GEOLOGIC MAP OF THE BAYHORSE ANTICLINE, CUSTER COUNTY, IDAHO

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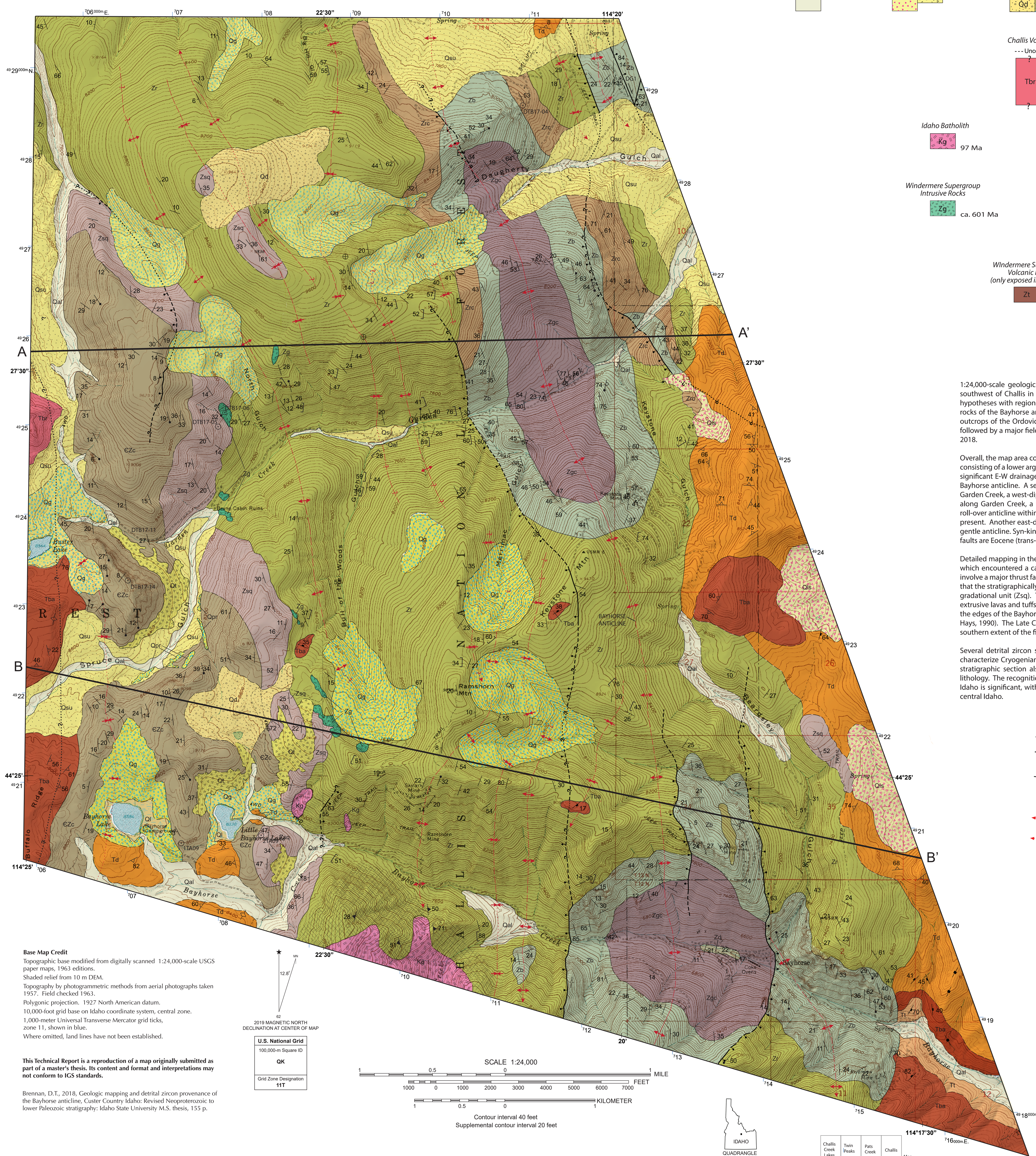
2020 (modified from Plate 1 in Brennan, 2018 ISU M.S. Thesis)



Base Map Credit

Topographic base modified from digitally scanned 1:24,000-scale USGS paper maps, 1963 editions.
Shaded relief from 10 m DEM.
Topography by photogrammetric methods from aerial photographs taken 1957. Field checked 1963.
Polygonic projection. 1927 North American datum.
10,000-foot grid base on Idaho coordinate system, central zone.
1,000-meter Universal Transverse Mercator grid ticks, zone 11, shown in blue.
Where omitted, land lines have not been established.

This Technical Report is a reproduction of a map originally submitted as part of a master's thesis. Its content and format and interpretations may not conform to IGS standards.

Brennan, D.T., 2018, Geologic mapping and detrital zircon provenance of the Bayhorse anticline, Custer Country Idaho: Revised Neoproterozoic to lower Paleozoic stratigraphy: Idaho State University M.S. thesis, 155 p.

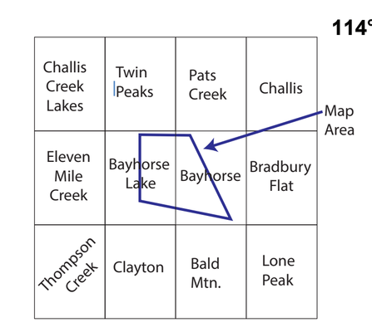
2019 MAGNETIC NORTH DECLINATION AT CENTER OF MAP

