Summary Report
U-Pb and Ar-Ar age dating, Penticton East-half (082E½)

Greenwood (082E/02), Almond Mountain (082E/07), Deer Park (082E/08), Burrell Creek (082E/09) and Christian Valley (082E/10) map sheets

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Summary

This report summarizes U-Pb zircon and Ar-Ar mineral dating in the Penticton east-half map sheet (082E½) during the course of regional mapping and compilation of 1:50,000 map sheets (Figure 1). Ar-Ar mineral dating was done by J. Gabites and U-Pb zircon dating by R. Friedman, both from the Department of Earth and Ocean Sciences, The University of British Columbia. Petrographic analyses of selected samples was done by K. Dunne, consulting geologist (Dunne, 2017; 2018). All data is summarized below, and details of analytical data and petrography are presented in the accompanying appendices.

Dating of intrusive rocks shows a complex history of periodic intrusive activity throughout the Late Triassic and Jurassic, and notably within the Paleogene. Several Ar-Ar dates of various intrusive phases of the Averill complex, host to mineralization in the Franklin camp, support a middle Jurassic age for the complex (Keep, 1989). Hornblende orthogneiss in the northern part of the Greenwood map sheet, inferred to be Proterozoic in age (Little, 1983), returned a middle Jurassic U-Pb age, similar to middle Jurassic granodiorite throughout the area.

Several magmatic pulses in the early Paleogene record a history of intrusive activity during tectonic extension and denudation. Paleocene granitic magmatism in the Christian Valley map area is dated at ca. 67 ma (CV-104), and K-feldspar megacrystic granite farther south in the Almond Mountain sheet, the Taurus Lake granite, has Ar-Ar mineral dates that range from ca. 67 ma to 63 ma.

The megacrystic granite was exposed by late Paleocene time as it is unconformably overlain by Penticton Group rocks, the basal Kettle River Formation and an overlying thick accumulation of alkalic volcanic rocks of the Marron Formation; these volcanic rocks have Ar-Ar dates that range from ca. 60 ma in a lower unit to ca. 53 ma in stratigraphically higher successions, dates that are interpreted to closely record extrusion. Farther east in the Deer Park map area, concomitant intrusive activity is recorded by the Ladybird granite dated at ca. 56 ma (U-Pb zircon, Parrish, 1992) and in the Burrell Creek area by a zoned alkalic intrusive complex, the Tenderloin complex, with Ar-Ar dates that range from ca. 60 ma to 52 ma (with younger dates possibly recording cooling ages).

A large part of the Penticton East map sheet is underlain by the "Okanagan batholith" or "Valhalla intrusions" comprising mainly "granite and granodiorite" of possible Jurassic or Cretaceous age (Tempelman-Kluit, 1989; Little, 1957). However, a ca. 51.5 ma U-Pb zircon date from a porphyritic quartz monzonite within the batholith east of the Rock Creek graben (CV-258), and a 56.3 K/Ar date (Hunt and Roddick, 1992) and several Ar-Ar mineral dates ranging from ca. 51-47 ma from the Trapping Creek granite suggest that the Okanagan batholith may in large part comprise Eocene calc-alkaline intrusive rocks.

Coryell syenite in the Deer Park map area is also dated at ca. 51 ma (Carr and Parkinson, l989). Farther west in the southern part of the Christian Valley map area, Coryell dykes and small stocks locally intrude Marron Formation in the Rock Creek graben.

Movement on the normal fault bounding the western margin of the Rock Creek graben is constrained by the age of truncated Coryell intrusion and a ca. 49.4 ma date (CV-294) on an unaltered latite dyke that cuts through sheared and brecciated granite within the fault zone. The Rock Creek fault is inferred to be a growth fault developed, in part, during deposition of the Marron Formation.

A variety of both base and precious metal deposits occur throughout the Penticton East map sheet. Paleogene deposits are controlled by regional structures, including the north-trending extensional faults and their intersections with northwest-trending faults. Furthermore, many are related to high-level Paleogene intrusions, including silver-lead-zinc vein deposits in the Beaverdell camp that lies immediately west of the map area, epithermal gold-quartz veins of the Lightning Peak camp in the northern part of the map area, and the Midas molybdenite porphyry deposit in a syenite porphyry within the Coryell batholith in the Burrel Creek maps sheet (Höy and Jackaman, 2019). Recognition of these small high-level intrusions within the granites and syenites of the Okanagan and Coryell batholiths remain as exciting exploration targets.

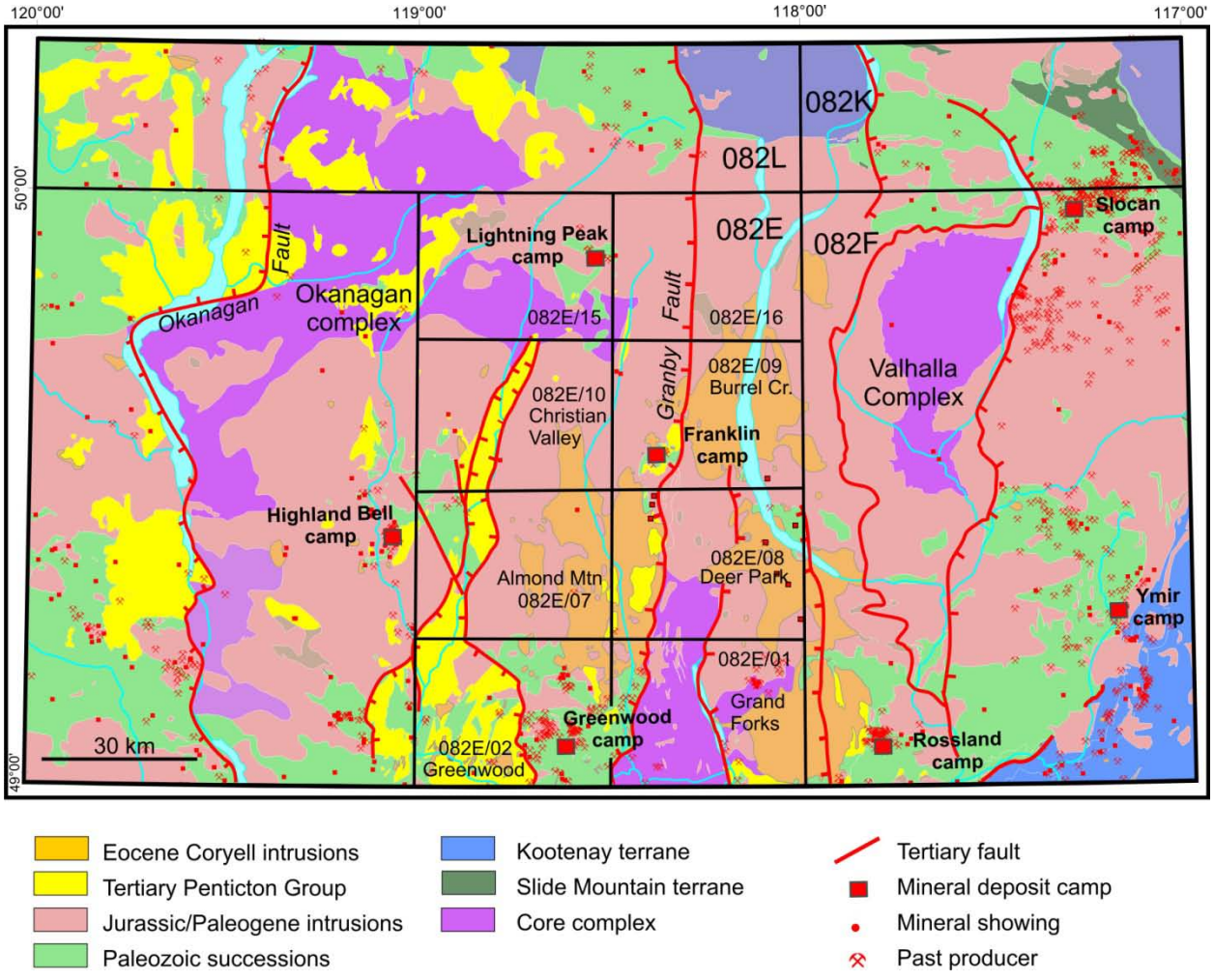


Figure 1: Regional geology map showing location of major mineral deposit camps and 1:50,000 scale maps.

Greenwood (082E/02)

G-167

Location: UTM 370256E 5452583N; collected along a forest service road, on the northeast slopes of Windfall Creek, approximately 14 km north-northwest of Greenwood.

Formal map unit: Jgd/Jogn; Pm2 (Little, 1983).

Map reference: Trim map 082E027; Geoscience BC maps 2018-11, 2019-04.

Description: Medium-grained, hornblende orthogneiss; protolith is correlative with the middle Jurassic "Nelson" plutonic suite.

Petrography summary: Well banded quartz-feldspar amphibole gneiss; dark layers comprise mainly "hornblende" and magnetite, and light layers, quartz and plagioclase; accessory minerals include trace apatite and titanite, and trace epidote-clinozoisite, illite alteration (Dunne, 2018).

Dating: U-Pb zircon; 162.8 ± 1.2 ma; R. Friedman, The University of British Columbia.

Comment: The unit is one of several hornblende ortho- and paragneisses in the northern part of the map sheet, and the ca. 163 ma date indicates that they are, in part, deformed middle Jurassic intrusions.

Photo: Hand samples, showing the gneissic textures.

Greenwood (082E/02)

G-200:

Location: UTM 377013E 5452682N; on a forest service road, on the east slope of Boundary Creek, approximately 13 km north of Greenwood.

Map reference: Trim map 082E027; Geoscience BC maps 2018-11, 2019-04.

Formal unit: Jgd; middle Jurassic "Nelson" plutonic suite.

Description: Medium grained, equigranular, relatively fresh, massive granodiorite.

Petrography summary: Massive to weakly foliated plagioclase (30%), quartz (15%), K-feldspar (15%) granodiorite with approx. 30% biotite and hornblende, minor magnetite, and trace titanite; generally fresh with only minor chlorite alteration of mafic minerals and illite in plagioclase (Dunne, 2018).

Date: U-Pb zircon; 168.3 ± 1.2 ma; R. Friedman, The University of British Columbia.

Comment: This intrusion, covering a large area in the northern part of the Greenwood map sheet has been variously assigned to either a Cretaceous-Jurassic age (Little, 1983) or a middle Jurassic age (Tempelman-Kluit, 1989); this date confirms a middle Jurassic age and the unit is informally included as part of the "Nelson" plutonic suite.

Photo: Hand sample of equigranular, medium grained granodiorite**.**

Almond Mountain (082E/07)

AM-391:

Location: UTM 357372E 5468453 N; along a forest service road between Taurus and Hoodoo Lake, 7 km due west of the Christian valley road and Kettle river.

Map reference: Trim map 082E036; Geoscience BC maps 2016-08, 2019-04.

Formal unit: Informally named the Paleocene Taurus Lake granite, unit Plg.

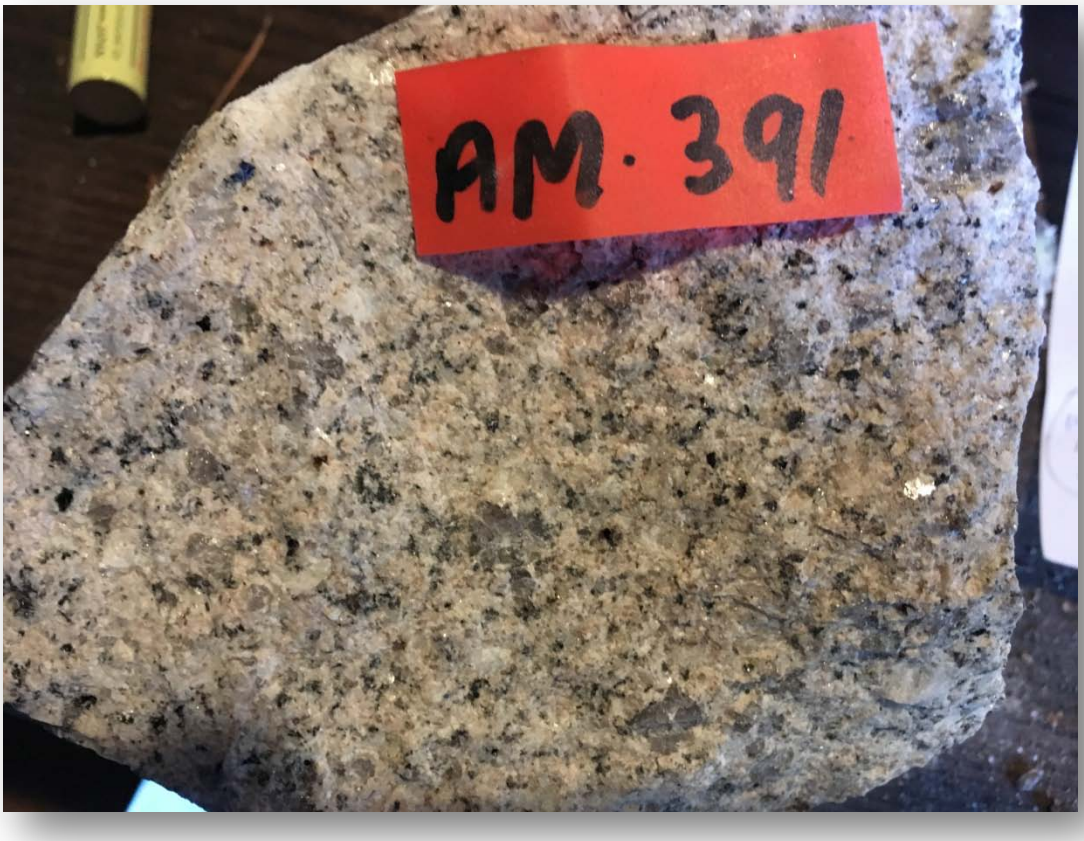
Description: Leucocratic, medium-grained, fresh "granite" with < 5% disseminated biotite.

Petrography summary: K-feldspar and quartz-phyric biotite monzogranite, with minor magnetite, accessory apatite and rare scattered grains of titanite and zircon(?) (Dunne, 2017).

Date: Ar-Ar biotite; 63.6 ± 1.3 ma; J. Gabites, The University of British Columbia.

Comment: U-Pb zircon analysis of the Taurus Lake granite returned a ca. 67 ma age (CV-104). Younger Ar-Ar ages (AM-563 and this sample) may record mineral cooling temperatures as the granite cools and crystallizes.

Photo: Hand sample of massive, relatively fresh, leucocratic monzonite.



Almond Mountain (082E/07)

AM-404:

Location: UTM 359883E 5482677N; on the Crouse Creek forest service road, on the east slope of Crouse Creek, approximately 6 km north-northeast of its junction with the Christian Valley road.

Map reference: Trim map 082E046; Geoscience BC maps 2016-08, 2019-04.

Formal unit: Early Jurassic plutonic suite, Unit Jgd.

Description: Medium grained, relatively fresh, hornblende-biotite granodiorite; minor chloritic alteration of mafic minerals.

Date: Ar-Ar muscovite; 177.7 ± 3.0 ma; J. Gabites, The University of British Columbia.

Comment: Several large exposures of relatively fresh granodiorite occur within splays of the Rock Creek graben; these intrude Paleozoic "basement" and host many of the mineral occurrences in the immediate area (see also sample AM-529).

Photo: Hand sample of equigranular, massive middle Jurassic hornblende-biotite granodiorite.

Almond Mountain (082E/07)

AM-470:

Location: UTM 361491E 5471677N; on the Crouse Creek forest service road, on the east slope of Crouse Creek, approximately 6 km north-northeast of its junction with the Christian Valley road.

Map reference: Trim map 082E036; Geoscience BC maps 2016-08, 2019-04.

Formal unit: Eocene Marron Formation, Em.

Description: Medium to dark grey, amygdaloidal alkali "andesite" with minor disseminated, fine-grained biotite and hornblende, and small euhedral plagioclase grains.

Petrography summary: (hornblende-biotite-clinopyroxene) plagioclase-phyric latite, with a fine to very fine recrystallized groundmass of plagioclase laths and K-feldspar with minor mafic phases and trace accessory minerals (Dunne, 2017).

Date: Ar-Ar feldspar; 57.8 ± 2.1 ma; J. Gabites, The University of British Columbia.

Comment: Exposure is taken from near the base of the Marron Formation that immediately to the south unconformably overlies the Paleocene Taurus Lake granite, Plg. As this is a sample of a rapidly cooled lava, the Ar-Ar date presumably records extrusive age.

Photo: Hand samples of latite porphyry of the Eocene Marron Formation.

Almond Mountain (082E/07)

AM-529:

Location:. UTM 362117E 5472621N; small exposure, 1 km west of Kettle River, 20 km north of the town of Rock Creek.

Map reference: Trim map 082E036; Geoscience BC maps 2016-08, 2019-04.

Formal unit: Early Jurassic pluton, Unit Jgd.

Description: Medium-grained, relatively fresh (biotite)-hornblende granite.

Petrography summary: Monzogranite with granular plagioclase, quartz and lesser biotite as large inclusions within large (microperthite) K-feldspar phenocrysts; minor magnetite, accessory apatite and titanite, and trace zircon; minor alteration of biotite to chlorite, and hornblende to chlorite (Dunne, 2017).

Date: Ar-Ar hornblende; 179.3 ± 4.5 ma; J. Gabites, The University of British Columbia

Comment: This small exposure is basement to unconformably overlying Kettle River Formation. The older Ar-Ar date, and ca. 177-178 ma dates on similar intrusions immediately to the north (AM 404, 07NMA43) are comparable to Early Jurassic Ar-Ar dates on the Averill complex of the Franklin camp. Of note, a ca. 215 ma U-Pb zircon date of a similar intrusion 8 km to the northwest (07NMA45) suggests these intrusions may be late Triassic in age, similar to the Josh Creek diorite in the Grand Forks (082E/01) sheet.

Photo: Hand sample of relatively fresh granodiorite.

Almond Mountain (082E/07)

AM-557:

Location:. UTM 361478E 5457103N; large exposures along the Christian valley road, approximately 10 km north of Westbridge.

Map reference: Trim map 082E026; Geoscience BC maps 2016-08, 2019-04.

Formal unit: Eocene Marron Formation, Em.

Description: Plagioclase-phyric andesite, with 2-3 mm subhedral plagioclase and minor biotite in an a fine-grained matrix.

Date: Ar-Ar plagioclase; 59.2 ± 0.8 ma; J. Gabites, The University of British Columbia

Comment: Part of a large exposure of Marron Formation along the Christian Valley road, probably from near the base of the formation. As this is a sample of a rapidly cooled lava, the Ar-Ar date presumably records approximate extrusive age.

Photo: Hand sample of plagioclase porphyritic andesite.

Almond Mountain (082E/07)

AM-563:

Location: UTM 361875E 5459547N; exposure along the Christian valley road, approximately 13 km north of Westbridge.

Map reference: Trim map 082E026; Geoscience BC map 2016-08, 2019-04.

Formal unit: Informally named the Paleocene "Taurus Lake" granite, unit Plg.

Description: Megacrystic K-feldspar porphyritic granite with a K-feldspar, plagioclase, quartz and minor biotite granular matrix.

Date: Ar-Ar feldspar; 67.7 ± 8 ma; J. Gabites, The University of British Columbia

Comment: A small exposure of the Taurus Lake granite, approximately 35 km to the north, has a U-Pb zircon date of 67 ma. The Kettle River Formation, the basal part of the Penticton Group, unconformably overlies similar megacrystic granite approximately 5 km north of the exposure of AM-563.

Photo: Hand sample of paleo-weathered and altered megacrystic granite; anhedral quartz appears grey in the photo.

Christian Valley (082E/10)

CV-06:

Location: UTM 362462E 5489153 N; located 7 km west of Christian valley, in a large clear cut, 50 m south of State FSR.

Formal map unit: Paleocene "Trapping Creek" granite; unit Eg (map 2017-10); Plgd (2019-04).

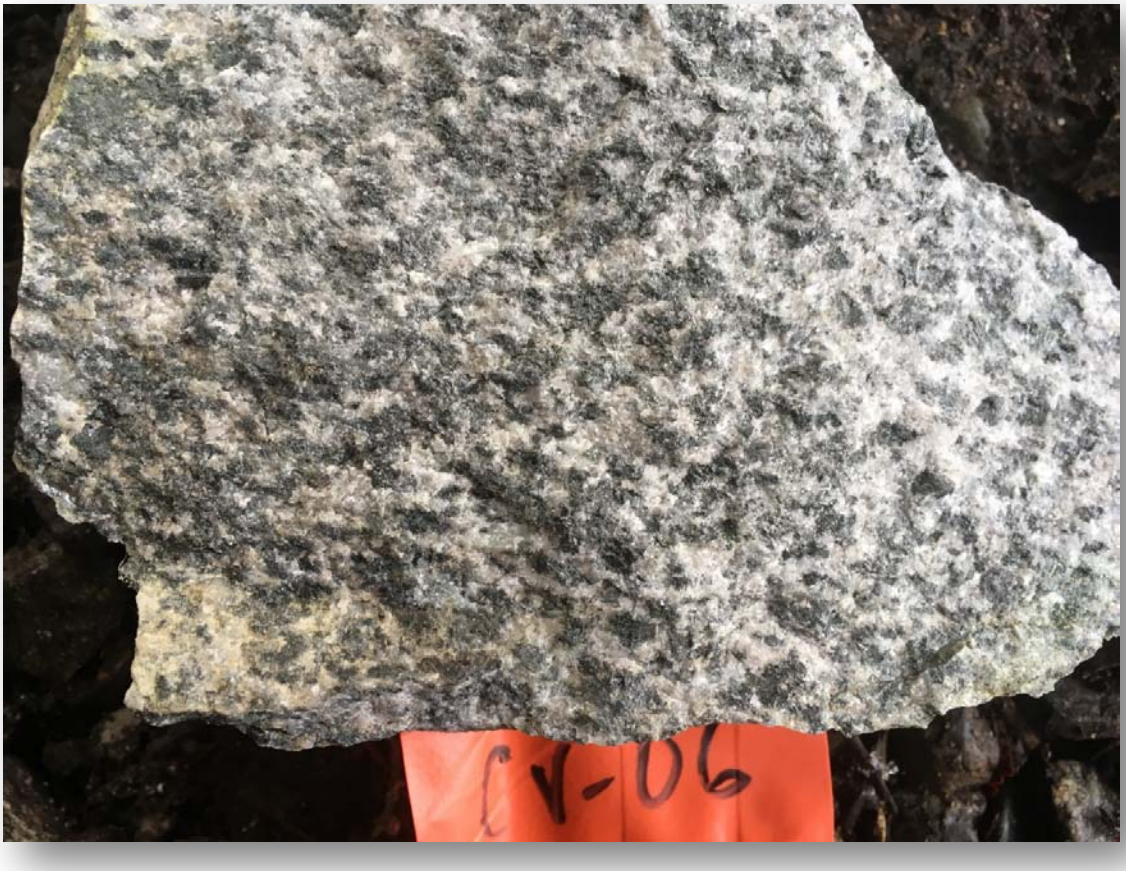
Map reference: Trim map 82E056; Geoscience BC maps 2017-10, 2019-04.

Description: Fresh, medium-grained, massive to foliated granite/granodiorite with approximately 20% hornblende and biotite.

Dating: Ar-Ar hornblende; 50.79 ± 0.69 ma; J. Gabites, The University of British Columbia.

Comment: The Ar-Ar date is interpreted as a cooling age for the unit; a U-Pb zircon age of 51.47 ma (sample CV-258) from east of the Rock Creek graben may be more representative of the intrusive age. The Trapping Creek granite is part of the Okanagan batholith, unit JKg (Tempelman-Kluit, 1989) or Valhalla intrusions (Little, 1957).

Photo: Hand sample of massive, medium-grained, leucocratic granodiorite.



Christian Valley (082E/10)

CV-41:

Location: UTM 364772E 5497380N; located along a spur road that connects Sandrift and State forest service roads, approximately 1 km northwest of Little Sandrift Lake.

Formal map unit: Eocene Marron Formation (?), Em.

Map reference: Trim map 82E066; Geoscience BC maps 2017-10, 2019-04.

Description: Fresh, crowded feldspar porphyry; grey, fine-grained matrix with numerous subhedral 2-3 mm white feldspar phenocrysts; minor biotite and hornblende in matrix.

Dating: Ar-Ar K-feldspar; 53.8 ± 1.8 ma; J. Gabites, The University of British Columbia.

Comment: The sample is from a small exposure within the Trapping Creek granite. Contact relationships are not known, but the unit is mapped as Marron Formation, unconformably overlying the granite; alternatively, it could possibly be a Marron-age dyke.

Photo: Field hand sample of intermediate, alkalic lava flow(?) (trachy andesite?)

Christian Valley (082E/10)

CV-43:

Location: UTM 364297E 5495884N; located approximately 1 km southwest of Little Sandrift Lake on a spur road the connects Sandrift and State forest service roads.

Formal map unit: Paleocene "Trapping Creek" granite; unit Plgd.

Map reference: Trim map 82E066; Geoscience BC maps 2017-10, 2019-04.

Description: Fresh, fine to medium-grained, equigranular, leucocratic granite; some swirled pegmatite.

Petrography summary: Medium-grained, weakly porphyritic biotite monzogranite comprising 30-40% plagioclase, 25-30% quartz, 20-25% K-feldspar and 5-10% quartz. Accessory minerals include apatite, rare titanite and zircon (Dunne, 2017).

Dating: Ar-Ar biotite; 47.16 ± 0.36 ma; J. Gabites, The University of British Columbia

Comment: The Ar-Ar date is interpreted as a cooling age. The Trapping Creek granite is part of the Okanagan batholith (Tempelman-Kluit (1989) or Valhalla intrusions (Little, 1957).

Photo: Hand sample of massive, medium-grained granite.

Christian Valley (082E/10)

CV-104:

Location: UTM 360639E 5491943N; located approximately 1 km southwest of Maloney Lake, on a spur road north from the Beaverdell FSR.

Formal map unit: Paleocene "Taurus Lake" granite; unit Plg.

Map reference: Trim map 82E056; Geoscience BC maps 2017-10, 2019-04.

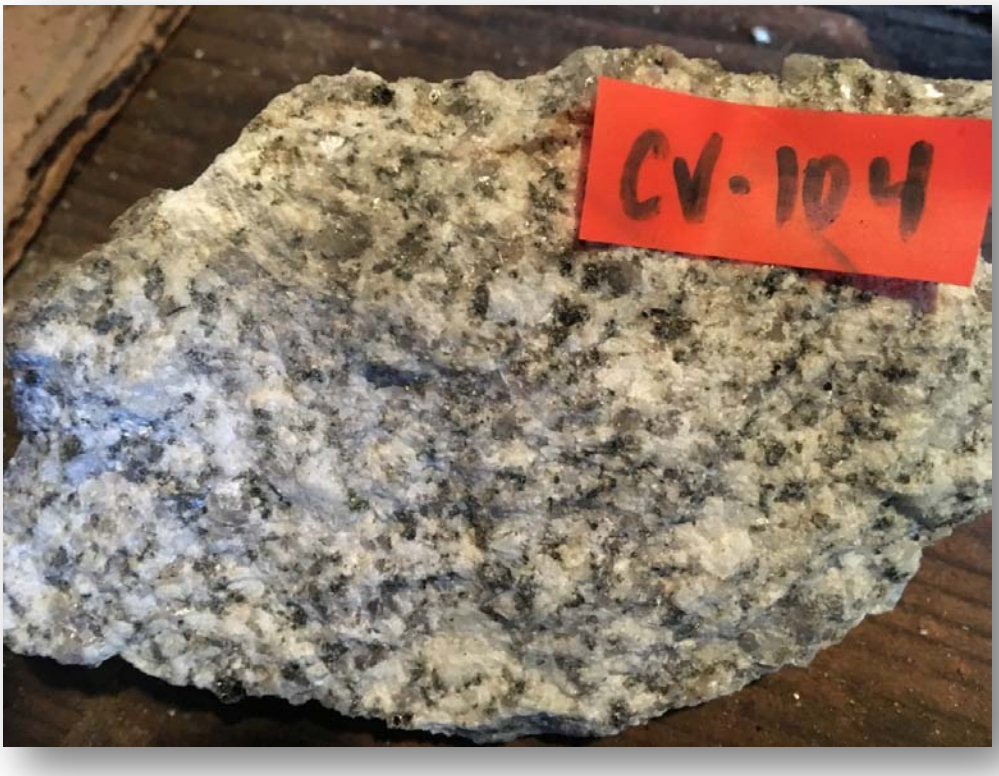
Description: Fresh, medium-grained, equigranular, leucocratic biotite granite.

Petrography summary: Dominantly intergrown plagioclase, quartz and lesser K-feldspar with minor biotite, trace amphibole and opaques; minor replacement of feldspars with carbonate and illite, and biotite with chlorite, epidote and carbonate (Dunne, 2017).

Dating: U-Pb zircon; 67.0 ± 0.46 ma; R. Friedman, The University of British Columbia.

Comment: This exposure is interpreted to be part of the Taurus Lake granite, rather than the younger Trapping Creek granite which occurs immediately to the north. The U-Pb date is considered to be the intrusive age of the Taurus Lake granite, part of the Okanagan batholith, unit JKg of Tempelman-Kluit (1989) or Valhalla intrusions (Little, 1957).

Photo: Hand sample of massive, medium-grained granite/granodiorite.



Christian Valley (082E/10)

CV-113:

Location: UTM 357626E 5499989N; collected from a small exposure on the south bank of Trapping Creek, near the junction of Trapping Creek and Big White West forest service roads.

Formal map unit: Paleocene "Trapping Creek" granite; unit Plgd (map 2019-04).

Map reference: Trim map 82E066; Geoscience BC maps 2017-10, 2019-04.

Description: Porphyritic to massive, medium-grained granite.

Petrography summary: Weakly porphyritic monzogranite, with ~35% plagioclase, 30% K-feldspar and 30% quartz; mafics include biotite and trace opaques; minor alteration of plagioclase to illite and biotite to sericite and/chlorite (Dunne, 2017).

Dating: Ar-Ar feldspar; 50.3 ± 0.19 ma; J. Gabites, The University of British Columbia.

Comment: The Ar-Ar date is interpreted to be a cooling age; a U-Pb zircon date of 51.47 ma from a sample east of the Rock Creek graben (CV-258) is considered the intrusive age. The Trapping Creek granite is part of the Okanagan batholith, unit JKg (Tempelman-Kluit, 1989) or Valhalla intrusions (Little, 1957).

Photo: Hand sample of slightly altered, porphyritic granite; note minor biotite.

