 18:50	-437	804	-3	3	1.737E-03	-	-
20130923@26.asc	WI-STD 80 UWC-3, Grain 2				9.45	0.34	1.836	1.121	1.638	9/23/2013 18:53	-474	775	-2	3	1.735E-03	-	-
	average and 2 SD				**9.29**	**0.27**											
20130923@27.asc	WI-STD 80 UW6220 Dol Grain 1				13.33	0.24	2.028	1.111	1.826	9/23/2013 18:57	1065	-254	-13	2	1.536E-03	-	-
20130923@28.asc	WI-STD 80 UW6220 Dol Grain 1				13.50	0.37	2.012	1.105	1.820	9/23/2013 19:01	1047	-278	-13	2	1.546E-03	-	-
20130923@29.asc	WI-STD 80 UW6220 Dol Grain 1				13.10	0.27	2.004	1.100	1.823	9/23/2013 19:04	1100	-216	-13	3	1.663E-03	-	-
20130923@30.asc	WI-STD 80 UW6220 Dol Grain 1				13.32	0.27	1.989	1.095	1.816	9/23/2013 19:07	1020	-230	-13	3	1.574E-03	-	-
	average and 2 SD	22.60		-9.08	**13.31**	**0.33**											
		*bias**(STD-UW6220)		0.00													
		Prop. error (2SE):		0.20													

				*bias**(STD-UWQ-1)		-3.89													
				Prop. error (2SE):		0.25													
		20130923@31.asc	UWAnk1 Grain 2				14.64	0.25	2.077	1.085	1.915	9/23/2013 19:13	567	4515	-5	21	1.791E-03	-	-
		20130923@32.asc	UWAnk1 Grain 2				14.49	0.23	2.078	1.078	1.928	9/23/2013 19:16	577	4493	-5	19	1.784E-03	-	-
		20130923@33.asc	UWAnk1 Grain 2				14.51	0.36	2.063	1.075	1.919	9/23/2013 19:19	583	4468	-5	19	1.904E-03	-	-
		20130923@34.asc	UWAnk1 Grain 2				14.45	0.27	2.048	1.070	1.913	9/23/2013 19:23	534	4481	-4	20	1.807E-03	-	-
			average and 2 SD	15.88		-1.34	**14.52**	**0.17**											
				*bias**(STD-UW6220)		7.82													
				Prop. error (2SE):		0.21													
				*bias**(STD-UWQ-1)		3.89													
				Prop. error (2SE):		0.20													
		20130923@38.asc	WI-STD 80 UWQ-1 Grain 1				6.94	0.29	1.387	1.119	1.239	9/23/2013 19:45	-516	-1666	-27	-1	5.110E-04	-	-
		20130923@39.asc	WI-STD 80 UWQ-1 Grain 1 (inclusion?)			7.761		0.41	1.390	1.115	1.247	9/23/2013 19:49	-520	-1612	-15	0	5.056E-04	-	-
		20130923@40.asc	WI-STD 80 UWQ-1 Grain 1				6.91	0.47	1.387	1.112	1.248	9/23/2013 19:52	-537	-1571	-15	0	5.156E-04	-	-
		20130923@41.asc	WI-STD 80 UWQ-1 Grain 1				7.23	0.29	1.378	1.106	1.246	9/23/2013 19:55	-577	-1607	-15	-2	5.156E-04	-	-
		20130923@42.asc	WI-STD 80 UWQ-1 Grain 1				7.14	0.32	1.368	1.102	1.241	9/23/2013 19:59	-556	-1639	-15	-2	5.279E-04	-	-
			average and 2 SD	12.33		-5.21	**7.06**	**0.31**											
				*bias**(STD-UW6220)		3.91													
				Prop. error (2SE):		0.25													
		20130923@43.asc	WI-STD 80 UWC-3, Grain 2				8.98	0.39	1.823	1.097	1.662	9/23/2013 20:03	-412	908	-2	2	1.873E-03	-	-
		20130923@44.asc	WI-STD 80 UWC-3, Grain 2				9.23	0.42	1.810	1.093	1.656	9/23/2013 20:06	-388	867	-2	2	1.857E-03	-	-
		20130923@45.asc	WI-STD 80 UWC-3, Grain 2				9.24	0.32	1.803	1.089	1.655	9/23/2013 20:09	-381	811	-2	2	1.884E-03	-	-
		20130923@46.asc	WI-STD 80 UWC-3, Grain 2				9.35	0.30	1.793	1.085	1.653	9/23/2013 20:12	-500	827	-2	3	1.874E-03	-	-
			average and 2 SD	12.49		-3.25	**9.20**	**0.31**											
			bracket average and 2SD	12.49		-3.20	**9.25**	**0.29**											
				*bias**(STD-UWQ-1)		2.02													
				Prop. error (2SE):		0.20													

SIMS δ^{18}O *bias* correction model for sample compositions along the dolomite-ankerite solid solution series

Standard	Fe# = [Fe/(Mg+Fe)]	*bias**(STD-UW6220)
UW6220 dolomite	0.004	0.00
UWAnk1	0.522	7.82

$$bias*(\mathrm{STD{-}UW6220}) = \frac{(bias*_{max})x^n}{k^n + x^n}$$

Session-specific constants:

$bias^*_{max}$	8.896
n	1.2
k	0.10

x = Fe# [= Fe/(Mg+Fe) molar ratio] of analyzed sample spot

SIMS δ^{18}O *bias* correction model for sample compositions along the calcite-dolomite solid solution

Standard	Ca/(Mg+Ca) molar ratio	*bias**(STD-UWQ-1)
UW6220 dolomite	0.501	-3.89
UWC-3 calcite	0.976	2.02

*bias**(STD-UWQ-1) = 12.45*x* -10.13

x = Ca/(Mg+Ca) molar ratio] of analyzed sample spot

Sample mount: C12996 1217.3'

		20130924@51.asc	C12996 1217.3 UWQ-1 lower grain			7.429		0.36	1.314	1.039	1.264	9/24/2013 8:48	-138	-228	9	8	4.270E-04	-	-
		20130924@52.asc	C12996 1217.3 UWQ-1 lower grain			7.442		0.45	1.305	1.032	1.265	9/24/2013 8:52	-108	-216	8	9	4.364E-04	-	-
		20130924@53.asc	C12996 1217.3 UWQ-1 lower grain			7.325		0.40	1.298	1.027	1.264	9/24/2013 8:56	-77	-206	8	8	4.448E-04	-	-
		20130924@54.asc	C12996 1217.3 UWQ-1 lower grain				6.86	0.31	1.289	1.023	1.260	9/24/2013 9:00	-53	-188	7	8	4.532E-04	-	-
		20130924@55.asc	C12996 1217.3 UWQ-1 lower grain				6.81	0.43	1.275	1.017	1.254	9/24/2013 9:04	-12	-196	6	8	4.631E-04	-	-
		20130924@56.asc	C12996 1217.3 UWQ-1 lower grain				6.69	0.37	1.260	1.009	1.249	9/24/2013 9:08	15	-185	6	8	4.742E-04	-	-
		20130924@57.asc	C12996 1217.3 UWQ-1 lower grain				7.16	0.36	1.254	1.003	1.250	9/24/2013 9:12	43	-175	6	8	4.759E-04	-	-
			average and 2 SD	12.33		-5.38	**6.88**	**0.39**											
Regular		20130924@58.asc	C12996 1217.3 Area1 ROI 1 Spot1	23.13	0.34	-7.12	15.84	0.31	1.875	0.985	1.903	9/24/2013 9:22	-934	-1342	11	0	2.637E-03	0.037	-
Regular		20130924@59.asc	C12996 1217.3 Area1 ROI 1 Spot2	22.83	0.34	-6.08	16.62	0.21	1.880	0.980	1.919	9/24/2013 9:26	-961	-1349	12	0	2.400E-03	0.060	-
Regular		20130924@60.asc	C12996 1217.3 Area1 ROI 1 Spot3	21.26	0.34	-2.66	18.54	0.28	1.866	0.974	1.916	9/24/2013 9:32	-995	-1368	13	0	2.661E-03	0.238	-
Regular		20130924@61.asc	C12996 1217.3 Area1 ROI 1 Spot4	22.00	0.34	-6.12	15.75	0.22	1.849	0.970	1.907	9/24/2013 9:36	-976	-1355	12	0	2.448E-03	0.059	-
Regular		20130924@62.asc	C12996 1217.3 Area1 ROI 1 Spot5	22.99	0.34	-1.25	21.71	0.27	1.917	0.962	1.993	9/24/2013 9:40	-1049	-1374	13	0	2.788E-03	0.617	-
Regular		20130924@63.asc	C12996 1217.3 Area2 ROI 2 Spot1	23.13	0.34	-7.17	15.79	0.37	1.788	0.952	1.878	9/24/2013 9:46	-1684	-2350	16	-8	2.524E-03	0.036	-
Regular		20130924@64.asc	C12996 1217.3 Area2 ROI 2 Spot2	23.48	0.34	-7.88	15.41	0.33	1.763	0.948	1.859	9/24/2013 9:51	-1680	-2312	17	-8	2.528E-03	0.023	-
Regular		20130924@65.asc	C12996 1217.3 Area2 ROI 2 Spot3	21.43	0.34	-2.41	18.96	0.34	1.785	0.945	1.890	9/24/2013 9:55	-1668	-2301	17	-8	2.765E-03	0.270	-
Regular		20130924@66.asc	C12996 1217.3 Area2 ROI 2 Spot4	23.52	0.34	-1.20	22.29	0.21	1.886	0.942	2.003	9/24/2013 9:58	-1657	-2288	18	-8	2.893E-03	0.650	-
Regular		20130924@67.asc	C12996 1217.3 Area2 ROI 2 Spot5	20.94	0.34	-1.31	19.60	0.35	1.834	0.937	1.957	9/24/2013 10:02	-1632	-2288	18	-8	2.870E-03	0.581	-
Regular		20130924@68.asc	C12996 1217.3 Area2 ROI 2 Spot6	21.01	0.34	-1.31	19.67	0.30	1.822	0.934	1.950	9/24/2013 10:06	-1608	-2309	18	-10	2.895E-03	0.581	-
		20130924@69.asc	C12996 1217.3 UWQ-1 lower grain				6.98	0.36	1.176	0.926	1.270	9/24/2013 10:10	-152	-212	2	6	5.282E-04	-	-
		20130924@70.asc	C12996 1217.3 UWQ-1 lower grain Cs-Res=187				7.17	0.42	1.286	1.012	1.271	9/24/2013 10:20	-126	-203	3	7	4.879E-04	-	-
		20130924@71.asc	C12996 1217.3 UWQ-1 lower grain				6.94	0.39	1.295	1.021	1.268	9/24/2013 10:23	-102	-194	3	7	4.837E-04	-	-
		20130924@72.asc	C12996 1217.3 UWQ-1 lower grain				7.10	0.32	1.295	1.023	1.267	9/24/2013 10:27	-79	-187	3	7	4.805E-04	-	-
			average and 2 SD	12.33		-5.22	**7.05**	**0.21**											
			bracket average and 2SD	12.33		-5.30	**6.96**	**0.34**											
Regular		20130924@73.asc	C12996 1217.3 Area3 ROI 3 Spot1	23.18	0.29	-1.05	22.11	0.20	1.986	1.026	1.937	9/24/2013 10:37	-2535	-2198	11	-10	2.687E-03	0.619	-
Regular	Mixed analysis[(a)]; exclude	20130924@74.asc	C12996 1217.3 Area3 ROI 3 Spot2	-	-	-	18.18	0.34	1.911	1.023	1.868	9/24/2013 10:40	-2538	-2182	11	-11	2.565E-03	-	-
Regular		20130924@75.asc	C12996 1217.3 Area3 ROI 3 Spot3	22.18	0.29	-7.69	14.32	0.29	1.902	1.019	1.867	9/24/2013 10:44	-2541	-2166	11	-9	2.398E-03	0.023	-
Irregular	Large cavity in pit + mixed analysis[(a)]; exclude	20130924@76.asc	C12996 1217.3 Area3 ROI 3 Spot4	-	-	-	19.39	0.24	1.906	1.013	1.880	9/24/2013 10:48	-2634	-2072	10	-9	2.863E-03	-	-
Regular	Mixed analysis[(a)]; exclude	20130924@77.asc	C12996 1217.3 Area3 ROI 3 Spot5	-	-	-	19.87	0.32	1.936	1.009	1.918	9/24/2013 10:51	-2627	-2086	10	-9	2.697E-03	-	-
Regular	Mixed analysis[(a)]; exclude	20130924@78.asc	C12996 1217.3 Area3 ROI 3 Spot6	-	-	-	18.16	0.21	1.890	1.004	1.882	9/24/2013 10:55	-2616	-2098	10	-10	2.628E-03	-	-
Regular	Mixed analysis[(a)]; exclude	20130924@79.asc	C12996 1217.3 Area3 ROI 3 Spot7	-	-	-	18.04	0.26	1.880	0.999	1.882	9/24/2013 10:59	-2606	-2113	10	-10	2.605E-03	-	-
Regular		20130924@80.asc	C12996 1217.3 Area3 ROI 4 Spot1	22.57	0.29	-6.53	15.89	0.24	1.870	0.991	1.887	9/24/2013 11:03	-2443	-2307	10	-12	2.448E-03	0.045	-
Regular		20130924@81.asc	C12996 1217.3 Area3 ROI 4 Spot2	21.06	0.29	-6.21	14.71	0.26	1.865	0.989	1.886	9/24/2013 11:07	-2428	-2307	10	-13	2.493E-03	0.052	-
Regular		20130924@82.asc	C12996 1217.3 Area3 ROI 4 Spot3	21.17	0.29	-2.76	18.36	0.27	1.872	0.982	1.907	9/24/2013 11:11	-2407	-2311	10	-13	2.685E-03	0.207	-
Regular		20130924@83.asc	C12996 1217.3 Area3 ROI 4 Spot4	23.19	0.29	-1.03	22.13	0.29	1.951	0.977	1.997	9/24/2013 11:14	-2391	-2311	8	-14	2.812E-03	0.632	-
Regular		20130924@84.asc	C12996 1217.3 Area3 ROI 4 Spot5	21.61	0.29	-1.15	20.44	0.35	1.945	0.966	2.014	9/24/2013 11:18	-2371	-2315	8	-13	2.871E-03	0.559	-
Regular	No EPMA data	20130924@85.asc	C12996 1217.3 Area3 ROI 4 Spot6	-	-	-	15.37	0.28	1.817	0.964	1.885	9/24/2013 11:24	-2407	-2376	8	-9	2.556E-03	-	-