U.S. National Grid
100,000-m Square ID
QK
Grid Zone Designation
11T

SCALE 1:24,000

Contour interval 40 feet
Supplemental contour interval 20 feet

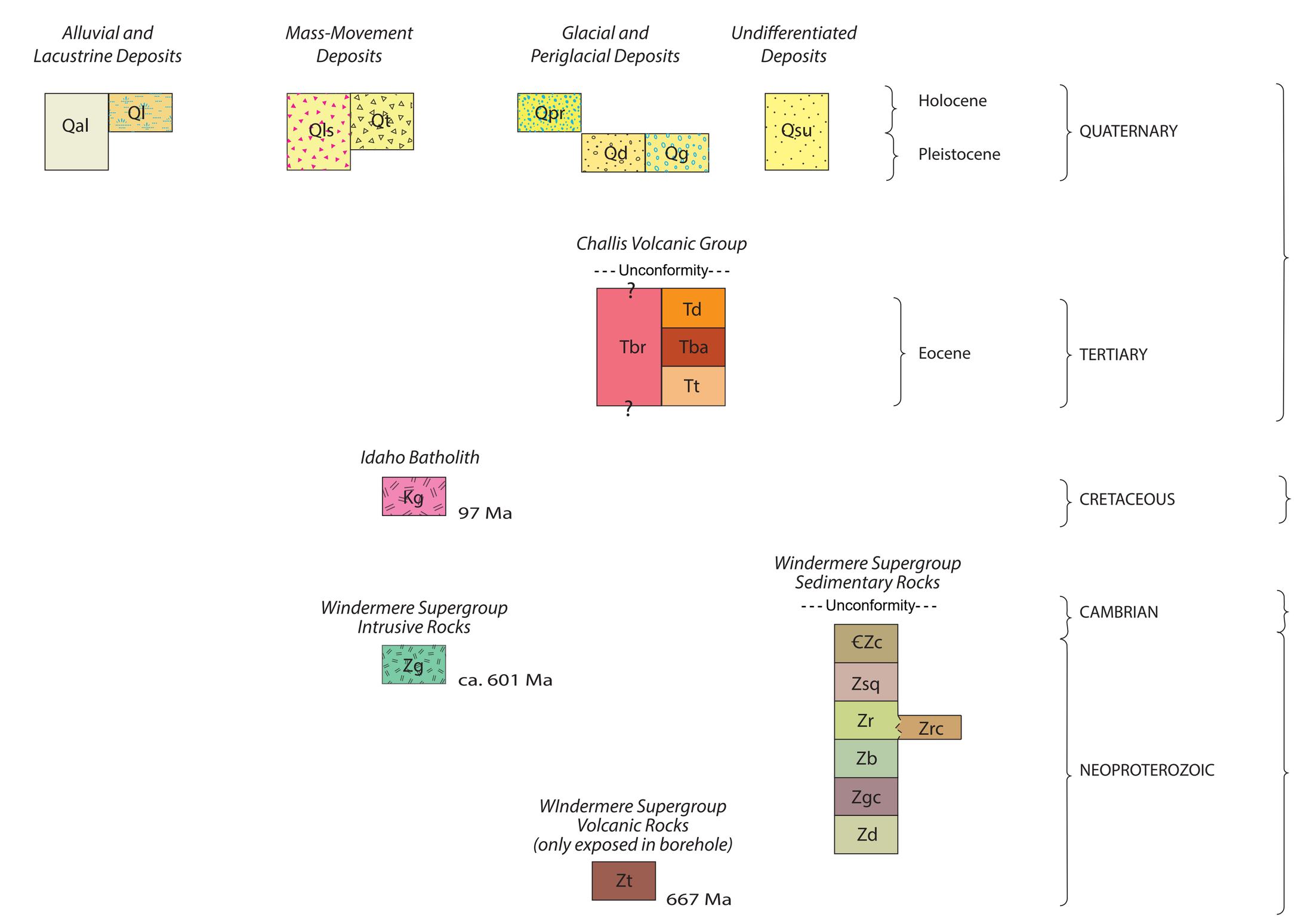
IDAHO
QUADRANGLE LOCATION



ADJOINING QUADRANGLES

Field work conducted 2017-2018.
This geologic map was funded by Edmap Award No. G17AC00159
Map version 1/22/2020

CORRELATION OF MAP UNITS



INTRODUCTION

1:24,000-scale geologic mapping and structural analysis of a region within the Bayhorse and Bayhorse Lake 7.5-minute quadrangles southwest of Challis in central Idaho refined 1:62,500-scale geologic mapping from Hobbs and others (1991) and tested several crucial hypotheses with regional implications. Previous mapping (Hobbs and others, 1991; Fisher and others, 1992; Krohe, 2016) designated the rocks of the Bayhorse anticline as Late Cambrian to Middle Ordovician in age, due in part to a miscorrelation of the Ramshorn Slate with outcrops of the Ordovician Phi Kappa Formation to the south (Hobbs and Hays, 1990). Preliminary field evaluation during fall 2016 was followed by a major field season during the late spring and summer of 2017, with concluding fieldwork during fall 2017 and early summer 2018.

Overall, the map area contains a north-trending anticline involving a slightly metamorphosed yet intact >2.5 km thick stratigraphic section consisting of a lower argillaceous and dolomitic sequence overlain by quartzite. Trending approximately perpendicular to the fold axis, three significant E-W drainages have incised, exposing the hinge zone of the anticline. Several smaller amplitude folds occur west of the main Bayhorse anticline. A series of N-S to NW-SE striking faults, with primarily normal offset, cross cut these folds. Along the eastern extent of Garden Creek, a west-dipping normal fault duplicates steeper dipping strata along the eastern limb of the Bayhorse anticline. Farther west, along Garden Creek, a west-dipping normal fault along the Ramshorn Slate/Bayhorse Dolomite contact resulted in the formation of a roll-over anticline within the Ramshorn Slate. This fault can be traced to the south where in Bayhorse Creek a small roll-over anticline is also present. Another east-dipping fault through the town of Bayhorse exposes large Bayhorse Dolomite cliffs to the east that are folded into a gentle anticline. Syn-kinematic fluorite mineralization (Ross, 1937), and lack of observable offset on Quaternary features suggest that these faults are Eocene (trans-Challis) in age (see Bennett, 1986 for discussion of trans-Challis fault system).

Detailed mapping in the northeast of the map area documented continuity within strata where the Daugherty Gulch borehole was drilled, which encountered a ca. 667 Ma subsurface tuff (Lund and others, 2010; Isakson, 2017). Instead of previously interpreted relations that involve a major thrust fault between the Clayton Mine Quartzite and the Ramshorn Slate (Hobbs and others, 1991), our mapping documents that the stratigraphically higher quartzites depositionally lie above the slate with an approximately 250 m interbedded siltite and quartzite gradational unit (Zsq). This stratigraphic interval was intruded by gabbroic sills dated here to ca. 601 Ma. Eocene Challis Volcanic Group extrusive lavas and tuffs cover the older sedimentary sequence to the east and west. Previous interpretations involved normal faults along the edges of the Bayhorse anticline and potentially these volcanic rocks were deposited against a scarp of these inferred faults (Hobbs and Hays, 1990). The Late Cretaceous (ca. 97 Ma) granitic Juliette stock with a recognizable contact aureole intruded into country rock in the southern extent of the field area.