Christian Valley (082E/10)

CV-159:

Location: UTM 365992E 5491657N; located on a road cut approximately 2.5 km south of State Lake on a spur road north of State FSR.

Formal map unit: Eocene Marron Formation; Unit Em .

Map reference: Trim map 82E056; Geoscience BC maps 2017-10, 2019-04.

Description: Black, fine-grained amygdaloidal lava flow with widely scattered biotite.

Petrography summary: Biotite-clinopyroxene-phyric trachyte lava with ~5% biotite and~3-5% plagioclase phenocrysts in a very fine-grained groundmass (Dunne, 2017).

Dating: Ar-Ar biotite; 52.77 ± 0.38 ma; J. Gabites, The University of British Columbia.

Comment: Sample is taken from higher exposures of the Marron, possibly within or near the Park Rill member of Church (1973) or Unit Epm1 (map 2017-10).

Photo: Hand sample of dark grey to black, amygdaloidal trachytic lava; note small biotite grains.

Christian Valley (082E/10)

CV-258:

Location: 374323E 5492821N; located on the east side of Christian Valley, east of the Rock Creek graben, on the Grano Creek forest service road.

Formal map unit: Okanagan batholith (Tempelman-Kluit, 1989); unit Plgd (map 2017-10).

Map reference: Trim map 82E057; Geoscience BC maps 2013-07-1, 2019-04.

Description: Unaltered megacrystic quartz monzonite, with large 2-3 cm K-feldspar phenocrysts in a matrix of K-feldspar, plagioclase, quartz and minor (15%) mafics - biotite and hornblende.

Petrography summary: Fine to coarse-grained porphyritic quartz monzonite. K-feldspar phenocrysts have a microperthite texture and contain inclusions of fine-grained plagioclase, biotite and titanite (Dunne, 2017).

Dating: U-Pb zircon; 51.47 ± 0.45 ma; R. Friedman, The University of British Columbia.

Comment: This ca. 51 ma date of the Okanagan batholith is similar to dates of the Trapping Creek granite west of the Rock Creek graben, but contrasts with older dates of the Taurus Lake granite; it is not known if this date is representative of the Okanagan batholith as a whole.

Photo: Hand samples (wet and dry) show large K-feldspar phenocrysts in a granular matrix.

Christian Valley (082E/10)

CV-294:

Location: 368478E 4598093N; located along a road cut near the junction of Copper Creek and Sandrift creeks, approximately 2.5 km due east of Sandrift Lake.

Formal map unit: Eocene dyke.

Map reference: Trim map 082E066; Geoscience BC maps 2017-10, 2019-04.

Description: Light grey microporphyritic alkalic dyke comprised of mainly plagioclase and K-feldspar with acicular hornblende and rare biotite phenocrysts.

Petrography summary: Selectively altered plagioclase-hornblende-phyric latite with approx. 10-15% med-grained plagioclase phenocrysts, 15% hornblende phenocrysts and trace fine-grained biotite in a groundmass of plagioclase, K-feldspar and minor mafic minerals (Dunne, 2017).

Dating: U-Pb zircon; 49.4 ± 0.77 ma; R. Friedman, The University of British Columbia.

Comment: This relatively fresh, undeformed dyke cuts a prominent shear zone along the west margin of the Rock Creek graben; this date constrains movement on a splay of the Rock Creek graben fault to pre ca. 50 ma.

Photo: Hand sample showing acicular hornblende and minor biotite laths in a fine-grained feldspar martix.

Burrell Creek (082E/09)

BC-193:

Location: UTM 404862E 5489113N; located on a Forest Service road approximately 2.5 km east of Burrell Creek and 5 km east-southeast of the Franklin Mining camp.

Formal map unit: "Ladybird granite", unit Kg or Plgd (map 2019-04).

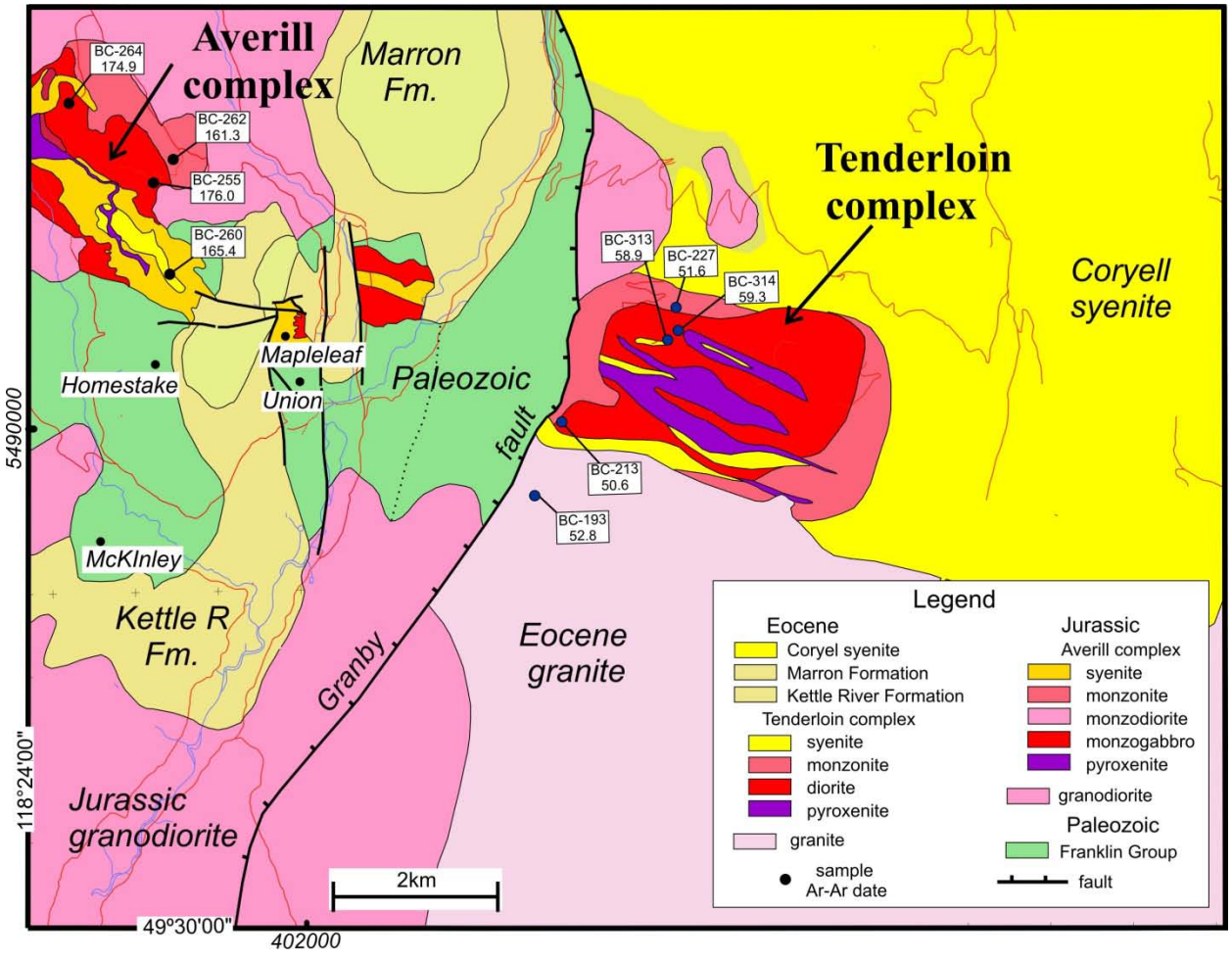
Map reference: Trim map 082E059, Geoscience BC maps 2013-07-01, 2019-04.

Description: Massive to porphyritic hornblende-(biotite) granite with some quartz-feldspar pegmatite lenses, and commonly large (to several cm) subhedral K-feldspar phenocrysts.

Dating: Ar-Ar hornblende; 52.8 ± 1.6 ma; J. Gabites, The University of British Columbia.

Comment: The Ar-Ar date may be a cooling age for the intrusion; a U-Pb date of 56.0 ma (sample 14581; Parrish, 1992) for the "Ladybird granite" is interpreted as the intrusive age.

Figure 2: Map showing geology of the Averill complex, Tenderloin complex and Franklin Mining camp areas, as well as locations of Burrell Creek (BC) samples in Trim map 082E059 .



Burrell Creek (082E/09)

BC-213

Location: UTM 405233E 5490010N; located in the footwall of the Granby fault, on Burrell-Tenderloin forest service road approximately 2 km east of Burrell Creek.

Formal map unit: Paleocene Tenderloin Complex biotite pyroxenite (Unit Etd, mEt).

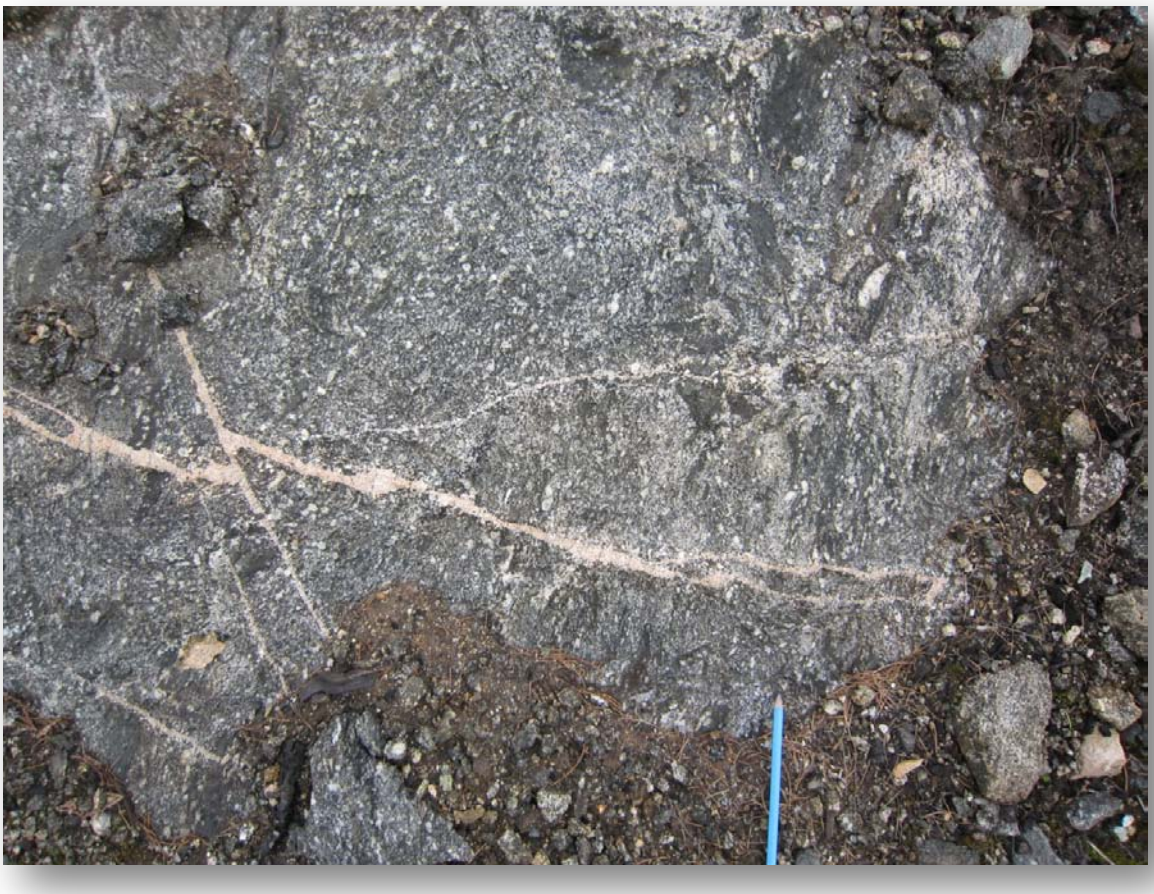
Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-014.

Description: Foliated to gneissic biotite pyroxenite that is cut by several fine-grained massive syenite dykes; note minor chlorite alteration of mafic minerals.

Dating: Ar-Ar biotite; 50.6 ± 0.6 ma; J. Gabites, The University of British Columbia.

Comment:. The Tenderloin complex is a zoned mafic alkalic intrusive complex that lies in the footwall of the Granby fault. As shown simplistically in Figure 2, the complex has an inner zone of gabbro and pyroxenite, surrounded by monzogabbro, diorite and monzonite. Syenite dikes commonly cut phases of the intrusive complex.

Photo: Field exposure showing biotite pyroxenite/gabbro cut by thin syenite dykes.



Burrell Creek (082E/09)

BC-227:

Location: UTM 406634E 5491346N; located on a small logging spur road, 3 km east of Burrell Creek and approximately 6 km east of the Franklin Mining camp.

Formal map unit: Paleocene Tenderloin complex quartz monzonite (Unit Etm, mEt).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Granular, medium to coarse-grained "quartz monzonite" with 20% mafic minerals, biotite and hornblende; numerous chlorite-epidote veins.

Dating: Ar-Ar biotite; 51.6 ± 0.6 ma; J. Gabites, The University of British Columbia.

Comment:. The Tenderloin complex is a zoned mafic alkalic intrusive complex that lies in the footwall of the Granby fault. As shown simplistically in Figure 2, the complex has an inner zone of gabbro and pyroxenite, surrounded by monzogabbro, diorite and monzonite. BC-227 is a sample from near the northern margin of the complex.

Photos: Exposures of Tenderloin "quartz monzonite" unit, several 100s m west of BC-227.
(left) Monzonite, cut by coarser grained dykes
(right) Intrusive breccia with clasts of diorite within syenite

Burrell Creek (082E/09)

BC-252:

Location: UTM 400651E 5493199N; located on a historical mineral exploration road in the northern part of the Franklin camp, approximately 800 m southwest of Gloucester Creek.

Formal map unit: Averill complex monzonite (Unit Jam; mJa).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Fine grained, equigranular, fresh monzonite with approximately 70% plagioclase > K-feldspar and 30% hornblende (+biotite); generally fresh, with minor limonite staining.

Dating: Ar-Ar hornblende; 161.3 ± 2.4 ma; J. Gabites, The University of British Columbia

Comment:. The Franklin camp is approximately centered on the Averill complex and this suggests mineralization of the camp is mainly Jurassic in age. The complex is a zoned intrusion with more mafic pyroxenite and diorite central to monzonite and monzodiorite phases.

Photo: Broken subcrop exposures of relatively fresh Averill monzonite.

Burrell Creek (082E/09)

BC-255:

Location: UTM 400355E 5492907N; located along a historical mineral exploration road in the Franklin camp, approximately 1200 m southwest of Gloucester Creek.

Formal map unit: Averill complex monzodiorite (Unit Jam; mJa).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Medium grained to coarse grained, equigranular "monzodiorite" with approximately 20% mafics (augite > hornblende).

Dating: Ar-Ar hornblende; 176.0 ± 2.5 ma; J. Gabites, The University of British Columbia.

Comment: The monzodiorite is the central phase of the zoned Averill complex.

Photo: Broken outcrop, Averill complex "monzodiorite".

Burrell Creek (082E/09)

BC-258:

Location: UTM 400173E 5492553N; located in the Franklin Mining camp on a mine exploration road approximately 1.5 km northwest of Mount Franklin.

Formal map unit: Unit Jas of the Averill complex (map 2013-07-01).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Coarse grained massive syenite/monzonite; minor alteration of hornblende; rare malachite blebs.

Dating: Ar-Ar plagioclase; 80.9 ± 1.2 ma; J. Gabites, The University of British Columbia.

Comment: Plagioclase gives a plateau date of 80.9 ma, and an integrated date of 88.6 ± 0.4 ma; these late Cretaceous dates are considerably younger than the middle Jurassic age of the Averill complex, but older than the early Eocene age of the Coryell syenite. There are no other late Cretaceous intrusions in the immediate vicinity (although the Whatshan Lake batholith approximately 25 km to the north is late Cretaceous, dated at ca. 77-79 ma; Thompson et al., 2004) and hence the reliability of this age is uncertain. Keep (1989) considers this "trachytic syenite" to be part of Jurassic Averill complex.

Burrell Creek (082E/09)

BC-260:

Location: UTM 400452E 5491927E; located along an historical mine exploration road in the Franklin camp approximately 1200 m northwest of Mount Franklin.

Formal map unit: Averill complex syenite (Unit Jas2; mJa).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Fresh, coarse-grained syenite, with subhedral K-feldspar and irregular grains and intergrowths of anhedral hornblende (+ pyroxene).

Dating: Ar-Ar hornblende; 165.4 ± 1.9 ma; J. Gabites, The University of British Columbia.

Comment:. Many phases of the Averill complex as well as the lithologic zonation are remarkably similar to those in the Tenderloin complex in the footwall of the Granby fault (see Figure 2). Restoration of movement along the fault places the Tenderloin complex beneath the Averill complex, yet the latter is Jurassic in age whereas the Tenderloin complex is Paleocene/Eocene, a coincidence that is difficult to explain!

Photo: Massive, fresh, coarse-grained syenite.

Burrell Creek (082E/09)

BC-262:

Location: UTM 339332E 5493885N;

Formal map unit: Averill complex monzodiorite (Unit Jam; mJa).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Medium-grained, equigranular, monzogabbro or monzodiorite; approx. 40% mafics (augite, biotite, hornblende?) and 60% plagioclase; relatively fresh.

Dating: Ar-Ar biotite; 175.90 ± 2.1 ma; J. Gabites, The University of British Columbia.

Comment: The monzodiorite is the central (and oldest) phase of the zoned Averill complex;

Photo: Exposure of Averill complex "monzodiorite", cut by syenite dykes; note hematite staining on fracture surfaces.

Burrell Creek (082E/09)

BC-313:

Location: UTM 406496E 5490971N; located on a small logging spur, 3 km east of Burrell Creek and approximately 6 km east of the Franklin mining camp.

Formal map unit: Paleocene/Eocene Tenderloin complex (Unit Etd, mEt).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Small exposure of "diorite", foliated, with approximately 40% plagioclase and 60% mafics (hornblende> biotite).

Dating: Ar-Ar biotite; 58.9 ± 0.7 ma; J. Gabites, The University of British Columbia.

Comment: Diorite/monzodiorite forms the central phases of a zoned mafic alkalic intrusion, the Tenderloin complex. The Paleocene ages for this unit contrasts with younger ages for intermediate and marginal phases of the complex.

Burrell Creek (082E/09)

BC-314:

Location: UTM406619E 5491078N; located on a small logging spur, 3 km east of Burrell Creek and approximately 6 km east of the Franklin mining camp.

Formal map unit: Paleocene/Eocene Tenderloin complex (Unit Etd, mEt).

Map reference: Trim map 082E059; Geoscience BC maps 2013-07-01, 2019-04.

Description: Foliated to massive leucocratic monzodiorite with approximately 25% mafic minerals (hornblende, pyroxene, biotite), and numerous dark inclusions; flow gneiss textures in part.

Dating: Ar-Ar biotite; 59.3 ± 0.7 ma; J. Gabites, The University of British Columbia.

Comment:. The older dates for samples of the monzodiorite/diorite phase of the Tenderloin complex (this sample and BC-313) suggest that this phase is the oldest phase in the complex; alternatively, different ages may record variable mineral cooling closure ages.

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APPENDIX 1

Ar-Ar mineral dating of selected intrusive and volcanic rock samples from the Almond Mountain (082E/07), Burrell Creek (082E/09) and Christian Valley (082E/10) map sheets, Penticton east-half project, B.C., Canada.

By: G. Gabites (M.Sc.)

Notes:

1. All samples were collected by T. Hoy during regional mapping of the 1:50,000 sheets;
2. Petrographic analyses of selective samples by K.P.E. Dunne are shown in appendices 1 and 2.

AM391 biotite

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	57.60	1.01	0.1646	0.0082	0.0174	0.0003	0.00285
2.70	30.11	1.38	0.0590	0.0031	0.0332	0.0015	0.00196
3.00	16.05	0.21	0.0185	0.0016	0.0623	0.0008	0.00115
3.30	16.60	1.97	0.0056	0.0008	0.0602	0.0072	0.00033
3.70	12.73	0.33	0.0019	0.0002	0.0786	0.0020	0.00014
3.90	12.43	1.21	0.0015	0.0004	0.0805	0.0078	0.00012
4.10	12.79	1.30	0.0023	0.0004	0.0782	0.0080	0.00017
4.30	13.50	1.50	0.0032	0.0005	0.0741	0.0082	0.00023
4.60	12.92	1.59	0.0021	0.0003	0.0774	0.0095	0.00016
4.90	11.62	0.98	0.0019	0.0004	0.0861	0.0073	0.00015
5.20	12.15	0.48	0.0018	0.0004	0.0823	0.0033	0.00014
5.70	11.87	0.48	0.0012	0.0002	0.0843	0.0034	0.00010
6.20	12.67	0.89	0.0027	0.0004	0.0790	0.0056	0.00021
7.00	13.29	0.44	0.0058	0.0011	0.0753	0.0025	0.00043

J = 0.00303075 ± 0.00000455 Volume 39ArK = 0.211 x E-13 cm3 NPT

Integrated Date = 63.99 ± 0.92 Ma

Plateau age = 63.6 ± 1.3 Ma (2s, including J-error of .2%) MSWD = 0.70, probability=0.69

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 13 points

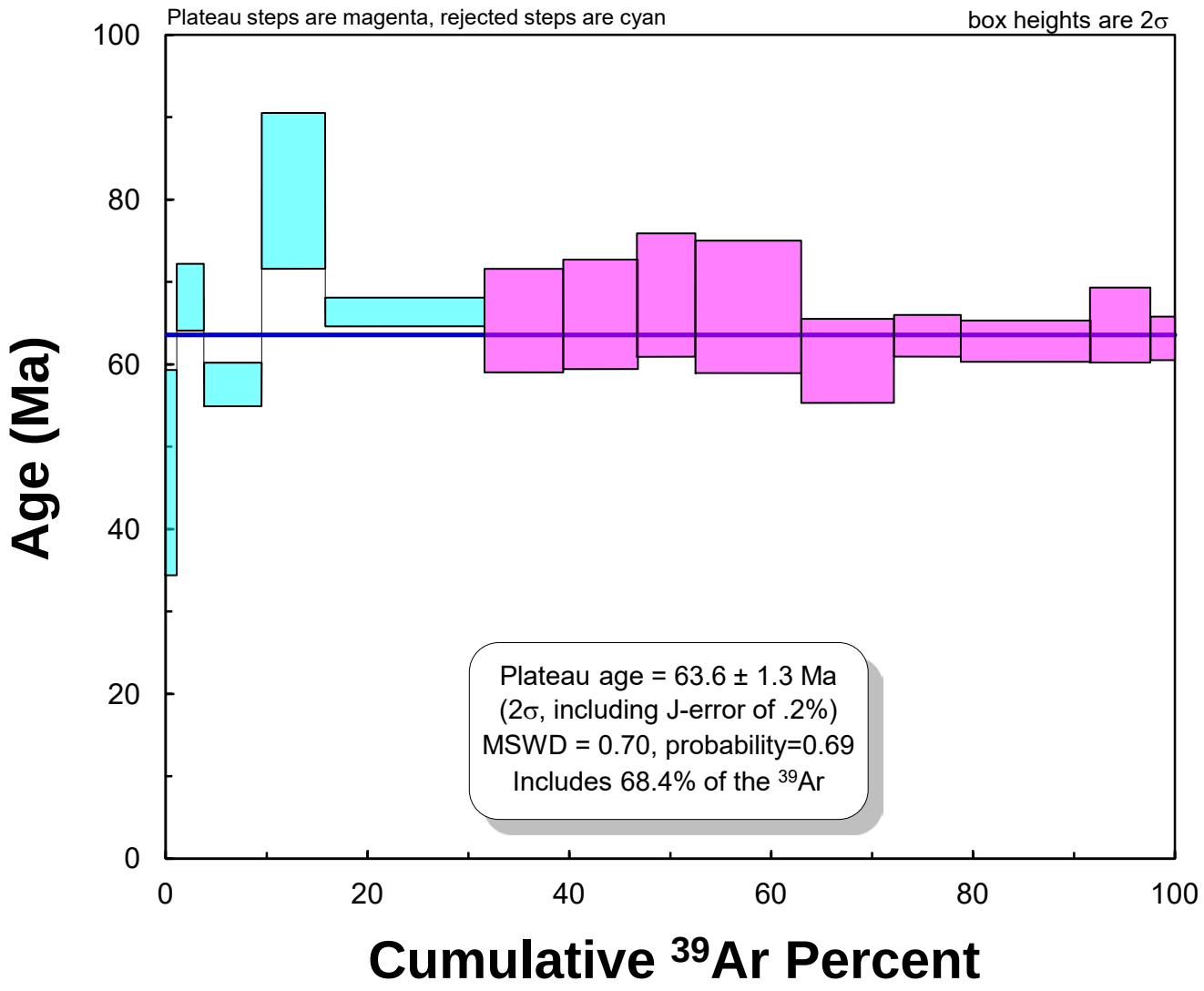
Age = 63.5 ± 2.2 Ma Initial 40Ar/36Ar =292 ± 22 MSWD = 4.3

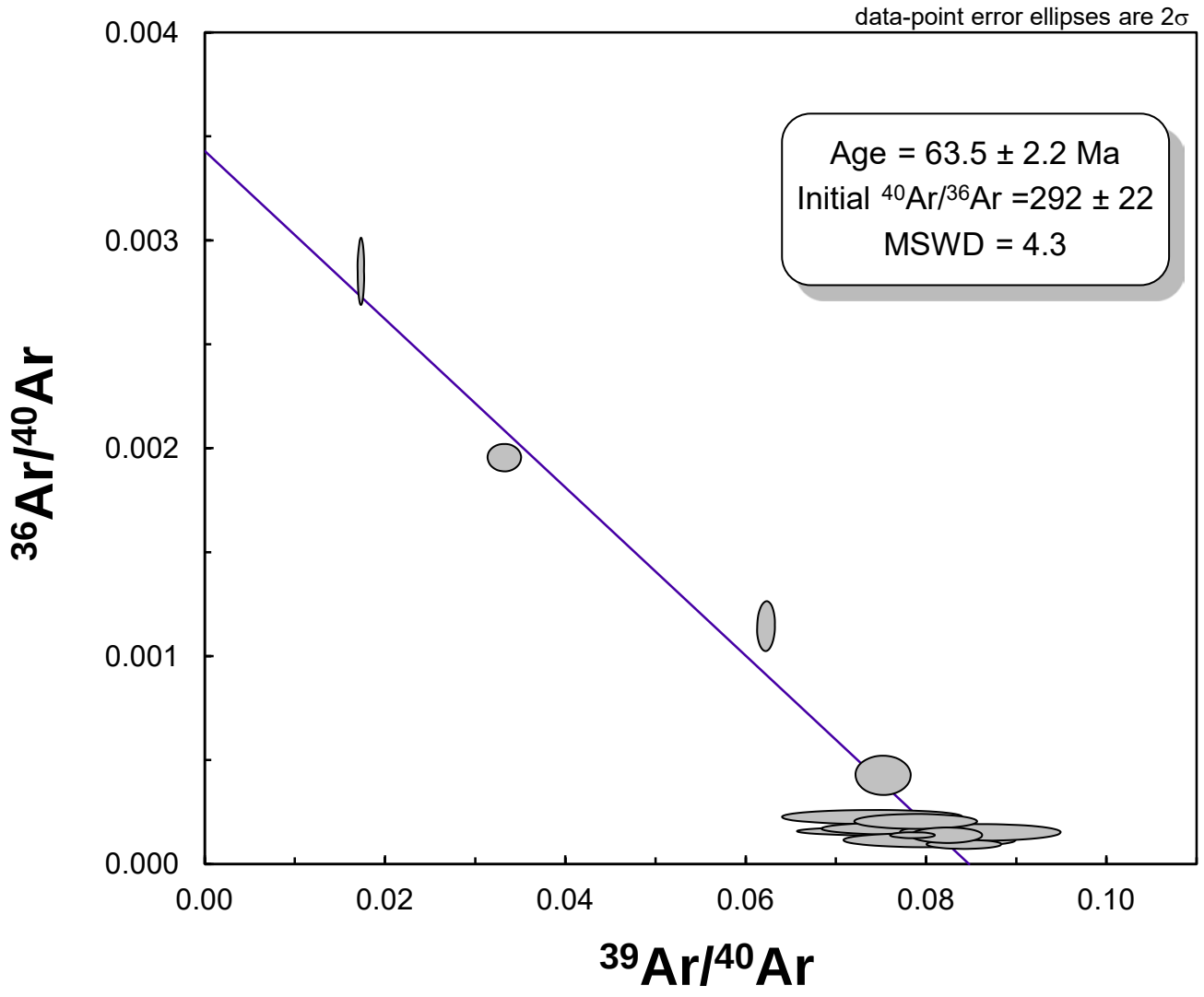
Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
Dept Earth and Ocean Sciences,
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.00013	0.006	7.72	14.86	1.08	8.563	46.90	± 12.40
0.00005	0.008	13.49	41.58	2.77	12.519	68.17	± 4.04
0.00010	0.055	54.55	65.73	5.66	10.547	57.59	± 2.66
0.00003	0.002	49.46	90.05	6.25	14.951	81.12	± 9.47
0.00001	0.012	57.58	95.77	15.81	12.189	66.40	± 1.70
0.00003	0.005	36.45	96.44	7.86	11.989	65.33	± 6.27
0.00002	0.007	18.21	94.82	7.31	12.132	66.10	± 6.64
0.00003	0.007	10.04	93.15	5.77	12.577	68.48	± 7.48
0.00002	0.000	11.42	95.20	10.51	12.302	67.01	± 8.08
0.00003	0.000	12.10	95.33	9.19	11.076	60.44	± 5.06
0.00003	0.000	16.43	95.80	6.61	11.642	63.48	± 2.54
0.00002	0.003	10.95	97.08	12.81	11.523	62.84	± 2.50
0.00003	0.000	10.63	93.81	5.90	11.887	64.79	± 4.53
0.00008	0.002	23.86	87.14	2.47	11.584	63.16	± 2.65

Includes 68.4% of the 39Ar steps 6 through 14

Probability = 0


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 63.6 ± 1.3 Ma
(2σ, including J-error of .2%)
MSWD = 0.70, probability=0.69
Includes 68.4% of the 39Ar


data-point error ellipses are 2σ
Age = 63.5 ± 2.2 Ma
Initial 40Ar/36Ar =292 ± 22
MSWD = 4.3
0.004
0.003
0.002
0.001
0.000
0.00
0.02
0.04
0.06
0.08
0.10
36Ar/40Ar
39Ar/40Ar