		20130924@86.asc	C12996 1217.3 UWQ-1 lower grain (beam pos. not checked)			7.443		0.40	1.210	0.957	1.264	9/24/2013 11:28	-159	-183	-13	7	5.216E-04	-	-
		20130924@87.asc	C12996 1217.3 UWQ-1 lower grain Cs-Res=189 (beam pos. not checked)			7.047		0.33	1.359	1.087	1.250	9/24/2013 11:46	-144	-166	-14	7	4.707E-04	-	-
		20130924@88.asc	C12996 1217.3 UWQ-1 lower grain				7.25	0.22	1.358	1.072	1.267	9/24/2013 11:54	-115	-171	-2	7	4.650E-04	-	-
		20130924@89.asc	C12996 1217.3 UWQ-1 lower grain				7.31	0.40	1.347	1.070	1.259	9/24/2013 11:57	-93	-161	-3	7	4.682E-04	-	-
		20130924@90.asc	C12996 1217.3 UWQ-1 lower grain				7.30	0.34	1.339	1.069	1.253	9/24/2013 12:00	-71	-151	-3	8	4.761E-04	-	-
		20130924@91.asc	C12996 1217.3 UWQ-1 lower grain				7.26	0.31	1.329	1.061	1.253	9/24/2013 12:04	-51	-144	-3	7	4.779E-04	-	-
			average and 2 SD	12.33		-4.99	**7.28**	**0.05**											
			bracket average and 2SD	12.33		-5.10	**7.16**	**0.29**											
Regular	Mixed analysis[a]; exclude	20130924@92.asc	C12996 1217.3 Area4 ROI 5 Spot1	-	-	-	18.52	0.26	2.010	1.049	1.916	9/24/2013 12:13	-1811	-4141	11	-18	2.510E-03	-	-
Regular		20130924@93.asc	C12996 1217.3 Area4 ROI 5 Spot2	23.71	0.24	-5.85	17.71	0.27	1.996	1.044	1.911	9/24/2013 12:16	-1791	-4144	10	-18	2.385E-03	0.059	-
Regular		20130924@94.asc	C12996 1217.3 Area4 ROI 5 Spot3	21.03	0.24	-6.61	14.28	0.28	1.975	1.041	1.898	9/24/2013 12:20	-1771	-4147	9	-17	2.391E-03	0.042	-
Regular		20130924@95.asc	C12996 1217.3 Area4 ROI 5 Spot4	19.83	0.24	-7.28	12.40	0.26	1.960	1.036	1.892	9/24/2013 12:23	-1751	-4151	9	-17	2.610E-03	0.029	-
Irregular	Mixed analysis[a]; exclude	20130924@96.asc	C12996 1217.3 Area4 ROI 5 Spot5	-	-	-	16.08	0.30	1.957	1.031	1.898	9/24/2013 12:27	-1732	-4155	9	-17	3.397E-03	-	-
Regular		20130924@97.asc	C12996 1217.3 Area4 ROI 5 Spot6	20.99	0.24	-1.12	19.85	0.28	1.980	1.022	1.937	9/24/2013 12:31	-1773	-4082	9	-18	2.633E-03	0.543	-
Regular	Mixed analysis[a]; exclude	20130924@98.asc	C12996 1217.3 Area4 ROI 5 Spot7	-	-	-	19.12	0.25	1.959	1.018	1.924	9/24/2013 12:35	-1772	-4193	9	-18	2.485E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@99.asc	C12996 1217.3 Area4 ROI 6 Spot1	-	-	-	20.96	0.21	1.970	1.013	1.944	9/24/2013 12:39	-1849	-4313	11	-20	2.665E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@100.asc	C12996 1217.3 Area4 ROI 6 Spot2	-	-	-	15.94	0.34	1.898	1.009	1.881	9/24/2013 12:43	-1867	-4315	11	-19	2.462E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@101.asc	C12996 1217.3 Area4 ROI 6 Spot3	-	-	-	14.18	0.22	1.903	1.002	1.899	9/24/2013 12:47	-1884	-4318	11	-18	2.483E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@102.asc	C12996 1217.3 Area4 ROI 6 Spot4	-	-	-	16.16	0.31	1.908	1.000	1.908	9/24/2013 12:50	-1916	-4324	11	-18	2.425E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@103.asc	C12996 1217.3 Area4 ROI 6 Spot5	-	-	-	15.15	0.28	1.902	0.997	1.908	9/24/2013 12:54	-1925	-4341	10	-20	2.439E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@104.asc	C12996 1217.3 Area4 ROI 6 Spot6	-	-	-	14.91	0.33	1.865	0.986	1.891	9/24/2013 13:01	-2005	-4272	9	-18	2.718E-03	-	-
Regular	Mixed analysis[a]; exclude	20130924@105.asc	C12996 1217.3 Area4 ROI 6 Spot7	-	-	-	13.45	0.31	1.854	0.982	1.889	9/24/2013 13:06	-2049	-4316	9	-18	3.023E-03	-	-
		20130924@106.asc	C12996 1217.3 UWQ-1 lower grain				7.14	0.30	1.229	0.977	1.259	9/24/2013 13:11	-77	-226	8	2	4.956E-04	-	-
		20130924@107.asc	C12996 1217.3 UWQ-1 lower grain				7.14	0.26	1.229	0.972	1.264	9/24/2013 13:14	-56	-227	7	2	5.027E-04	-	-
		20130924@108.asc	C12996 1217.3 UWQ-1 lower grain Cs-Res=190				7.03	0.32	1.279	1.010	1.266	9/24/2013 13:19	-35	-224	7	4	4.837E-04	-	-
		20130924@109.asc	C12996 1217.3 UWQ-1 lower grain				7.40	0.46	1.286	1.023	1.257	9/24/2013 13:23	-12	-210	8	4	4.773E-04	-	-
			average and 2 SD	12.33		-5.09	**7.18**	**0.32**											
			bracket average and 2SD	12.33		-5.04	**7.23**	**0.24**											

Data lines 20130924@110-180: sample data that is not the subject of this manuscript (C12996 1004.1' and C12996 1094'))

Sample mount: C131467 277.9' A1

		20130925@285.asc	C131467 277.9 A1 UWQ-1				6.89	0.34	1.259	1.010	1.247	9/25/2013 12:19	-2431	784	-7	-10	1.462E-04	-	-
		20130925@286.asc	C131467 277.9 A1 UWQ-1				7.16	0.37	1.258	1.008	1.248	9/25/2013 12:23	-2329	752	-8	-10	1.374E-04	-	-
		20130925@287.asc	C131467 277.9 A1 UWQ-1				7.02	0.42	1.252	1.006	1.245	9/25/2013 12:26	-2269	716	-8	-11	1.389E-04	-	-
		20130925@288.asc	C131467 277.9 A1 UWQ-1				7.08	0.36	1.252	1.004	1.247	9/25/2013 12:30	-2230	722	-9	-11	1.313E-04	-	-
			average and 2 SD	12.33		-5.23	**7.04**	**0.23**											
Regular		20130925@289.asc	C131467 277.9 A1 Area3 ROI1 Spot 1	25.56	0.31	-3.33	22.15	0.26	1.429	0.998	1.432	9/25/2013 12:39	-3147	2590	-8	5	2.387E-03	-	0.963
Irregular	Exclude; Kspar intergrowth(s)	20130925@290.asc	C131467 277.9 A1 Area3 ROI1 Spot 2	-	-	-	22.98	0.28	1.422	0.998	1.425	9/25/2013 12:44	-3144	2605	-9	5	2.223E-03	-	-
Regular		20130925@291.asc	C131467 277.9 A1 Area3 ROI1 Spot 3	25.79	0.31	-3.33	22.38	0.29	1.408	0.996	1.414	9/25/2013 12:48	-3089	2629	-8	5	3.362E-03	-	0.963
Regular	< 1 µm cavities	20130925@292.asc	C131467 277.9 A1 Area3 ROI1 Spot 4	23.38	0.31	-8.41	14.78	0.17	1.790	1.002	1.787	9/25/2013 12:52	-3100	2569	-11	3	1.837E-03	0.012	-
Regular	< 1 µm cavities	20130925@293.asc	C131467 277.9 A1 Area3 ROI1 Spot 5	24.46	0.31	-8.41	15.85	0.19	1.798	1.009	1.782	9/25/2013 12:57	-3051	2543	-11	3	1.915E-03	0.012	-
Regular	< 1 µm cavities	20130925@294.asc	C131467 277.9 A1 Area3 ROI1 Spot 6	25.28	0.31	-8.41	16.67	0.25	1.792	1.012	1.771	9/25/2013 13:01	-2979	2564	-11	2	1.243E-03	0.012	-
Regular	< 1 µm cavities	20130925@295.asc	C131467 277.9 A1 Area3 ROI1 Spot 7	25.45	0.31	-8.41	16.83	0.26	1.823	1.013	1.800	9/25/2013 13:05	-3261	2593	-10	3	9.108E-04	0.012	-
Irregular	Exclude; 'ledges' in pit	20130925@296.asc	C131467 277.9 A1 Area3 ROI1 Spot 8	-	-	-	16.54	0.27	1.738	1.016	1.711	9/25/2013 13:12	-3369	2712	-10	3	2.534E-03	-	-
Regular		20130925@297.asc	C131467 277.9 A1 Area7 ROI2 Spot 1	25.83	0.31	-3.48	22.27	0.35	1.450	1.016	1.427	9/25/2013 13:17	-2832	2890	-8	8	3.734E-03	-	0.951
Irregular	Exclude; cavities larger than 1 µm	20130925@298.asc	C131467 277.9 A1 Area7 ROI2 Spot 2	-	-	-	16.12	0.29	1.752	1.017	1.723	9/25/2013 13:23	-2739	2810	-10	5	1.382E-03	-	-
		20130925@299.asc	C131467 277.9 A1 UWQ-1				7.42	0.38	1.270	1.011	1.256	9/25/2013 13:27	-2256	736	-9	-11	1.301E-04	-	-
		20130925@300.asc	C131467 277.9 A1 UWQ-1				7.01	0.29	1.262	1.009	1.250	9/25/2013 13:31	-2227	680	-9	-13	1.159E-04	-	-
		20130925@301.asc	C131467 277.9 A1 UWQ-1				7.05	0.44	1.264	1.012	1.248	9/25/2013 13:35	-2268	645	-9	-13	1.144E-04	-	-
		20130925@302.asc	C131467 277.9 A1 UWQ-1				7.10	0.43	1.266	1.017	1.245	9/25/2013 13:38	-2371	699	-8	-13	1.087E-04	-	-
			average and 2 SD	12.33		-5.12	**7.14**	**0.38**											
			bracket average and 2SD	12.33		-5.17	**7.09**	**0.31**											
		20130925@303.asc	C131467 277.9 A1 UWQ-1 NMR=1007664				7.17	0.38	1.253	1.008	1.243	9/25/2013 13:50	-2444	753	-7	-13	1.216E-04	-	-
		20130925@304.asc	C131467 277.9 A1 UWQ-1				7.36	0.28	1.246	1.002	1.243	9/25/2013 13:54	-2265	629	-8	-14	1.218E-04	-	-
		20130925@305.asc	C131467 277.9 A1 UWQ-1				7.08	0.36	1.235	0.993	1.244	9/25/2013 13:58	-2118	714	-10	-11	1.074E-04	-	-
		20130925@306.asc	C131467 277.9 A1 UWQ-1				7.29	0.46	1.229	0.987	1.246	9/25/2013 14:02	-2151	691	-9	-12	1.097E-04	-	-
			average and 2 SD	12.33		-5.04	**7.23**	**0.25**											
Irregular	Exclude; pit overlaps crack(s)	20130925@307.asc	C131467 277.9 A1 Area1 ROI4 Spot 1	-	-	-	17.19	0.27	1.673	0.978	1.712	9/25/2013 14:10	-1985	-491	-6	-12	1.917E-03	-	-
Regular	< 1 µm cavities	20130925@308.asc	C131467 277.9 A1 Area1 ROI4 Spot 2	26.58	0.40	-8.28	18.09	0.29	1.693	0.972	1.741	9/25/2013 14:15	-1752	-437	-6	-10	1.081E-03	0.010	-
		20130925@309.asc	C131467 277.9A1 UWQ-1 NMR=1007671				7.22	0.38	1.200	0.962	1.248	9/25/2013 14:34	-2287	560	-8	-14	1.112E-04	-	-
		20130925@310.asc	C131467 277.9A1 UWQ-1				7.70	0.40	1.196	0.958	1.249	9/25/2013 14:40	-2265	582	-9	-14	1.157E-04	-	-
		20130925@311.asc	C131467 277.9A1 UWQ-1				7.52	0.39	1.193	0.958	1.245	9/25/2013 14:44	-2358	629	-9	-14	1.122E-04	-	-
		20130925@312.asc	C131467 277.9A1 UWQ-1 Cs-Res=202				7.43	0.41	1.293	1.041	1.242	9/25/2013 14:55	-2385	639	-9	-14	1.082E-04	-	-
			average and 2 SD	12.33		-4.81	**7.46**	**0.40**											
			bracket average and 2SD	12.33		-4.92	**7.34**	**0.40**											
Regular	< 1 um cavities	20130925@313.asc	C131467 277.9A1 Area5 ROI 5 Spot 1	23.68	0.42	-7.74	15.76	0.29	1.852	1.042	1.777	9/25/2013 15:01	-2771	3910	-13	24	1.632E-03	0.015	-
Regular	< 1 um cavities	20130925@314.asc	C131467 277.9A1 Area5 ROI 5 Spot 2	23.15	0.42	-7.74	15.23	0.35	1.859	1.039	1.790	9/25/2013 15:04	-2782	3923	-15	24	7.785E-04	0.015	-
Regular		20130925@315.asc	C131467 277.9A1 Area5 ROI 5 Spot 3	23.36	0.42	-7.74	15.44	0.21	1.845	1.038	1.778	9/25/2013 15:08	-2738	3988	-13	25	1.236E-03	0.015	-
Regular	< 1 um cavities	20130925@316.asc	C131467 277.9A1 Area5 ROI 5 Spot 4	25.31	0.42	-7.74	17.38	0.37	1.830	1.036	1.767	9/25/2013 15:12	-2585	4038	-14	27	8.962E-04	0.015	-
Regular	< 1 um cavities	20130925@317.asc	C131467 277.9A1 Area5 ROI 5 Spot 5	25.09	0.42	-7.86	17.04	0.35	1.852	1.033	1.793	9/25/2013 15:17	-2497	3780	-13	23	1.048E-03	0.013	-
Irregular	Exclude; pit overlaps large cavity	20130925@318.asc	C131467 277.9A1 Area1 ROI 4 Spot 3	-	-	-	16.02	0.24	1.761	1.029	1.711	9/25/2013 15:23	-2008	-511	-6	-10	1.713E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@319.asc	C131467 277.9A1 Area1 ROI 4 Spot 4	-	-	-	14.29	0.21	1.796	1.022	1.757	9/25/2013 15:29	-2035	-400	-5	-10	1.067E-03	-	-
Irregular	Exclude; Kspar intergrowth(s)	20130925@320.asc	C131467 277.9A1 Area1 ROI 4 Spot 5	-	-	-	16.07	0.33	1.794	1.022	1.755	9/25/2013 15:33	-2233	-631	-6	-12	1.739E-03	-	-
Regular	< 1 um cavities	20130925@321.asc	C131467 277.9A1 Area1 ROI 4 Spot 6	24.79	0.42	-8.03	16.56	0.34	1.812	1.022	1.773	9/25/2013 15:38	-1792	-510	-7	-10	1.507E-03	0.010	-
Irregular	Exclude; Kspar intergrowths	20130925@322.asc	C131467 277.9A1 Area1 ROI 4 Spot 7	-	-	-	17.85	0.37	1.718	1.020	1.685	9/25/2013 15:43	-1778	-578	-7	-11	1.762E-03	-	-
		20130925@323.asc	C131467 277.9A1 UWQ-1				7.57	0.38	1.264	1.019	1.240	9/25/2013 15:48	-2324	1051	-11	-7	1.015E-04	-	-
		20130925@324.asc	C131467 277.9A1 UWQ-1				7.91	0.33	1.259	1.017	1.237	9/25/2013 15:52	-2284	1068	-12	-7	1.037E-04	-	-
		20130925@325.asc	C131467 277.9A1 UWQ-1				7.68	0.39	1.240	1.013	1.224	9/25/2013 15:55	-2245	1087	-12	-8	1.048E-04	-	-
		20130925@326.asc	C131467 277.9A1 UWQ-1				7.70	0.48	1.249	1.009	1.237	9/25/2013 15:59	-2235	989	-12	-8	1.152E-04	-	-
			average and 2 SD	12.33		-4.56	**7.71**	**0.28**											
			bracket average and 2SD	12.33		-4.68	**7.59**	**0.42**											