Several detrital zircon samples analyzed from key stratigraphic intervals show similarity to regional trends in detrital age-peaks that characterize Cryogenian to earliest Cambrian strata along the Cordilleran margin (Yonkee and others, 2014 and references therein). This stratigraphic section also shows a similarity to the Neoproterozoic stratigraphy of southeastern Idaho with respect to thickness and lithology. The recognition of a thick Cryogenian to Lower Cambrian, relatively intact stratigraphic section west of the Lemhi arch in central Idaho is significant, with implications for the rate and geometry of Neoproterozoic rift development and related sedimentation through central Idaho.

SYMBOLS

- Contact: dashed where approximately located, dotted where concealed.
- Normal fault: ball and bar on downthrown side; dashed where approximately located; dotted where concealed.
- Reactivated (?) right-lateral strike-slip fault: bar and ball on downthrown side; dashed were approximately located; dotted where concealed.
- 57 / 48 Lineation on inclined fault surface. Tick shows fault dip value and direction; arrow shows bearing and plunge of lineation
- Anticline axial trace: dashed where approximately located; dotted where concealed.
- Syncline axial trace: dashed where approximately located; dotted where concealed.
- 2 Strike and dip of bedding.
- Strike of vertical bedding.
- 52 Strike and dip of bedding where sedimentary structures show bedding to be upright.
- 17 Strike and dip of bedding where sedimentary structures show bedding to be overturned.
- 89 Strike and dip of primary foliation.
- Strike of vertical primary foliation.
- 9 Strike and dip of secondary (metamorphic) foliation.
- 78 Strike and dip of joint.
- Strike of vertical joint.
- 53 Strike and dip of cleavage
- Extent of contact metamorphism
- DTB17-04 Location and sample number used for detrital zircon U-Pb analysis (see Fig. 1)
- DG1 Location of Daugherty Gluch borehole containing Tuff of Daugherty Gulch.
- DTB17-06 Location and sample number used for baddeleyite U-Pb analysis (see Fig. 3)

DESCRIPTION OF MAP UNITS

In the following unit descriptions, we use the metric system for sizes of mineral or clast constituents of rock units and also for small-scale features of outcrops. Unit thickness and distance are listed in metric units. Grain size classification of unconsolidated and consolidated sediment is based on the Wentworth scale (Lane, 1947). Intrusive rocks are classified according to IUGS nomenclature using normalized values of modal quartz (Q), alkali feldspar (A), and plagioclase (P) on a ternary diagram (Streckeisen, 1976). Volcanic rocks are classified by total alkalis versus silica chemical composition according to IUGS recommendations (LeMaitre, 1984).

SEDIMENTARY DEPOSITS

Qal **Alluvium (Holocene and Pleistocene)-** Silt, sand, pebbles, and cobbles associated with drainage systems of Daugherty Gulch, Garden Creek, and Bayhorse Creek. Includes probable terrace deposits along Garden Creek. Clasts are generally rounded and show crude stratification, sorting, and imbrication.

Qsu **Surficial deposits undivided (Holocene and Pleistocene)-** Unconsolidated deposits of variable grain size and sorting. Contains colluvium deposited by solifluction, avalanche, and alluvial processes.

Qls **Landslide deposits (Holocene and Pleistocene)-** Angular to subangular and poorly sorted, silt- to boulder- sized debris. Formed by slope failure and characterized by a hummocky surface; vegetated soil overburden is often present near the toe of the landslide. Common in Challis volcanic deposits.

Qt **Talus (Holocene and Pleistocene)-** Locally derived loose masses of angular cobbles and boulders that mantle slopes of moderate angle. Primarily restricted to slopes below cliffs of Ramshorn Slate or Clayton Mine Quartzite.

Ql **Lacustrine sediments (Holocene)-** Very well-sorted unlithified sediment, with thinly laminated beds of silts and clays. Located in seasonally inundated low-lying areas surrounding Bayhorse and Little Bayhorse Lakes.

Qpr **Protalus rampart (Holocene)-** Locally derived, distinct ramparts of unsorted angular cobbles and boulders at the toe of Clayton Mine Quartzite cliffs and talus fields.

Qd **Diamicton (Pleistocene)-** Unsorted terrigenous sediment, ranging in size from clay to boulders in a silty soil matrix. Often poorly drained and mantles a low- relief surface.

Qg **Glacial sediments (Pleistocene)-** Unsorted to poorly sorted cobbles, gravel, and boulders interpreted as glacial till. Often heads into a cirque where mapped near high ridges of Ramshorn Slate. Where cirque is over steepened, minor mass-movement deposits are common (unmapped). Near and above Bayhorse and Little Bayhorse Lakes, a poorly drained clayey matrix with thick soil accumulation is present. A calibrated ^{14}C basal core date (14,000 years BP) from Bayhorse Lake (B. Finney and M. Shapley, personal comm. 2018) suggests glacial features are Pinedale in age.

CHALLIS VOLCANIC GROUP

Td **Dacite (Eocene)-** Orange to light gray, sometimes altered to teal or bright red, dacite lava. Contains variable phenocryst assemblages but is primarily (< 20%) plagioclase (~5 mm) and (< 7%) hornblende (~2 mm) in an aphanitic groundmass. Full thickness is not exposed but estimated to be less than 600 m (Hobbs and Hays, 1991). Potassium-argon age is 49.3 ± 1.4 Ma (Armstrong, 1975). Locally appears to overlie some thin flows of basalt.

Tba **Potassium-rich basalt and andesite (Eocene)-** Very dark gray/black weathers to orange, basalt lava. Contain ~3% (< 2mm) bottle green olivine in a dark aphanitic groundmass. Occurs as a discrete local accumulation along the western margin of the mapping area. Likely less than 150 m thick. Potassium-argon age is 50.3 ± 1.5 Ma (Armstrong, 1975).