AM404 muscovite

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	211.69	25.03	0.644	0.079	0.005	0.001	0.0030
2.70	35.34	0.84	0.082	0.003	0.028	0.001	0.0023
2.90	40.96	3.12	0.089	0.010	0.024	0.002	0.0022
3.20	55.23	5.20	0.076	0.007	0.018	0.002	0.0014
3.50	48.90	0.85	0.054	0.002	0.020	0.000	0.0011
3.90	36.26	2.40	0.012	0.001	0.028	0.002	0.0003
4.30	36.64	1.19	0.011	0.001	0.027	0.001	0.0003
4.90	29.70	1.83	0.012	0.002	0.034	0.002	0.0004
6.00	36.18	0.77	0.023	0.001	0.028	0.001	0.0006

J = 0.00309324 ± 0.00000464 Volume 39ArK = 0.074 x E-13 cm3 NPT

Integrated Date = 141.03 ± 1.94 Ma

Plateau age = 177.7 ± 3.0 Ma (2s, including J-error of .2%) MSWD = 0.33, probability=0.80

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 5 points

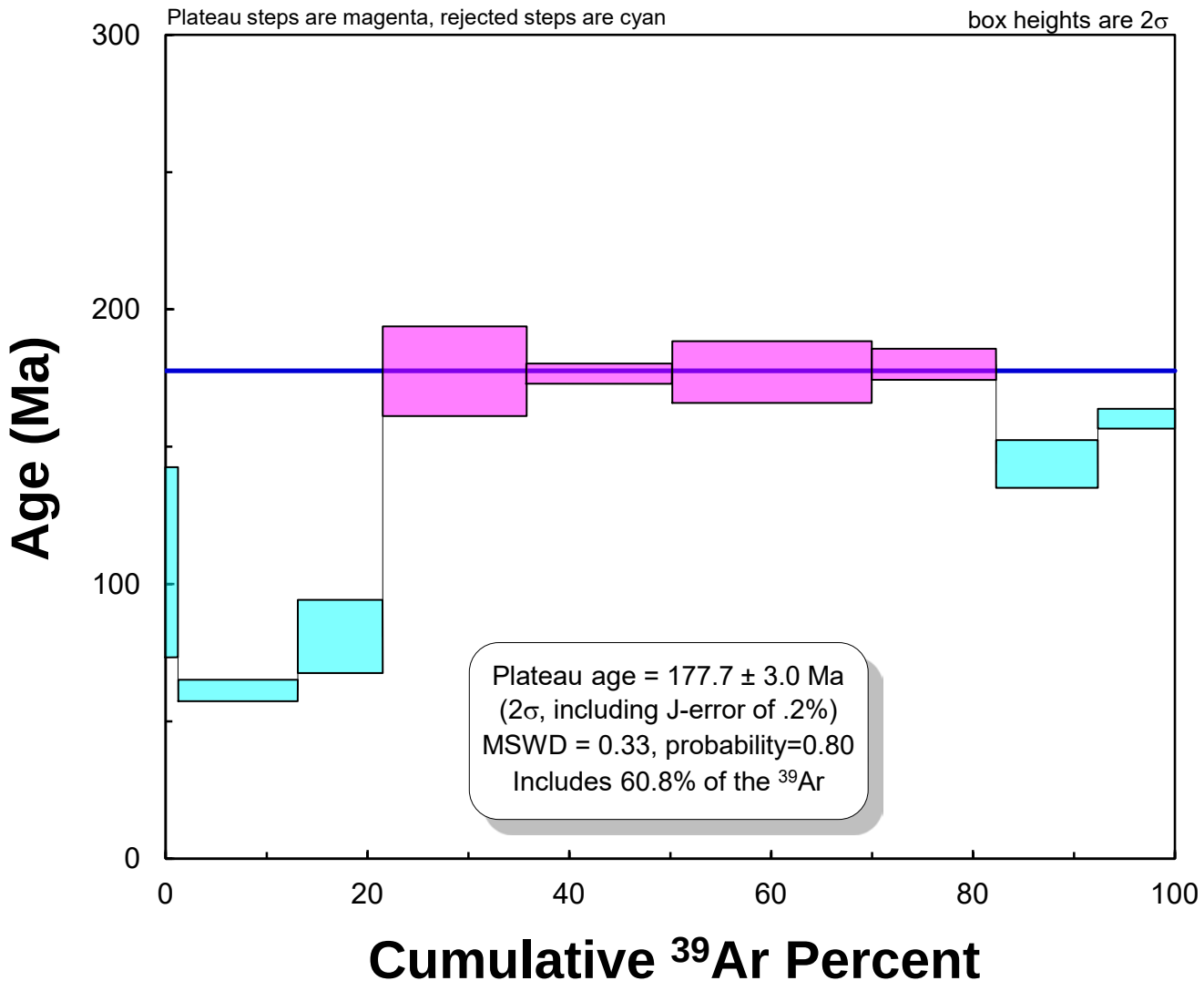
Age = 179.2 ± 3.7 Ma Initial 40Ar/36Ar =278 ± 10 MSWD = 0.23

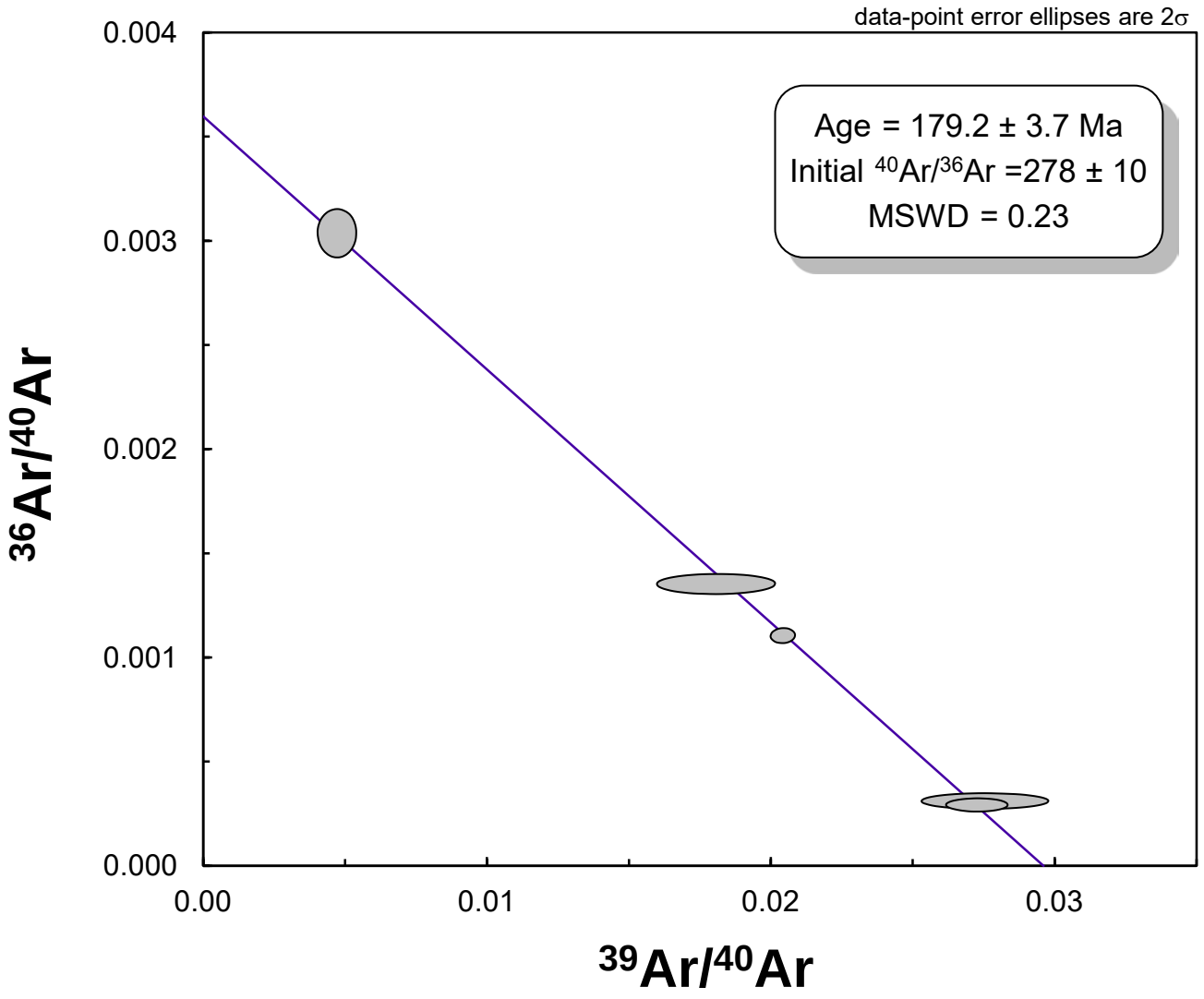
Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
Dept Earth and Ocean Sciences,
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.0001	0.006	0.43	9.28	1.26	19.653	108.03	± 34.53
0.0001	0.029	0.29	31.13	11.87	11.017	61.34	± 3.95
0.0002	0.008	0.22	35.62	8.34	14.616	80.94	± 13.32
0.0000	0.027	0.26	59.55	14.31	32.938	177.60	± 16.40
0.0000	0.060	1.35	66.96	14.45	32.750	176.63	± 3.84
0.0000	0.003	0.77	90.65	19.79	32.884	177.32	± 11.33
0.0000	0.006	0.45	91.16	12.26	33.424	180.09	± 5.77
0.0000	0.004	0.26	88.86	10.08	26.430	143.85	± 8.79
0.0000	0.022	0.17	81.63	7.64	29.600	160.37	± 3.67

Includes 60.8% of the 39Ar steps 4 through 7

Probability = 0.87


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
300
200
100
0
Age (Ma)
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 177.7 ± 3.0 Ma
(2σ, including J-error of .2%)
MSWD = 0.33, probability=0.80
Includes 60.8% of the 39Ar


data-point error ellipses are 2σ
Age = 179.2 ± 3.7 Ma
Initial 40Ar/36Ar =278 ± 10
MSWD = 0.23
0.004
0.003
0.002
0.001
0.000
0.00
0.01
0.02
0.03
36Ar/40Ar
39Ar/40Ar

AM470 Plagioclase

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	372.05	6.43	1.44	0.036	0.003	0.0000	0.0039
2.50	89.70	1.54	0.27	0.008	0.011	0.0002	0.0030
2.80	49.20	0.51	0.13	0.004	0.020	0.0002	0.0027
3.10	33.15	0.30	0.08	0.002	0.030	0.0003	0.0023
3.50	35.19	0.47	0.08	0.003	0.028	0.0004	0.0023
4.00	44.08	0.44	0.11	0.003	0.023	0.0002	0.0025
4.50	58.69	1.09	0.16	0.005	0.017	0.0003	0.0028
5.10	60.81	0.98	0.15	0.006	0.016	0.0003	0.0025
6.50	69.93	0.58	0.18	0.005	0.014	0.0001	0.0026

J = 0.00308240 ± 0.00000462 Volume 39ArK = 0.074 x E-13 cm3 NPT

Integrated Date = 60.21 ± 1.99 Ma

Plateau age = 57.8 ± 2.1 Ma (2s, including J-error of .2%) MSWD = 0.29, probability=0.92

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 6 points

Age = 59.1 ± 5.5 Ma Initial 40Ar/36Ar =294.6 ± 9.3 MSWD = 0.20

Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
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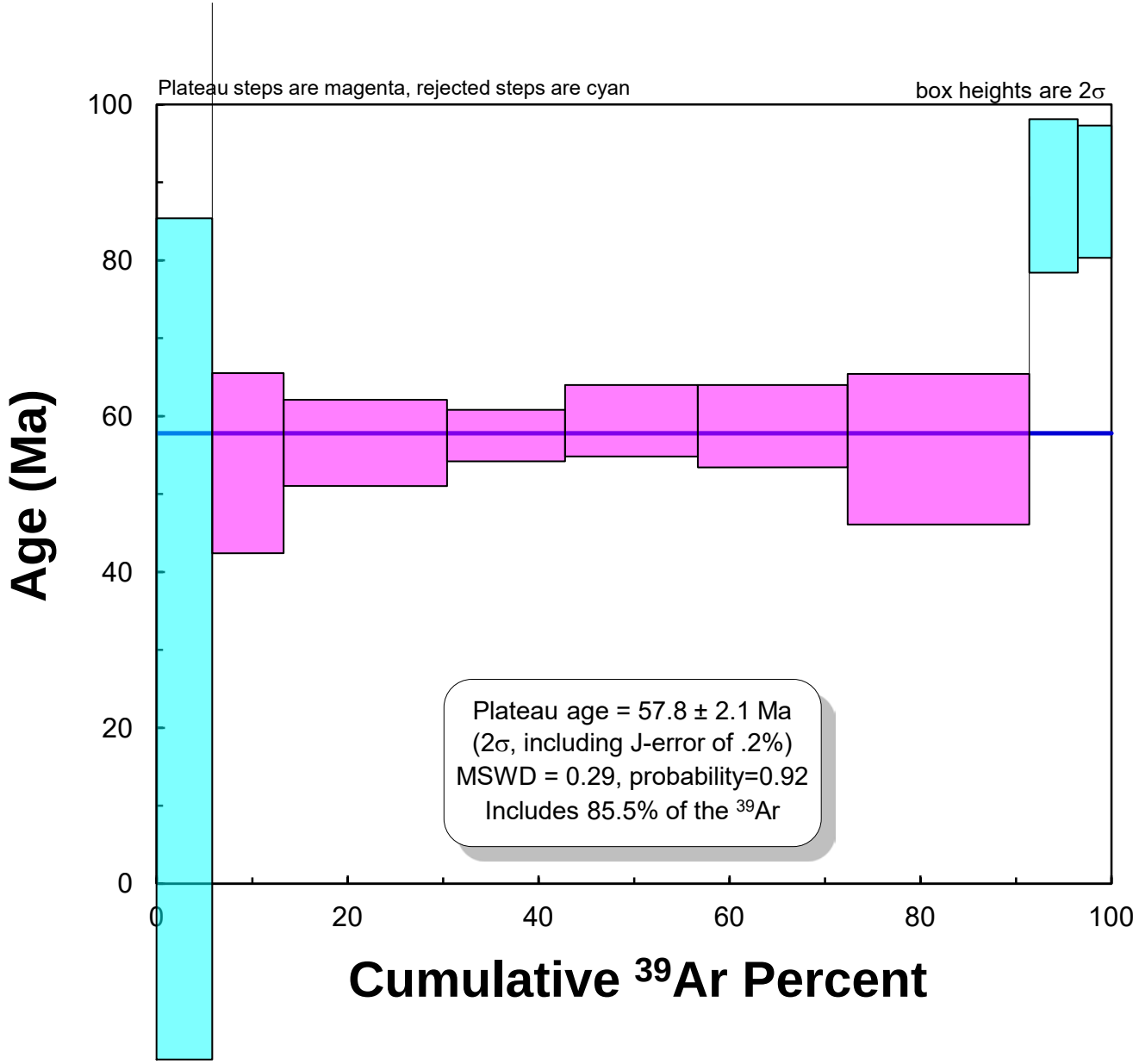
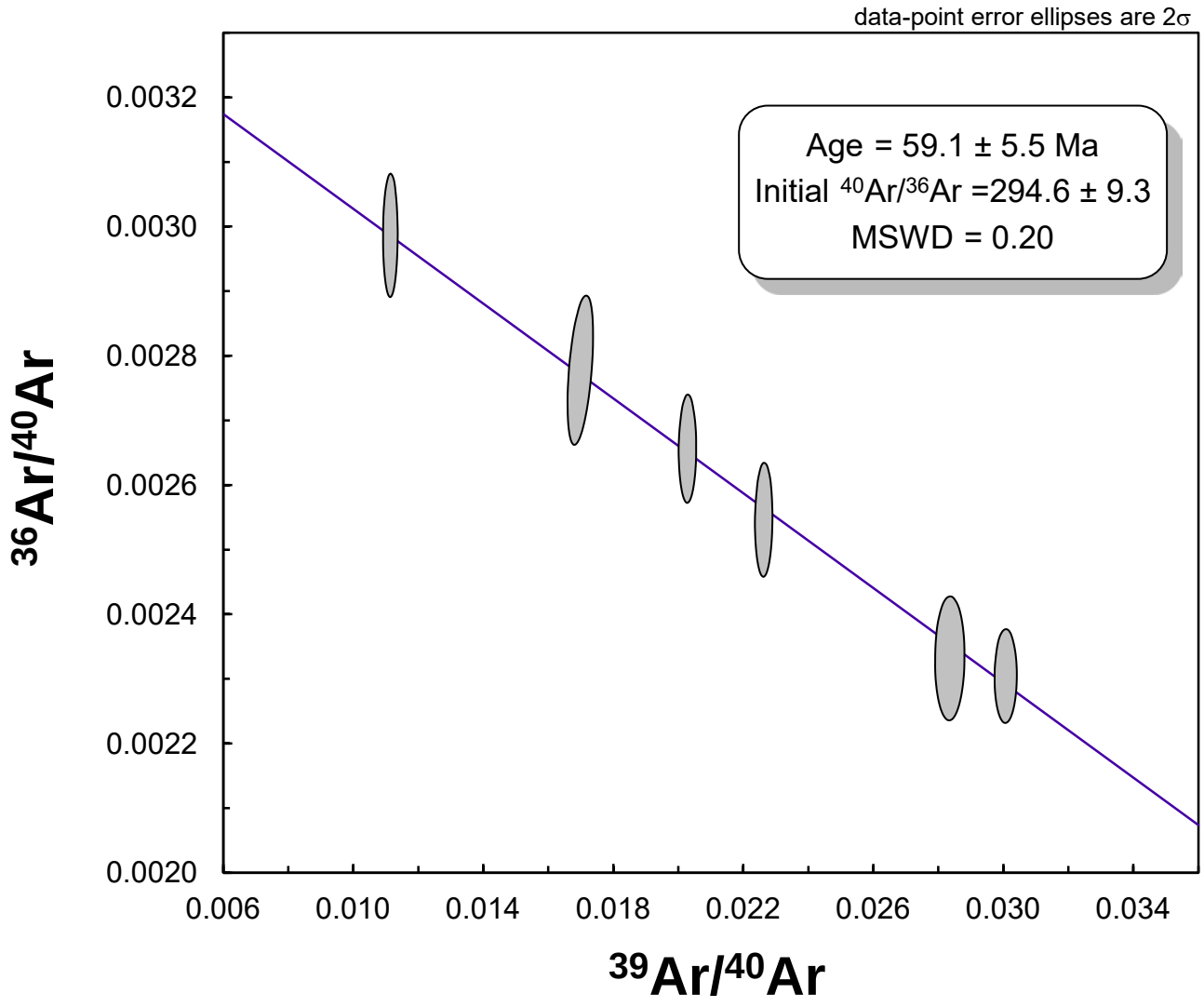
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.0001	0.010	0.48	-15.74	5.81	58.610	-364.74	± 54.77
0.0001	0.014	0.53	10.82	7.51	9.714	54.00	± 11.53
0.0001	0.028	0.24	20.67	17.09	10.187	56.60	± 5.54
0.0001	0.025	0.17	31.19	12.33	10.362	57.55	± 3.27
0.0001	0.041	0.17	30.37	13.94	10.708	59.44	± 4.63
0.0001	0.034	0.17	23.96	15.63	10.583	58.76	± 5.25
0.0001	0.464	0.12	17.05	19.03	10.039	55.78	± 9.61
0.0001	0.011	0.09	26.25	5.13	16.028	88.27	± 9.81
0.0001	0.027	0.07	22.95	3.52	16.132	88.83	± 8.48

Includes 85.5% of the 39Ar steps 2 through 7

Probability = 0.974


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 57.8 ± 2.1 Ma
(2σ, including J-error of .2%)
MSWD = 0.29, probability=0.92
Includes 85.5% of the 39Ar


data-point error ellipses are 2σ
Age = 59.1 ± 5.5 Ma
Initial 40Ar/36Ar =294.6 ± 9.3
MSWD = 0.20
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
36Ar/40Ar
0.006
0.010
0.014
0.018
0.022
0.026
0.030
0.034
39Ar/40Ar

AM529 Hornblende

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	85.96	19.49	0.23	0.0539	0.0116	0.0026	0.00270
2.70	55.31	5.18	0.08	0.0078	0.0181	0.0017	0.00138
3.00	38.86	8.19	0.03	0.0070	0.0256	0.0054	0.00078
3.40	35.34	0.96	0.01	0.0005	0.0282	0.0008	0.00019
3.80	37.54	1.00	0.01	0.0010	0.0265	0.0007	0.00021
4.00	38.73	1.62	0.02	0.0013	0.0257	0.0011	0.00034
4.50	26.77	2.53	0.00	0.0020	0.0373	0.0035	0.00012

J = 0.00308131 ± 0.00000462 Volume 39ArK = 0.074 x E-13 cm3 NPT

Integrated Date = 180.80 ± 2.98 Ma

Plateau age = 179.3 ± 4.5 Ma (2s, including J-error of .2%) MSWD = 0.83, probability=0.44

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 6 points

Age = 185.1 ± 8.5 Ma Initial 40Ar/36Ar =238 ± 72 MSWD = 3.0

Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
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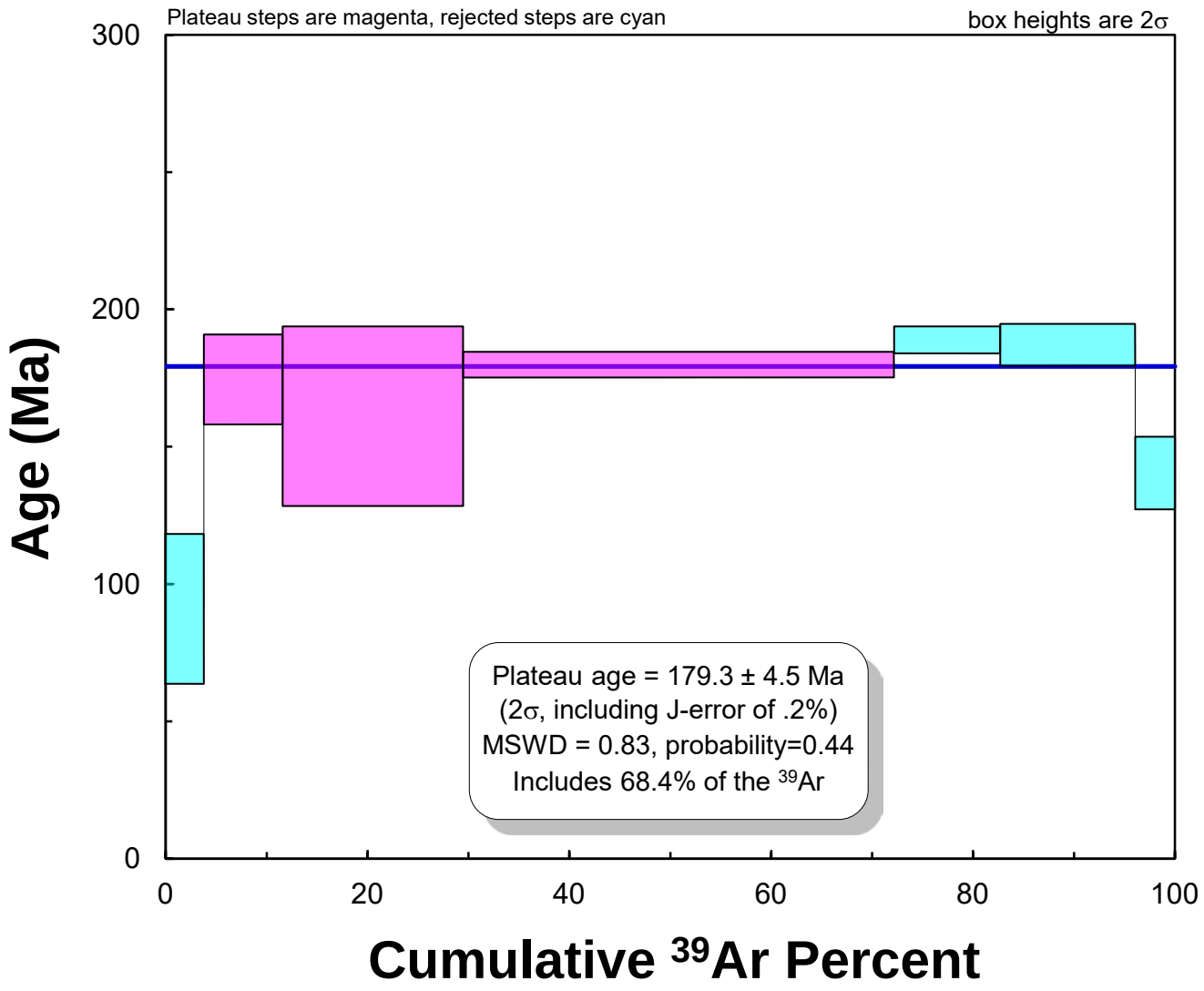
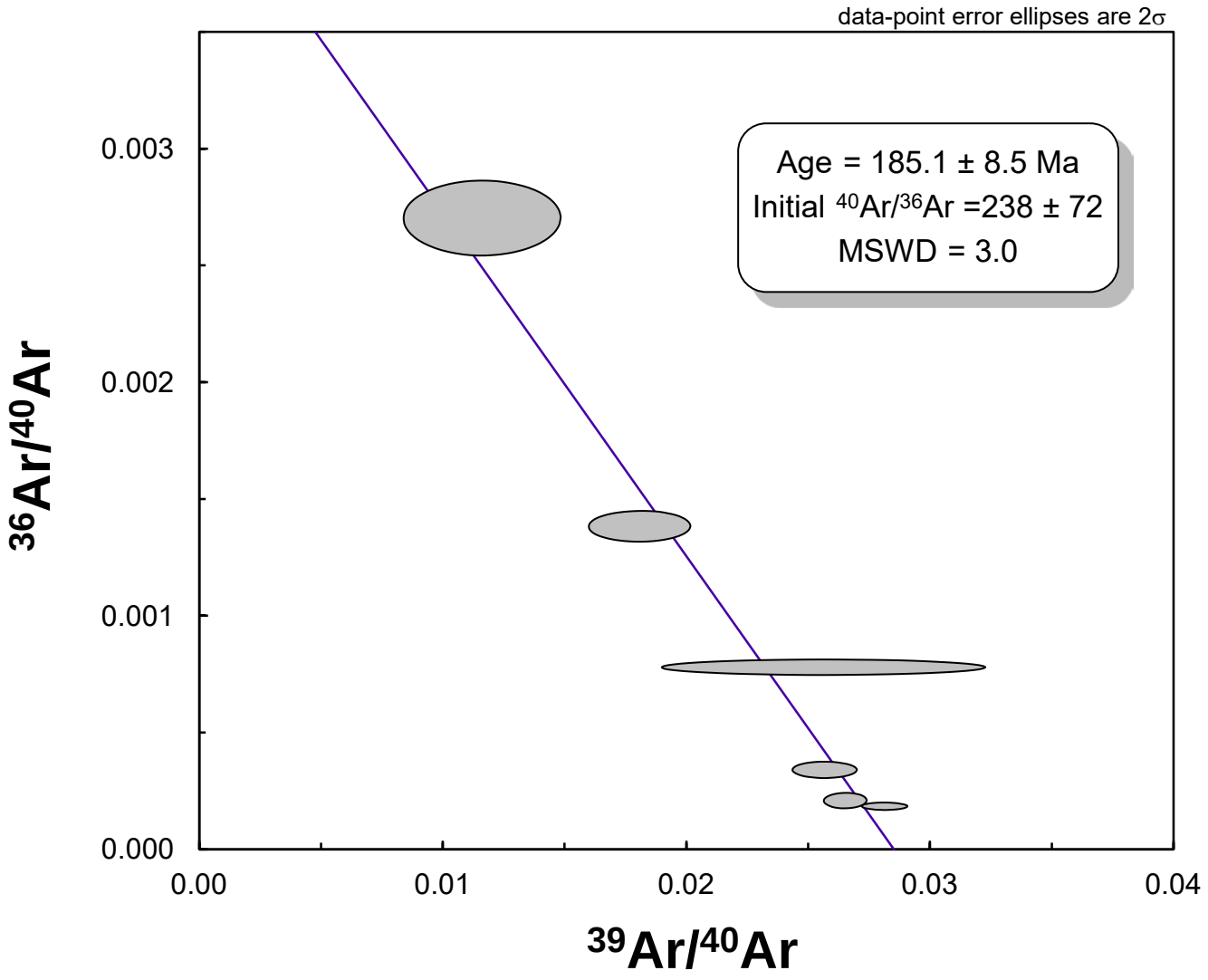
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.00013	0.004	-44.55	19.25	3.76	16.548	91.04	± 27.23
0.00005	0.011	99.86	58.68	7.85	32.454	174.47	± 16.31
0.00003	0.002	0.11	76.68	17.86	29.900	161.33	± 32.71
0.00001	0.004	0.08	94.46	42.68	33.545	180.05	± 4.73
0.00003	0.028	0.10	93.67	10.52	35.303	189.02	± 5.07
0.00003	0.004	0.08	89.76	13.39	34.938	187.16	± 7.67
0.00007	0.003	0.16	96.44	3.94	25.885	140.47	± 13.19

Includes 68.4% of the 39Ar steps 2 through 4

Probability = 0.019


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
300
200
100
0
Age (Ma)
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 179.3 ± 4.5 Ma
(2σ, including J-error of .2%)
MSWD = 0.83, probability=0.44
Includes 68.4% of the 39Ar


data-point error ellipses are 2σ
Age = 185.1 ± 8.5 Ma
Initial 40Ar/36Ar =238 ± 72
MSWD = 3.0
0.003
0.002
0.001
0.000
0.00
0.01
0.02
0.03
0.04
36Ar/40Ar
39Ar/40Ar

AM557 Plagioclase

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	1003.88	50.75	4.16	0.22	0.001	0.000	0.0041
2.50	42.29	0.40	0.11	0.00	0.024	0.000	0.0026
2.70	31.18	0.38	0.06	0.00	0.032	0.000	0.0020
2.90	28.39	0.23	0.06	0.00	0.035	0.000	0.0021
3.20	20.44	0.23	0.03	0.00	0.049	0.001	0.0017
3.50	21.21	0.46	0.04	0.00	0.047	0.001	0.0016
3.80	25.99	1.00	0.05	0.00	0.038	0.001	0.0019
4.10	23.47	0.40	0.04	0.00	0.043	0.001	0.0018
4.70	19.27	0.45	0.03	0.00	0.052	0.001	0.0015
5.50	18.05	0.21	0.03	0.00	0.055	0.001	0.0014