Sample mount: C4006 3857'

		20130925@327.asc	C4006 3857 UWQ-1				7.68	0.32	1.262	0.991	1.274	9/25/2013 16:17	291	694	2	-13	4.293E-04	-	-
		20130925@328.asc	C4006 3857 UWQ-1				7.67	0.35	1.257	0.985	1.277	9/25/2013 16:21	291	669	2	-13	4.552E-04	-	-
		20130925@329.asc	C4006 3857 UWQ-1				7.66	0.39	1.252	0.984	1.272	9/25/2013 16:24	291	644	3	-14	4.683E-04	-	-
		20130925@330.asc	C4006 3857 UWQ-1				7.80	0.50	1.253	0.982	1.275	9/25/2013 16:28	296	619	3	-14	4.813E-04	-	-
			average and 2 SD	12.33		-4.57	**7.70**	**0.13**											
Regular		20130925@331.asc	C4006 3857 Area6 ROI 1 Spot 1	16.94	0.29	-0.88	16.05	0.30	1.917	0.979	1.957	9/25/2013 16:33	1677	4485	2	-9	2.557E-03	0.460	-
Regular	Mixed analysis[a]; usable	20130925@332.asc	C4006 3857 Area6 ROI 1 Spot 2	23.39	0.29	-2.97	20.35	0.28	1.883	0.979	1.923	9/25/2013 16:37	1707	4486	2	-9	2.324E-03	0.153	-
Regular	Mixed analysis[a]; usable	20130925@333.asc	C4006 3857 Area6 ROI 1 Spot 3	23.28	0.29	-2.55	20.67	0.25	1.875	0.987	1.901	9/25/2013 16:41	1726	4485	2	-9	2.508E-03	0.182	-
Regular	Mixed analysis[a]; usable	20130925@334.asc	C4006 3857 Area2 ROI 2 Spot 1	18.03	0.29	-1.59	16.42	0.32	1.858	0.993	1.872	9/25/2013 16:46	1729	3575	4	-12	2.774E-03	0.289	-
Regular	Mixed analysis[a]; usable	20130925@335.asc	C4006 3857 Area2 ROI 2 Spot 2	19.19	0.29	-1.10	18.07	0.25	1.863	0.991	1.880	9/25/2013 16:50	1727	3598	3	-13	2.781E-03	0.390	-

Regular	Mixed analysis[a]; usable	20130925@336.asc	C4006 3857 Area2 ROI 2 Spot 3	15.99	0.29	-0.86	15.11	0.23	1.887	0.986	1.914	9/25/2013 16:54	1729	3619	2	-12	2.963E-03	0.466	-
Irregular	Exclude; pit overlaps crack(s)	20130925@337.asc	C4006 3857 Area2 ROI 2 Spot 4	-	-	-	16.85	0.32	1.860	0.986	1.887	9/25/2013 16:59	1732	3558	4	-14	3.140E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@338.asc	C4006 3857 Area2 ROI 2 Spot 5	-	-	-	15.06	0.31	1.886	0.983	1.919	9/25/2013 17:03	1737	3543	4	-13	5.136E-03	-	-
Regular	Mixed analysis[a]; exclude	20130925@339.asc	C4006 3857 Area8 ROI 5 Spot 1	-	-	-	14.82	0.28	1.845	0.977	1.888	9/25/2013 17:12	-1992	-1401	0	-14	2.985E-03	-	-
Irregular	Exclude; pit overlaps crack(s) + large cavity	20130925@340.asc	C4006 3857 Area8 ROI 5 Spot 2	-	-	-	17.52	0.30	1.832	0.974	1.880	9/25/2013 17:15	-1978	-1379	-1	-14	3.401E-03	-	-
		20130925@341.asc	C4006 3857 UWQ-1				7.78	0.37	1.216	0.967	1.257	9/25/2013 17:21	330	697	-7	-13	5.761E-04	-	-
		20130925@342.asc	C4006 3857 UWQ-1				7.85	0.38	1.208	0.960	1.258	9/25/2013 17:24	330	672	-6	-14	5.877E-04	-	-
		20130925@343.asc	C4006 3857 UWQ-1				7.41	0.53	1.203	0.955	1.259	9/25/2013 17:28	330	647	-6	-14	5.921E-04	-	-
		20130925@344.asc	C4006 3857 UWQ-1				7.52	0.43	1.201	0.951	1.263	9/25/2013 17:31	330	622	-6	-14	5.997E-04	-	-
			average and 2 SD	12.33		-4.63	**7.64**	**0.42**											
			bracket average and 2SD	12.33		-4.60	**7.67**	**0.29**											
		20130925@345.asc	C4006 3857 UWQ-1 Cs-Res=203				7.85	0.49	1.278	1.017	1.257	9/25/2013 17:41	355	622	-7	-14	5.687E-04	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@346.asc	C4006 3857 Area8 ROI 5 Spot 3	-	-	-	15.39	0.17	1.971	1.026	1.921	9/25/2013 17:45	-1965	-1352	0	-14	4.544E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@347.asc	C4006 3857 Area8 ROI 5 Spot 4	-	-	-	15.70	0.25	1.994	1.029	1.938	9/25/2013 17:50	-1950	-1323	1	-14	3.469E-03	-	-
Regular		20130925@348.asc	C4006 3857 Area9 ROI 6 Spot 1	16.33	0.34	-0.95	15.37	0.28	1.966	1.032	1.906	9/25/2013 17:55	-550	4974	-8	-5	3.276E-03	0.442	-
Irregular	Exclude; pit overlaps crack(s)	20130925@349.asc	C4006 3857 Area9 ROI 6 Spot 2	-	-	-	16.92	0.28	1.960	1.033	1.898	9/25/2013 17:59	-536	4988	-8	-4	3.626E-03	-	-
Regular	Mixed analysis[a]; exclude	20130925@350.asc	C4006 3857 Area9 ROI 6 Spot 3	-	-	-	18.80	0.28	1.945	1.032	1.885	9/25/2013 18:03	-526	5000	-8	-5	2.945E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@351.asc	C4006 3857 Area9 ROI 6 Spot 4	-	-	-	19.96	0.28	1.928	1.029	1.873	9/25/2013 18:07	-510	5011	-8	-5	3.129E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@352.asc	C4006 3857 Area9 ROI 6 Spot 5	-	-	-	21.44	0.29	1.932	1.026	1.882	9/25/2013 18:11	-498	5021	-7	-5	4.202E-03	-	-
Regular		20130925@353.asc	C4006 3857 Area9 ROI 6 Spot 6	23.23	0.34	-1.98	21.20	0.23	1.913	1.020	1.876	9/25/2013 18:15	-482	5033	-7	-5	3.429E-03	0.238	-
Regular		20130925@354.asc	C4006 3857 Area9 ROI 6 Spot 7	24.07	0.34	-2.02	22.00	0.31	1.905	1.009	1.888	9/25/2013 18:20	-467	5041	-7	-5	3.310E-03	0.233	-
Regular		20130925@355.asc	C4006 3857 Area9 ROI 6 Spot 8	21.14	0.34	-3.28	17.79	0.25	1.902	0.999	1.903	9/25/2013 18:24	-452	5079	-7	-5	2.965E-03	0.136	-
Regular		20130925@356.asc	C4006 3857 Area9 ROI 6 Spot 9	23.76	0.34	-3.15	20.53	0.25	1.893	0.990	1.912	9/25/2013 18:27	-442	5106	-7	-5	3.288E-03	0.143	-
		20130925@357.asc	C4006 3857 UWQ-1				7.82	0.40	1.254	0.985	1.273	9/25/2013 18:33	254	704	-5	-13	6.008E-04	-	-
		20130925@358.asc	C4006 3857 UWQ-1				7.62	0.47	1.250	0.987	1.266	9/25/2013 18:36	254	684	-5	-14	5.999E-04	-	-
		20130925@359.asc	C4006 3857 UWQ-1				7.75	0.47	1.245	0.983	1.267	9/25/2013 18:40	254	664	-5	-14	5.970E-04	-	-
		20130925@360.asc	C4006 3857 UWQ-1				7.47	0.54	1.243	0.980	1.268	9/25/2013 18:43	254	644	-5	-15	5.963E-04	-	-
			average and 2 SD	12.33		-4.61	**7.66**	**0.31**											
			bracket average and 2SD	12.33		-4.62	**7.65**	**0.34**											
Regular	Mixed analysis[a]; usable	20130925@361.asc	C4006 3857 Area3 ROI 3 Spot 1	15.22	0.53	-0.67	14.54	0.23	1.944	0.972	1.999	9/25/2013 18:49	2205	3890	-5	-12	3.259E-03	0.464	-
Regular	Mixed analysis[a]; exclude	20130925@362.asc	C4006 3857 Area3 ROI 3 Spot 2	-	-	-	18.64	0.24	1.883	0.973	1.934	9/25/2013 18:52	2190	3893	-5	-12	3.368E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@363.asc	C4006 3857 Area3 ROI 3 Spot 3	-	-	-	19.92	0.35	1.879	0.972	1.934	9/25/2013 18:56	2175	3882	-5	-13	3.285E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@364.asc	C4006 3857 Area3 ROI 3 Spot 4	-	-	-	22.89	0.20	1.855	0.967	1.919	9/25/2013 19:01	2151	3881	-5	-12	3.389E-03	-	-
Irregular	Intergrowths + mixed analysis[a]; exclude	20130925@365.asc	C4006 3857 Area3 ROI 3 Spot 5	-	-	-	20.64	0.34	1.865	0.966	1.930	9/25/2013 19:05	2134	3877	-5	-12	3.262E-03	-	-
Regular		20130925@366.asc	C4006 3857 Area3 ROI 3 Spot 6	23.39	0.53	-2.98	20.34	0.31	1.875	0.977	1.919	9/25/2013 19:09	2126	3895	-6	-12	3.112E-03	0.141	-
Irregular	Exclude; pit overlaps crack(s)	20130925@367.asc	C4006 3857 Area3 ROI 3 Spot 7	-	-	-	20.31	0.20	1.864	0.982	1.898	9/25/2013 19:13	2121	3908	-6	-12	3.311E-03	-	-
Irregular	Exclude; pit overlaps crack(s)	20130925@368.asc	C4006 3857 Area3 ROI 3 Spot 8	-	-	-	19.01	0.27	1.882	0.981	1.919	9/25/2013 19:18	1884	3902	-6	-10	3.445E-03	-	-
Regular		20130925@369.asc	C4006 3857 Area3 ROI 3 Spot 9	24.34	0.53	-1.76	22.54	0.33	1.859	0.979	1.898	9/25/2013 19:23	2165	3907	-5	-11	3.389E-03	0.238	-
		20130925@370.asc	C4006 3857 UWQ-1				8.04	0.51	1.222	0.981	1.246	9/25/2013 19:29	236	703	-5	-13	5.930E-04	-	-
		20130925@371.asc	C4006 3857 UWQ-1				8.29	0.39	1.223	0.980	1.249	9/25/2013 19:33	231	683	-5	-14	5.981E-04	-	-
		20130925@372.asc	C4006 3857 UWQ-1				8.08	0.32	1.216	0.979	1.241	9/25/2013 19:37	160	702	-5	-13	6.337E-04	-	-
		20130925@373.asc	C4006 3857 UWQ-1				7.89	0.33	1.219	0.976	1.249	9/25/2013 19:41	160	682	-5	-15	6.230E-04	-	-
		20130925@374.asc	C4006 3857 UWQ-1			8.560		0.49	1.218	0.973	1.253	9/25/2013 19:45	160	662	-5	-14	6.200E-04	-	-
			average and 2 SD	12.33		-4.20	**8.07**	**0.33**											
			bracket average and 2SD	12.33		-4.41	**7.87**	**0.53**											