Tt **Lithic tuff (Eocene)-** Greenish beige weathers to light orange, matrix supported, volcanic lithic tuff. Contains angular volcanic clasts ranging in size from fine pebbles to small cobbles in an aphanitic (ashy?) matrix. Appears to be volcanic in origin but may be reworked by sedimentary processes.

Tbr **Buster Lake breccia (Eocene)-** Reddish-orange weathers to brown, well-cemented pumaceous breccia. Contains pumaceous lava fragments (<5 cm) as well as grayish-purple (mafic?) fragments.

IDAHO BATHOLITH

Kg **Juliette stock (Cretaceous)-** Pink weathers to pinkish-gray, equigranular, moderately coarse-grained, granite to quartz monzonite, with secondary muscovite. K-Ar age of biotite from main stock is 98.1 ± 3.3 Ma (McIntyre and others, 1976). U-Pb age of zircon from main stock is 96.9 ± 0.8 Ma (Krohe, 2016), at the upper end of the magmatic age range of the Atlanta lobe of the Idaho batholith. Where in contact with the Ramshorn Slate, mica- and andalusite-rich contact aureoles are present.

WINDERMERE SUPERGROUP INTRUSIVE ROCKS

Zg **Ramshorn gabbro (Neoproterozoic)-** Grayish-green gabbro that consistently intruded as 10- to 100-meter scale sill-like bodies near the stratigraphic contact between Ramshorn Slate and Interbedded siltite and quartzite. Contains phenocrysts of amphibole, plagioclase, and clinopyroxene, and secondary pyrite generally < 2 mm in length in a fine-grained groundmass showing chlorite and epidote alteration. Sedimentary beds above the gabbro show an inflation/bedding shift suggesting shallow laccolithic intrusion. In situ U-Pb secondary ionization mass spectrometry of baddeleyite, presented here, indicates a 601 ± 27 Ma crystallization age.

WINDERMERE SUPERGROUP SEDIMENTARY ROCKS

€Zc **Clayton Mine Quartzite (Neoproterozoic to Cambrian)-** Dominantly quartzitic rocks that are heterogeneous in color, degree of sorting, and bedding. Formation ranges from orange, well-sorted, medium-grained quartz sandstone with variable feldspar content to reddish-purple, matrix-supported pebble conglomerate, to clean quartz arenite. Lower Clayton Mine is dominantly tightly quartz-cemented, medium- to thick-tabular cross-stratified, feldspathic arenite with distinct thin, shiny green silt interlaminations. Locally small (<2 cm in diameter) reduction spots are abundant. The unit is interpreted to record variable fluvial and shallow marine deposition and likely contains one or more undocumented unconformities. The upper contact is covered by Tertiary volcanic rocks and/or faulted. Over 800 m thick.

Zsq **Interbedded siltite and quartzite (Neoproterozoic)-** Cyclically interbedded mudstone and sandstone, demonstrating a gradation between the underlying Ramshorn Slate and the overlying Clayton Mine Quartzite. Quartzite beds are primarily medium- to coarse-grained, subfeldspathic arenites with finer beds containing more detrital feldspar and muscovite. Quartzite is interbedded with meter-scale (3-4 m), thick laminated siltstone. One distinct bed of orange to gray, locally oolitic dolostone with laminations of distinct scattered subangular coarse quartz sand to fine pebbles is present. Approximately 250 m thick.

Zr **Ramshorn Slate (Neoproterozoic)-** Medium-gray to blueish-gray to olive-green to reddish-brown, fine-grained, medium-laminated to thin-bedded, slate with a subtle sheen, showing localized foliation and crenulation. Displays Leisegang banding. Pervasively cleaved at high angles to bedding with lesser amounts of pencil cleavage. Breaks along cleavage except where slightly coarser-grained to very-fine sand. Exhibits cyclic (~1 cm) thick, normally-graded laminations indicative of fine-grained turbidite deposition with a noticeable lack of bioturbation. Flute cast swarms are abundant near contact with incised Ramshorn conglomerate. Locally contact metamorphosed to hornfels near the Juliette stock, with muscovite and andalusite visible. Chiastolite/andalusite is weathered out, leaving lath-like depressions. Approximately 650 m thick.

Zrc **Ramshorn conglomerate (Neoproterozoic)-** Reddish-pink, well-rounded, poorly-sorted, coarse to medium pebbles that are supported in a fine sand matrix. Vein quartz with rare red jaspilite pebbles, and intrabasinal sandstone/siltstone clasts are present. Laterally interfingers with reddish-brown, coarse-grained, well-rounded, moderately-sorted, quartz arenite and medium-gray, fine-bedded slate with locally abundant flute cast swarms. Deposited within paleochannel(s) into the Bayhorse Dolomite. Where present, the conglomerate within the Ramshorn Slate overlies the Bayhorse Dolomite in a slight erosional unconformity, suggested by thinned Bayhorse Dolomite. Maximum thickness of approximately 200 m.

Zb **Bayhorse Dolomite (Neoproterozoic)-** Gray to tan/orange, primarily dolomicritic mudstone. Locally contains chert nodules, sometimes as localized (~3 cm) thick beds, dark-gray silicified chert lithic (pisolite?) grainstone beds, and rare fine-grained sandy laminations that locally show cross-stratification. Stratigraphically lower portions show thin tabular-bedding, stratigraphically higher levels show less-defined bedding except for an ~15 m interval of dark gray/brown laminated siltstone and argillite. Contains poorly defined stromatolitic bioherms, calcite veins (often as en-echelon tension gashes), and localized cross laminations. Dolostone is strongly brecciated along faults and near the upper contact with Ramshorn Slate. Breccia ranges up to ~20 cm in diameter and is commonly supported in a dark-red or gray siliceous matrix. Abundant fluorite mineralization is common where faulted and brecciated, particularly in the vicinity of the Daugherty Gluch borehole (DG1), and the Pacific and Keystone mines. Brecciated horizons are likely pipe breccias associated with Eocene volcanism or an irregular paleokarst surface (Ross, 1937). Overlies Garden Creek Phyllite in apparent ~10 m gradational contact. Approximately 375 m thick.

Zgc **Garden Creek Phyllite (Neoproterozoic)-** Dark-gray to nearly black, slightly calcareous phyllite. Weathers to thin, smooth flakes and chips, breaking along irregular, wavy bedding planes. Otherwise, bedding is indistinct. Unit is poorly exposed except where deeply eroded by Garden and Bayhorse creeks. Exposures with southern aspect often do not sustain conifer growth. Overlies in apparent conformity the basal dolomite of Bayhorse Creek. Estimated thickness of approximately 500 m.