J = 0.00309154 ± 0.00000464 Volume 39ArK = 0.096 x E-13 cm3 NPT

Integrated Date = 59.61 ± 0.80 Ma

Plateau age = 59.22 ± 0.83 Ma (2s, including J-error of .2%) MSWD = 0.96, probability=0.45

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 8 points

Age = 58.7 ± 2.4 Ma Initial 40Ar/36Ar =297 ± 11 MSWD = 1.05

Analysis by Janet Gabites
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Dept Earth and Ocean Sciences,
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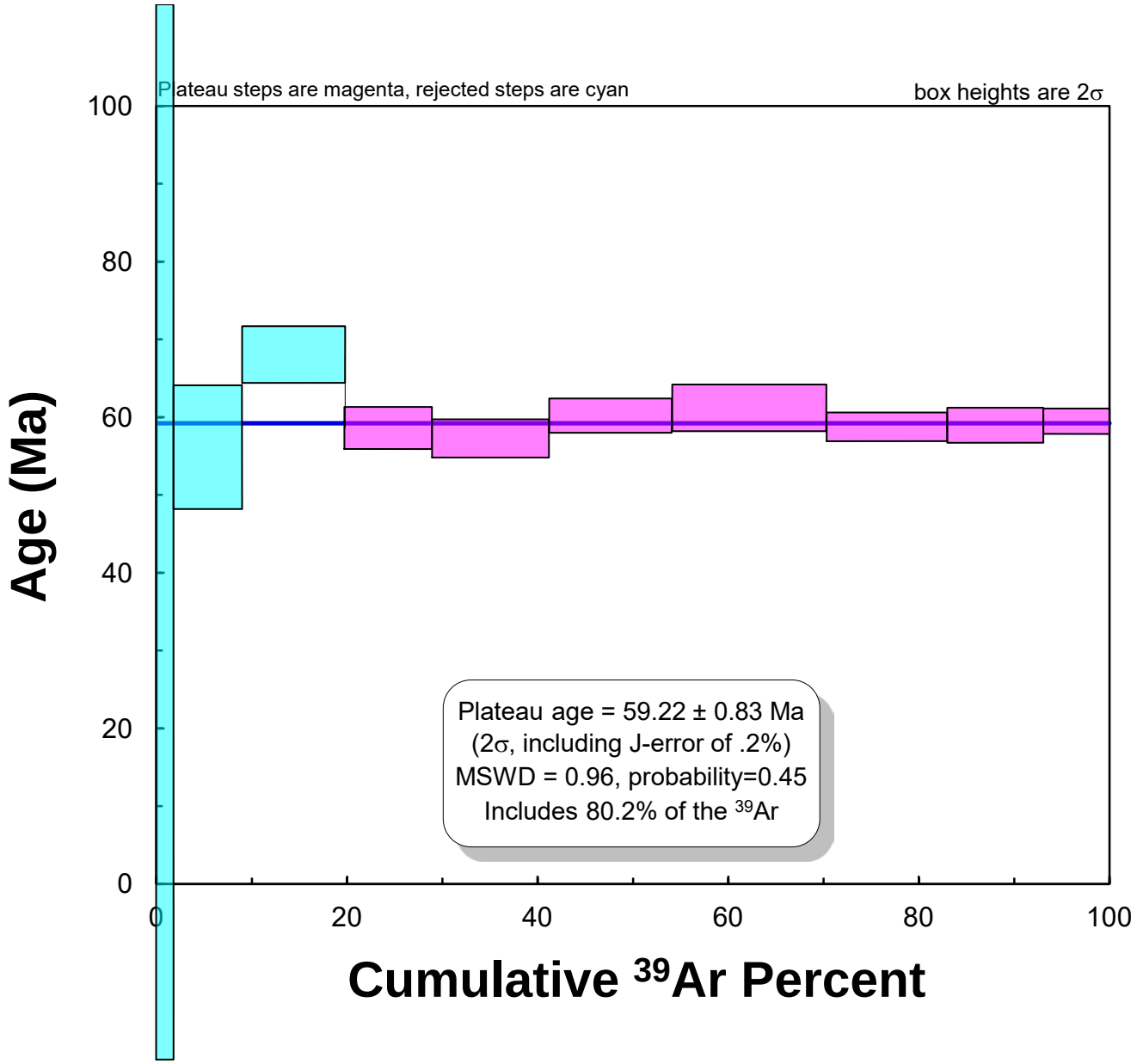
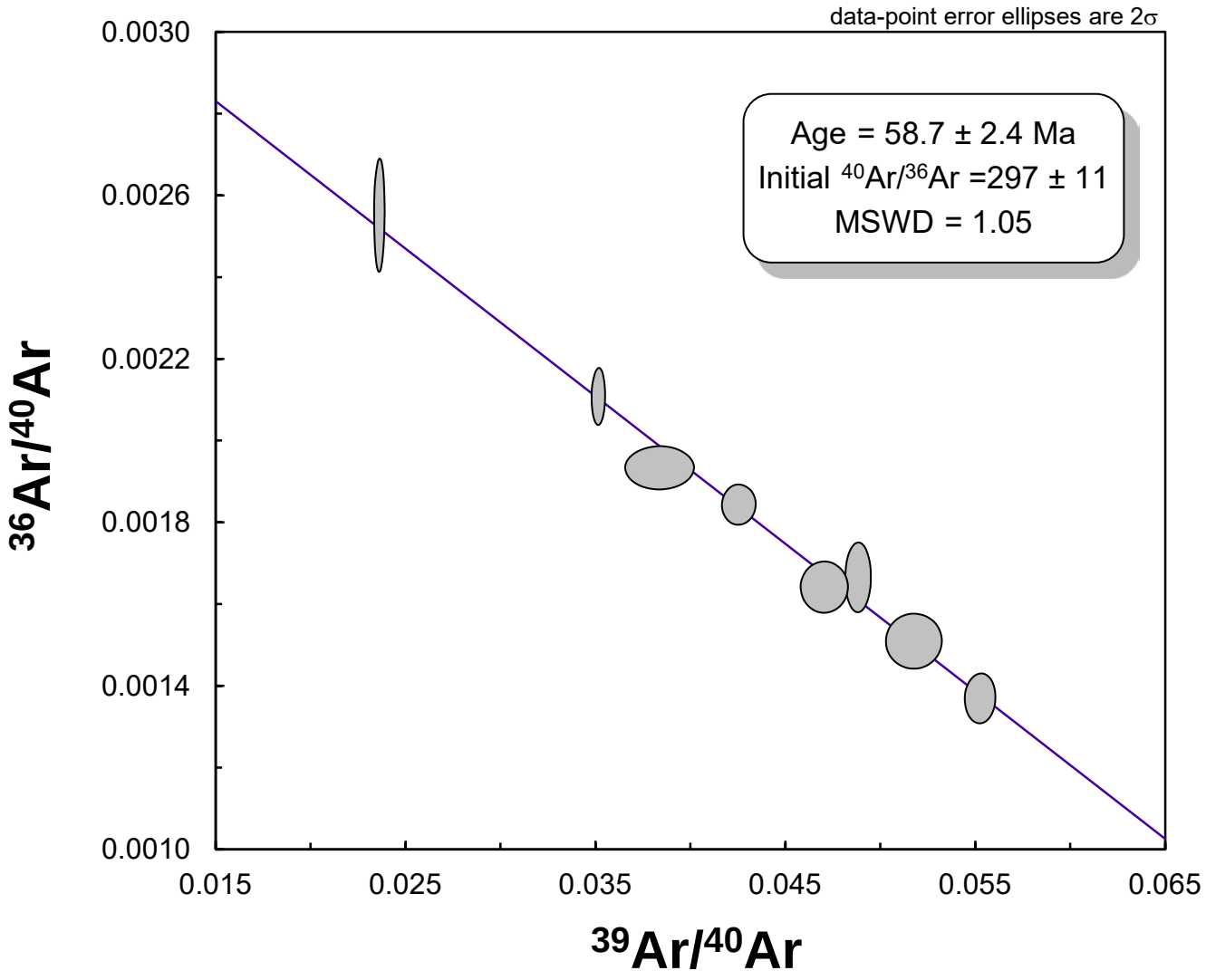
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.0001	0.003	0.35	-23.56	1.76	236.820	-2411.29	± 521.05
0.0001	0.060	0.29	23.81	7.22	10.085	56.20	± 7.95
0.0001	0.118	0.21	39.24	10.80	12.259	68.09	± 3.66
0.0001	0.024	0.20	37.04	9.11	10.537	58.68	± 2.71
0.0001	0.015	0.23	50.24	12.30	10.285	57.29	± 2.45
0.0001	0.007	0.23	50.96	12.96	10.828	60.27	± 2.21
0.0000	0.007	0.22	42.27	16.16	11.007	61.25	± 2.96
0.0000	0.015	0.23	44.93	12.64	10.560	58.81	± 1.86
0.0001	0.009	0.22	54.90	10.10	10.595	59.00	± 2.23
0.0000	0.039	0.20	59.08	6.95	10.687	59.50	± 1.63

Includes 80.2% of the 39Ar steps 4 through 10

Probability = 0.937


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 59.22 ± 0.83 Ma
(2σ, including J-error of .2%)
MSWD = 0.96, probability=0.45
Includes 80.2% of the 39Ar


data-point error ellipses are 2σ
Age = 58.7 ± 2.4 Ma
Initial 40Ar/36Ar =297 ± 11
MSWD = 1.05
0.0030
0.0026
0.0022
0.0018
0.0014
0.0010
0.015
0.025
0.035
0.045
0.055
0.065
36Ar/40Ar
39Ar/40Ar

AM563 feldspar

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	956.92	35.18	3.54	0.15	0.0010	0.0000	0.0037
2.60	164.55	7.83	0.52	0.03	0.0061	0.0003	0.0032
2.90	210.59	6.60	0.66	0.02	0.0047	0.0001	0.0032
3.20	95.93	4.56	0.28	0.02	0.0104	0.0005	0.0029
3.60	167.69	4.15	0.49	0.05	0.0060	0.0001	0.0029
4.00	142.23	1.08	0.39	0.01	0.0070	0.0001	0.0028
4.50	280.34	3.95	0.89	0.02	0.0036	0.0001	0.0032
5.50	217.71	4.66	0.69	0.02	0.0046	0.0001	0.0032

J = 0.00309611 ± 0.00000464 Volume 39ArK = 0.016 x E-13 cm3 NPT

Integrated Date = 76.58

Plateau age = no plateau

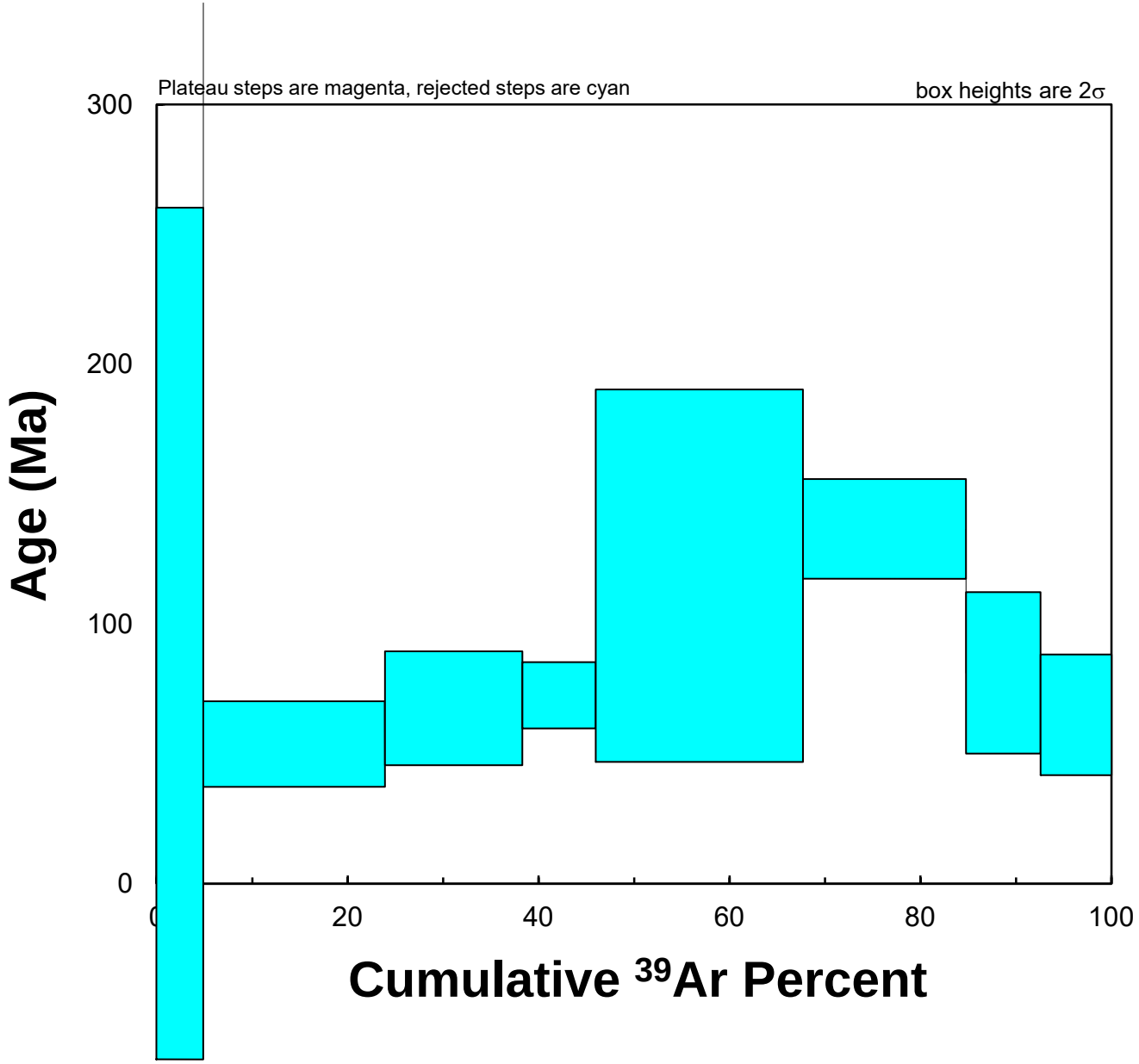
Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 6 points

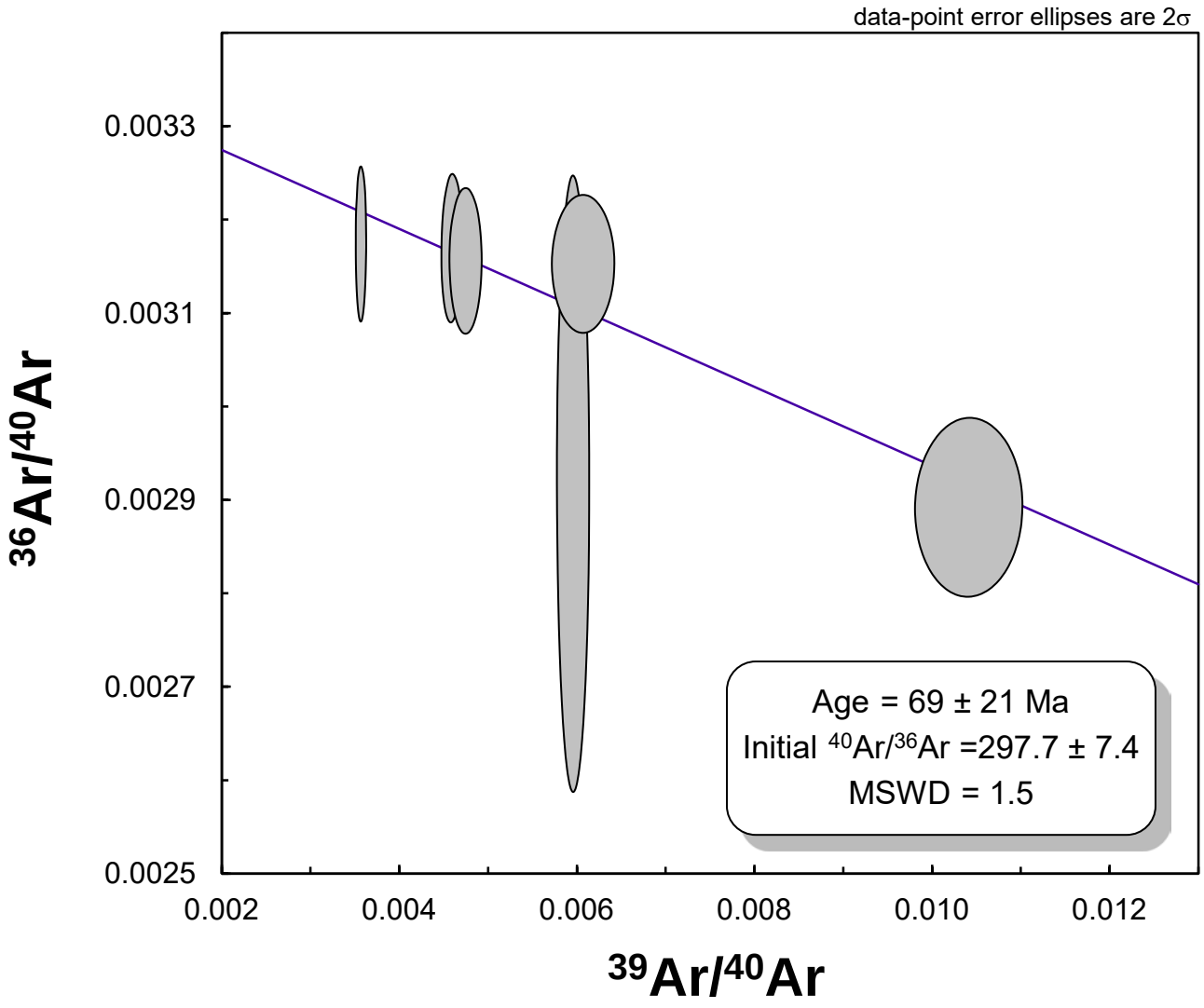
Age = 69 ± 21 Ma Initial 40Ar/36Ar =297.7 ± 7.4 MSWD = 1.5

Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
Dept Earth and Ocean Sciences,
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.0001	0.002	0.12	-10.27	4.97	98.616	-666.87	± 166.42
0.0001	0.004	2.27	5.86	18.90	9.648	53.88	± 16.47
0.0001	0.004	0.92	5.78	14.47	12.168	67.69	± 21.93
0.0001	0.018	1.30	13.64	7.62	13.093	72.74	± 12.75
0.0003	0.002	0.71	12.90	21.74	21.639	118.70	± 71.75
0.0001	0.048	0.73	17.59	17.06	25.038	136.67	± 19.34
0.0001	0.035	1.12	5.23	7.76	14.670	81.31	± 30.94
0.0001	0.082	0.74	5.37	7.47	11.693	65.10	± 23.34

Probability = 0.19


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
300
200
100
0
Age (Ma)
0
20
40
60
80
100
Cumulative 39Ar Percent


data-point error ellipses are 2σ
0.0033
0.0031
0.0029
0.0027
0.0025
36Ar/40Ar
0.002
0.004
0.006
0.008
0.010
0.012
39Ar/40Ar
Age = 69 ± 21 Ma
Initial 40Ar/36Ar =297.7 ± 7.4
MSWD = 1.5

CV-06 hornblende

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	86.91	12.49	0.2508	0.0616	0.01	0.002	0.00288
2.70	33.90	1.19	0.0690	0.0110	0.03	0.001	0.00203
3.10	13.23	0.49	0.0075	0.0079	0.08	0.003	0.00051
3.60	15.87	0.39	0.0212	0.0023	0.06	0.002	0.00127
4.10	9.86	0.16	0.0023	0.0018	0.10	0.002	0.00021
4.50	7.72	0.18	0.0036	0.0017	0.13	0.003	0.00047
5.00	8.00	0.13	0.0033	0.0017	0.13	0.002	0.00041
5.60	7.18	0.12	0.0008	0.0003	0.14	0.002	0.00011
6.20	7.05	0.12	0.0006	0.0004	0.14	0.002	0.00008
7.00	7.14	0.11	0.0013	0.0005	0.14	0.002	0.00018
8.00	6.94	0.14	0.00	0.00	0.14	0.003	0.00012
9.50	7.46	0.33	0.00	0.00	0.13	0.006	0.00052

J = 0.00409720 ± 0.00000615 Volume 39ArK = 0.347 x E-13 cm3 NPT

Integrated Date = 51.16 ± 0.59 Ma

Plateau age = 50.79 ± 0.69 Ma (2s, including J-error of .2%) MSWD = 0.90, probability=0.46

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 8 points

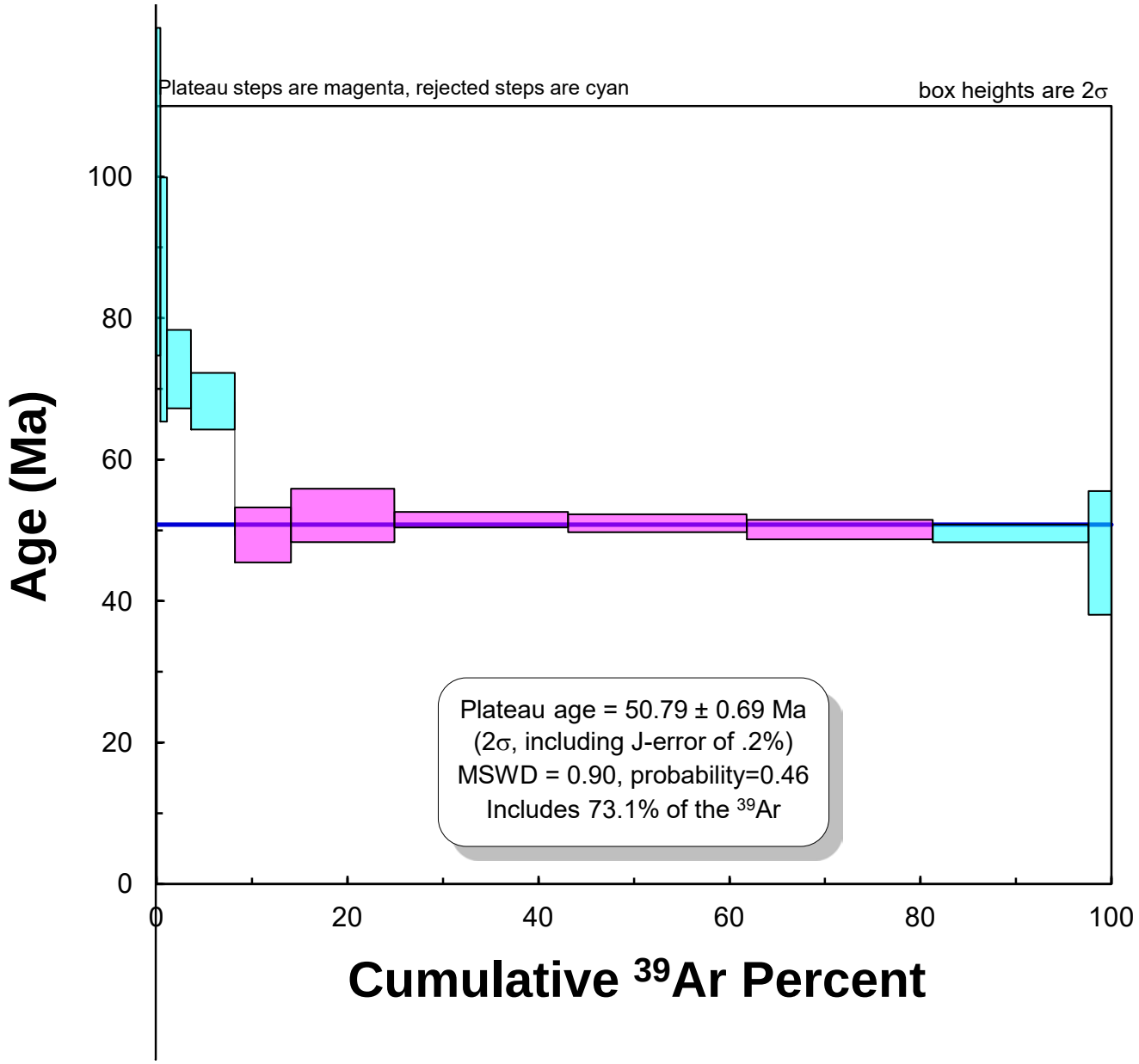
Age = 49.60 ± 0.73 Ma Initial 40Ar/36Ar =319 ± 58 MSWD = 1.3

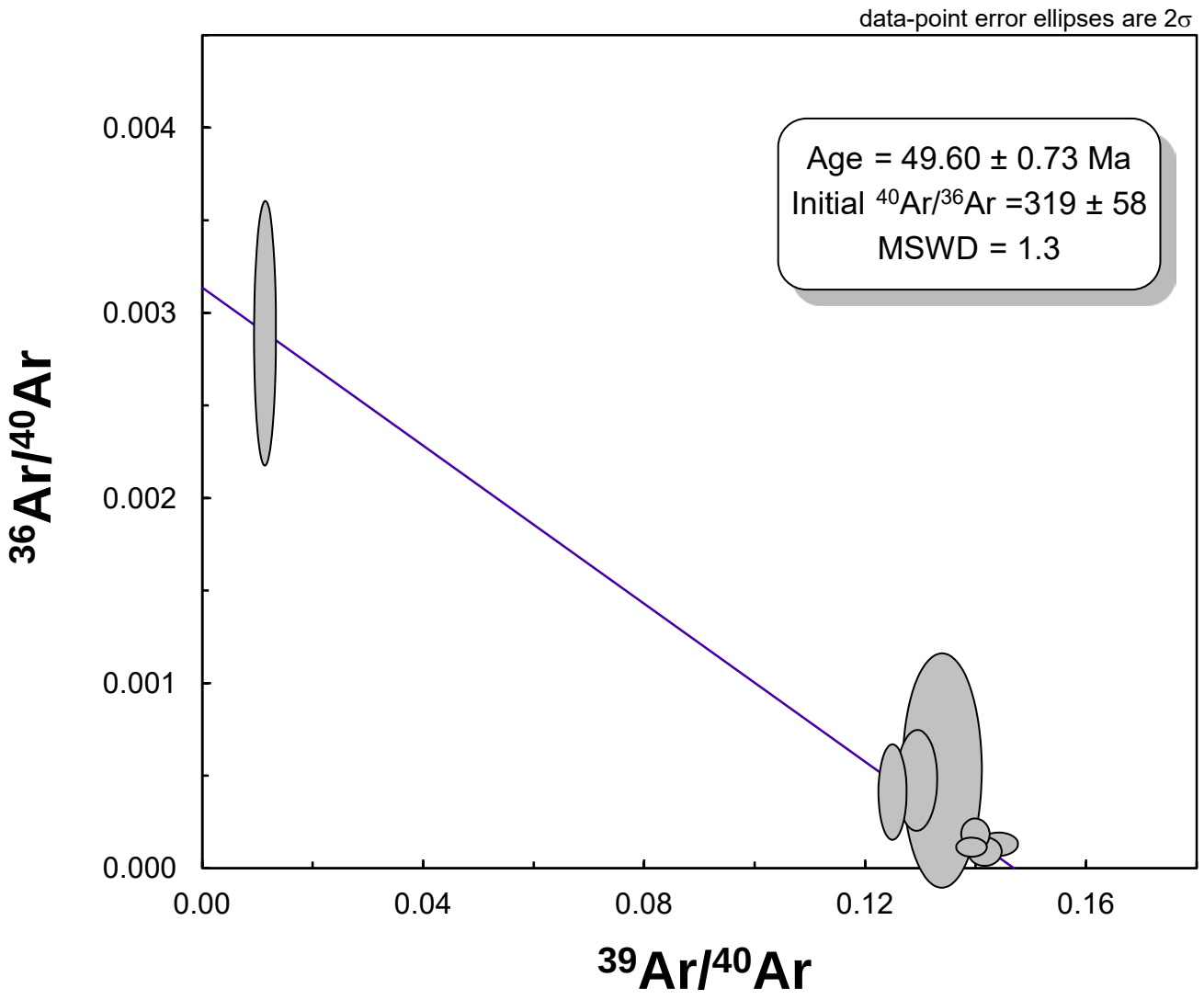
Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
Dept Earth and Ocean Sciences,
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.00058	0.021	1.46	13.91	0.07	12.096	88.54	± 109.10
0.00032	0.025	0.80	39.47	0.38	13.392	97.78	± 23.25
0.00060	0.010	0.23	84.82	0.77	11.246	82.46	± 17.25
0.00015	0.128	0.18	62.05	2.49	9.875	72.60	± 5.52
0.00018	0.003	0.70	93.75	4.62	9.248	68.08	± 3.99
0.00022	0.026	32.19	85.99	5.81	6.641	49.14	± 3.93
0.00021	0.014	43.10	87.81	10.80	7.022	51.92	± 3.79
0.00004	0.004	48.33	96.67	18.18	6.939	51.31	± 1.07
0.00006	0.007	68.75	97.50	18.72	6.875	50.85	± 1.31
0.00007	0.002	96.32	94.59	19.58	6.753	49.96	± 1.33
0.00005	0.026	205.13	96.22	16.23	6.674	49.38	± 1.28
0.00052	0.007	34.41	84.46	2.35	6.303	46.67	± 8.70

Includes 73.1% of the 39Ar steps 6 through 10

Probability = 0.23


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 50.79 ± 0.69 Ma
(2σ, including J-error of .2%)
MSWD = 0.90, probability=0.46
Includes 73.1% of the 39Ar


data-point error ellipses are 2σ
Age = 49.60 ± 0.73 Ma
Initial 40Ar/36Ar =319 ± 58
MSWD = 1.3
0.004
0.003
0.002
0.001
0.000
0.00
0.04
0.08
0.12
0.16
36Ar/40Ar
39Ar/40Ar

CV-41 feldspar

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	71.57	2.96	0.22	0.018	0.01	0.001	0.0030
2.30	21.98	0.52	0.04	0.004	0.05	0.001	0.0019
2.70	13.83	0.22	0.02	0.001	0.07	0.001	0.0014
3.10	11.91	0.21	0.02	0.001	0.08	0.001	0.0013
3.50	17.27	0.28	0.03	0.002	0.06	0.001	0.0019
3.90	13.73	0.32	0.02	0.002	0.07	0.002	0.0016
4.30	10.54	0.31	0.01	0.002	0.09	0.003	0.0010
4.90	11.50	0.28	0.01	0.004	0.09	0.002	0.0010

J = 0.00400110 ± 0.00000600 Volume 39ArK = 0.111 x E-13 cm3 NPT

Integrated Date = 55.73 ± 1.54 Ma

Plateau age = 53.8 ± 1.8 Ma (2s, including J-error of .2%) MSWD = 0.53, probability=0.72