[a] **Mixed analysis**: In the *in-situ* analysis of $\delta^{18}O$ in chemically zoned carbonate minerals by SIMS, it is preferable that each sample pit be placed within a single compositional zone (avoiding overlaps) if the width of individual zones can accommodate the commonly used 10-µm-diameter spot-size. In the application of SIMS $\delta^{18}O$ *bias* corrections, this minimizes the component of uncertainty that is functionally related to the cation-composition (Fe# = Fe/(Mg+Fe)] of the analyzed sample spot. *Bias* corrections cannot be confidently applied in instances where a pit overlaps two or more zones; this is because the pit geometry cannot easily be modeled as a simple symmetric ellipsoid, and thus it is difficult to accurately assess the contribution of each zone to the total volume of sputtered sample material. Such mixed analyses are typically excluded from data compilations unless the extent of overlap is minor (<25% based on the surface footprint of the SIMS pit) and the compositional contrast between the relevant zones (based on BSE-SEM imaging) is not visually striking. Mixed analysis pits are thus either labeled as **'Mixed analysis (excluded)'** or **'Mixed analysis (usable).'**

APPENDIX 5: COMPLETE SECONDARY ION MASS SPECTROMETRY DATA TABLE: 3-μM SPOT-SIZE SESSIONS

SIMS session S4 (3-μm spot-size): 25-27th February, 2014

Calibration standard mount: WI-STD-80

SIMS pit quality	Notes	File	Comment	$\delta^{18}O$ (‰, VSMOW)	2SD	$\delta^{18}O$ bias (‰, VSMOW)	$\delta^{18}O$ raw	$\delta^{18}O$ (2SE)	^{16}O (E6 cps)	date	time	X microns	Y microns	DTFA-X	DTFA-Y	$^{16}O^{1}H/^{16}O$	Sample spot Fe# (Dol-Ank)	Sample spot Ca# (Cal-Dol)
		20140224@16.asc	WI-STD-80, UWC-3 shutter open			-1.523		1.05	45.287	2/25/2014	8:46	-327	660	9	-7	1.639E-03	-	-
		20140224@17.asc	WI-STD-80, UWC-3 shutter open				-0.85	0.64	44.688	2/25/2014	8:53	-332	668	8	-7	1.685E-03	-	-
		20140224@18.asc	WI-STD-80, UWC-3 shutter open				-0.91	0.59	45.508	2/25/2014	9:02	-320	671	9	-6	1.785E-03	-	-
		20140224@19.asc	WI-STD-80, UWC-3 shutter open				-0.46	0.67	44.426	2/25/2014	9:10	-328	678	8	-8	1.748E-03	-	-
		20140224@20.asc	WI-STD-80, UWC-3 shutter open				-0.73	0.51	43.529	2/25/2014	9:17	-319	685	7	-8	1.788E-03	-	-
			Avg. and 2 SD	12.49		-13.06	**-0.74**	**0.40**										
		20140224@21.asc	WI-STD-80, UWQ-1 gr.1				0.01	0.67	38.498	2/25/2014	9:27	590	1295	5	-6	9.176E-04	-	-
		20140224@22.asc	WI-STD-80, UWQ-1 gr.2				0.43	0.48	38.809	2/25/2014	9:36	649	2906	4	-1	9.325E-04	-	-
		20140224@23.asc	WI-STD-80, UWQ-1 gr.3				0.35	0.48	38.459	2/25/2014	9:44	609	3602	5	1	8.830E-04	-	-
		20140224@24.asc	WI-STD-80, UWQ-1 gr.4				0.48	0.46	38.611	2/25/2014	9:52	578	4567	6	5	8.692E-04	-	-
			average and 2 SD	12.33		-11.86	**0.32**	**0.42**										
				bias(STD-UW6220)		7.80												
				Prop. error (2SE):		0.42												
		20140224@25.asc	WI-STD-80, UWC-3 gr.1				-1.02	0.70	45.577	2/25/2014	10:01	-309	684	8	-10	1.767E-03	-	-
		20140224@26.asc	WI-STD-80, UWC-3 gr.1				-1.50	0.64	44.161	2/25/2014	10:08	-309	674	7	-9	1.874E-03	-	-
		20140224@27.asc	WI-STD-80, UWC-3 gr.1 (EM HV no change)				-1.66	0.59	44.860	2/25/2014	10:27	-310	664	8	-9	2.130E-03	-	-
		20140224@28.asc	WI-STD-80, UWC-3 gr.1				-1.27	0.56	45.051	2/25/2014	10:35	-298	681	6	-9	1.865E-03	-	-
			Avg. and 2 SD	12.49		-13.68	**-1.36**	**0.56**										
			bracket: average and 2 SD	12.49		-13.37	**-1.05**	**0.80**										
		20140224@29.asc	WI-STD-80, UW6220 dol gr.1				2.35	0.64	45.040	2/25/2014	10:45	-1202	921	11	-5	1.554E-03	-	-
		20140224@30.asc	WI-STD-80, UW6220 dol gr.3				2.14	0.35	45.541	2/25/2014	10:55	-1833	1923	13	-5	1.512E-03	-	-
		20140224@31.asc	WI-STD-80, UW6220 dol gr.5				2.25	0.46	44.778	2/25/2014	11:02	-2916	2682	15	-5	1.424E-03	-	-
		20140224@32.asc	WI-STD-80, UW6220 dol gr.4				2.45	0.53	44.045	2/25/2014	11:10	-3484	1982	16	-7	1.413E-03	-	-
			average and 2 SD	22.60		-19.86	**2.30**	**0.27**										
				bias(STD-UW6220)		0.00												
				Prop. error (2SE):		0.31												
				bias(STD-UWQ-1)		-7.74												
				Prop. error (2SE):		0.42												
		20140224@33.asc	WI-STD-80, Ank-1 gr.1				4.74	0.39	59.048	2/25/2014	11:19	-423	-1077	7	-10	1.466E-03	-	-
		20140224@34.asc	WI-STD-80, Ank-1 gr.3				4.91	0.37	58.785	2/25/2014	11:27	-1331	-1931	9	-11	1.292E-03	-	-
		20140224@35.asc	WI-STD-80, Ank-1 gr.2				5.10	0.51	57.351	2/25/2014	11:35	-481	-2339	7	-13	1.309E-03	-	-
		20140224@36.asc	WI-STD-80, Ank-1 gr.5				5.24	0.29	58.620	2/25/2014	11:43	-513	-3401	5	-16	1.298E-03	-	-
			average and 2 SD	15.88		-10.71	**5.00**	**0.44**										
				bias(STD-UW6220)		9.33												
				Prop. error (2SE):		0.36												

SIMS $\delta^{18}O$ *bias* correction model for sample compositions along the dolomite-ankerite solid solution series

Standard	Fe# = [Fe/(Mg+Fe)]	*bias**(STD-UW6220)
UW6220 dolomite	0.004	0.00
UWAnk1	0.522	9.33

$$bias*(\mathrm{STD{-}UW6220}) = \frac{(bias*_{max})x^n}{k^n + x^n}$$

Session-specific constants:

$bias^*_{max}$	10.614
n	1.2
k	0.10

x = Fe# [= Fe/(Mg+Fe) molar ratio] of analyzed sample spot

Data lines 20140224@37-78: analyses of other non-dolomite-ankerite standards

Data lines 20140224@329-378: sample data that is not the subject of this manuscript (ADM CCS#1 5513.2 aka DVW#1 5513.2')

Sample mount: C12996 1217.3'