Zd **Basal dolomite of Bayhorse Creek (Neoproterozoic)-** Light- to medium-gray, weathers grayish-orange to brown, thin- to medium-tabular bedded, sandy dolomicritic mudstone. The upper 20 m is exposed along Bayhorse Creek near center of the Bayhorse anticline. True interpreted thickness is approximately 50 m in the Daugherty Gulch drill hole. Lower contact is in depositional conformity with the tuff of Daugherty Gulch (Jacob, 1990).

WINDERMERE SUPERGROUP VOLCANIC ROCKS

Zt **Tuff of Daugherty Gulch (Neoproterozoic)-** Volcanic lithic tuff showing lower greenschist facies metamorphism. Contains ~50% clasts of rhyolite, lesser quartz and metasandstone (< 25 cm) in fine grained matrix. Age is 664 ± 7 Ma (SHRIMP: Lund and others, 2010), 667.76 ± 0.22 (CA-TIMS: Isakson, 2017) Found only within the Daugherty Gulch borehole (see Jacob, 1990). Shown only in cross-section.

DISCUSSION

DAUGHERTY GULCH TUFF

Our field mapping documented continuity in surface geology between the 667 Ma subsurface tuff (Isakson, 2017) within the Daugherty Gulch borehole and the north-trending Bayhorse anticline. The borehole (Jacob, 1990) was drilled into overburden but only ~50 m to the west, the Bayhorse Dolomite crops out and contains pisolitic grainstones and stromatolitic bioherms. Just west of Daugherty Spring, a small syncline/anticline pair occurs on the eastern limb of the regional Bayhorse anticline. Approximately 500 m west of where the Daugherty borehole was drilled, a west-dipping normal fault juxtaposes the Ramshorn Slate against the stratigraphically higher Bayhorse Dolomite, suggesting at most a couple hundred meters of offset. West of this fault, the borehole was drilled into the east-dipping limb of this small anticline. The measured surficial bedding plane (dipping moderately to the E/SE) orientations are consistent with the attitudes within the borehole described by Jacob (1990). Additionally, the thicknesses, lithology, and gradational nature of stratigraphic contacts described by the borehole log (Jacob, 1990) are consistent with what is observed between correlative units on the surface. Thus, we infer stratigraphic continuum in the stratigraphy above this subsurface tuff.

STRUCTURAL ANALYSIS

Stereonet analysis (Fig. 1) shows that the pressure solution cleavage in the Ramshorn Slate was folded around the same fold axis as the bedding, indicating that cleavage formed prior to significant folding. The formation of cleavage early in the deformational history of an area may have been aided by elevated temperatures and pressures caused by increased overburden due to emplacement of earlier overriding thrust sheets (Mitra and others, 1984), potentially the Copper Basin thrust sheet.

DETRITAL ZIRCON DATA

Quartzite samples for detrital zircon dating were collected from six localities within the mapping area. Individual U-Pb zircon ages were obtained using laser-ablation ICP-MS methods at the University of Arizona Laserchron Center (Fig. 2).

Four detrital zircon samples were collected from an E-W traverse along Garden Creek (DTB17-04, DTB17-05, DTB17-11, and DTB17-14). Additionally, two samples had been previously collected from near Bayhorse Lake (2TA09 and 1TA09; Krohe, 2016). The two stratigraphically lowest samples, just above the upper and lower Ramshorn Slate contacts, contain significant Grenville (1000-1300 Ma), ~1400 Ma (mid-continent granite), and ~1760 Ma, and ~2700 Ma aged grains. Samples (DTB17-05 and DTB17-11) collected right above and below the lower Clayton Mine contact show unique ~650-665 Ma populations likely derived from the Big Creek intrusive belt (Lund and others, 2010). The other Clayton Mine samples (1TA09 and DTB17-14) show minor Grenville (1000-1300 Ma) and ~1400 Ma (mid-continent granite) populations with a major ~1780 Ma peak.

DTB17-04 and 2TA09 show similar detrital zircon age populations to the Ediacaran Papoose Creek Formation and Caddy Canyon Quartzite of southeast Idaho (Yonkee and others, 2014), consistent with an Ediacaran age. DTB17-05 and DTB17-11 may record a first-order sedimentary system draining off a specific outcrop (Ingersoll, 1990; Ingersoll and others, 1993; Link and others, 2005) containing the ca. 650 Ma Big Creek plutonic belt. This local provenance is mixed with a more regional provenance that contains Grenville-age and older Proterozoic detrital grains. 1TA09 and DTB17-14 show ages that are similar to detrital zircon ages from the Camelback Mountain Quartzite, which spans the Neoproterozoic to Cambrian boundary (Yonkee and others, 2014).

RAMSHORN GABBRO

Field relationships indicate that gabbroic sills intruded the upper Ramshorn Slate in the Bayhorse section, did not intrude the nearby Cretaceous and Eocene volcanic rocks, and were folded with the host rocks. Hobbs and others (1991) interpreted the rocks to be Jurassic in age, based on a fission track age. The lack of any similar Jurassic magmatism in the region made this age suspect. X-ray mapping of zirconium in a polished thin section by K.R. Chamberlain identified that 5-15 μm baddeleyite (ZrO_2) was present with thin zircon overgrowths. In situ U-Pb secondary ionization mass spectrometry of baddeleyite, presented here, indicates a 601 ± 27 Ma crystallization age based on 9 out of 12 robust analyses (Fig. 3). This provides an important age of regional volcanism and minimum depositional age constraint on the lower portion of the Bayhorse section.