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 7 points

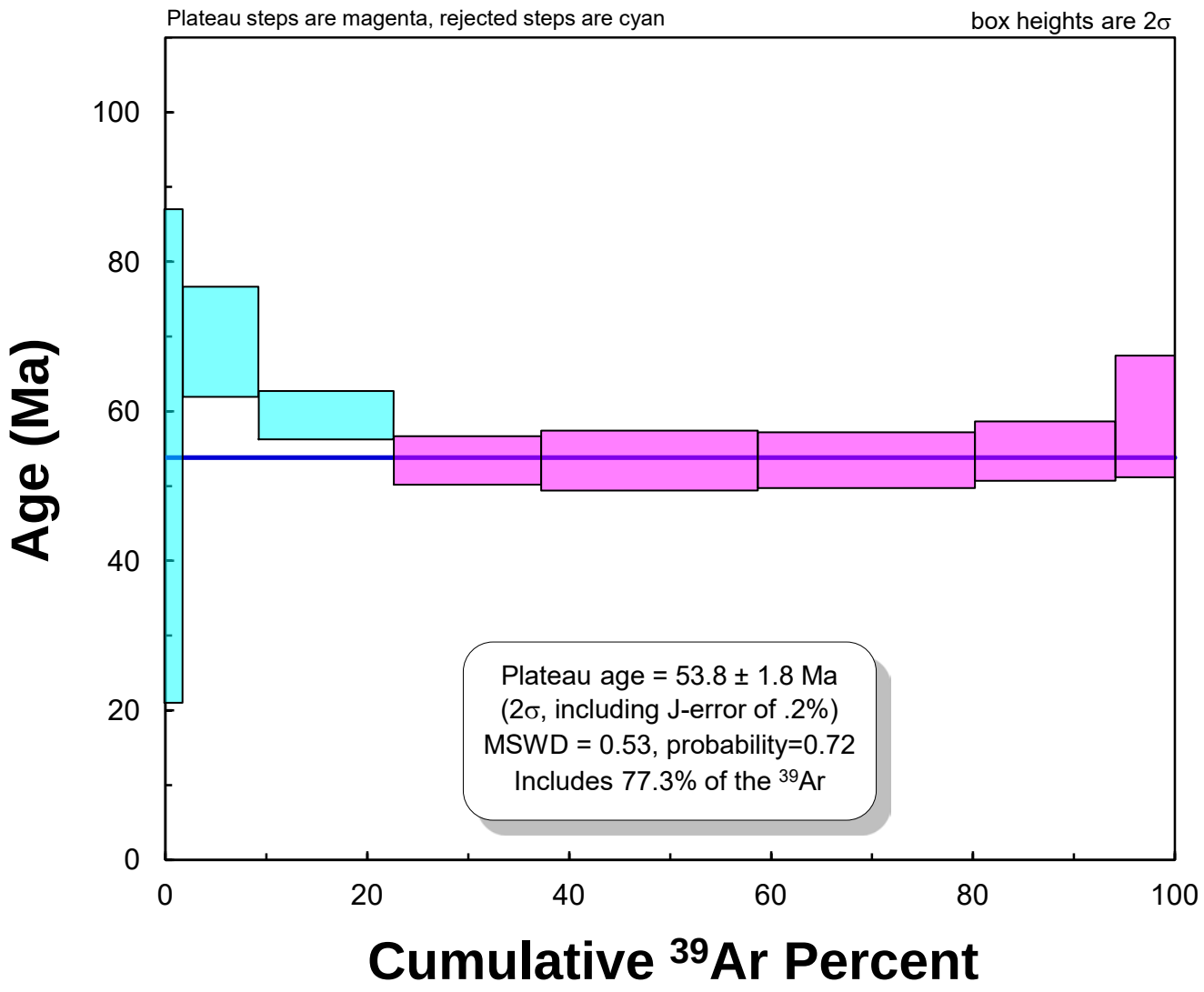
Age = 54.6 ± 5.7 Ma Initial 40Ar/36Ar =297 ± 36 MSWD = 2.2

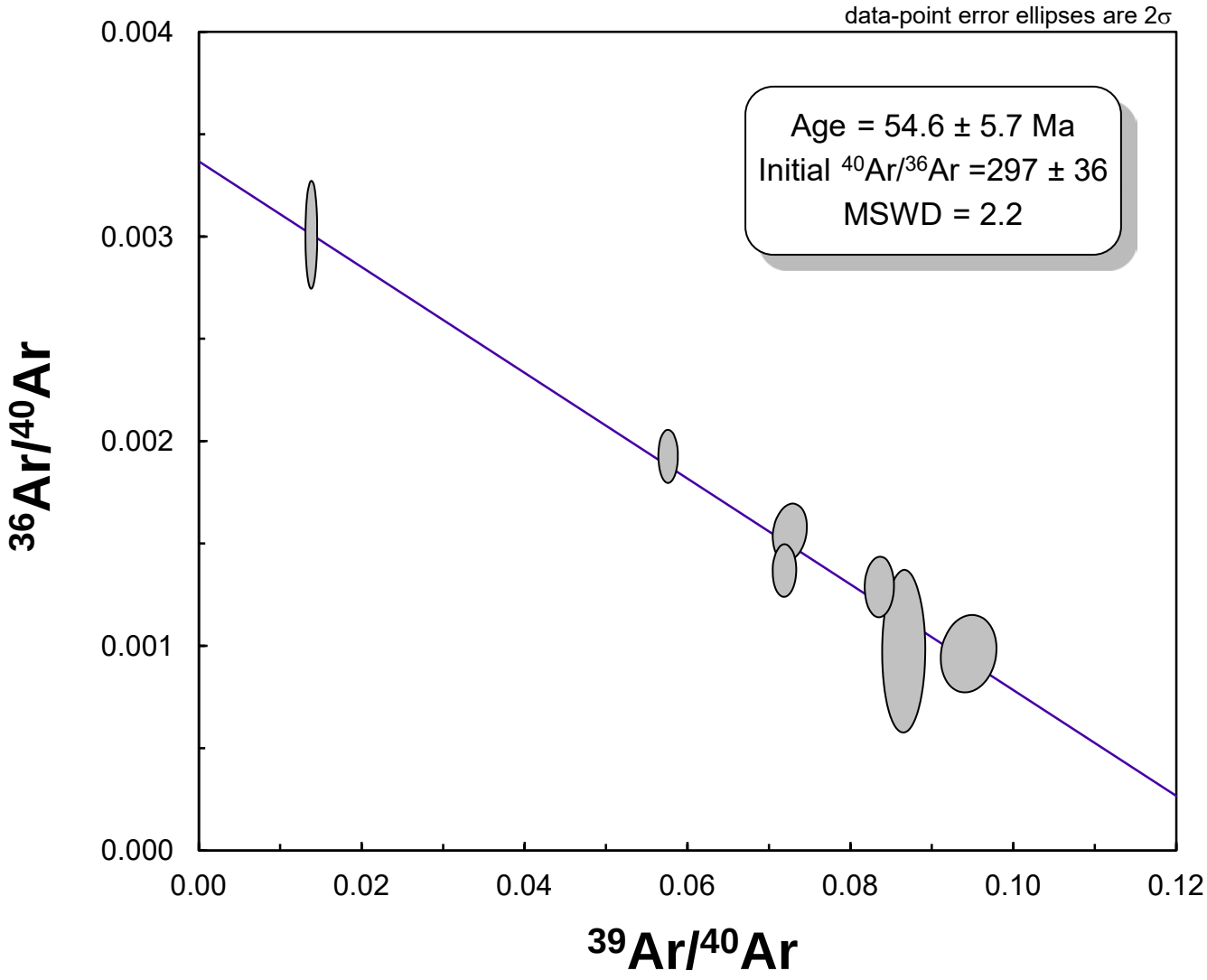
Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
Dept Earth and Ocean Sciences,
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.0002	0.028	0.17	10.39	1.76	7.460	53.84	± 33.04
0.0002	0.018	0.13	43.57	7.58	9.616	69.11	± 7.37
0.0001	0.032	0.11	59.25	13.37	8.232	59.32	± 3.25
0.0001	0.038	0.14	61.68	14.56	7.375	53.24	± 3.25
0.0001	0.023	0.18	42.60	21.52	7.379	53.26	± 4.03
0.0001	0.184	0.16	53.66	21.43	7.389	53.33	± 3.77
0.0002	0.129	0.17	71.44	13.95	7.555	54.51	± 3.96
0.0003	0.024	0.11	71.04	5.82	8.205	59.13	± 8.12

Includes 77.3% of the 39Ar steps 4 through 8

Probability = 0.54


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 53.8 ± 1.8 Ma
(2σ, including J-error of .2%)
MSWD = 0.53, probability=0.72
Includes 77.3% of the 39Ar


data-point error ellipses are 2σ
Age = 54.6 ± 5.7 Ma
Initial 40Ar/36Ar =297 ± 36
MSWD = 2.2
0.004
0.003
0.002
0.001
0.000
0.00
0.02
0.04
0.06
0.08
0.10
0.12
36Ar/40Ar
39Ar/40Ar

CV-43 biotite

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	21.78	0.55	0.0578	0.0075	0.05	0.001	0.00265
2.70	9.19	0.18	0.0084	0.0006	0.11	0.002	0.00092
3.10	7.18	0.10	0.0019	0.0002	0.14	0.002	0.00026
3.50	6.85	0.10	0.0012	0.0002	0.15	0.002	0.00018
4.00	6.79	0.11	0.0005	0.0001	0.15	0.002	0.00007
4.50	6.75	0.11	0.0006	0.0001	0.15	0.002	0.00008
5.30	6.88	0.11	0.0009	0.0001	0.15	0.002	0.00013
6.10	7.39	0.12	0.0032	0.0008	0.14	0.002	0.00042
7.50	8.48	0.32	0.0010	0.0046	0.12	0.004	0.00009

J = 0.00396090 ± 0.00000594 Volume 39ArK = 0.624 x E-13 cm3 NPT

Integrated Date = 47.17 ± 0.35 Ma

Plateau age = 47.16 ± 0.36 Ma (2s, including J-error of .2%) MSWD = 0.95, probability=0.46

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 8 points

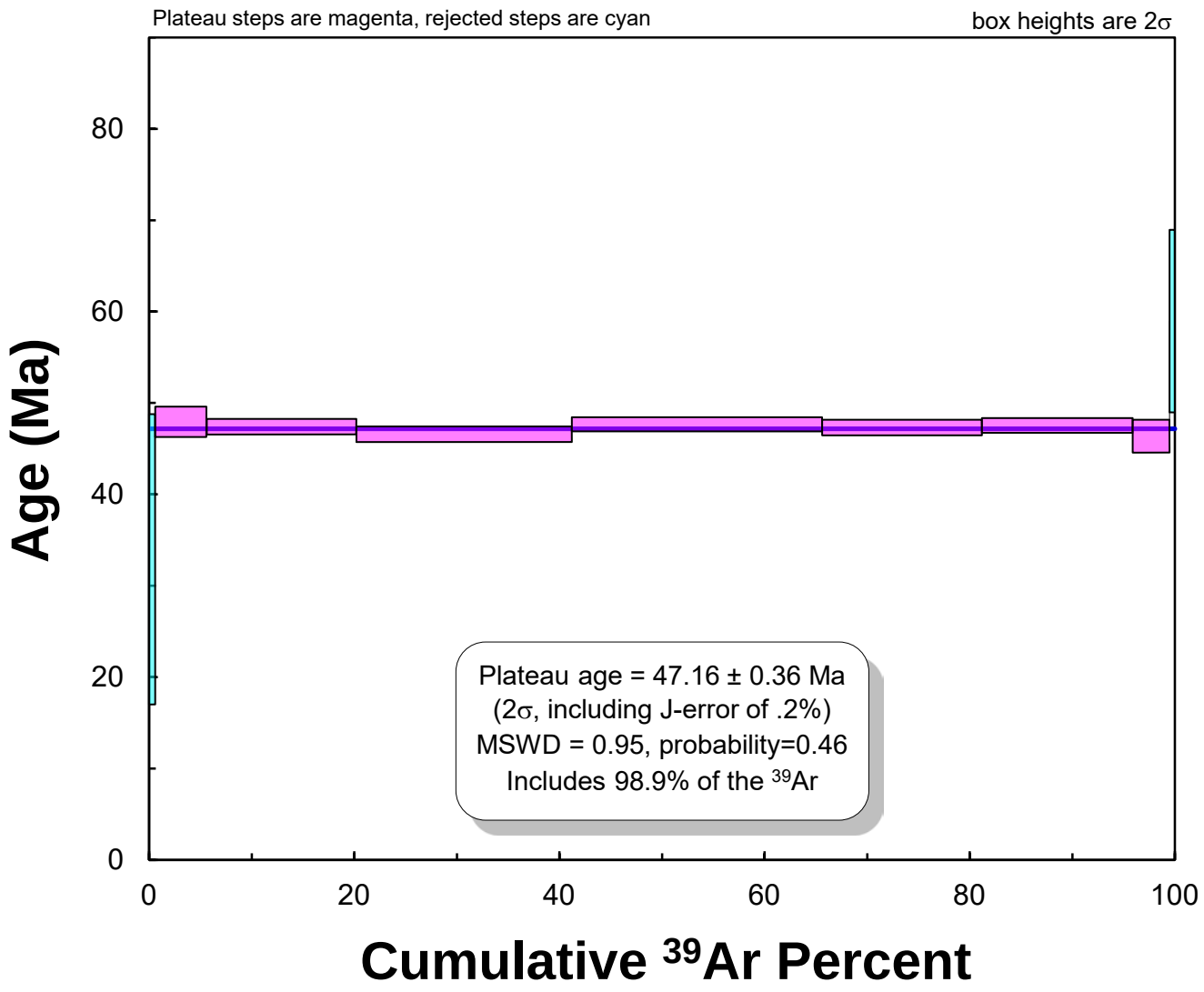
Age = 46.57 ± 0.41 Ma Initial 40Ar/36Ar =290 ± 23 MSWD = 1.4

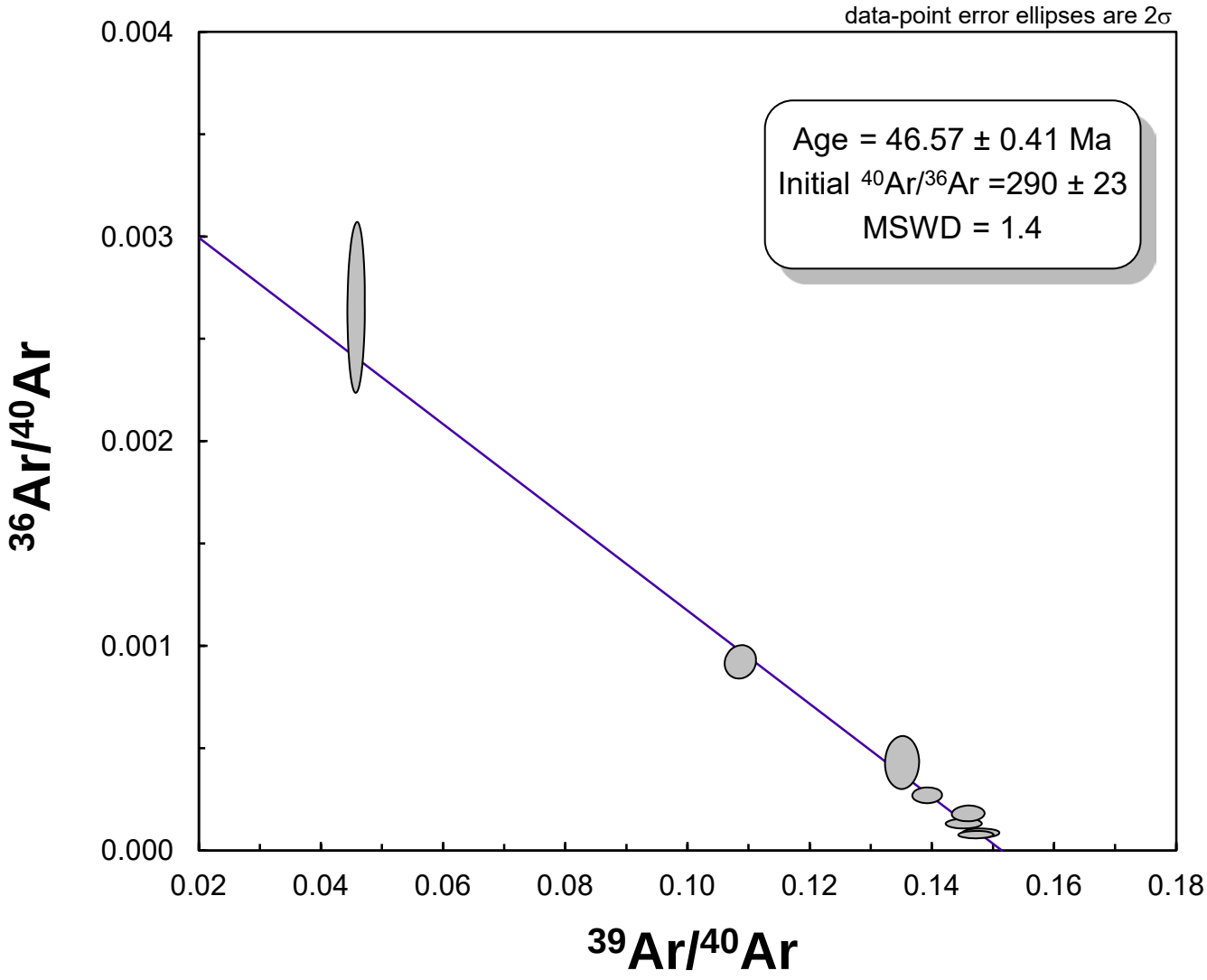
Analysis by Janet Gabites
Pacific Centre for Isotopic and Geochemical Research,
Dept Earth and Ocean Sciences,
The University of British Columbia,
Vancouver, BC., Canada

2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.00034	0.052	3.53	20.93	0.58	4.559	32.76	± 15.86
0.00007	0.102	16.27	72.62	5.00	6.674	47.76	± 1.66
0.00003	0.030	45.05	92.07	14.62	6.608	47.30	± 0.85
0.00003	0.027	30.93	94.69	21.02	6.488	46.45	± 0.83
0.00001	0.017	15.99	97.78	24.36	6.640	47.52	± 0.78
0.00002	0.028	31.64	97.59	15.60	6.590	47.17	± 0.82
0.00002	0.013	11.67	96.16	14.70	6.621	47.39	± 0.83
0.00011	0.027	3.28	87.34	3.60	6.458	46.23	± 1.84
0.00055	0.004	0.90	97.15	0.52	8.243	58.81	± 9.99

Includes 98.9% of the 39Ar steps 2 through 8

Probability = 0.28


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
0
20
40
60
80
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 47.16 ± 0.36 Ma
(2σ, including J-error of .2%)
MSWD = 0.95, probability=0.46
Includes 98.9% of the 39Ar


data-point error ellipses are 2σ
Age = 46.57 ± 0.41 Ma
Initial 40Ar/36Ar =290 ± 23
MSWD = 1.4
0.004
0.003
0.002
0.001
0.000
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0.18
36Ar/40Ar
39Ar/40Ar

CV-113 feldspar

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	400.53	6.19	1.13	0.05	0.00	0.000	0.00283
2.60	120.84	1.96	0.3065	0.0137	0.01	0.000	0.00253
2.90	20.23	0.27	0.0323	0.0014	0.05	0.001	0.00159
3.20	9.90	0.12	0.0065	0.0003	0.10	0.001	0.00066
3.50	8.00	0.11	0.0032	0.0001	0.13	0.002	0.00039
3.80	7.58	0.11	0.0018	0.0001	0.13	0.002	0.00023
4.10	7.74	0.10	0.0020	0.0001	0.13	0.002	0.00026
4.30	7.94	0.10	0.0027	0.0001	0.13	0.002	0.00035
4.50	7.79	0.11	0.0024	0.0001	0.13	0.002	0.00030
4.70	7.92	0.10	0.0027	0.0001	0.13	0.002	0.00034
4.90	8.61	0.12	0.0028	0.0001	0.12	0.002	0.00033
5.00	8.53	0.11	0.0022	0.0001	0.12	0.001	0.00026
5.10	8.31	0.13	0.0019	0.0001	0.12	0.002	0.00022
5.20	7.66	0.10	0.0016	0.0001	0.13	0.002	0.00021
5.30	7.44	0.10	0.0014	0.0001	0.13	0.002	0.00018
5.50	7.47	0.10	0.0013	0.0001	0.13	0.002	0.00018
5.80	7.41	0.10	0.0011	0.0001	0.14	0.002	0.00015
6.20	7.39	0.09	0.0014	0.0001	0.14	0.002	0.00019
6.60	7.51	0.10	0.0013	0.0001	0.13	0.002	0.00018
7.20	7.31	0.10	0.0011	0.0001	0.14	0.002	0.00015
7.80	8.08	0.10	0.0012	0.0001	0.12	0.002	0.00015

J = 0.00394080 ± 0.00000591 Volume 39ArK = 6.061 x E-13 cm3 NPT

Integrated Date = 51.51 ± 0.17 Ma

Plateau age = 50.48 ± 0.31 Ma (2s, including J-error of .2%) MSWD = 0.41, probability=0.84

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 13 points

Age = 49.10 ± 0.56 Ma Initial 40Ar/36Ar =337 ± 42 MSWD = 1.3

Inverse isochron (correlation age) results, older steps: Model 1 Solution (±95%-conf.) on 8 points

Age = 53.44 ± 0.95 Ma Initial 40Ar/36Ar =366 ± 21 MSWD = 3.6

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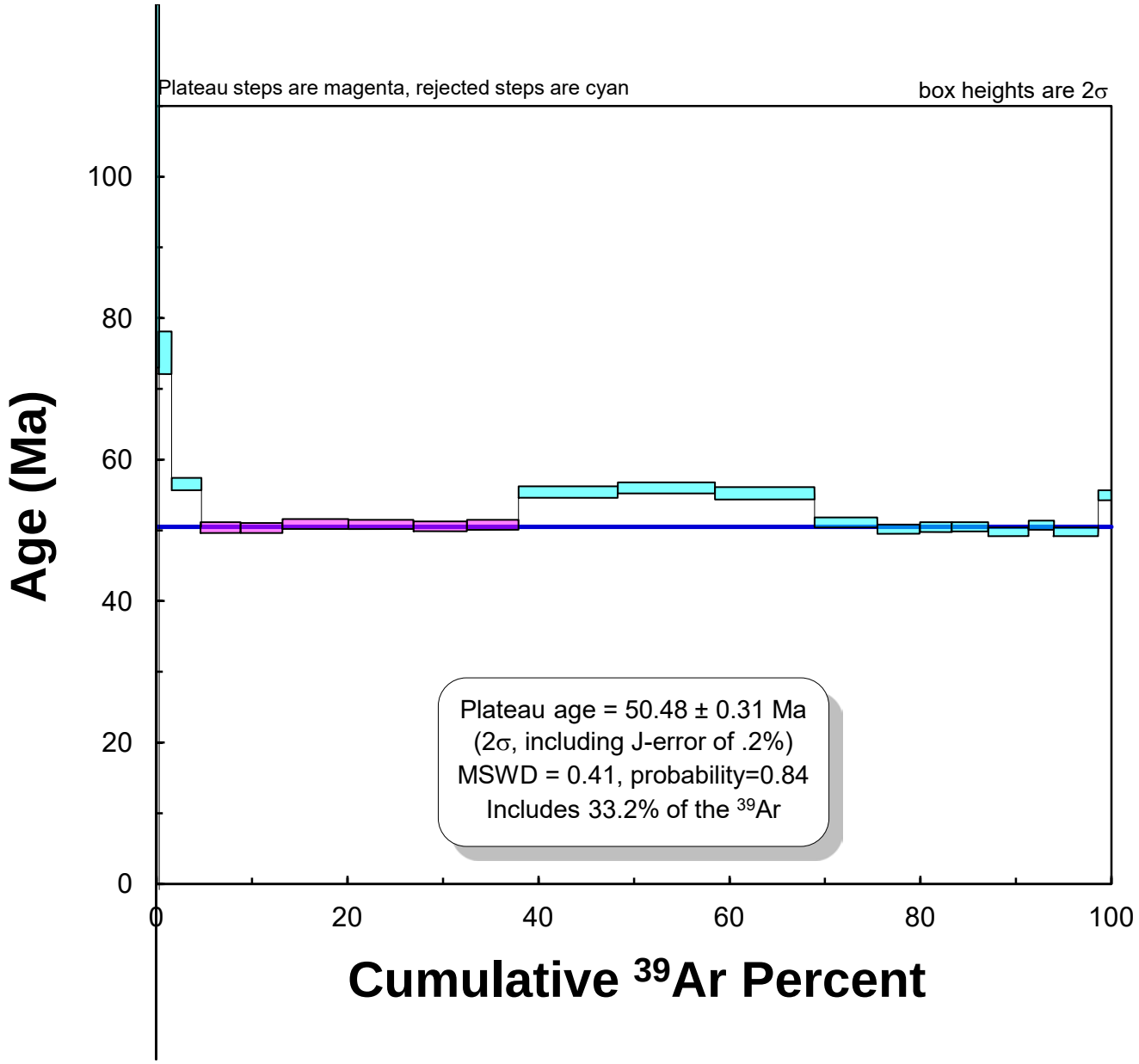
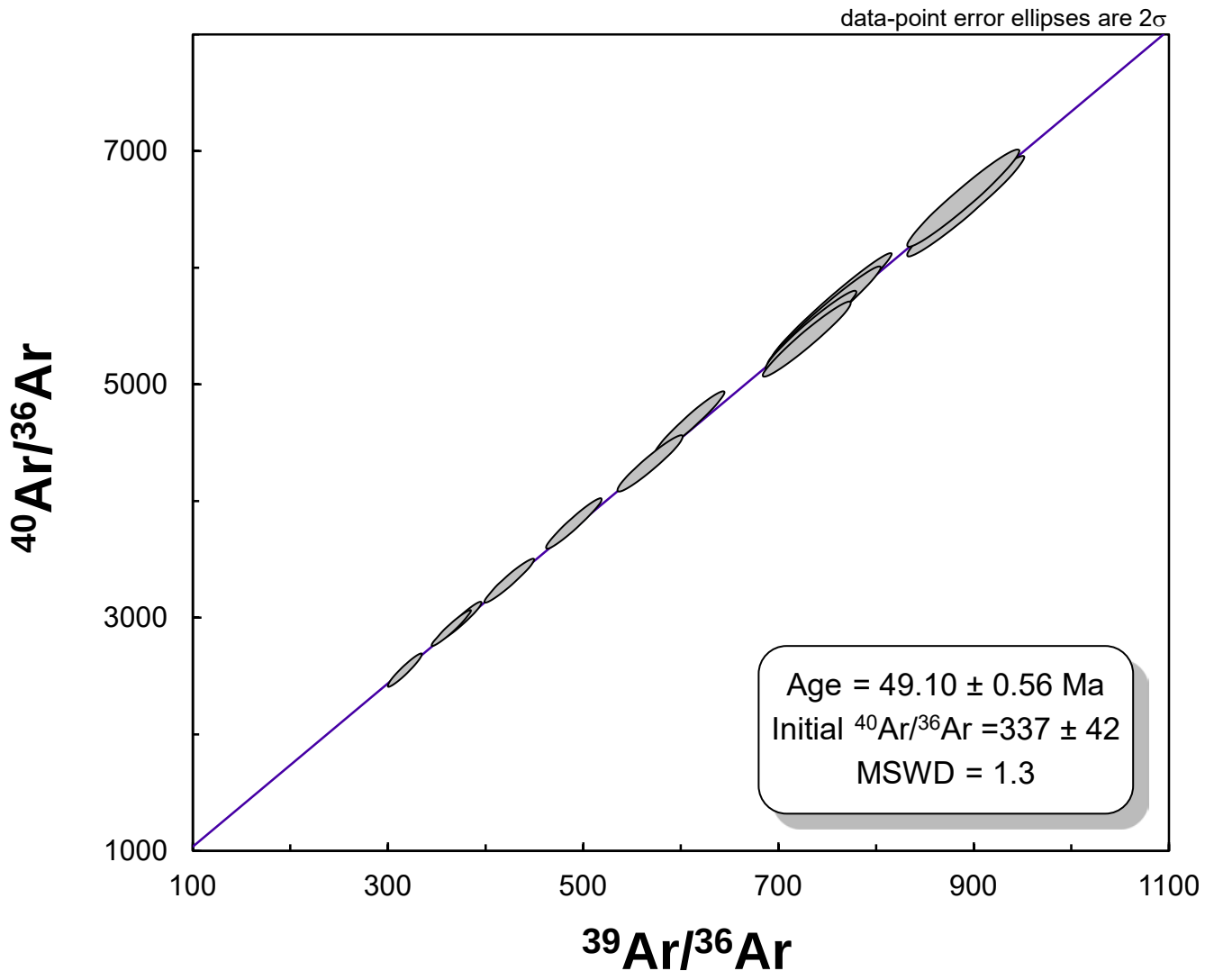
2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.00012	0.060	4.04	15.55	0.10	62.296	401.85	± 84.06
0.00011	0.092	9.61	24.36	0.28	29.439	200.92	± 25.91
0.00007	0.046	32.14	52.39	1.35	10.601	74.92	± 3.08
0.00003	0.009	51.46	80.26	3.05	7.942	56.42	± 0.92
0.00002	0.080	48.87	88.19	4.10	7.058	50.22	± 0.79
0.00001	0.010	37.41	93.01	4.41	7.052	50.18	± 0.73
0.00001	0.046	45.02	92.07	6.89	7.127	50.70	± 0.70
0.00002	0.017	44.29	89.64	6.85	7.121	50.66	± 0.68
0.00001	0.030	48.31	90.91	5.58	7.083	50.39	± 0.74
0.00001	0.009	65.73	89.88	5.36	7.115	50.62	± 0.70
0.00001	0.070	69.55	90.20	10.42	7.765	55.17	± 0.83
0.00001	0.029	33.22	92.10	10.17	7.860	55.84	± 0.74
0.00001	0.110	34.56	93.25	10.44	7.749	55.06	± 0.87
0.00001	0.025	41.32	93.54	6.59	7.162	50.95	± 0.67
0.00001	0.017	39.76	94.46	4.42	7.030	50.02	± 0.66
0.00001	0.007	44.17	94.59	3.36	7.067	50.28	± 0.70
0.00001	0.027	114.04	95.40	3.83	7.072	50.31	± 0.68
0.00001	0.007	40.71	94.39	4.18	6.973	49.63	± 0.64
0.00001	0.013	56.45	94.67	2.68	7.108	50.57	± 0.67
0.00001	0.009	69.45	95.35	4.65	6.972	49.61	± 0.65
0.00001	0.009	185.26	95.48	1.30	7.717	54.83	± 0.73