SIMS pit quality	Notes	File	Comment	$\delta^{18}O$ (‰, VSMOW)	2SD	$\delta^{18}O$ bias (‰, VSMOW)	$\delta^{18}O$ raw	$\delta^{18}O$ (2SE)	^{16}O (E6 cps)	date	time	X microns	Y microns	DTFA-X	DTFA-Y	$^{16}O^{1}H/^{16}O$	Sample spot Fe# (Dol-Ank)	Sample spot Ca# (Cal-Dol)
		20140224@379.asc	C12996 1217.3 UWQ-1			-7.203		0.60	36.466	2/27/2014	16:18	130	474	-13	-10	5.292E-04	-	-
		20140224@380.asc	C12996 1217.3 UWQ-1			-7.598		0.73	36.243	2/27/2014	16:25	137	474	-14	-10	6.597E-04	-	-
		20140224@381.asc	C12996 1217.3 UWQ-1 (EM HV adjust -> 2530V)				-6.13	0.69	36.539	2/27/2014	16:36	144	474	-13	-10	6.891E-04	-	-
		20140224@382.asc	C12996 1217.3 UWQ-1				-6.03	0.55	36.446	2/27/2014	16:45	151	474	-14	-9	7.222E-04	-	-
		20140224@383.asc	C12996 1217.3 UWQ-1				-6.02	0.65	35.571	2/27/2014	16:52	130	467	-14	-10	7.943E-04	-	-
		20140224@384.asc	C12996 1217.3 UWQ-1				-6.07	0.61	35.475	2/27/2014	16:59	137	467	-14	-10	8.216E-04	-	-
		20140224@385.asc	C12996 1217.3 UWQ-1				-6.12	0.46	35.509	2/27/2014	17:06	144	467	-15	-11	8.255E-04	-	-
			Avg. and 2 SD	12.33		-18.18	**-6.07**	**0.10**										
Regular	Exclude; abnormal 2SE	20140224@386.asc	C12996 1217.3 A1 R1 Spot1 Dol-Ank	20.66	0.78	-18.08	2.21	14.70	43.402	2/27/2014	17:19	-811	-1753	-5	-19	2.824E-03	-	-
Regular		20140224@387.asc	C12996 1217.3 A1 R1 Spot2 Dol-Ank	24.31	0.78	-24.10	-0.38	0.49	42.249	2/27/2014	17:27	-809	-1757	-6	-19	4.237E-03	0.024	-
Regular		20140224@388.asc	C12996 1217.3 A1 R1 Spot3 Dol-Ank	19.80	0.78	-16.62	2.86	0.43	53.972	2/27/2014	17:35	-892	-1818	-5	-21	2.769E-03	0.513	-
		20140224@389.asc	C12996 1217.3 UWQ-1				-6.09	0.55	35.821	2/27/2014	17:45	150	471	-7	-10	7.819E-04	-	-
		20140224@390.asc	C12996 1217.3 UWQ-1				-4.99	0.51	35.199	2/27/2014	17:53	129	464	-7	-10	8.125E-04	-	-
		20140224@391.asc	C12996 1217.3 UWQ-1				-6.39	0.55	35.096	2/27/2014	18:00	136	464	-7	-11	8.549E-04	-	-
		20140224@392.asc	C12996 1217.3 UWQ-1				-5.92	0.70	34.737	2/27/2014	18:08	145	464	-7	-11	8.348E-04	-	-
			Avg. and 2 SD	12.33		-17.95	**-5.85**	**1.21**										
			Bracket: average and 2SD	12.33		-18.08	**-5.97**	**0.78**										
Regular		20140224@393.asc	C12996 1217.3 A1 R1 Spot4 Dol-Ank	20.79	0.93	-16.31	4.14	0.48	63.410	2/27/2014	18:18	-920	-1824	-9	-17	2.848E-03	0.676	-
Regular		20140224@394.asc	C12996 1217.3 A1 R1 Spot5 Dol-Ank	20.53	0.93	-16.38	3.82	0.59	58.787	2/27/2014	18:28	-896	-1798	-11	-19	2.812E-03	0.633	-
Regular		20140224@395.asc	C12996 1217.3 A1 R1 Spot6 Dol-Ank	21.94	0.93	-17.93	3.62	0.47	53.707	2/27/2014	18:37	-881	-1792	-10	-19	2.721E-03	0.252	-
Regular		20140224@396.asc	C12996 1217.3 A1 R1 Spot7 Dol-Ank	19.33	0.93	-23.54	-4.67	0.46	45.581	2/27/2014	18:45	-874	-1779	-10	-17	4.654E-03	0.033	-
Regular		20140224@397.asc	C12996 1217.3 A1 R1 Spot8 Dol-Ank	19.75	0.93	-22.84	-3.54	0.47	48.573	2/27/2014	18:53	-851	-1769	-9	-19	2.803E-03	0.045	-
Regular	Missed target	20140224@398.asc	C12996 1217.3 A1 R1 Spot9 Dol-Ank	-	-	-	-6.83	1.45	43.232	2/27/2014	19:05	-917	-1728	-8	-18	3.133E-02	-	-

Regular		20140224@399.asc	C12996 1217.3 A1 R1 Spot10 Dol-Ank	21.89	0.93	-17.93	3.56	0.39	53.087	2/27/2014	19:12	-876	-1795	-11	-18	2.802E-03	0.252	-
Regular		20140224@400.asc	C12996 1217.3 A1 R1 Spot11 Dol-Ank	22.54	0.93	-24.12	-2.13	0.37	43.316	2/27/2014	19:22	-808	-1756	-9	-18	5.671E-03	0.024	-
		20140224@401.asc	C12996 1217.3 UWQ-1				-6.09	0.50	35.221	2/27/2014	19:32	132	460	-13	-10	7.915E-04	-	-
		20140224@402.asc	C12996 1217.3 UWQ-1				-5.89	0.57	34.559	2/27/2014	19:40	137	460	-14	-10	8.294E-04	-	-
		20140224@403.asc	C12996 1217.3 UWQ-1				-6.04	0.49	34.527	2/27/2014	19:47	144	460	-14	-11	8.378E-04	-	-
		20140224@404.asc	C12996 1217.3 UWQ-1				-6.55	0.65	34.581	2/27/2014	19:54	151	460	-14	-10	8.039E-04	-	-
			Avg. and 2 SD	12.33		-18.25	**-6.14**	**0.57**										
			Bracket: average and 2SD	12.33		-18.10	**-5.99**	**0.93**										
Regular		20140224@405.asc	C12996 1217.3 A2 R2 Spot1 Dol-Ank	19.69	0.73	-24.24	-5.02	0.51	44.582	2/27/2014	20:06	-1468	-2792	-3	-24	2.953E-03	0.025	-
Regular		20140224@406.asc	C12996 1217.3 A2 R2 Spot2 Dol-Ank	19.97	0.73	-21.18	-1.63	0.53	46.153	2/27/2014	20:13	-1453	-2796	-3	-25	2.913E-03	0.086	-
Regular		20140224@407.asc	C12996 1217.3 A2 R2 Spot3 Dol-Ank	21.56	0.73	-18.77	2.38	0.48	50.386	2/27/2014	20:21	-1451	-2795	-3	-25	2.835E-03	0.193	-
Regular		20140224@408.asc	C12996 1217.3 A2 R2 Spot4 Dol-Ank	20.66	0.73	-17.88	2.41	0.54	52.210	2/27/2014	20:28	-1444	-2791	-2	-25	2.825E-03	0.279	-
Regular		20140224@409.asc	C12996 1217.3 A2 R2 Spot5 Dol-Ank	21.23	0.73	-16.66	4.22	0.48	52.760	2/27/2014	20:36	-1437	-2788	-3	-26	2.901E-03	0.581	-
Regular		20140224@410.asc	C12996 1217.3 A2 R2 Spot6 Dol-Ank	19.97	0.73	-16.77	2.86	0.46	58.572	2/27/2014	20:43	-1401	-2775	-5	-25	2.607E-03	0.531	-
Regular		20140224@411.asc	C12996 1217.3 A2 R2 Spot7 Dol-Ank	22.32	0.73	-22.02	-0.19	0.60	46.590	2/27/2014	20:52	-1465	-2807	-4	-25	3.090E-03	0.065	-
Regular	Crack nearby	20140224@412.asc	C12996 1217.3 A2 R2 Spot8 Dol-Ank	22.76	0.73	-21.44	0.83	0.41	47.199	2/27/2014	21:00	-1477	-2803	-4	-23	4.741E-03	0.079	-
Regular		20140224@413.asc	C12996 1217.3 A1 R1 Spot2 Dol-Ank	21.68	0.73	-24.92	-3.78	0.66	44.088	2/27/2014	21:09	-787	-1792	-6	-20	3.149E-03	0.015	-
		20140224@414.asc	C12996 1217.3 UWQ-1				-6.12	0.55	34.155	2/27/2014	21:20	131	450	-5	-12	7.872E-04	-	-
		20140224@415.asc	C12996 1217.3 UWQ-1				-5.75	0.57	33.725	2/27/2014	21:27	138	450	-6	-13	7.969E-04	-	-
		20140224@416.asc	C12996 1217.3 UWQ-1				-6.09	0.55	34.079	2/27/2014	21:34	145	450	-5	-12	8.195E-04	-	-
		20140224@417.asc	C12996 1217.3 UWQ-1				-6.88	0.59	34.488	2/27/2014	21:41	152	450	-5	-11	7.894E-04	-	-
		20140224@418.asc	C12996 1217.3 UWQ-1			-7.308		0.65	34.552	2/27/2014	21:48	159	450	-4	-10	7.552E-04	-	-
			Avg. and 2 SD	12.33		-18.31	**-6.21**	**0.96**										
			Bracket: average and 2SD	12.33		-18.28	**-6.18**	**0.73**										

SIMS session S8 (3-μm spot-size): 22-25th July, 2014

Calibration standard mount: WI-STD-80

20140722@7.asc	WI-STD-80 UWC-3 SW gr				-7.92	0.53	45.191	7/22/2014	17:49	68	-481	5	-4	0.001916663	-	-
20140722@8.asc	WI-STD-80 UWC-3 gr.1				-8.09	0.61	44.952	7/22/2014	17:57	-301	311	5	-4	0.001891053	-	-
20140722@9.asc	WI-STD-80 UWC-3 gr.4				-7.46	0.58	44.698	7/22/2014	18:05	883	602	4	-4	0.001912977	-	-
20140722@10.asc	WI-STD-80 UWC-3 gr.3				-8.08	0.73	44.420	7/22/2014	18:13	672	-139	4	-5	0.001865505	-	-
	average and 2SD				**-7.89**	**0.59**										
20140722@11.asc	WI-STD-80 UW6220 gr.1			-7.55	-3.74	0.46	43.136	7/22/2014	18:21	-1422	938	4	-5	0.00202446	-	-
20140722@12.asc	WI-STD-80 UW6220 gr.3				-3.93	0.57	43.737	7/22/2014	18:29	-2434	1537	4	-5	0.001902186	-	-
20140722@13.asc	WI-STD-80 UW6220 gr.4				-3.33	0.49	43.203	7/22/2014	18:36	-3653	1670	4	-5	0.001842399	-	-
20140722@14.asc	WI-STD-80 UW6220 gr.5				-3.78	0.39	44.306	7/22/2014	18:45	-3527	2487	3	-5	0.001927119	-	-
	average and 2SD	22.60		-25.71	**-3.69**	**0.52**										
		bias(STD-UW6220)		0.00												
		Prop. error (2SE):		0.30												
		bias(STD-UWQ-1)		-9.93												
		Prop. error (2SE):		0.43												
20140722@15.asc	WI-STD-80 Ank-1 gr.1				-1.41	0.51	55.376	7/22/2014	18:55	-487	-1321	5	-8	0.001917978	-	-
20140722@16.asc	WI-STD-80 Ank-1 gr.3				-0.93	0.59	55.286	7/22/2014	19:03	-1440	-2579	8	-11	0.001986835	-	-
20140722@17.asc	WI-STD-80 Ank-1 gr.2				-1.07	0.57	55.619	7/22/2014	19:10	-459	-2710	6	-13	0.001958207	-	-
20140722@18.asc	WI-STD-80 Ank-1 gr.5				-0.69	0.43	55.142	7/22/2014	19:18	-447	-3742	7	-17	0.001893924	-	-
	average and 2SD	15.88		-16.64	**-1.02**	**0.60**										
		bias(STD-UW6220)		9.31												
		Prop. error (2SE):		0.45												
20140722@19.asc	WI-STD-80 UWC-3 SW gr				-7.66	0.60	42.659	7/22/2014	19:26	81	-477	6	-7	0.002079631	-	-
20140722@20.asc	WI-STD-80 UWC-3 gr.1				-7.76	0.67	42.350	7/22/2014	19:34	-303	302	5	-6	0.002004771	-	-
20140722@21.asc	WI-STD-80 UWC-3 gr.4 HV no change				-7.96	0.68	42.650	7/22/2014	19:43	893	624	3	-9	0.002109825	-	-
20140722@22.asc	WI-STD-80 UWC-3 gr.3				-7.85	0.44	41.648	7/22/2014	19:51	657	-135	3	-9	0.001961048	-	-
	average and 2SD				**-7.81**	**0.25**										
	UWC-3 Reference bracket average and	12.49		-20.09	**-7.85**	**0.43**										
		bias(STD-UW6220)		5.77												

Data lines 20140722@23-30: analyses of other non-dolomite-ankerite standards

20140722@31.asc	WI-STD-80 UWC-3 SW gr.				-7.67	0.63	36.727	7/22/2014	21:05	88	-475	8	-9	0.002418117	-	-
20140722@32.asc	WI-STD-80 UWC-3 gr.1				-7.87	0.76	37.521	7/22/2014	21:13	-295	313	8	-8	0.002167842	-	-
20140722@33.asc	WI-STD-80 UWC-3 gr.4 HV no change				-8.12	0.51	36.671	7/22/2014	21:22	901	624	6	-9	0.003004554	-	-
20140722@34.asc	WI-STD-80 UWC-3 gr.3				-7.84	0.81	37.324	7/22/2014	21:30	649	-129	5	-11	0.002201979	-	-
	average and 2SD				**-7.87**	**0.37**										
	bracket average and 2SD	12.49		-20.08	**-7.84**	**0.30**										