REGIONAL CORRELATIONS

The stratigraphic patterns of Neoproterozoic rocks in northeastern Washington and southeastern Idaho exhibit remarkable similarities to the newly reassigned Neoproterozoic to Cambrian stratigraphy of the Bayhorse section. In southeastern Idaho, the upper Scout Mountain Member of the Pocatello Formation contains a reworked fallout tuff bed, U-Pb SHRIMP dated to 667 ± 5 Ma (Fanning and others, 2004). This Cryogenian tuff is overlain by limestone and argillite of the upper member of the Pocatello Formation (Link and others, 1987), which in turn is overlain by micritic, oolitic, and sandy carbonate of the Blackrock Canyon Limestone, which contains poorly defined stromatolitic bioherms (Corsetti and others, 2007). Based on matching volcanic tuff ages and lithological similarity we correlate the upper Scout Mountain Member to the 667 Ma tuff of Daugherty Gulch and the overlying basal dolomite of Bayhorse Creek. At Bayhorse, this lower interval is overlain by the Garden Creek Phyllite and Bayhorse Dolomite. We suggest that the Garden Creek Phyllite and Bayhorse Dolomite correlate to the Pocatello Formation and the Blackrock Canyon Limestone. The Bayhorse Dolomite and Blackrock Canyon Limestone share similar oolitic and stromatolitic intervals. A karst surface has also been proposed for the upper contact of the Bayhorse Dolomite (Hobbs and Hays, 1990), and may represent a hiatus in deposition.

The Blackrock Canyon Limestone and the Bayhorse Dolomite are overlain by fine-grained units of the Papoose Creek Formation and Ramshorn Slate, respectively. The Papoose Creek Formation contains graded, fine-grained beds (Yonkee and others, 2014), which are comparable to those observed in the Ramshorn Slate.

In southeastern Idaho, ~3.5 km of the Caddy Canyon Quartzite, Inkom Formation, Mutual Formation, and Camelback Mountain quartzites of the Brigham Group overlie the Papoose Creek Formation. At Bayhorse, the ~1 km thick Clayton Mine Quartzite overlies the Ramshorn Slate. The stratigraphic position of the Clayton Mine, lying conformably above the Ramshorn Slate, suggests a correlation to the Caddy Canyon Quartzite. Stratigraphically higher within the Clayton Mine Quartzite, a major change is evident in the detrital zircon populations with the decreasing prevalence of Grenville grains and the transition to a significant ca. 1780 Ma peak. This same provenance change is recognized within the Neoproterozoic to Early Cambrian Camelback Mountain Quartzite of southeastern Idaho. Based on these stratigraphic trends the Clayton Mine is interpreted to span from the Neoproterozoic (Ediacaran) to Early Cambrian.

Metamorphosed Neoproterozoic and Cambrian stratigraphy found in central Idaho roof pendants near Stibnite and Edwardsburg (Lund and others, 2003; Stewart and others, 2017; Isakson 2017; Lewis and others, written commun.) likely correlate to the Bayhorse strata. The basal dolomite of Bayhorse Creek, Garden Creek Phyllite, Bayhorse Dolomite and Ramshorn Slate likely correlate with the Moores Station Formation and possibly partially with the underlying Edwardsburg Formation. The Moores Station Formation is overlain by predominantly quartzites of the Moores Lake and Umbrella Butte Formations. These units likely correlate with the Interbedded quartzite and siltite, and overlying Clayton Mine Quartzite.