Includes 62.9% of the 39Ar steps 5 through 10, 14 through 20

Probability = 0.22

Probability = 0.001


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 50.48 ± 0.31 Ma
(2σ, including J-error of .2%)
MSWD = 0.41, probability=0.84
Includes 33.2% of the 39Ar


data-point error ellipses are 2σ
7000
5000
3000
1000
100
300
500
700
900
1100
40Ar/36Ar
39Ar/36Ar
Age = 49.10 ± 0.56 Ma
Initial 40Ar/36Ar =337 ± 42
MSWD = 1.3

CV-159 biotite

Laser	*Isotope Ratios*						
Power(%)	*40Ar/39Ar*	*2σ*	*36Ar/39Ar*	*2σ*	*39Ar/40Ar*	*2σ*	*36Ar/40Ar*
2.30	67.23	2.10	0.50	0.05	0.01	0.000	0.00743
2.70	16.79	0.26	0.0430	0.0027	0.06	0.001	0.00255
3.10	12.01	0.21	0.0168	0.0010	0.08	0.001	0.00139
3.50	10.45	0.15	0.0106	0.0007	0.10	0.001	0.00101
4.00	9.19	0.14	0.0075	0.0004	0.11	0.002	0.00081
4.50	8.38	0.13	0.0048	0.0003	0.12	0.002	0.00057
5.00	8.47	0.14	0.0048	0.0002	0.12	0.002	0.00056
5.50	8.07	0.11	0.0032	0.0002	0.12	0.002	0.00039
6.00	8.01	0.11	0.0025	0.0001	0.12	0.002	0.00031
6.50	8.02	0.13	0.0027	0.0001	0.12	0.002	0.00034
8.60	7.76	0.12	0.0017	0.0001	0.13	0.002	0.00021
9.60	7.87	0.11	0.0025	0.0001	0.13	0.002	0.00031
10.60	7.57	0.10	0.0018	0.0001	0.13	0.002	0.00024

J = 0.00406140 ± 0.00000609 Volume 39ArK = 1.022 x E-13 cm3 NPT

Integrated Date = 52.20 ± 0.28 Ma

Plateau age = 52.77 ± 0.38 Ma (2s, including J-error of .2%) MSWD = 1.2, probability=0.30

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 11 points

Age = 52.3 ± 1.2 Ma Initial 40Ar/36Ar =266 ± 33 MSWD = 6.5

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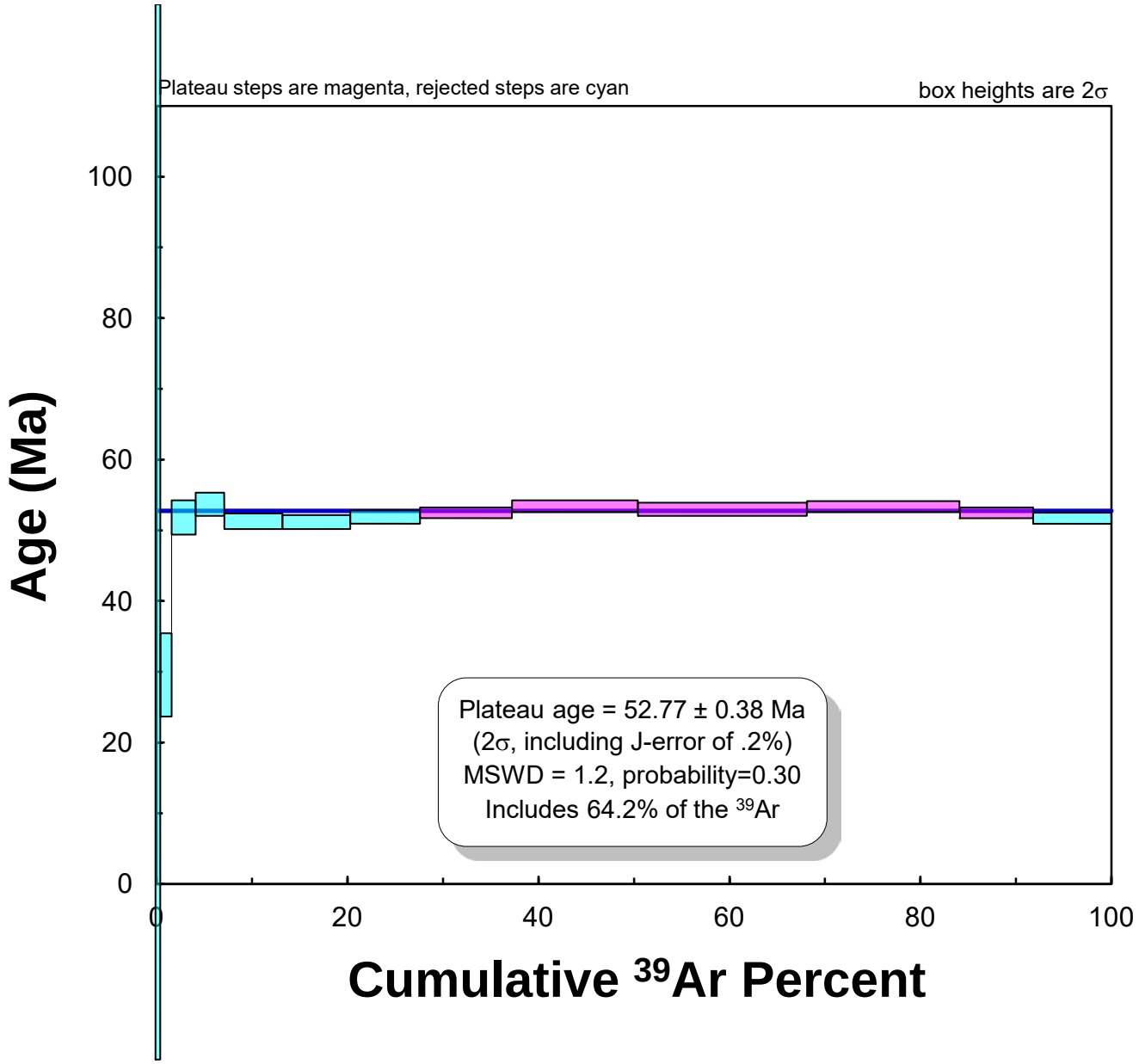
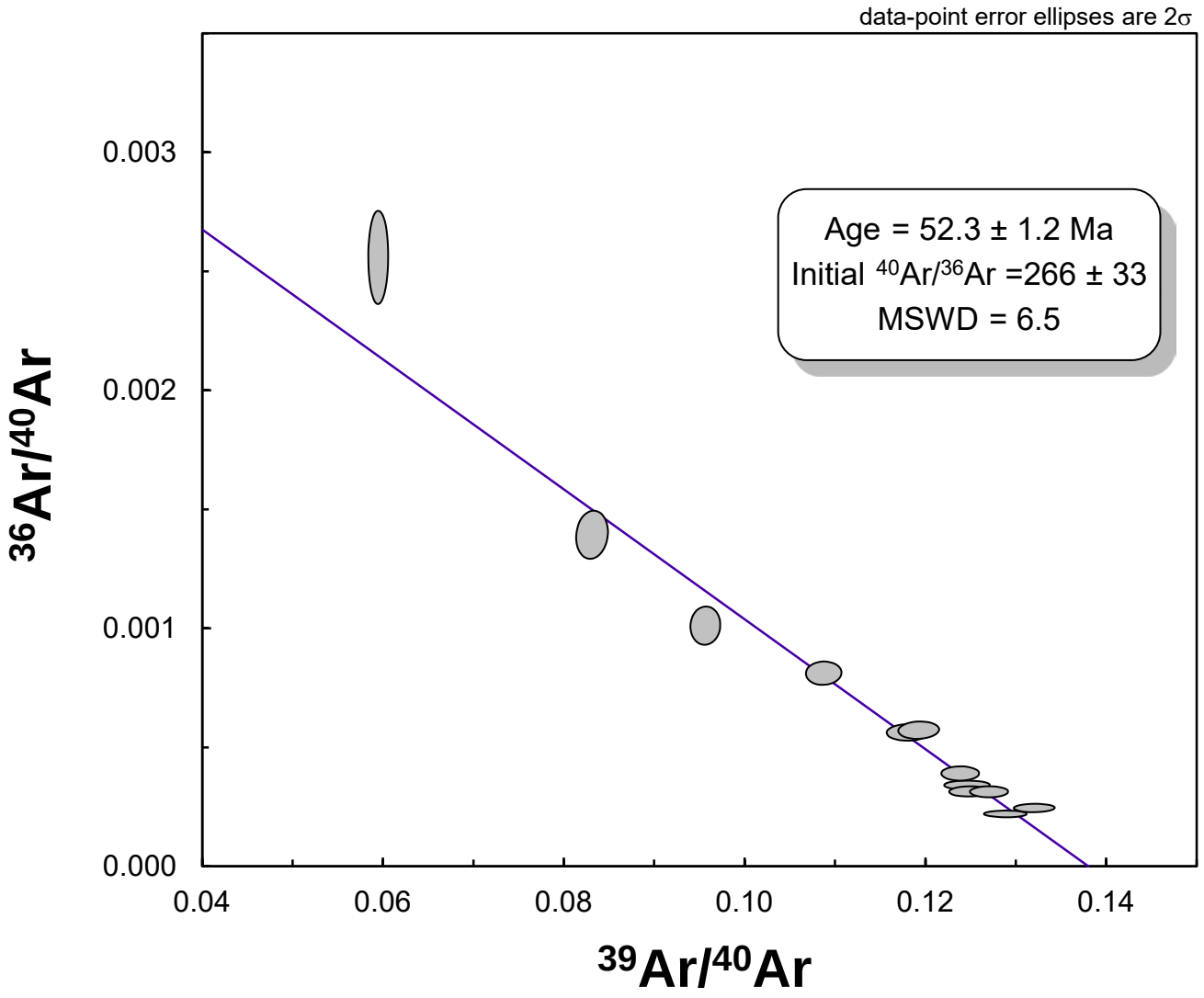
2σ	Rho	K/Ca	%40Ar rad	f 39Ar	40Ar*/39ArK	Age	2 σ
0.00072	0.247	1.26	-121.83	0.51	81.936	-740.70	± 155.62
0.00016	0.021	2.35	23.75	1.20	3.989	29.42	± 5.87
0.00008	0.108	1.55	58.58	2.46	7.040	51.60	± 2.41
0.00007	0.040	3.50	69.94	3.01	7.307	53.53	± 1.68
0.00004	0.044	12.76	75.85	6.16	6.970	51.10	± 1.12
0.00003	0.092	18.68	83.03	7.01	6.957	51.00	± 0.99
0.00003	0.044	19.53	83.30	7.30	7.053	51.70	± 0.99
0.00002	0.016	15.88	88.44	9.62	7.139	52.32	± 0.81
0.00002	0.024	30.67	90.70	13.26	7.263	53.22	± 0.81
0.00002	0.022	27.10	89.89	17.63	7.212	52.84	± 0.92
0.00001	0.013	32.81	93.54	16.05	7.259	53.18	± 0.81
0.00002	0.038	34.70	90.72	7.67	7.140	52.33	± 0.77
0.00001	0.051	138.29	92.79	8.13	7.026	51.50	± 0.74

Includes 64.2% of the 39Ar steps 8 through 12

Probability = 0.03


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 52.77 ± 0.38 Ma
(2σ, including J-error of .2%)
MSWD = 1.2, probability=0.30
Includes 64.2% of the 39Ar


data-point error ellipses are 2σ
Age = 52.3 ± 1.2 Ma
Initial 40Ar/36Ar =266 ± 33
MSWD = 6.5
0.003
0.002
0.001
0.000
0.04
0.06
0.08
0.10
0.12
0.14
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-193 hornblende			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	6122.36	370.92	6.54	0.49	22.095	1.499	12.03
2.60	920.35	62.22	2.87	0.32	3.136	0.287	5.26
2.90	398.79	11.12	4.19	0.16	1.330	0.055	7.69
3.20	40.06	0.37	5.90	0.12	0.115	0.003	10.85
3.50	13.83	0.11	4.75	0.10	0.026	0.001	8.72
3.80	7.77	0.08	4.65	0.18	0.005	0.000	8.54
4.20	7.42	0.06	4.33	0.09	0.005	0.001	7.96
5.60	8.65	0.20	4.90	0.21	0.011	0.003	9.00

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	8.882	0.042	4.729	0.049	0.0078	0.0003	

J = 0.0044177 ± 0.0000221 Volume 39ArK = 0.075 Integrated Date = 52.80 ± 1.50

Plateau age = 52.8 ± 1.6 Ma (2s, including J-error of 1%) MSWD = 0.62, probability=0.71

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 7 points Age = 53.0 ± 1.

Initial 40Ar/36Ar =290.2 ± 8.9 MSWD = 1.11 Probability = 0.36

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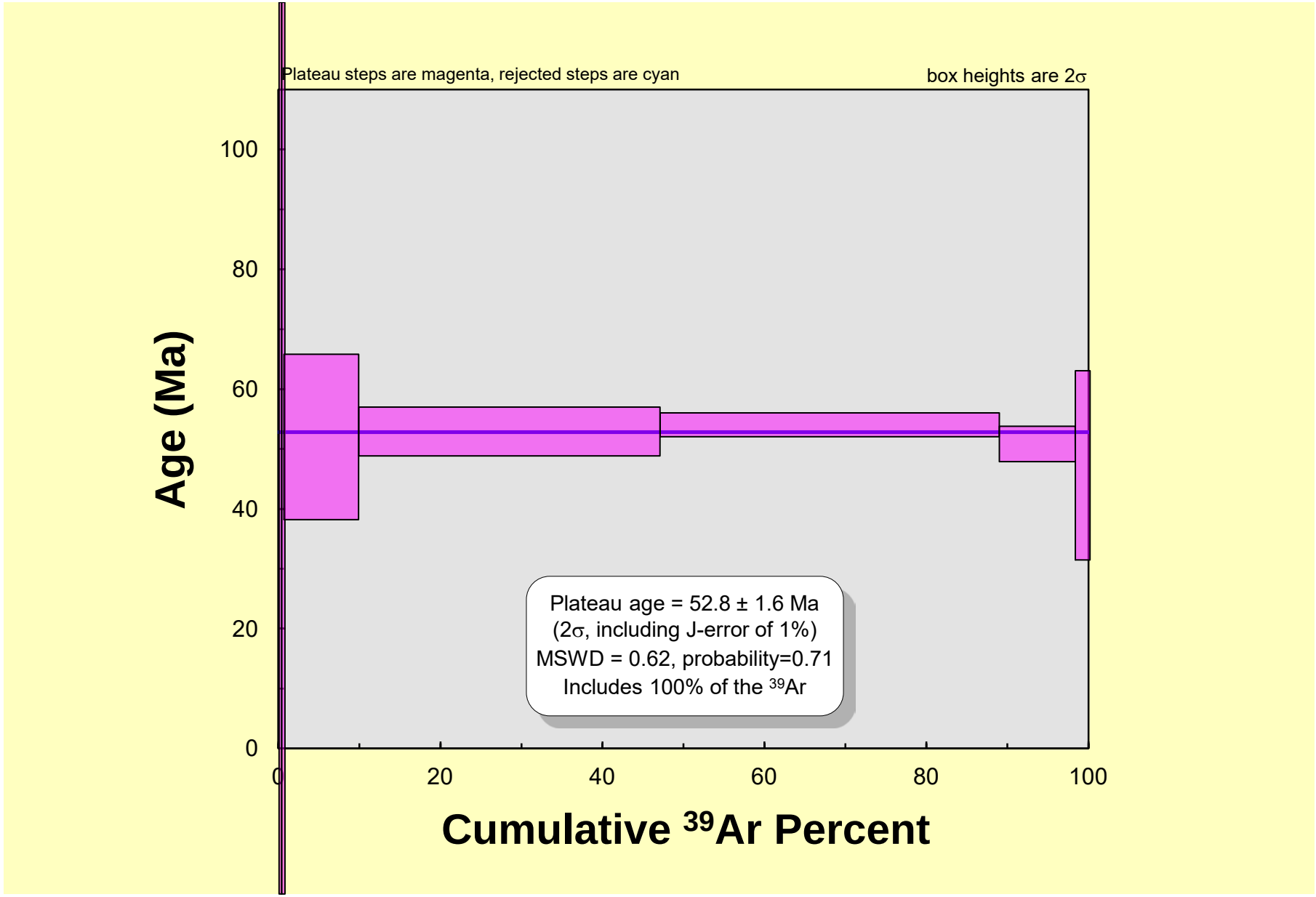
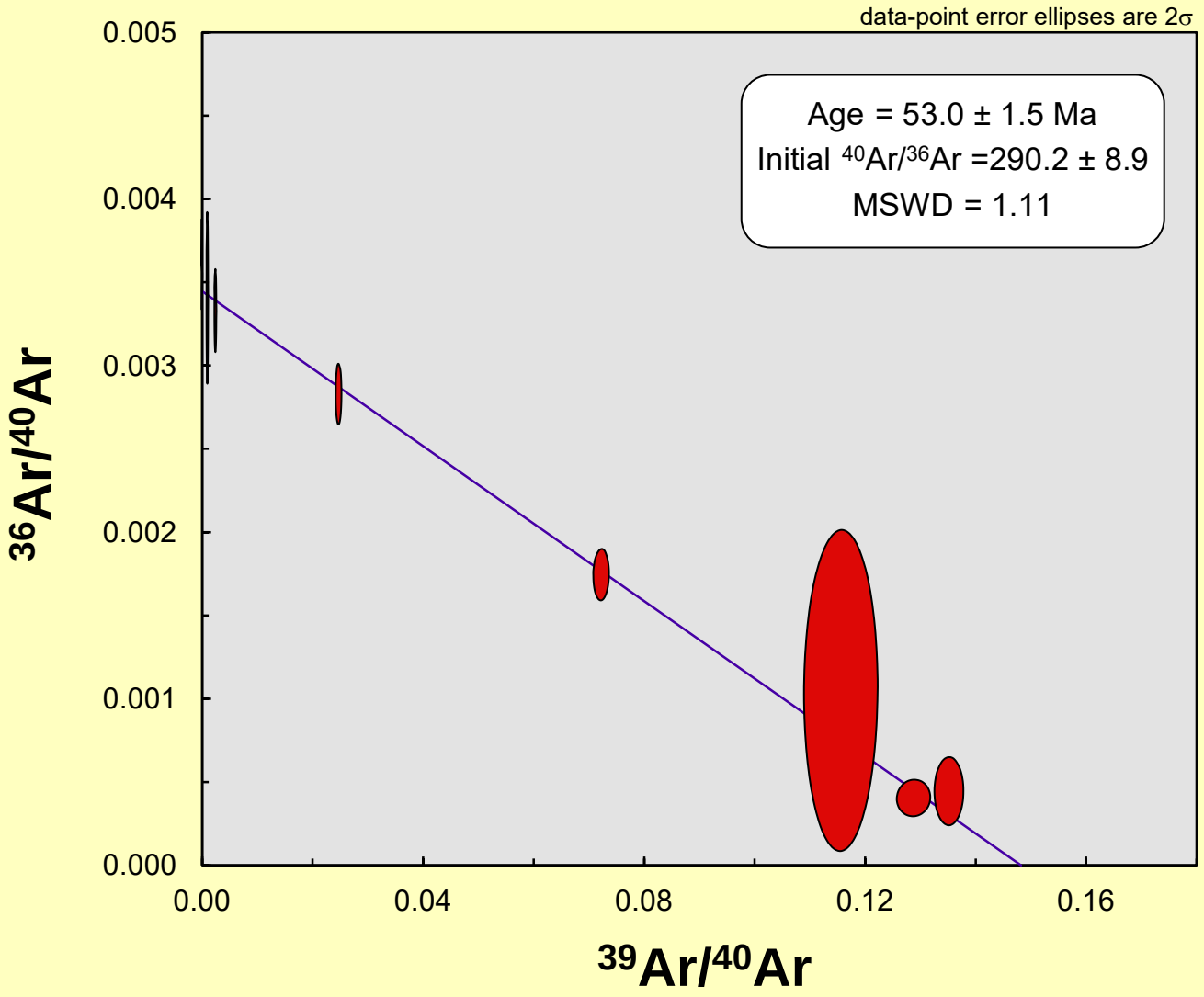
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
106.64	0.17	408.141	0.00	± 4049.58
100.66	0.16	6.102	-49.42	± 940.18
98.43	0.34	6.276	49.45	± 189.31
83.66	9.12	6.574	51.77	± 13.82
51.70	37.15	6.700	52.75	± 4.12
12.32	41.87	6.839	53.82	± 1.95
13.53	9.34	6.435	50.69	± 2.97
31.33	1.84	5.960	47.00	± 15.86

%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	6.706	0.097

Ma
Includes 100% of the 39Ar steps 2 through 8
.5 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 52.8 ± 1.6 Ma
(2σ, including J-error of 1%)
MSWD = 0.62, probability=0.71
Includes 100% of the 39Ar


data-point error ellipses are 2σ
Age = 53.0 ± 1.5 Ma
Initial 40Ar/36Ar =290.2 ± 8.9
MSWD = 1.11
0.005
0.004
0.003
0.002
0.001
0.000
36Ar/40Ar
0.00
0.04
0.08
0.12
0.16
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-213 biotite			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	37.42	0.29	0.07	0.01	0.125	0.004	0.14
2.60	8.99	0.05	0.03	0.00	0.011	0.000	0.06
2.90	7.31	0.04	0.00	0.00	0.002	0.000	0.01
3.20	7.06	0.04	0.01	0.00	0.001	0.000	0.01
3.50	6.85	0.04	0.01	0.00	0.001	0.000	0.02
3.80	6.77	0.05	0.01	0.00	0.001	0.000	0.02
3.90	7.18	0.05	0.01	0.00	0.002	0.000	0.02
4.10	6.97	0.05	0.02	0.00	0.001	0.000	0.03
4.50	6.94	0.04	0.02	0.00	0.001	0.000	0.03
5.00	7.21	0.07	0.06	0.00	0.002	0.000	0.11
5.50	9.01	0.07	0.04	0.01	0.008	0.001	0.07

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	7.350	0.015	0.011	0.000	0.0009	0.0000	

J = 0.0042775 ± 0.0000214 Volume 39ArK = 0.433 Integrated Date = 50.43 ± 0.28

Plateau age = 50.63 ± 0.58 Ma (2s, including J-error of 1%) MSWD = 0.73, probability=0.67

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 11 points Age = 50.98 ± (

Initial 40Ar/36Ar =240 ± 19 MSWD = 2.5 Probability = 0.01

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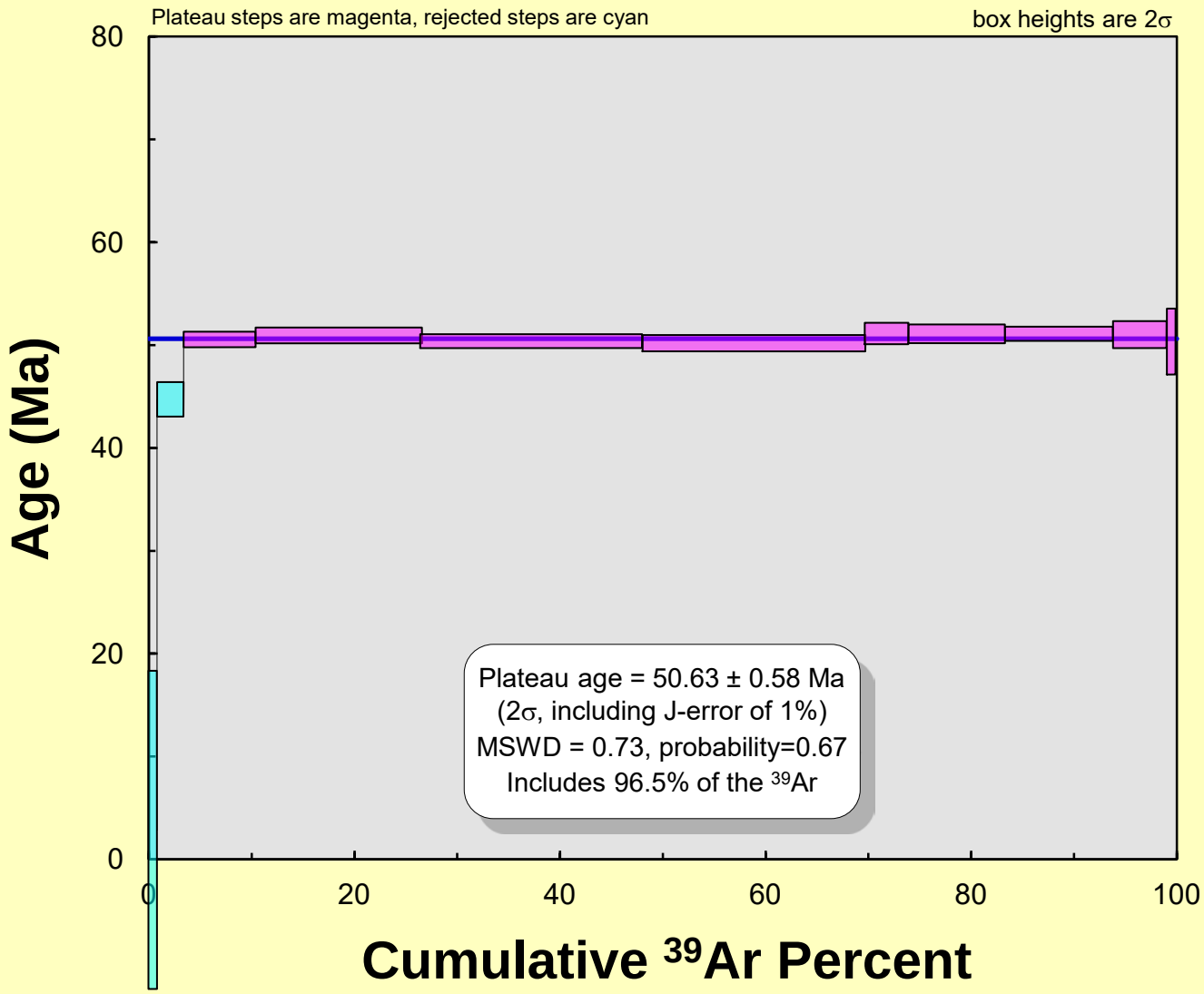
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
99.12	0.80	0.330	2.55	± 15.59
35.08	2.73	5.840	44.62	± 1.65
9.56	6.90	6.613	50.44	± 0.75
5.64	16.10	6.662	50.81	± 0.75
3.85	21.53	6.591	50.28	± 0.69
3.12	21.65	6.562	50.06	± 0.82
6.84	4.24	6.685	50.98	± 1.06
4.08	9.41	6.683	50.97	± 0.95
3.61	10.50	6.685	50.98	± 0.67
7.42	5.18	6.674	50.90	± 1.32
26.93	0.95	6.581	50.20	± 3.18

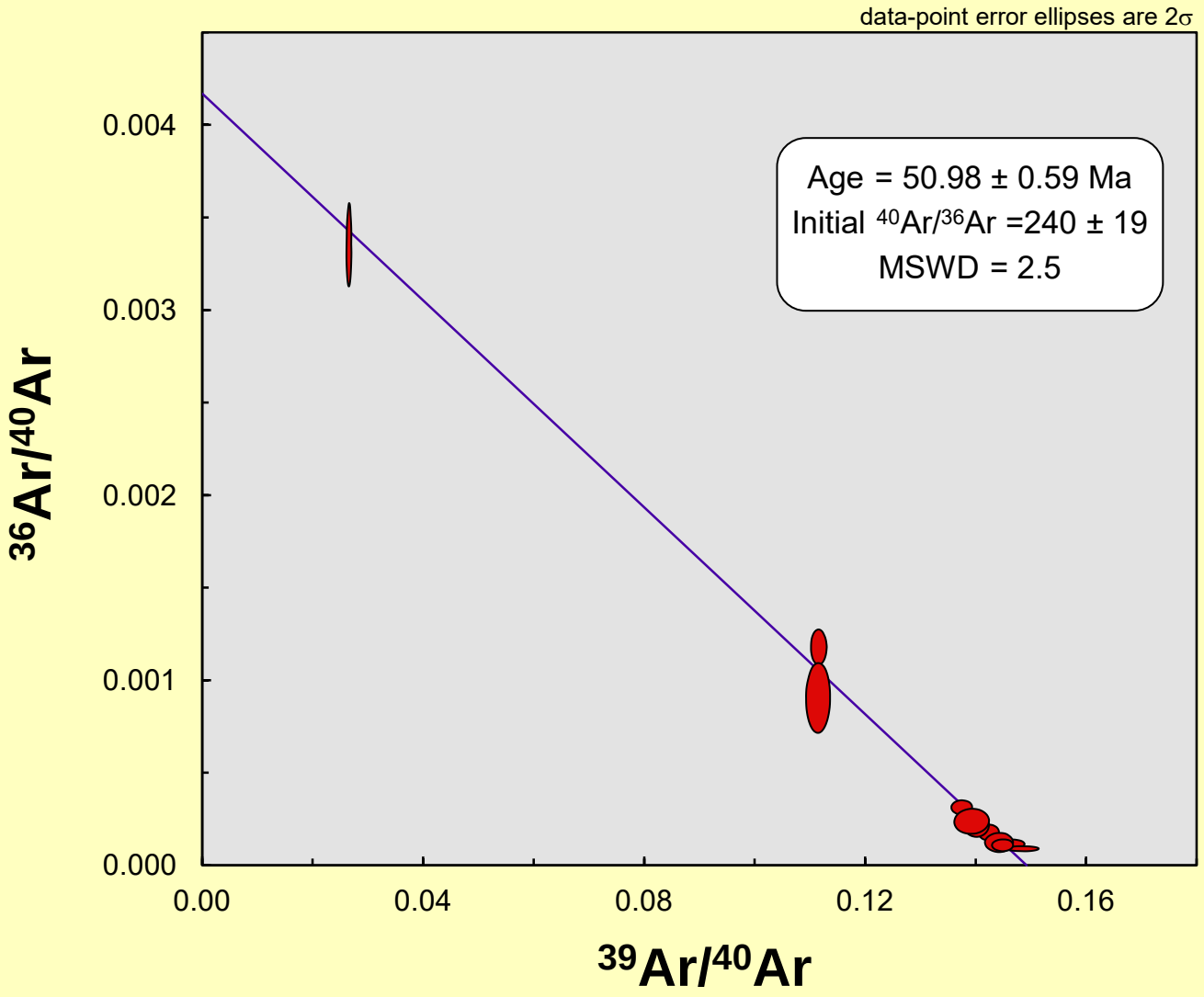
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	6.612	0.019

Ma

Includes 96.5% of the 39Ar steps 3 through 11

0.59 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 50.63 ± 0.58 Ma
(2σ, including J-error of 1%)
MSWD = 0.73, probability=0.67
Includes 96.5% of the 39Ar


data-point error ellipses are 2σ
Age = 50.98 ± 0.59 Ma
Initial 40Ar/36Ar =240 ± 19
MSWD = 2.5
0.004
0.003
0.002
0.001
0.000
0.00
0.04
0.08
0.12
0.16
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-227 biotite			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	49.39	0.56	0.19	0.01	0.140	0.006	0.35
2.60	14.24	0.10	0.09	0.00	0.017	0.001	0.16
2.90	8.02	0.05	0.04	0.00	0.003	0.000	0.07
3.20	7.22	0.04	0.03	0.00	0.001	0.000	0.05
3.50	7.02	0.05	0.04	0.00	0.001	0.000	0.07
3.80	6.91	0.04	0.08	0.00	0.001	0.000	0.15
4.10	7.09	0.04	0.02	0.00	0.001	0.000	0.04
4.50	7.22	0.04	0.04	0.00	0.002	0.000	0.08

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	7.438	0.018	0.032	0.000	0.0010	0.0000	

J = 0.0042902 ± 0.0000215 Volume 39ArK = 0.299 Integrated Date = 51.79 ± 0.33

Plateau age = 51.50 ± 0.62 Ma (2s, including J-error of 1%) MSWD = 0.89, probability=0.47

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 10 points Age = 51.1 ± 1.