Data lines 20140722@35-38: analyses of other non-dolomite-ankerite standards

20140722@39.asc	WI-STD-80 UWQ-1 gr.1				-3.30	0.75	27.862	7/22/2014	22:09	510	1117	2	-13	0.001157633	-	-
20140722@40.asc	WI-STD-80 UWQ-1 gr.2				-2.78	0.63	27.655	7/22/2014	22:17	321	2507	2	-8	0.001005096	-	-
20140722@41.asc	WI-STD-80 UWQ-1 gr.3				-3.89	0.76	27.448	7/22/2014	22:24	277	3383	1	-5	0.000986626	-	-
20140722@42.asc	WI-STD-80 UWQ-1 gr.4				-2.99	0.73	27.129	7/22/2014	22:33	251	4461	0	0	0.001014232	-	-
	average and 2SD	12.33		-15.38	**-3.24**	**0.96**										
		bias(STD-UW6220)		10.03												
		Prop. error (2SE):		0.73												
20140722@43.asc	WI-STD-80 UWC-3 SW gr.				-6.89	0.69	36.686	7/22/2014	22:41	74	-493	8	-11	0.002293631	-	-
20140722@44.asc	WI-STD-80 UWC-3 gr.1				-6.69	0.68	36.306	7/22/2014	22:48	-296	301	8	-10	0.002180405	-	-
20140722@45.asc	WI-STD-80 UWC-3 gr.4 EM HV adjust not checked				-7.63	0.60	36.417	7/22/2014	23:01	896	615	6	-12	0.002801279	-	-
20140722@46.asc	WI-STD-80 UWC-3 gr.3				-6.47	0.69	36.078	7/22/2014	23:08	641	-141	6	-10	0.00216137	-	-
20140722@47.asc	WI-STD-80 UWC-3 gr.4				-6.38	0.67	36.327	7/22/2014	23:16	894	630	7	-13	0.002540689	-	-
	average and 2SD				**-6.81**	**1.00**										
	bracket average and 2SD	12.49		-19.53	**-7.28**	**1.34**										

Calibration standard mount: 2014_MGS_Carb_02

		20140722@48.asc	2014_MGS_Carb_02 UWC-3				-5.80	0.55	34.714	7/22/2014	23:31	-113	681	14	-2	0.002536708	-	-
		20140722@49.asc	2014_MGS_Carb_02 UWC-3				-6.75	0.70	34.936	7/22/2014	23:39	-114	672	15	-2	0.002763304	-	-
		20140722@50.asc	2014_MGS_Carb_02 UWC-3 EM HV no change				-6.04	0.50	35.187	7/22/2014	23:49	-115	662	15	-2	0.002936479	-	-
		20140722@51.asc	2014_MGS_Carb_02 UWC-3				-7.20	0.72	34.873	7/22/2014	23:57	-116	654	14	-3	0.003162217	-	-
			average and 2SD				**-6.45**	**1.28**										
		20140722@52.asc	2014_MGS_Carb_02 Ank93418-08 gr.1				-6.77	0.55	39.318	7/23/2014	0:05	332	-992	16	-14	0.002783131	-	-
		20140722@53.asc	2014_MGS_Carb_02 Ank93418-08 gr.2				-7.28	0.59	39.111	7/23/2014	0:12	1028	-1721	14	-18	0.002872387	-	-
		20140722@54.asc	2014_MGS_Carb_02 Ank93418-08 gr.8				-6.73	0.47	39.408	7/23/2014	0:20	827	-2383	15	-21	0.002888767	-	-
		20140722@55.asc	2014_MGS_Carb_02 Ank93418-08 gr.7				-6.56	0.48	39.530	7/23/2014	0:27	326	-2718	18	-25	0.003057995	-	-
			average and 2SD	9.220		-15.91	**-6.84**	**0.62**										
		IMF adjusted for drift relative to UWC-3 reference bracket				-17.65												
				bias(STD-UW6220)		8.27												
				Prop. error (2SE):		0.64												
		20140722@56.asc	2014_MGS_Carb_02 UWC-3				-6.00	0.84	34.297	7/23/2014	0:35	-119	627	19	-4	0.003058871	-	-
		20140722@57.asc	2014_MGS_Carb_02 UWC-3				-6.18	0.49	33.892	7/23/2014	0:42	-119	619	18	-3	0.002961962	-	-
		20140722@58.asc	2014_MGS_Carb_02 UWC-3				-5.52	0.55	34.458	7/23/2014	0:51	-119	611	19	-4	0.003347447	-	-
		20140722@59.asc	2014_MGS_Carb_02 UWC-3				-5.19	0.67	35.167	7/23/2014	1:00	-119	603	18	-7	0.003396709	-	-
			average and 2SD				**-5.72**	**0.90**										
			bracket average and 2SD	12.49		-18.35	**-6.08**	**1.29**										

SIMS $\delta^{18}O$ *bias* correction model for sample compositions along the dolomite-ankerite solid solution series

Standard	**Fe# = [Fe/(Mg+Fe)]**	*bias**(STD-UW6220)
UW6220 dolomite	0.004	0.00
UWAnk1	0.522	9.31
UWAnk4	0.179	8.27

$$bias*(\mathrm{STD{-}UW6220}) = \frac{(bias*_{max})x^n}{k^n + x^n}$$

Session-specific constants:

$bias*_{max}$	10.98
n	1.2
k	0.10

x = Fe# [= Fe/(Mg+Fe) molar ratio] of analyzed sample spot

Sample mount: C12996 1217.3'

		20140722@144.asc	C129996 1217.3' UW6220				-1.39	0.56	45.645	7/23/2014	20:39	-116	61	26	-6	0.006512637	-	-
		20140722@145.asc	C129996 1217.3' UW6220				-1.32	0.45	48.228	7/23/2014	20:48	-116	50	25	-6	0.006225072	-	-
		20140722@146.asc	C129996 1217.3' UW6220 EM HV adju no change				-0.96	0.41	48.689	7/23/2014	20:58	-117	38	26	-7	0.006693113	-	-
		20140722@147.asc	C129996 1217.3' UW6220				-0.85	0.47	48.242	7/23/2014	21:05	-118	27	25	-7	0.006485464	-	-
			average and 2SD	22.60		-23.21	**-1.13**	**0.54**										
Regular		20140722@148.asc	C129996 1217.3' A1 spot 1 dol-ank	18.07	0.56	-13.97	3.85	0.56	59.576	7/23/2014	21:17	-1025	-1406	22	-25	0.006975568	0.504	-
Regular		20140722@149.asc	C129996 1217.3' A1 spot 2 dol-ank	19.88	0.56	-13.97	5.63	0.52	60.839	7/23/2014	21:26	-1018	-1406	23	-27	0.006967608	0.504	-
Regular		20140722@150.asc	C129996 1217.3' A1 spot 3 dol-ank	18.91	0.56	-14.01	4.64	0.48	61.827	7/23/2014	21:34	-1011	-1406	22	-26	0.006820973	0.490	-
Regular		20140722@151.asc	C129996 1217.3' A1 spot 4 dol-ank	21.85	0.56	-13.65	7.90	0.56	58.678	7/23/2014	21:43	-1004	-1406	22	-27	0.007481611	0.648	-
Regular		20140722@152.asc	C129996 1217.3' A1 spot 5 dol-ank	20.76	0.56	-15.77	4.66	0.69	52.816	7/23/2014	21:51	-997	-1406	22	-26	0.007171668	0.208	-
Regular		20140722@153.asc	C129996 1217.3' A1 spot 6 dol-ank	23.49	0.56	-13.65	9.52	0.51	63.694	7/23/2014	22:01	-1011	-1400	22	-26	0.007307875	0.648	-
Regular		20140722@154.asc	C129996 1217.3' A1 spot 7 dol-ank	19.27	0.56	-14.01	5.00	0.45	59.670	7/23/2014	22:08	-1019	-1400	22	-28	0.007188016	0.490	-
Regular		20140722@155.asc	C129996 1217.3' A1 spot 8 dol-ank	18.95	0.56	-13.97	4.72	0.48	59.197	7/23/2014	22:16	-1026	-1400	21	-28	0.007553002	0.504	-
		20140722@156.asc	C129996 1217.3' UW6220 dol				-1.43	0.49	45.925	7/23/2014	22:25	-128	64	24	-7	0.006890548	-	-
		20140722@157.asc	C129996 1217.3' UW6220 dol				-1.73	0.53	45.023	7/23/2014	22:32	-128	59	24	-7	0.007093519	-	-
		20140722@158.asc	C12996 1217.3' UW6220 EM HV no change; Cs res --> 86				-1.31	0.55	47.991	7/23/2014	22:43	-128	52	25	-6	0.007222319	-	-
		20140722@159.asc	C12996 1217.3' UW6220				-1.18	0.52	48.319	7/23/2014	22:51	-128	45	25	-8	0.006872909	-	-
			average and 2SD	22.60		-23.48	**-1.41**	**0.47**										
			bracket average and 2SD	22.60		-23.34	**-1.27**	**0.56**										
Regular		20140722@160.asc	C12996 1217.3' A1 spot 9 OQ	24.67	0.77	-14.01	10.32	0.61	37.651	7/23/2014	23:00	-1037	-1315	20	-27	0.001575008	N/A	N/A
Regular		20140722@161.asc	C12996 1217.3' A1 spot 10 OQ	24.35	0.77	-14.01	10.00	0.51	36.071	7/23/2014	23:08	-1037	-1320	19	-27	0.001772033	N/A	N/A
Regular		20140722@162.asc	C12996 1217.3' A1 spot 11 OQ	24.56	0.77	-14.01	10.21	0.59	35.766	7/23/2014	23:16	-1034	-1319	19	-27	0.001968557	N/A	N/A
Regular		20140722@163.asc	C12996 1217.3' A1 spot 12 dol-ank	22.41	0.77	-15.89	6.16	0.35	56.838	7/23/2014	23:24	-1040	-1310	20	-27	0.007013892	0.237	-
Regular		20140722@164.asc	C12996 1217.3' A1 spot 13 dol-ank	22.31	0.77	-15.89	6.07	0.49	56.633	7/23/2014	23:32	-1040	-1306	19	-27	0.006549105	0.237	-
Regular		20140722@165.asc	C12996 1217.3' A1 spot 14 dol-ank	24.44	0.77	-15.76	8.29	0.45	42.272	7/23/2014	23:40	-1028	-1320	19	-28	0.005194897	0.250	-
Regular		20140722@166.asc	C12996 1217.3' A1 spot 15 dol-ank	25.68	0.77	-22.73	2.37	0.90	47.612	7/23/2014	23:52	-881	-1182	19	-26	0.008667856	0.016	-
Regular	Exclude; abnormal 2SE	20140722@167.asc	C12996 1217.3' A1 spot 16 dol-ank	23.30	0.77	-22.73	0.04	1.83	45.909	7/24/2014	0:01	-870	-1181	19	-26	0.04469159	0.016	-
		20140722@168.asc	C12996 1217.3' UW6220 dol				-1.94	0.58	46.079	7/24/2014	0:09	-138	68	18	-8	0.006473298	-	-
		20140722@169.asc	C12996 1217.3' UW6220 dol				-2.11	0.59	45.627	7/24/2014	0:16	-138	61	19	-7	0.006619624	-	-
		20140722@170.asc	C12996 1217.3' UW6220 dol EM HV adj no change, Cs res --> 87				-2.14	0.43	48.383	7/24/2014	0:27	-138	54	18	-8	0.006864361	-	-
		20140722@171.asc	C12996 1217.3' UW6220 dol				-2.07	0.61	48.228	7/24/2014	0:34	-138	47	19	-8	0.006423098	-	-
			average and 2SD	22.60		-24.12	**-2.06**	**0.18**										
			bracket average and 2SD	22.60		-23.80	**-1.74**	**0.77**										
Regular		20140722@172.asc	C12996 1217.3' A1 spot 17 dol-ank	21.35	0.61	-16.50	4.50	0.41	58.483	7/24/2014	0:44	-1061	-1288	20	-28	0.005872952	0.226	-
Regular		20140722@173.asc	C12996 1217.3' A1 spot 18 dol-ank	21.73	0.61	-16.26	5.12	0.53	56.737	7/24/2014	0:52	-1065	-1288	20	-27	0.006538249	0.249	-
Regular		20140722@174.asc	C12996 1217.3' A1 spot 19 dol-ank	23.03	0.61	-16.40	6.25	0.47	56.827	7/24/2014	1:00	-1070	-1293	20	-28	0.005915915	0.235	-
Regular		20140722@175.asc	C12996 1217.3' A1 spot 20 dol-ank	21.85	0.61	-20.77	0.63	0.44	51.057	7/24/2014	1:07	-1042	-1272	19	-27	0.005793626	0.055	-
Regular		20140722@176.asc	C12996 1217.3' A1 spot 21 dol-ank	22.96	0.61	-21.79	0.67	0.38	49.829	7/24/2014	1:16	-1050	-1277	19	-29	0.006021996	0.037	-
Regular		20140722@177.asc	C12996 1217.3' A1 spot 22 dol-ank	21.67	0.61	-22.79	-1.62	0.63	49.254	7/24/2014	1:24	-1055	-1279	20	-28	0.006081078	0.022	-
Regular		20140722@178.asc	C12996 1217.3' A1 spot 23 dol-ank	23.12	0.61	-21.86	0.76	0.42	49.816	7/24/2014	1:32	-1037	-1249	19	-28	0.005798968	0.036	-
Regular		20140722@179.asc	C12996 1217.3' A1 spot 24 dol-ank	27.94	0.61	-22.65	4.66	0.48	51.726	7/24/2014	1:41	-1059	-1242	20	-27	0.005873741	0.024	-
Regular		20140722@180.asc	C12996 1217.3' A1 spot 25 dol-ank	23.93	0.61	-20.28	3.16	0.53	50.989	7/24/2014	1:48	-1052	-1243	19	-28	0.005847798	0.065	-
		20140722@181.asc	C12996 1217.3' UW6220 dol				-2.40	0.61	46.541	7/24/2014	1:56	-149	69	19	-9	0.005814877	-	-
		20140722@182.asc	C12996 1217.3' UW6220 dol				-1.92	0.59	46.633	7/24/2014	2:04	-149	62	19	-10	0.005992556	-	-
		20140722@183.asc	C12996 1217.3' UW6220 dol EM HV adj no change; Cs res --> 88				-2.76	0.49	48.849	7/24/2014	2:13	-149	55	19	-9	0.006029309	-	-
		20140722@184.asc	C12996 1217.3' UW6220 dol				-2.54	0.59	49.208	7/24/2014	2:20	-149	48	19	-8	0.005769292	-	-
			average and 2SD	22.60		-24.45	**-2.41**	**0.71**										
			bracket average and 2SD	22.60		-24.29	**-2.24**	**0.60**										