ACKNOWLEDGMENTS

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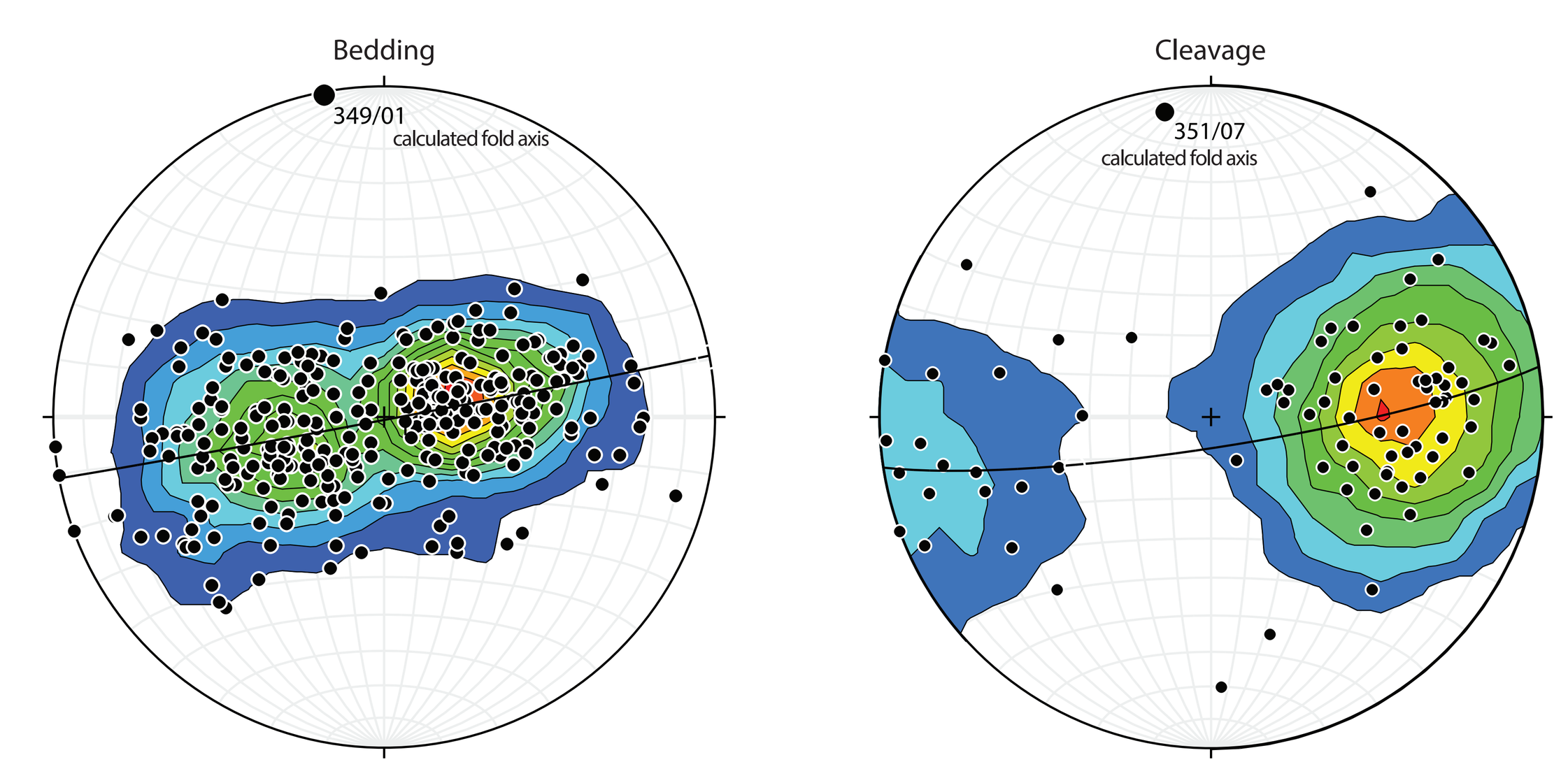
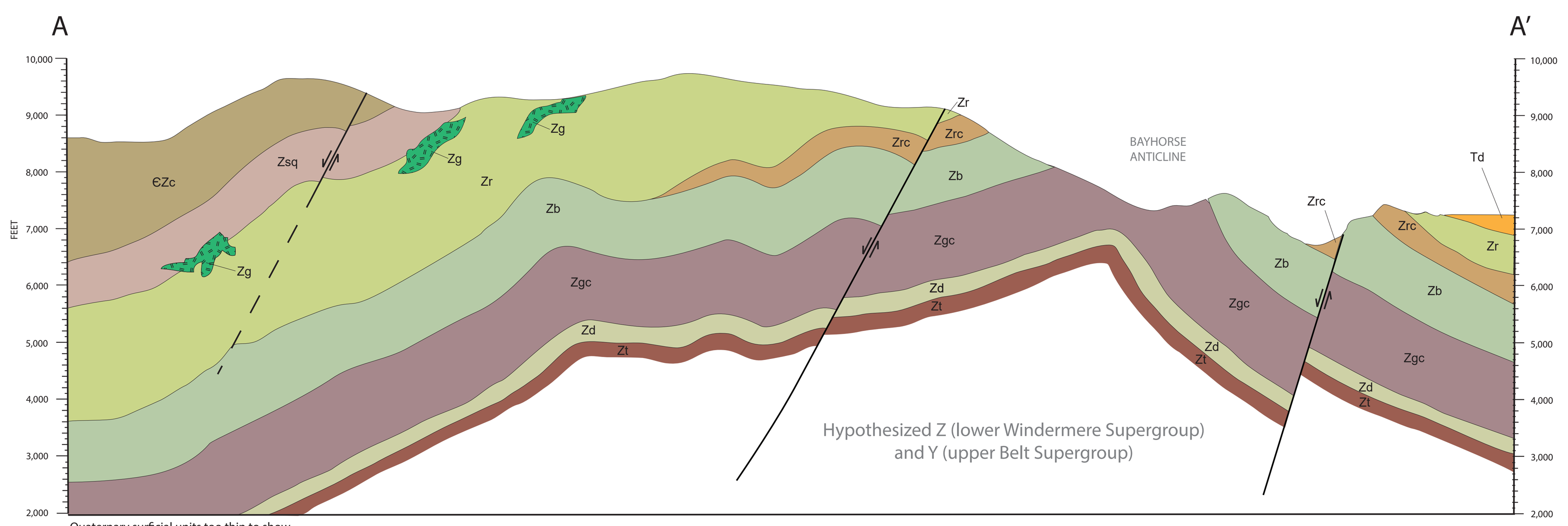
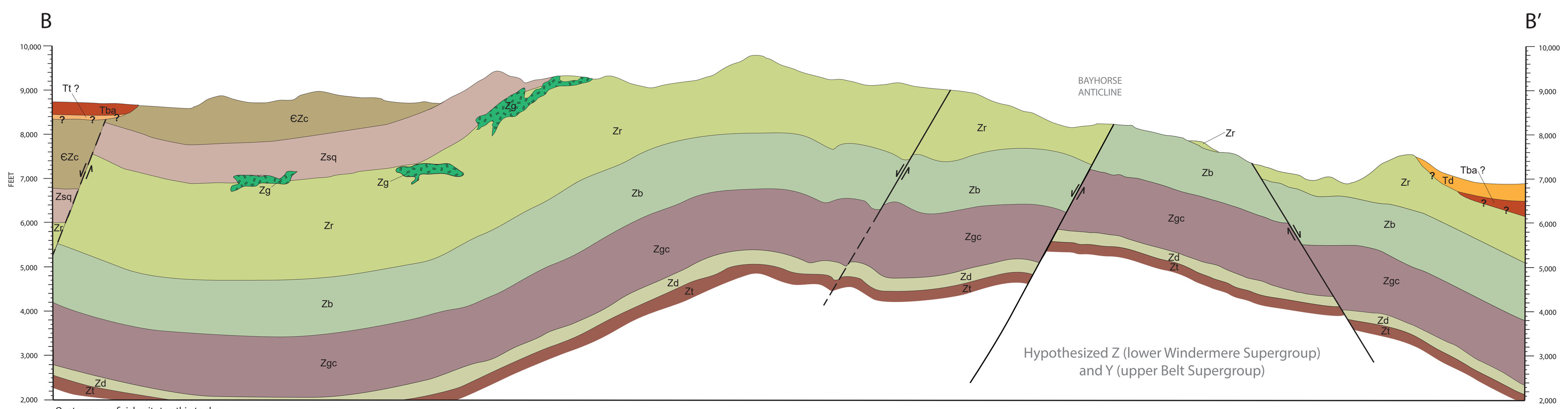


Figure 1. Stereograms (Cardozo and Allmendinger, 2013; Allmendinger and others, 2011) of attitudes measured from the Bayhorse Anticline. The poles to the planes were plotted and a cylindrical best fit was calculated. For bedding the fold axis was calculated to be 349/01, and for the cleavage it was calculated to be 351/07.