Initial 40Ar/36Ar =358 ± 75 MSWD = 5.8 Probability = 0.001

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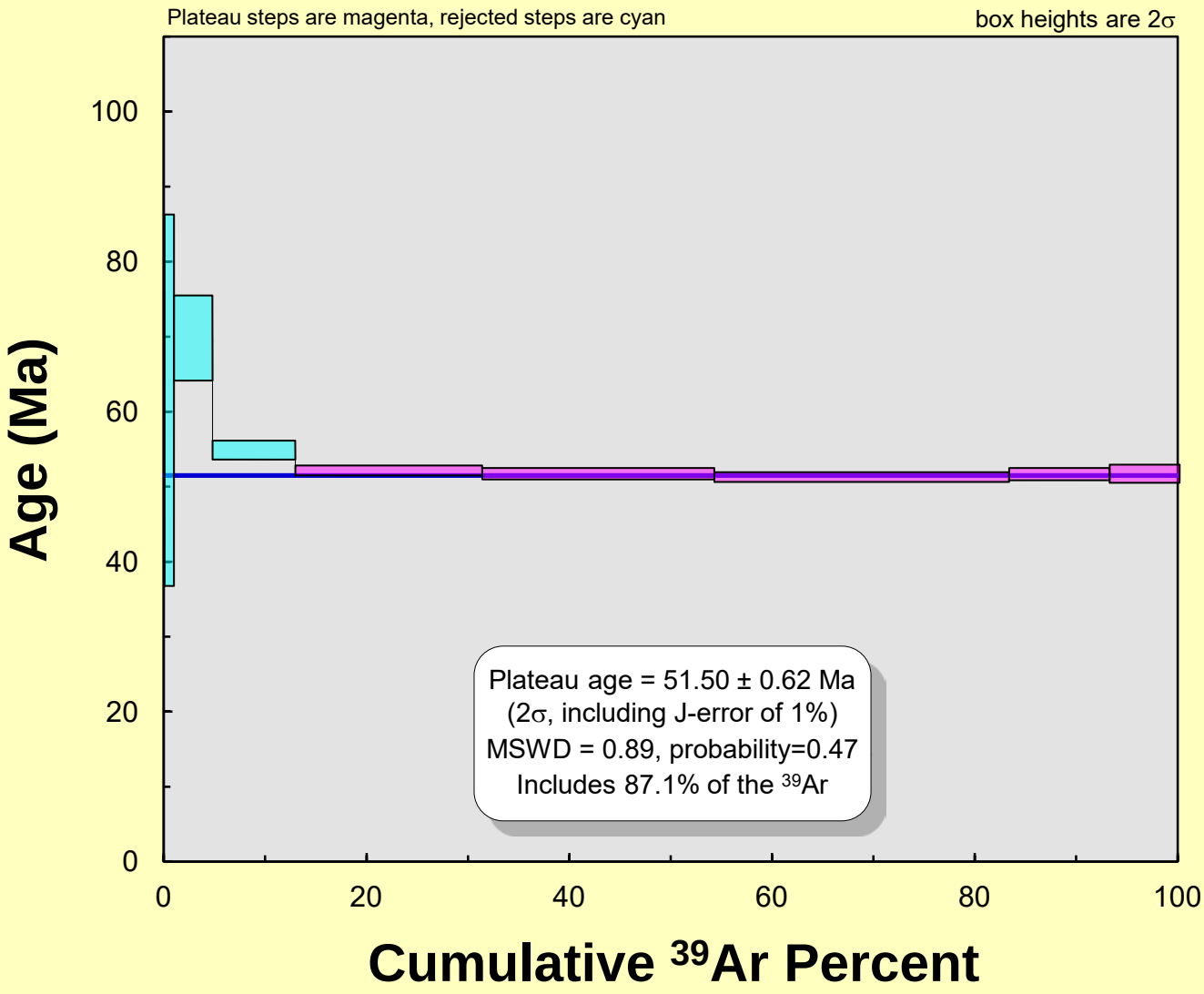
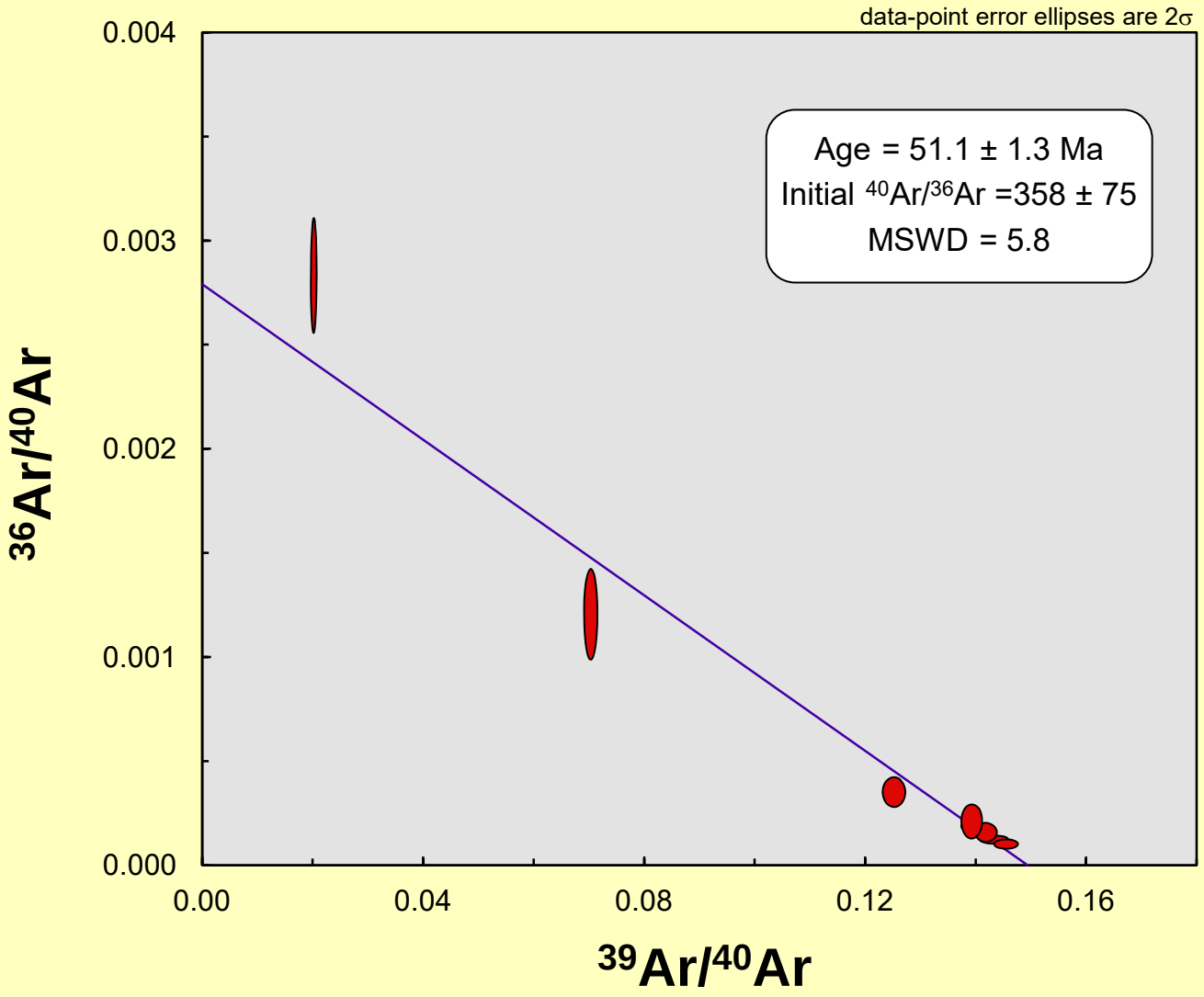
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
83.73	0.94	8.039	61.31	± 24.76
35.76	3.72	9.149	69.62	± 5.68
10.76	8.29	7.155	54.67	± 1.27
5.90	18.26	6.791	51.93	± 0.66
4.08	22.93	6.735	51.51	± 0.79
3.43	29.10	6.673	51.05	± 0.67
5.07	9.80	6.734	51.50	± 0.82
6.61	6.97	6.738	51.54	± 1.23

%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	6.771	0.022

Ma
Includes 87.1% of the 39Ar steps 4 through 8
.3 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 51.50 ± 0.62 Ma
(2σ, including J-error of 1%)
MSWD = 0.89, probability=0.47
Includes 87.1% of the 39Ar


data-point error ellipses are 2σ
Age = 51.1 ± 1.3 Ma
Initial 40Ar/36Ar =358 ± 75
MSWD = 5.8
0.004
0.003
0.002
0.001
0.000
0.00
0.04
0.08
0.12
0.16
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-252 hornblende			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	181.41	1.72	2.16	0.09	0.420	0.011	3.96
2.70	35.12	0.31	0.53	0.02	0.064	0.003	0.97
3.00	24.01	0.15	1.07	0.02	0.016	0.001	1.96
3.30	25.05	0.19	7.73	0.14	0.017	0.000	14.24
3.60	22.90	0.36	8.46	0.20	0.009	0.000	15.59
3.80	23.55	0.18	7.23	0.13	0.011	0.001	13.31
4.10	22.35	0.18	4.13	0.15	0.007	0.001	7.58
5.00	21.98	0.16	1.49	0.03	0.005	0.001	2.73

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	24.239	0.072	0.960	0.012	0.0119	0.0002	

J = 0.0045002 ± 0.0000225 Volume 39ArK = 0.094 Integrated Date = 158.48 ± 1.48

Plateau age = 161.3 ± 2.4 Ma (2s, including J-error of 1%) MSWD = 0.78, probability=0.54

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 7 points Age = 164.2 ±

Initial 40Ar/36Ar =221 ± 65 MSWD = 6.6 Probability = 0.0

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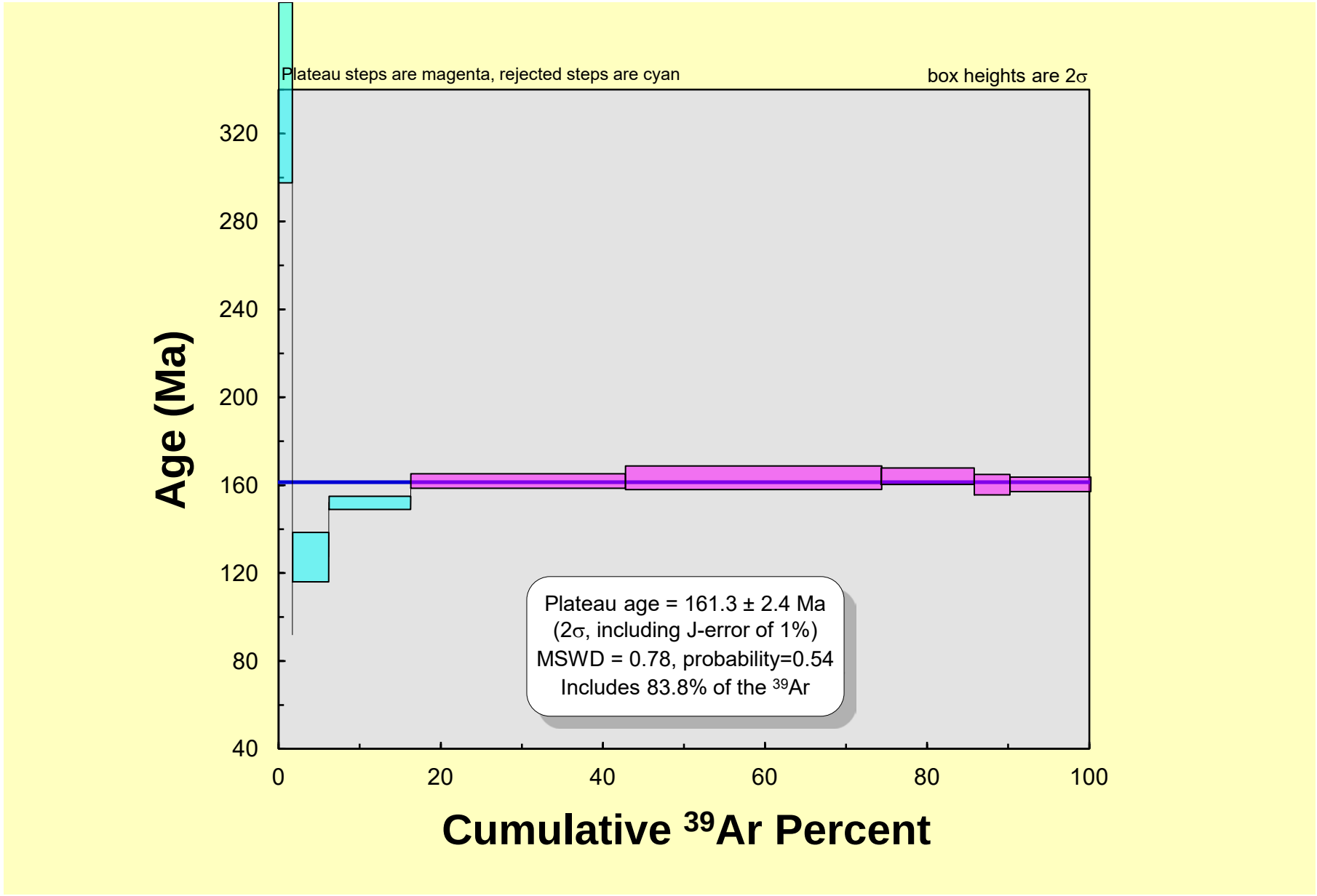
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
68.34	1.55	57.527	416.32	± 41.90
54.20	4.58	16.090	126.42	± 11.43
19.23	10.06	19.407	151.41	± 2.91
17.65	26.44	20.743	161.38	± 3.28
9.13	31.55	20.934	162.80	± 5.26
11.12	11.39	21.042	163.60	± 3.84
8.47	4.45	20.520	159.72	± 4.59
6.76	9.99	20.517	159.70	± 3.44

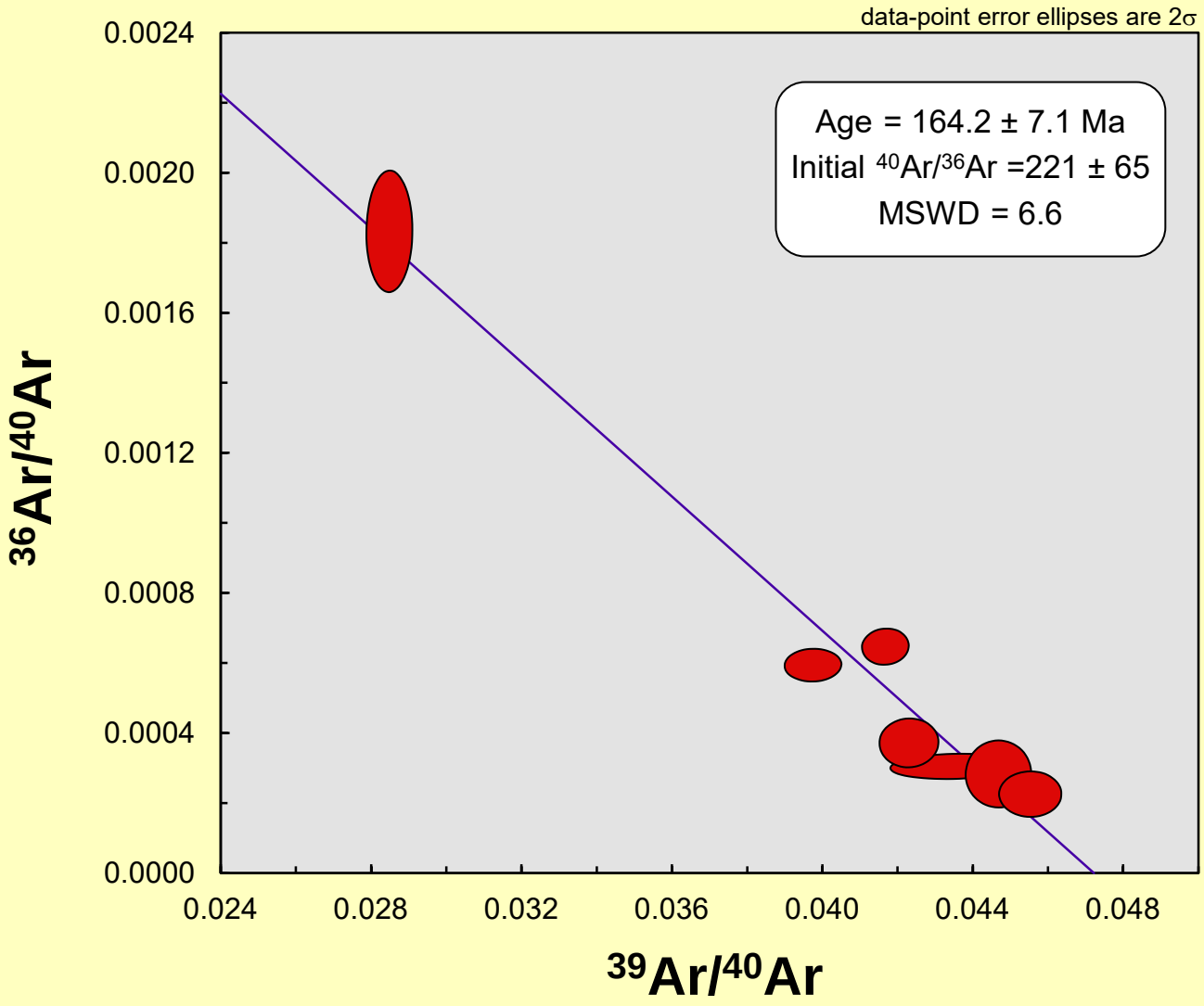
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	20.341	0.099

Ma

Includes 83.8% of the 39Ar steps 4 through 8

7.1 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
320
280
240
200
160
120
80
40
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 161.3 ± 2.4 Ma
(2σ, including J-error of 1%)
MSWD = 0.78, probability=0.54
Includes 83.8% of the 39Ar


data-point error ellipses are 2σ
Age = 164.2 ± 7.1 Ma
Initial 40Ar/36Ar =221 ± 65
MSWD = 6.6
0.0024
0.0020
0.0016
0.0012
0.0008
0.0004
0.0000
36Ar/40Ar
0.024
0.028
0.032
0.036
0.040
0.044
0.048
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-255 hornblende			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	674.28	16.44	2.71	0.14	2.035	0.082	4.97
2.60	112.23	1.19	1.22	0.06	0.275	0.015	2.23
3.00	44.83	0.76	1.30	0.05	0.078	0.006	2.38
3.40	25.54	0.20	7.89	0.15	0.014	0.001	14.53
3.60	23.67	0.14	8.60	0.16	0.008	0.000	15.84
3.80	23.77	0.25	7.86	0.17	0.008	0.001	14.48
4.30	23.67	0.30	9.35	0.23	0.018	0.003	17.24

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	25.084	0.096	2.580	0.035	0.0093	0.0002	

J = 0.0046173 ± 0.0000231 Volume 39ArK = 0.060 Integrated Date = 175.75 ± 1.83

Plateau age = 176.0 ± 2.5 Ma (2s, including J-error of 1%) MSWD = 0.040, probability=0.99

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 7 points Age = 173.9 ± 3

Initial 40Ar/36Ar =320 ± 28 MSWD = 1.7 Probability = 0.13

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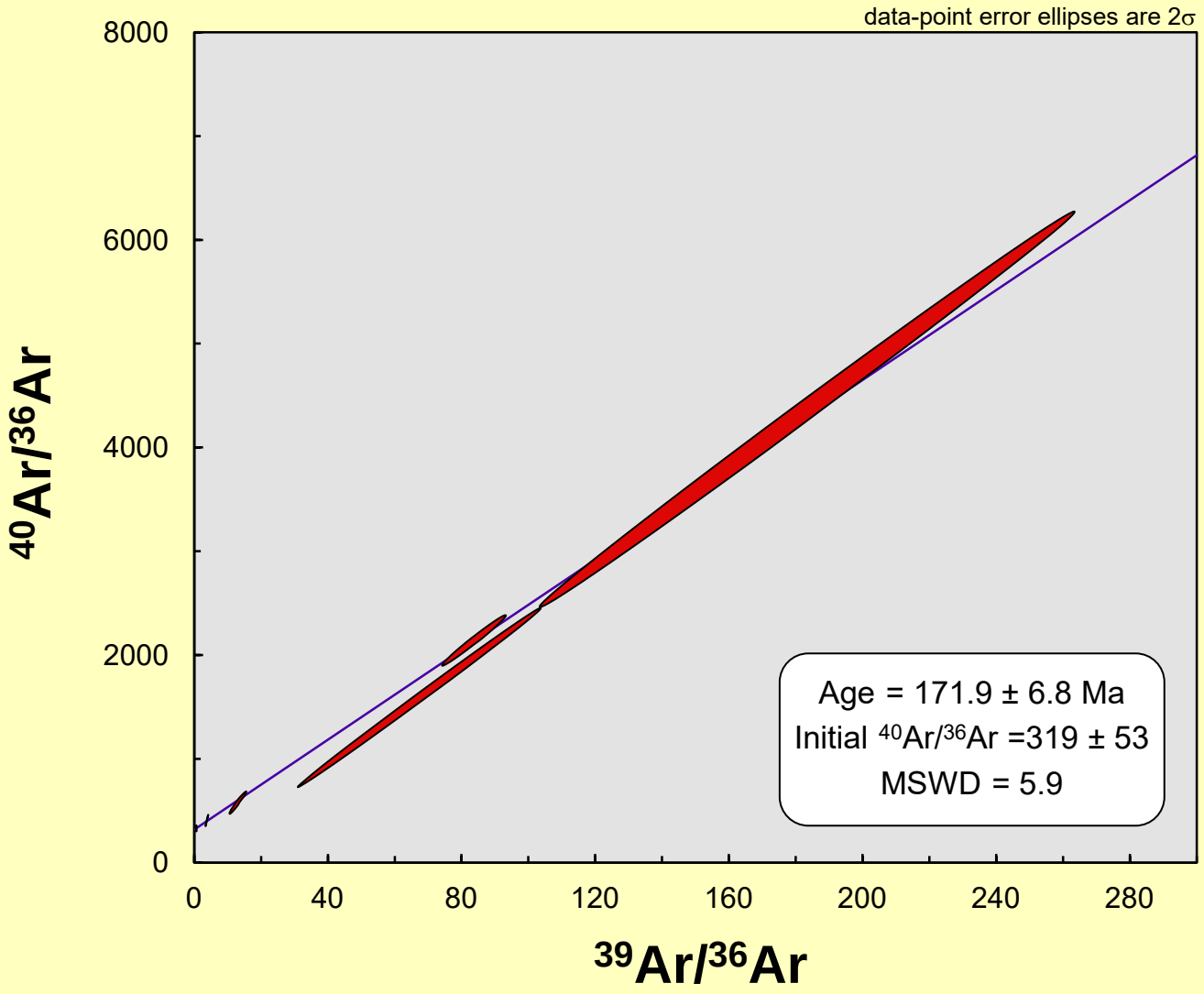
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
89.15	0.51	73.307	527.19	± 243.05
72.38	1.45	31.025	242.09	± 64.15
50.94	2.16	22.013	175.05	± 27.55
13.90	29.64	22.117	175.84	± 3.69
7.11	53.51	22.122	175.87	± 2.31
6.88	9.91	22.254	176.87	± 5.63
18.64	2.82	19.386	155.03	± 15.47

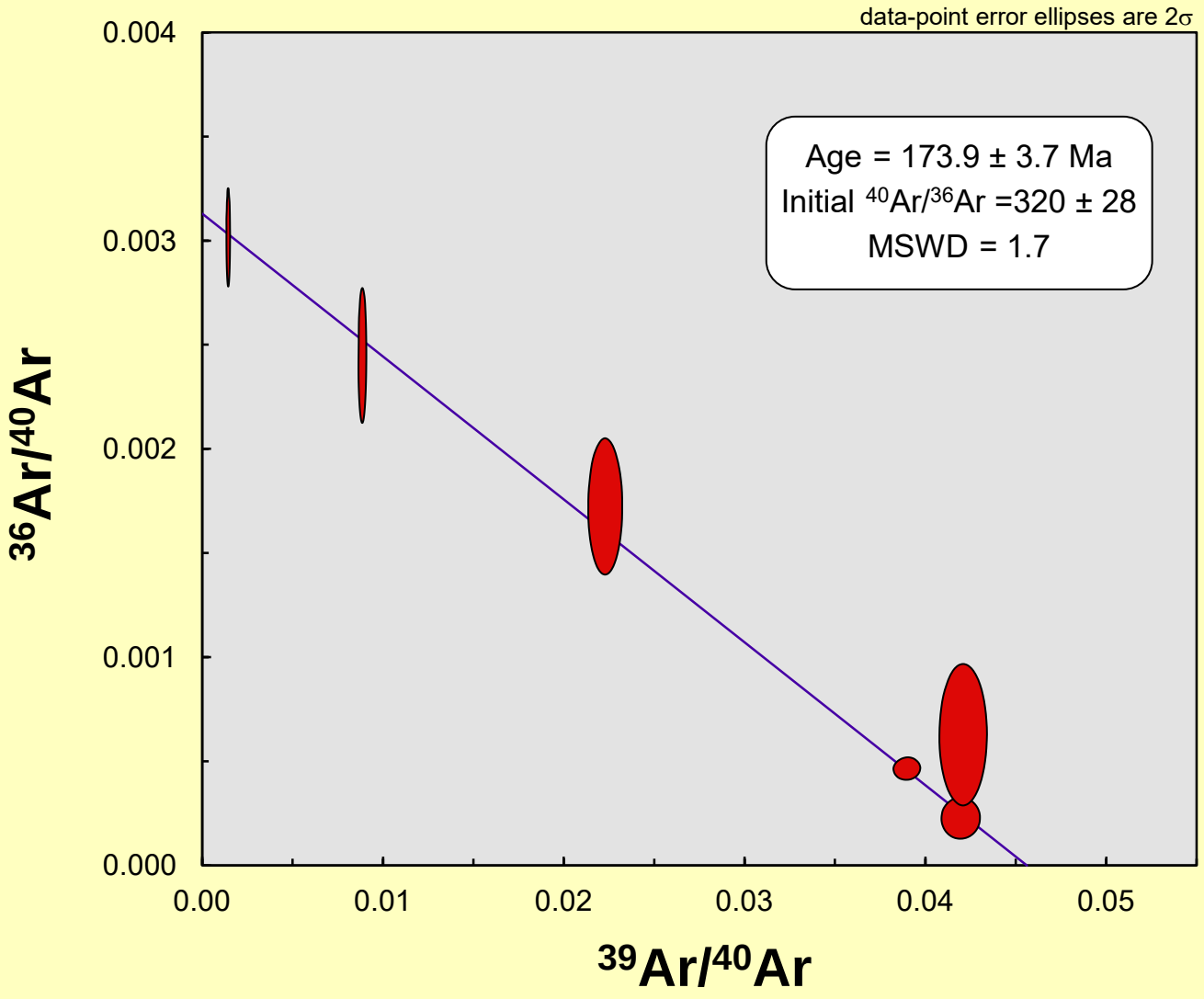
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	22.104	0.121

Ma

Includes 95.2% of the 39Ar steps 3 through 7

3.7 Ma


data-point error ellipses are 2σ
8000
6000
4000
2000
0
0
40
80
120
160
200
240
280
40Ar/36Ar
39Ar/36Ar
Age = 171.9 ± 6.8 Ma
Initial 40Ar/36Ar =319 ± 53
MSWD = 5.9


data-point error ellipses are 2σ
Age = 173.9 ± 3.7 Ma
Initial 40Ar/36Ar =320 ± 28
MSWD = 1.7
0.004
0.003
0.002
0.001
0.000
0.00
0.01
0.02
0.03
0.04
0.05
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC258 plagioclase			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	508.28	3.22	0.09	0.03	1.705	0.076	0.16
2.40	78.86	0.45	0.02	0.01	0.201	0.016	0.04
2.50	24.55	0.15	0.03	0.00	0.030	0.001	0.05
2.70	21.04	0.12	0.01	0.00	0.033	0.002	0.02
2.90	17.86	0.15	0.02	0.00	0.023	0.001	0.03
3.10	16.57	0.10	0.03	0.00	0.021	0.001	0.05
3.40	12.86	0.07	0.02	0.00	0.010	0.000	0.03
3.70	12.54	0.10	0.01	0.00	0.010	0.000	0.02
4.00	11.01	0.06	0.01	0.00	0.005	0.000	0.02
4.20	11.57	0.06	0.01	0.00	0.005	0.000	0.01
4.40	11.99	0.08	0.01	0.00	0.007	0.000	0.01
4.60	12.84	0.07	0.01	0.00	0.007	0.000	0.01
4.80	13.33	0.08	0.00	0.00	0.007	0.000	0.01
5.00	13.30	0.08	0.01	0.00	0.007	0.000	0.03
5.30	13.38	0.09	0.01	0.00	0.006	0.000	0.01
5.50	14.51	0.12	0.02	0.00	0.006	0.000	0.04
5.80	15.29	0.09	0.01	0.00	0.007	0.000	0.02
6.20	13.89	0.08	0.01	0.00	0.006	0.000	0.02
6.60	13.86	0.08	0.00	0.00	0.007	0.000	0.01
7.00	15.32	0.09	0.00	0.00	0.012	0.000	0.01

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	13.717	0.019	0.009	0.000	0.0065	0.0001	

J = 0.0046519 ± 0.0000233 Volume 39ArK = 1.491 Integrated Date = 88.86 ± 0.40

Plateau age = 80.9 ± 1.2 Ma (2s, including J-error of 1%) MSWD = 2.0, probability=0.080

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 10 points Age = 79.1 ± 2.