Regular		20140722@185.asc	C12996 1217.3' A1 spot 26 dol-ank	23.57	0.61	-22.81	0.22	0.71	49.980	7/24/2014	2:30	-1015	-1236	20	-28	0.006737763	0.024	-
Regular		20140722@186.asc	C12996 1217.3' A1 spot 27 dol-ank	23.32	0.61	-22.02	0.79	0.41	50.981	7/24/2014	2:39	-1031	-1241	19	-28	0.005551651	0.036	-
Regular		20140722@187.asc	C12996 1217.3' A1 spot 28 dol-ank	24.71	0.61	-22.74	1.40	0.56	49.826	7/24/2014	2:49	-846	-999	18	-24	0.006908968	0.025	-
Regular		20140722@188.asc	C12996 1217.3' A1 spot 29 dol-ank	21.29	0.61	-22.74	-1.94	0.53	49.330	7/24/2014	2:57	-844	-1010	17	-23	0.008557852	0.025	-
Regular		20140722@189.asc	C12996 1217.3' A1 spot 30 dol-ank	24.46	0.61	-22.74	1.16	0.61	49.541	7/24/2014	3:05	-851	-993	18	-24	0.006566812	0.025	-
Regular		20140722@190.asc	C12996 1217.3' A1 spot 31 dol-ank	22.20	0.61	-16.88	4.94	0.41	56.515	7/24/2014	3:14	-1003	-1399	19	-28	0.00531512	0.208	-
No pit image	No pit image	20140722@191.asc	C12996 1217.3' A1 spot 32 OQ	25.66	0.61	-14.66	10.62	0.48	38.094	7/24/2014	3:23	-964	-1403	18	-28	0.001528257	N/A	N/A
Regular		20140722@192.asc	C12996 1217.3' A1 spot 33 OQ	25.47	0.61	-14.66	10.43	0.49	38.200	7/24/2014	3:31	-988	-1424	18	-29	0.001470128	N/A	N/A
		20140722@193.asc	C12996 1217.3' UW6220 dol				-2.39	0.45	47.646	7/24/2014	3:39	-157	76	19	-10	0.005553313	-	-
		20140722@194.asc	C12996 1217.3' UW6220 dol				-2.63	0.55	47.262	7/24/2014	3:46	-157	69	20	-9	0.00562515	-	-
		20140722@195.asc	C12996 1217.3' UW6220 dol EM HV adj --> 2379/80V				-2.61	0.53	47.543	7/24/2014	3:56	-157	62	19	-9	0.005902765	-	-
		20140722@196.asc	C12996 1217.3' UW6220 dol				-1.96	0.48	47.068	7/24/2014	4:03	-157	55	19	-10	0.005625313	-	-
			average and 2SD	22.60		-24.44	**-2.40**	**0.61**										
			bracket average and 2SD	22.60		-24.45	**-2.40**	**0.61**										
		20140722@197.asc	C12996 1217.3' UWQ-1				-2.59	0.54	36.977	7/24/2014	4:11	-186	1057	12	-34	0.001380059	-	-
		20140722@198.asc	C12996 1217.3' UWQ-1				-2.37	0.71	36.418	7/24/2014	4:18	-186	1050	12	-34	0.001575836	-	-
		20140722@199.asc	C12996 1217.3' UWQ-1				-2.44	0.49	36.021	7/24/2014	4:25	-186	1043	12	-35	0.001612385	-	-
		20140722@200.asc	C12996 1217.3' UWQ-1				-2.35	0.46	36.098	7/24/2014	4:32	-186	1036	12	-35	0.001634286	-	-
			average and 2SD	12.33		-14.59	**-2.44**	**0.22**										
Regular		20140722@201.asc	C12996 1217.3' A1 spot 34 OQ	24.45	0.71	-14.49	9.60	0.47	35.999	7/24/2014	4:40	-1045	-1312	20	-30	0.001251594	N/A	N/A
Regular		20140722@202.asc	C12996 1217.3' A1 spot 35 OQ	24.98	0.71	-14.49	10.13	0.74	34.204	7/24/2014	4:48	-1045	-1318	20	-29	0.001371678	N/A	N/A
Regular		20140722@203.asc	C12996 1217.3' A1 spot 36 OQ	24.31	0.71	-14.49	9.47	0.52	34.079	7/24/2014	4:58	-1042	-1314	20	-29	0.001536915	N/A	N/A
Regular		20140722@204.asc	C12996 1217.3' A1 spot 37 dol-ank	20.75	0.71	-16.21	4.21	0.34	54.837	7/24/2014	5:07	-1050	-1306	19	-29	0.005316535	0.253	-
Regular		20140722@205.asc	C12996 1217.3' A1 spot 38 dol-ank	22.99	0.71	-16.21	6.41	0.49	54.681	7/24/2014	5:15	-1044	-1308	20	-29	0.005458091	0.253	-
Regular		20140722@206.asc	C12996 1217.3' A1 spot 39 dol-ank	22.06	0.71	-16.37	5.32	0.45	54.385	7/24/2014	5:22	-1044	-1302	19	-29	0.005337649	0.237	-
Regular		20140722@207.asc	C12996 1217.3' A1 spot 40 dol-ank	20.73	0.71	-15.98	4.42	0.45	55.126	7/24/2014	5:30	-1031	-1305	18	-29	0.005203387	0.280	-
Regular		20140722@208.asc	C12996 1217.3' A1 spot 41 dol-ank	23.54	0.71	-16.21	6.95	0.59	46.175	7/24/2014	5:38	-1031	-1313	19	-29	0.00554528	0.253	-
		20140722@209.asc	C12996 1217.3' UWQ-1				-2.69	0.62	35.247	7/24/2014	5:47	-176	1063	13	-34	0.001422117	-	-
		20140722@210.asc	C12996 1217.3' UWQ-1				-2.67	0.49	34.449	7/24/2014	5:54	-176	1056	13	-33	0.001577541	-	-
		20140722@211.asc	C12996 1217.3' UWQ-1 EM HV no change, Cs res --> 89				-1.81	0.59	36.059	7/24/2014	6:04	-176	1049	13	-34	0.00151654	-	-
		20140722@212.asc	C12996 1217.3' UWQ-1				-1.79	0.56	35.382	7/24/2014	6:11	-176	1042	13	-34	0.001516711	-	-
			average and 2SD	12.33		-14.39	**-2.24**	**1.01**										
			bracket average and 2SD	12.33		-14.49	**-2.34**	**0.71**										
Regular		20140722@213.asc	C12996 1217.3' A1 spot 42 OQ	26.16	1.01	-14.28	11.51	0.66	37.536	7/24/2014	6:21	-993	-1428	18	-29	0.001308866	N/A	N/A
Regular		20140722@214.asc	C12996 1217.3' A1 spot 43 OQ	27.15	1.01	-14.28	12.48	0.48	37.703	7/24/2014	6:28	-998	-1421	18	-30	0.001426788	N/A	N/A
Regular		20140722@215.asc	C12996 1217.3' A1 spot 44 OQ	28.23	1.01	-14.28	13.55	0.60	37.619	7/24/2014	6:36	-1000	-1419	18	-31	0.00147004	N/A	N/A
Regular		20140722@216.asc	C12996 1217.3' A1 spot 45 OQ	25.44	1.01	-14.28	10.80	0.54	37.005	7/24/2014	6:45	-1007	-1415	18	-31	0.001472148	N/A	N/A
Regular		20140722@217.asc	C12996 1217.3' A1 spot 46 OQ	24.70	1.01	-14.28	10.07	0.48	36.550	7/24/2014	6:52	-1009	-1411	19	-31	0.001465489	N/A	N/A
Regular		20140722@218.asc	C12996 1217.3' A1 spot 47 OQ	23.58	1.01	-14.28	8.97	0.58	38.738	7/24/2014	7:01	-1081	-1345	19	-30	0.001144669	N/A	N/A
Regular		20140722@219.asc	C12996 1217.3' A1 spot 48 OQ	24.52	1.01	-14.28	9.89	0.64	38.293	7/24/2014	7:09	-1088	-1349	18	-29	0.001354467	N/A	N/A
Regular	Exclude; pit overlaps detrital qtz	20140722@220.asc	C12996 1217.3' A1 spot 49 OQ	10.99	1.01	-14.28	-3.45	0.86	37.186	7/24/2014	7:16	-1097	-1352	19	-30	0.00692165	N/A	N/A
Regular		20140722@221.asc	C12996 1217.3' A1 spot 50 OQ	24.68	1.01	-14.28	10.05	0.50	37.674	7/24/2014	7:25	-1095	-1344	19	-30	0.001495958	N/A	N/A
		20140722@222.asc	C12996 1217.3' UWQ-1				-2.56	0.65	36.540	7/24/2014	7:32	-169	1068	13	-35	0.001278366	-	-
		20140722@223.asc	C12996 1217.3' UWQ-1				-2.41	0.54	35.678	7/24/2014	7:40	-169	1061	13	-33	0.001371881	-	-
		20140722@224.asc	C12996 1217.3' UWQ-1 EM HV adj --> 2391V, Cs res --> 90				-1.46	0.52	36.888	7/24/2014	7:51	-169	1054	13	-34	0.00130934	-	-
		20140722@225.asc	C12996 1217.3' UWQ-1 EM HV adj --> 2391V, Cs res --> 90				-1.61	0.59	37.027	7/24/2014	7:58	-169	1047	13	-34	0.001320409	-	-
			average and 2SD	12.33		-14.16	**-2.01**	**1.11**										
			bracket average and 2SD	12.33		-14.28	**-2.12**	**1.01**										