Quaternary surficial units too thin to show.
No vertical exaggeration.
Scale 1:24,000



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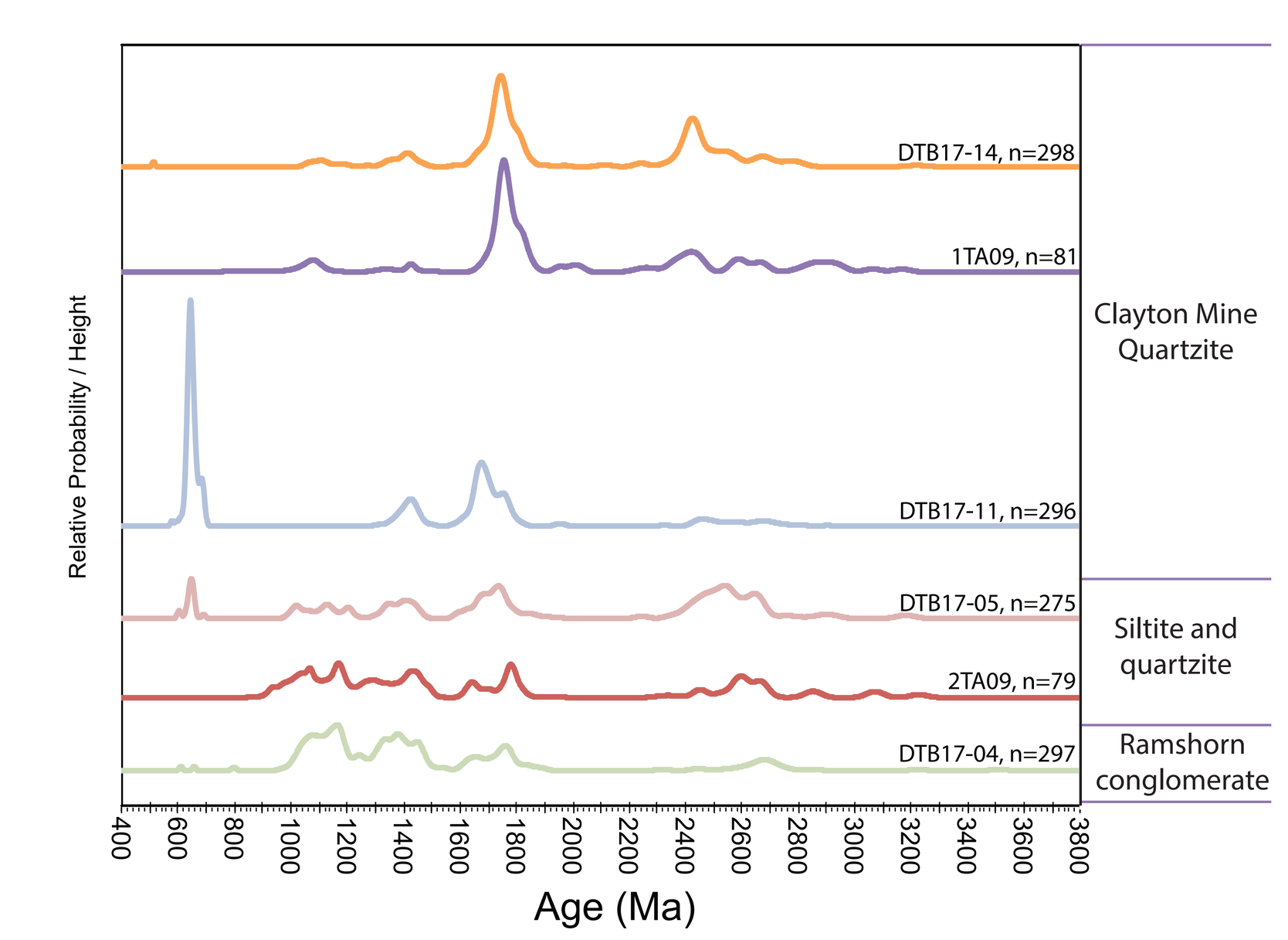

Figure 2. Normalized age-probability plot of detrital zircon U-Pb analyses from the northern Bayhorse Anticline area.

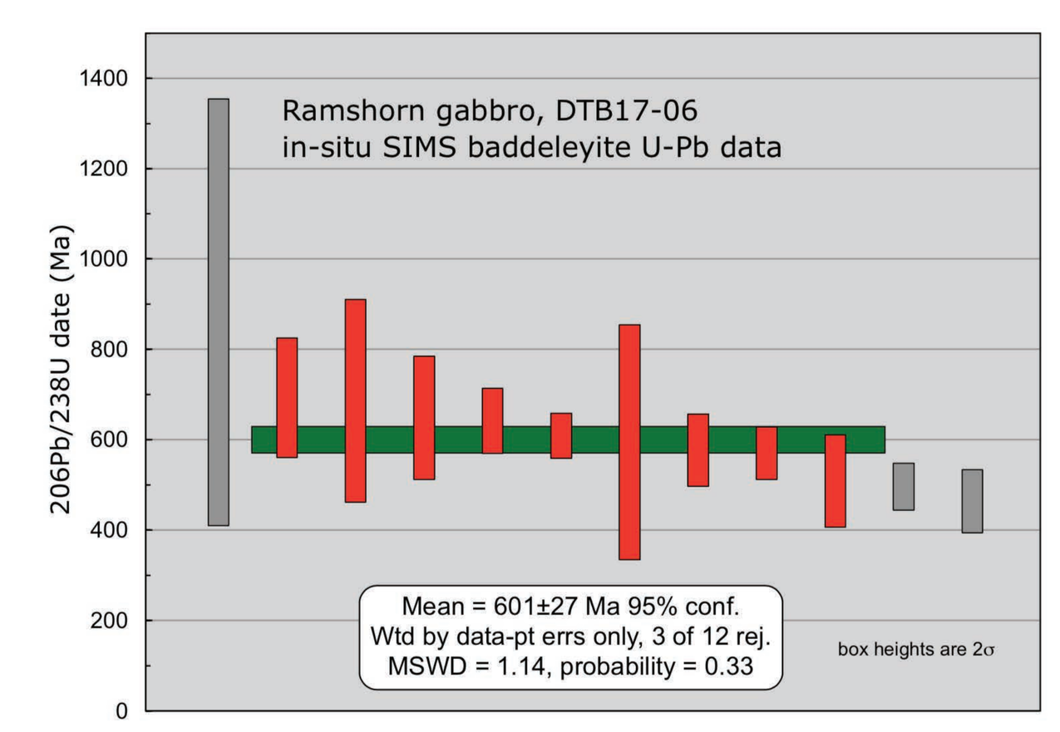

Figure 3. Weighted mean age of 12 best baddeleyite analyses from the Ramshorn gabbro (Zg), showing included (red) and rejected analyses (gray). MSWD: Mean square weighted deviation.

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