Data lines 20140722@271-295: analyses of other non-dolomite-ankerite standards

Sample mount: C131467 277.9' A1

		20140722@314.asc	C131467 277.9A1 UW6220				-0.46	0.72	46.402	7/24/2014	20:55	-75	-2702	15	-24	0.001620498	-	-
		20140722@315.asc	C131467 277.9A1 UW6220				-0.66	0.61	46.868	7/24/2014	21:02	-75	-2709	13	-24	0.001422226	-	-
		20140722@316.asc	C131467 277.9A1 UW6220 dol EM HV no change				-0.14	0.48	47.763	7/24/2014	21:11	-75	-2716	15	-24	0.001260204	-	-
		20140722@317.asc	C131467 277.9A1 UW6220 dol				-0.84	0.54	47.093	7/24/2014	21:18	-75	-2723	15	-25	0.001150937	-	-
			average and 2SD	22.60		-22.61	**-0.52**	**0.60**										
Regular		20140722@318.asc	C131467 277.9A1 A5 Spot 1 dol	24.93	0.80	-22.68	1.69	0.63	46.478	7/24/2014	21:32	-2286	3834	6	-3	0.001199231	0.004	-
Regular		20140722@319.asc	C131467 277.9A1 A5 Spot 2 dol	27.21	0.80	-22.68	3.91	0.54	47.232	7/24/2014	21:39	-2279	3868	5	-4	0.001759114	0.004	-
Regular		20140722@320.asc	C131467 277.9A1 A5 Spot 3 dol	21.04	0.80	-21.54	-0.95	0.78	47.889	7/24/2014	21:47	-2288	3858	5	-4	0.002000378	0.020	-
Regular		20140722@321.asc	C131467 277.9A1 A5 Spot 4 dol	20.04	0.80	-21.54	-1.93	0.60	47.446	7/24/2014	21:55	-2292	3868	5	-4	0.001135101	0.020	-
Regular		20140722@322.asc	C131467 277.9A1 A5 Spot 5 dol	25.22	0.80	-22.68	1.98	0.60	45.597	7/24/2014	22:03	-2299	3890	4	-2	0.001202709	0.004	-
Regular		20140722@323.asc	C131467 277.9A1 A5 Spot 6 dol	20.26	0.80	-21.54	-1.71	0.65	47.529	7/24/2014	22:11	-2335	3896	4	-2	0.001199074	0.020	-
Regular		20140722@324.asc	C131467 277.9A1 A5 Spot 7 dol	24.96	0.80	-22.68	1.72	0.36	45.521	7/24/2014	22:20	-2319	3886	4	-3	0.001176459	0.004	-
Regular		20140722@325.asc	C131467 277.9A1 A5 Spot 8 dol	19.75	0.80	-21.54	-2.22	0.64	45.804	7/24/2014	22:29	-2304	3919	5	1	0.001001864	0.020	-
		20140722@326.asc	C131467 277.9A1 UW6220 dol				-1.01	0.67	44.208	7/24/2014	22:37	-62	-2698	15	-23	0.000863016	-	-
		20140722@327.asc	C131467 277.9A1 UW6220 dol				-0.95	0.51	44.291	7/24/2014	22:46	-62	-2705	16	-24	0.000931249	-	-
		20140722@328.asc	C131467 277.9A1 UW6220 dol EM HV no change; Cs res -->95				-1.46	0.67	46.109	7/24/2014	22:56	-62	-2712	16	-24	0.000857529	-	-
		20140722@329.asc	C131467 277.9A1 UW6220 dol				-1.00	0.53	46.756	7/24/2014	23:03	-62	-2719	17	-24	0.0008371	-	-
			average and 2SD	22.60		-23.18	**-1.11**	**0.48**										
			bracket average and 2SD	22.60		-22.90	**-0.81**	**0.80**										
Regular		20140722@330.asc	C131467 277.9A1 A1 Spot 1 cal	23.59	0.65	-17.67	5.50	0.56	49.192	7/24/2014	23:12	-3049	2901	8	-17	0.008403859	-	0.967
Regular		20140722@331.asc	C131467 277.9A1 A1 Spot 2 dol	23.71	0.65	-21.68	1.52	0.55	48.565	7/24/2014	23:19	-3041	2901	8	-19	0.00076821	0.024	-
Regular		20140722@332.asc	C131467 277.9A1 A1 Spot 3 dol	21.62	0.65	-21.40	-0.25	0.64	47.643	7/24/2014	23:28	-3039	2899	8	-18	0.000805964	0.028	-
Regular		20140722@333.asc	C131467 277.9A1 A1 Spot 4 dol	21.48	0.65	-21.75	-0.73	0.66	47.884	7/24/2014	23:36	-3030	2894	7	-20	0.000892185	0.023	-
Regular		20140722@334.asc	C131467 277.9A1 A1 Spot 5 dol	23.05	0.65	-21.34	1.23	0.54	48.247	7/24/2014	23:45	-3015	2897	8	-21	0.000797846	0.029	-
Regular		20140722@335.asc	C131467 277.9A1 A1 Spot 6 dol	22.42	0.65	-21.27	0.67	0.43	48.381	7/24/2014	23:54	-3034	2876	7	-20	0.001576554	0.030	-
Regular		20140722@336.asc	C131467 277.9A1 A1 Spot 7 dol	21.77	0.65	-21.14	0.17	0.48	46.549	7/25/2014	0:01	-3013	2880	8	-19	0.001324363	0.032	-
Regular		20140722@337.asc	C131467 277.9A1 A1 Spot 8 dol	21.63	0.65	-21.82	-0.66	0.38	47.356	7/25/2014	0:09	-3007	2886	8	-19	0.00104528	0.022	-
		20140722@338.asc	C131467 277.9A1 UW6220 dol				-1.35	0.58	47.020	7/25/2014	0:17	-74	-2729	15	-26	0.00074647	-	-
		20140722@339.asc	C131467 277.9A1 UW6220 dol				-1.84	0.44	46.678	7/25/2014	0:24	-74	-2736	16	-25	0.000741179	-	-
		20140722@340.asc	C131467 277.9A1 UW6220 dol EM HV no change				-0.93	0.60	46.448	7/25/2014	0:33	-74	-2743	16	-25	0.000721282	-	-
		20140722@341.asc	C131467 277.9A1 UW6220 dol				-1.41	0.67	46.621	7/25/2014	0:41	-74	-2750	15	-26	0.000722992	-	-
			average and 2SD	22.60		-23.45	**-1.38**	**0.74**										
			bracket average and 2SD	22.60		-23.32	**-1.24**	**0.65**										
Regular	Slight overlap of cal&dol?	20140722@342.asc	C131467 277.9A1 A1 Spot 9 Cal	24.46	1.02	-18.15	5.87	0.61	48.582	7/25/2014	0:50	-3043	2847	8	-19	0.01209792	-	0.968
Regular		20140722@343.asc	C131467 277.9A1 A1 Spot 10 Dol	25.65	1.02	-22.16	2.92	0.54	47.681	7/25/2014	0:57	-3043	2853	7	-19	0.000718563	0.024	-
Regular		20140722@344.asc	C131467 277.9A1 A1 Spot 11 Dol	26.15	1.02	-22.16	3.41	0.57	47.685	7/25/2014	1:05	-3037	2848	8	-20	0.001022062	0.024	-
Regular	cal pit overlap adjacent dol	20140722@345.asc	C131467 277.9A1 A1 Spot 12 Cal	22.69	1.02	-18.12	4.16	0.42	46.468	7/25/2014	1:13	-3026	2836	8	-19	0.001840042	-	0.970
Regular		20140722@346.asc	C131467 277.9A1 A1 Spot 13 Dol	25.44	1.02	-21.82	3.07	0.62	47.775	7/25/2014	1:22	-3032	2844	8	-20	0.001013348	0.029	-
Regular	Clipped dol; do not use	20140722@347.asc	C131467 277.9A1 A1 Spot 14 Cal	22.57	1.02	-18.30	3.85	0.54	45.416	7/25/2014	1:31	-2933	2817	7	-19	0.008038304	-	0.955
Regular		20140722@348.asc	C131467 277.9A1 A1 Spot 15 Dol	25.49	1.02	-19.98	5.00	0.52	48.799	7/25/2014	1:38	-2925	2821	7	-20	0.000763791	0.061	-
Regular		20140722@349.asc	C131467 277.9A1 A1 Spot 16 Dol	23.51	1.02	-21.82	1.18	1.65	44.495	7/25/2014	1:46	-2919	2866	7	-20	0.00711291	0.029	-

		20140722@350.asc	C131467 277.9A1 UW6220 dol				-2.03	0.47	45.070	7/25/2014	1:54	-61	-2728	15	-26	0.000712272	-	-
		20140722@351.asc	C131467 277.9A1 UW6220 dol				-2.39	0.60	44.674	7/25/2014	2:01	-61	-2735	15	-26	0.000721581	-	-
		20140722@352.asc	C131467 277.9A1 UW6220 dol Cs res --> 96, EM HV no change				-1.58	0.50	47.543	7/25/2014	2:11	-61	-2742	15	-26	0.000693248	-	-
		20140722@353.asc	C131467 277.9A1 UW6220 dol				-2.36	0.63	47.469	7/25/2014	2:18	-61	-2749	15	-27	0.000689281	-	-
			average and 2SD	22.60		-24.14	**-2.09**	**0.75**										
			bracket average and 2SD	22.60		-23.80	**-1.74**	**1.02**										
		Sample mount: C4006 3857'																
		20140722@354.asc	C4006 3857' UW6220 dol				-2.10	0.80	45.111	7/25/2014	2:36	-942	1477	3	-29	0.00836908	-	-
		20140722@355.asc	C4006 3857' UW6220 dol				-2.83	0.65	46.289	7/25/2014	2:43	-942	1470	3	-28	0.009462586	-	-
		20140722@356.asc	C4006 3857' UW6220 dol EM HV adj --> 2441 V				-1.97	0.42	47.111	7/25/2014	2:53	-942	1463	3	-28	0.006928104	-	-
		20140722@357.asc	C4006 3857' UW6220 dol				-1.87	0.52	47.014	7/25/2014	3:00	-942	1456	4	-28	0.006637849	-	-
				22.60		-24.25	**-2.19**	**0.87**										
Regular		20140722@358.asc	C4006 3857' A2 R2 Spot 1	16.65	0.88	-15.19	1.20	0.63	58.273	7/25/2014	3:10	1716	3194	15	-19	0.006872597	0.461	-
Regular		20140722@359.asc	C4006 3857' A2 R2 Spot 2 ank	20.51	0.88	-15.26	4.93	0.63	55.557	7/25/2014	3:19	1718	3165	13	-23	0.007019665	0.441	-
Regular		20140722@360.asc	C4006 3857' A2 R2 Spot 3 ank	19.87	0.88	-15.26	4.31	0.45	56.114	7/25/2014	3:28	1718	3171	14	-22	0.007014681	0.441	-
Regular		20140722@361.asc	C4006 3857' A2 R2 Spot 4 ank	16.94	0.88	-15.26	1.42	0.47	56.552	7/25/2014	3:35	1716	3177	14	-21	0.007734226	0.441	-
Regular		20140722@362.asc	C4006 3857' A2 R2 Spot 5 ank	16.23	0.88	-15.26	0.72	0.42	56.596	7/25/2014	3:43	1716	3182	14	-21	0.007705984	0.441	-
Regular		20140722@363.asc	C4006 3857' A2 R2 Spot 6 ank	15.08	0.88	-15.07	-0.22	0.63	56.722	7/25/2014	3:51	1715	3189	14	-21	0.007721899	0.502	-
Regular		20140722@364.asc	C4006 3857' A2 R2 Spot 7 ank	13.43	0.88	-15.12	-1.90	0.55	55.027	7/25/2014	3:59	1711	3201	14	-20	0.00813221	0.484	-
Regular		20140722@365.asc	C4006 3857' A2 R2 Spot 8 ank	15.11	0.88	-15.12	-0.24	0.48	55.160	7/25/2014	4:08	1710	3205	15	-21	0.008641879	0.484	-
Regular		20140722@366.asc	C4006 3857' A2 R2 Spot 9 ank	14.53	0.88	-15.12	-0.81	0.31	55.661	7/25/2014	4:17	1714	3196	14	-22	0.00996947	0.484	-
		20140722@367.asc	C4006 3857' UW6220 dol				-2.54	0.61	43.825	7/25/2014	4:25	-933	1477	2	-30	0.008905865	-	-
		20140722@368.asc	C4006 3857' UW6220 dol				-2.59	0.48	43.830	7/25/2014	4:33	-933	1463	2	-28	0.008127049	-	-
		20140722@369.asc	C4006 3857' UW6220 dol EM HV adj --> 2443V, Cs res -->97				-3.07	0.53	46.564	7/25/2014	4:43	-933	1456	3	-28	0.008259667	-	-
		20140722@370.asc	C4006 3857' UW6220 dol				-2.07	0.63	46.125	7/25/2014	4:50	-933	1449	3	-28	0.01325943	-	-
			average and 2SD	22.60		-24.61	**-2.57**	**0.81**										
			bracket average and 2SD	22.60		-24.43	**-2.38**	**0.88**										
Regular		20140722@371.asc	C4006 3857' A9 R6 Spot 1 Ank	13.63	0.91	-15.20	-1.78	0.61	56.665	7/25/2014	5:01	-395	4462	19	-19	0.007726595	0.560	-
Missed	Went into void space and hit OQ	20140722@372.asc	C4006 3857' A9 R6 Spot 2 Ank	-	-	-	3.21	1.49	6.816	7/25/2014	5:12	-409	4436	16	-28	0.0105641	0.560	-
Regular		20140722@373.asc	C4006 3857' A9 R6 Spot 3 Ank	16.34	0.91	-15.20	0.90	0.49	49.936	7/25/2014	5:21	-413	4440	15	-23	0.00731296	0.560	-
Regular		20140722@374.asc	C4006 3857' A9 R6 Spot 4 Ank	16.73	0.91	-15.36	1.11	0.42	53.856	7/25/2014	5:30	-419	4443	16	-23	0.008028013	0.497	-
Regular		20140722@375.asc	C4006 3857' A9 R6 Spot 5 Ank	16.29	0.91	-15.46	0.57	0.50	56.873	7/25/2014	5:40	-425	4446	15	-20	0.007818078	0.462	-
Regular		20140722@376.asc	C4006 3857' A9 R6 Spot 6 Ank	15.87	0.91	-15.51	0.11	0.47	55.938	7/25/2014	5:47	-431	4449	16	-21	0.007746773	0.448	-
Regular		20140722@377.asc	C4006 3857' A9 R6 Spot 7 Ank	16.62	0.91	-15.59	0.77	0.31	57.315	7/25/2014	5:55	-437	4452	17	-20	0.007738503	0.428	-
Regular		20140722@378.asc	C4006 3857' A9 R6 Spot 8 Ank	17.25	0.91	-15.59	1.39	0.45	56.949	7/25/2014	6:03	-443	4455	17	-19	0.007679872	0.428	-
		20140722@379.asc	C4006 3857' UW6220 dol				-3.30	0.52	45.295	7/25/2014	6:11	-956	1461	3	-29	0.007629908	-	-
		20140722@380.asc	C4006 3857' UW6220 dol				-3.08	0.58	45.773	7/25/2014	6:20	-956	1454	4	-29	0.007918969	-	-
		20140722@381.asc	C4006 3857' UW6220 dol EM HV adj --> 2451V				-2.10	0.80	46.053	7/25/2014	6:29	-956	1447	4	-30	0.007866661	-	-
		20140722@382.asc	C4006 3857' UW6220 dol				-2.53	0.54	45.702	7/25/2014	6:36	-949	1440	4	-28	0.007498594	-	-
			average and 2SD	22.60		-24.79	**-2.75**	**1.08**										
			bracket average and 2SD	22.60		-24.70	**-2.66**	**0.91**										