Initial 40Ar/36Ar =326 ± 33 MSWD = 3.3 Probability = 0.0009

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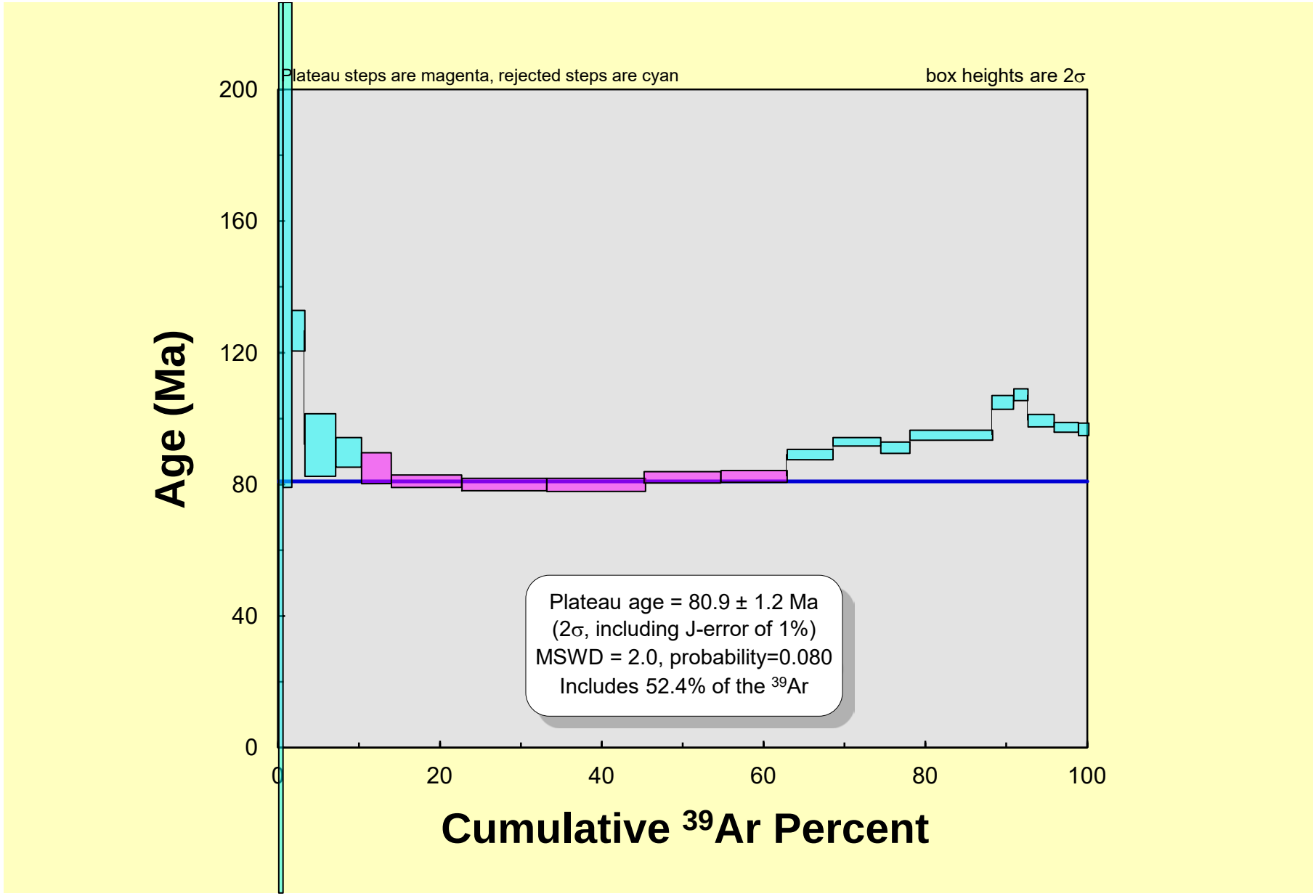
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
99.13	0.52	4.398	36.62	± 367.33
75.41	1.14	19.390	156.17	± 74.00
36.62	1.43	15.559	126.36	± 6.20
46.89	3.96	11.175	91.65	± 9.55
39.02	3.18	10.892	89.38	± 4.58
37.85	3.72	10.297	84.61	± 4.69
23.86	8.63	9.794	80.57	± 1.87
23.04	10.46	9.653	79.43	± 2.00
12.41	12.13	9.641	79.33	± 2.00
14.09	9.34	9.939	81.73	± 1.70
16.75	8.16	9.979	82.06	± 1.81
15.76	5.74	10.813	88.75	± 1.59
15.41	5.83	11.278	92.47	± 1.40
16.73	3.67	11.079	90.87	± 1.71
13.71	10.12	11.543	94.59	± 1.46
11.72	2.64	12.810	104.67	± 2.10
14.36	1.76	13.090	106.89	± 1.80
12.92	3.21	12.099	99.02	± 1.81
14.51	3.01	11.851	97.04	± 1.50
23.24	1.34	11.762	96.33	± 1.94

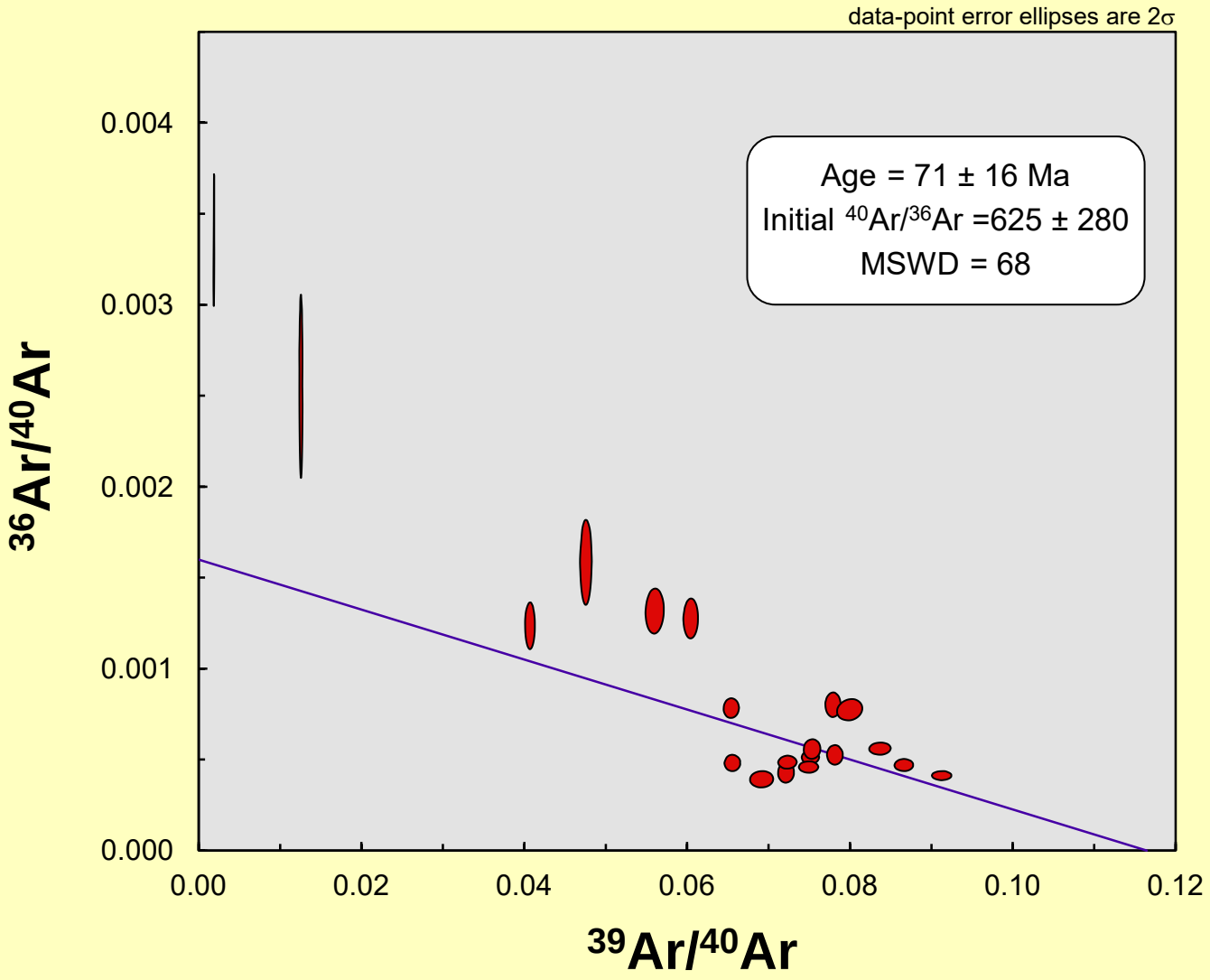
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	10.819	0.025

Ma

Includes 52.4% of the 39Ar steps 6 through 11

.2 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
200
160
120
80
40
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 80.9 ± 1.2 Ma
(2σ, including J-error of 1%)
MSWD = 2.0, probability=0.080
Includes 52.4% of the 39Ar


data-point error ellipses are 2σ
Age = 71 ± 16 Ma
Initial 40Ar/36Ar =625 ± 280
MSWD = 68
36Ar/40Ar
39Ar/40Ar
0.004
0.003
0.002
0.001
0.000
0.00
0.02
0.04
0.06
0.08
0.10
0.12

Laser	*Isotope Ratios*						
	BC-260 hornblende			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	190.85	6.94	1.82	0.13	0.306	0.038	3.34
2.60	31.16	0.25	0.10	0.02	0.080	0.003	0.18
2.90	58.73	1.00	0.20	0.02	0.164	0.007	0.36
3.20	19.37	0.19	0.50	0.03	0.019	0.004	0.92
3.50	22.15	0.13	2.02	0.03	0.005	0.000	3.70
3.80	21.44	0.15	2.24	0.08	0.003	0.000	4.11
4.00	21.37	0.15	2.48	0.05	0.003	0.000	4.55
4.30	21.00	0.12	2.95	0.09	0.003	0.000	5.41
4.70	21.53	0.17	3.11	0.08	0.004	0.001	5.71

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	21.935	0.059	0.598	0.010	0.0032	0.0001	

J = 0.0046704 ± 0.0000234 Volume 39ArK = 0.176 Integrated Date = 165.88 ± 1.06

Plateau age = 166.3 ± 2.1 Ma (2s, including J-error of 1%) MSWD = 1.4, probability=0.25

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 9 points Age = 166.7 ± 9

Initial 40Ar/36Ar =243 ± 120 MSWD = 48 Probability = 0

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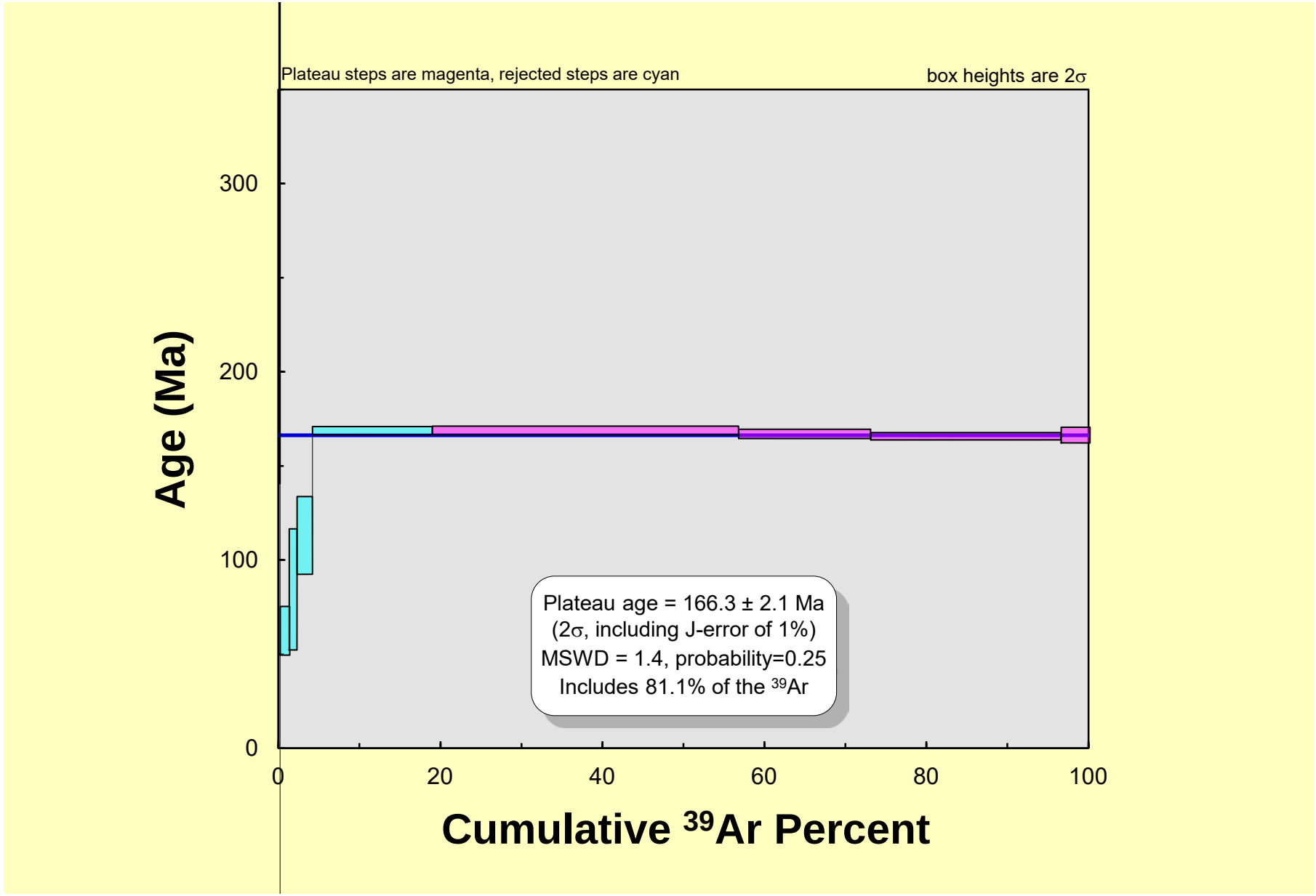
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
47.29	0.13	100.719	697.16	± 130.31
76.18	1.18	7.423	61.63	± 13.09
82.75	0.84	10.135	83.63	± 32.37
29.13	1.98	13.730	112.39	± 20.66
5.91	14.74	20.867	168.16	± 2.15
2.80	37.83	20.870	168.19	± 2.40
3.55	16.18	20.649	166.49	± 2.39
2.72	23.54	20.471	165.11	± 1.92
4.81	3.57	20.540	165.65	± 4.32

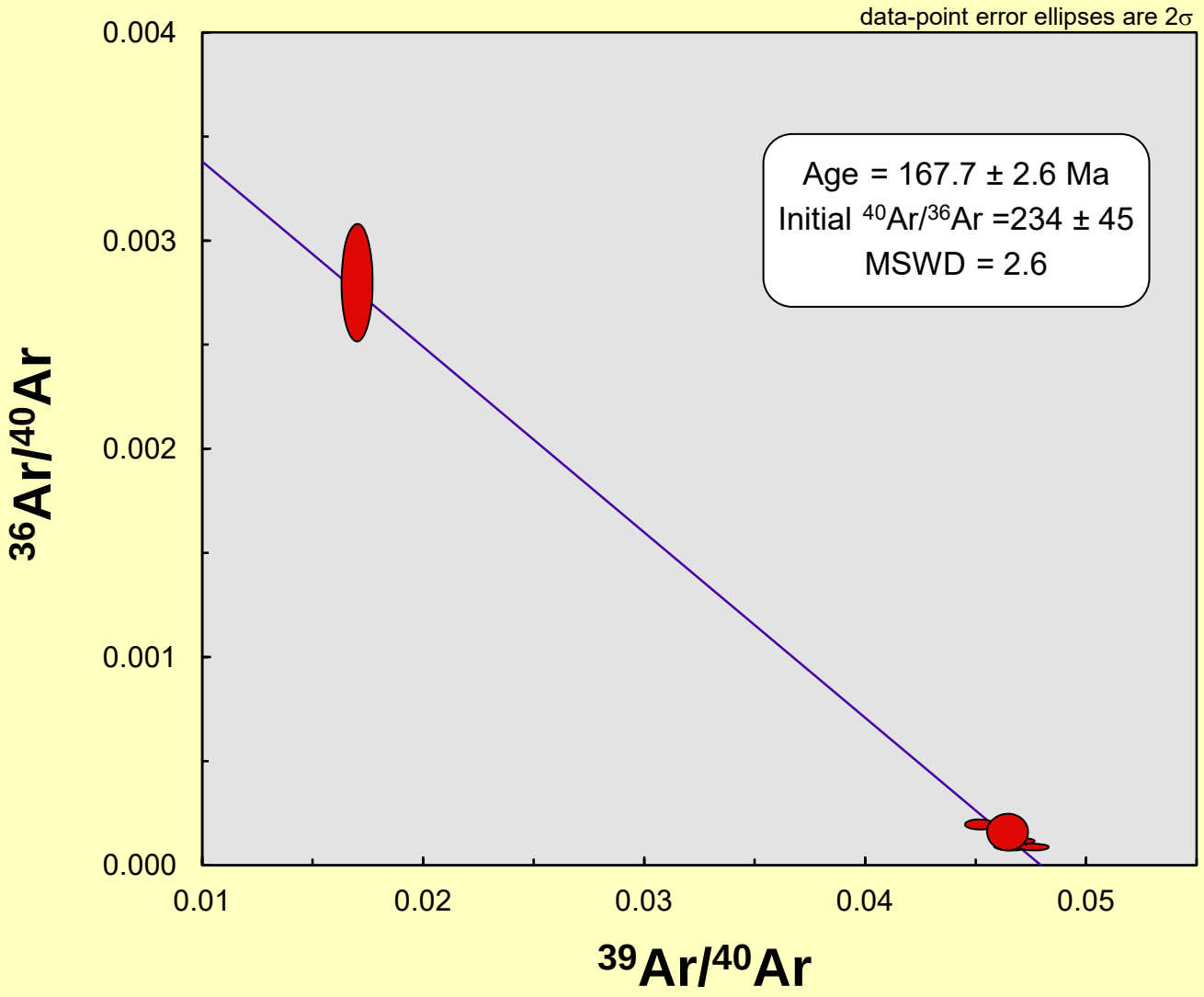
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	20.558	0.069

Ma

Includes 81.1% of the 39Ar steps 6 through 9

9.0 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
300
200
100
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 166.3 ± 2.1 Ma
(2σ, including J-error of 1%)
MSWD = 1.4, probability=0.25
Includes 81.1% of the 39Ar


data-point error ellipses are 2σ
Age = 167.7 ± 2.6 Ma
Initial 40Ar/36Ar =234 ± 45
MSWD = 2.6
0.004
0.003
0.002
0.001
0.000
0.01
0.02
0.03
0.04
0.05
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-262 biotite			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	68.94	0.81	0.02	0.01	0.207	0.005	0.03
2.60	23.94	0.14	0.01	0.00	0.017	0.000	0.02
2.80	23.75	0.15	0.01	0.00	0.006	0.000	0.02
3.00	23.68	0.18	0.02	0.00	0.006	0.000	0.03
3.20	23.07	0.13	0.02	0.00	0.004	0.000	0.03
3.50	23.10	0.16	0.02	0.00	0.004	0.000	0.04
4.00	23.27	0.16	0.04	0.00	0.004	0.000	0.07
4.50	23.92	0.16	0.06	0.01	0.004	0.001	0.11
5.50	26.22	0.16	0.06	0.01	0.010	0.001	0.11

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	24.030	0.054	0.017	0.000	0.0059	0.0001	

J = 0.0046597 ± 0.0000233 Volume 39ArK = 0.226 Integrated Date = 173.02 ± 0.99

Plateau age = 175.9 ± 2.1 Ma (2s, including J-error of 1%) MSWD = 1.11, probability=0.35

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 9 points Age = 177.5 ±

Initial 40Ar/36Ar =216 ± 67 MSWD = 36 Probability = 0.00

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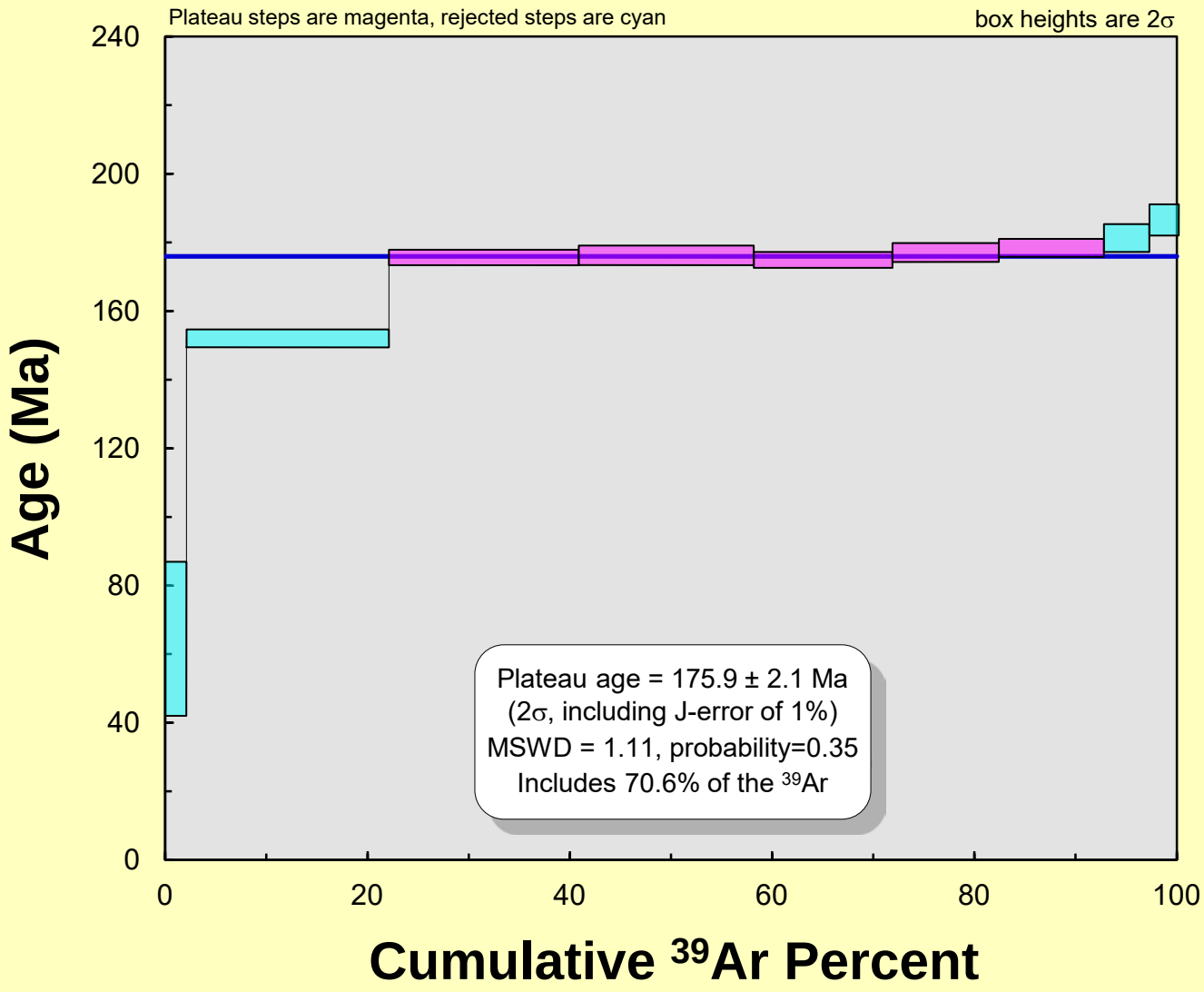
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
88.79	1.95	7.731	64.00	± 22.53
21.69	20.01	18.749	151.46	± 2.62
8.04	18.81	21.843	175.28	± 2.33
7.52	17.19	21.901	175.72	± 2.87
5.72	13.74	21.755	174.60	± 2.28
4.60	10.43	22.036	176.76	± 2.77
4.61	10.46	22.195	177.97	± 2.64
5.58	4.49	22.586	180.96	± 4.13
11.31	2.91	23.258	186.07	± 4.52

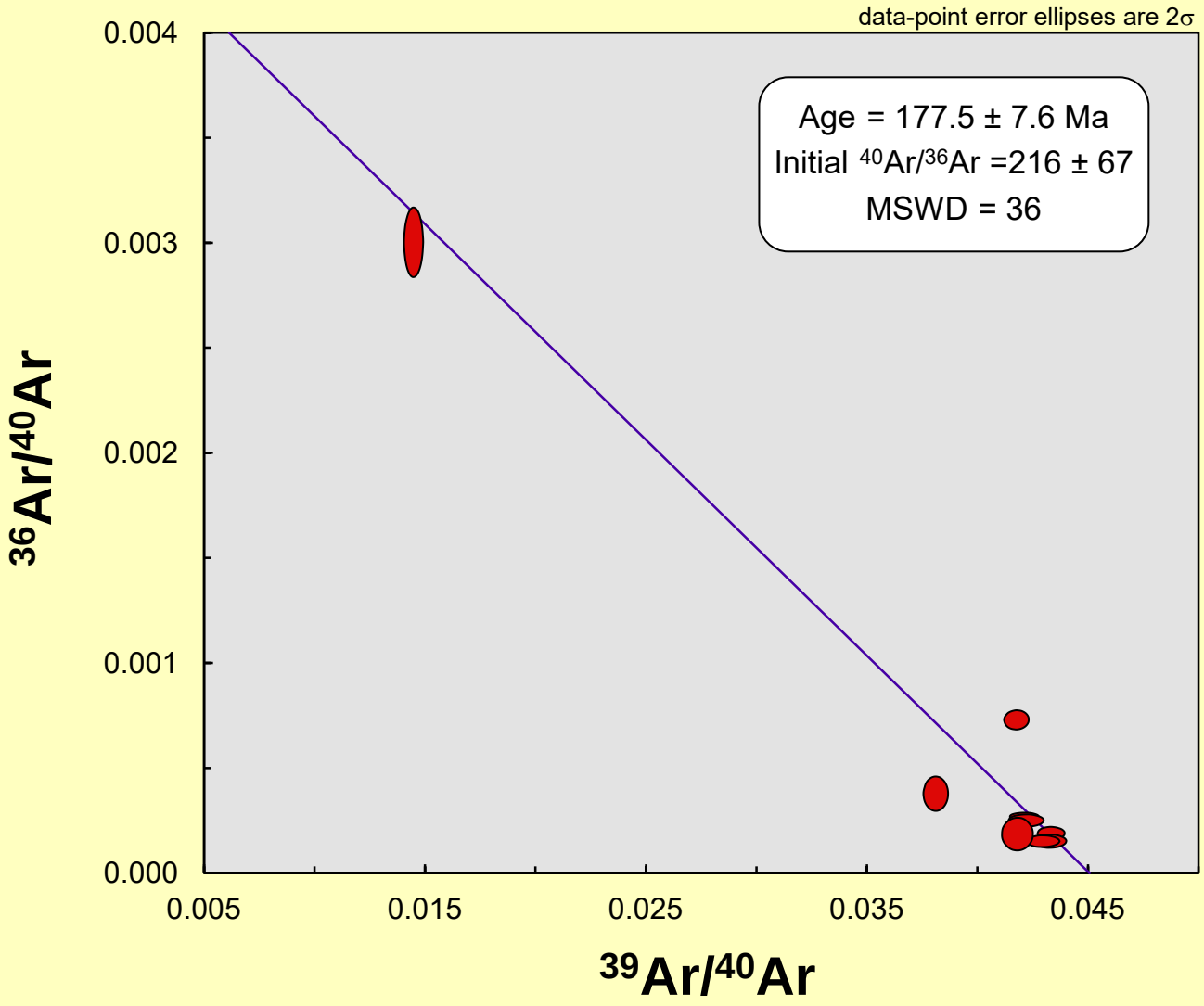
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	21.536	0.064

Ma

Includes 70.6% of the 39Ar steps 3 through 7

7.6 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
240
200
160
120
80
40
0
Age (Ma)
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 175.9 ± 2.1 Ma
(2σ, including J-error of 1%)
MSWD = 1.11, probability=0.35
Includes 70.6% of the 39Ar


data-point error ellipses are 2σ
Age = 177.5 ± 7.6 Ma
Initial 40Ar/36Ar =216 ± 67
MSWD = 36
0.004
0.003
0.002
0.001
0.000
0.005
0.015
0.025
0.035
0.045
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-313 biotite			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	122.24	1.14	0.20	0.01	0.414	0.015	0.36
2.60	13.94	0.10	0.18	0.01	0.030	0.001	0.33
2.90	8.75	0.05	0.17	0.01	0.007	0.001	0.31
3.20	7.99	0.05	0.06	0.00	0.002	0.000	0.10
3.50	7.71	0.04	0.05	0.00	0.002	0.000	0.08
3.80	7.75	0.04	0.04	0.00	0.002	0.000	0.08
4.10	7.72	0.05	0.06	0.00	0.002	0.000	0.11
4.40	7.59	0.05	0.08	0.00	0.001	0.000	0.14
4.80	7.73	0.06	0.09	0.01	0.002	0.000	0.16
5.50	7.49	0.04	0.02	0.00	0.000	0.001	0.05
6.50	7.46	0.04	0.03	0.00	0.001	0.000	0.06
7.50	7.72	0.04	0.02	0.00	0.001	0.000	0.04

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	7.880	0.014	0.045	0.001	0.0016	0.0001	

J = 0.0045850 ± 0.0000229 Volume 39ArK = 0.225 Integrated Date = 58.70 ± 0.39

Plateau age = 58.86 ± 0.71 Ma (2s, including J-error of 1%) MSWD = 0.80, probability=0.60

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 11 points Age = 59.05 ± (

Initial 40Ar/36Ar =258 ± 27 MSWD = 2.8 Probability = 0.02

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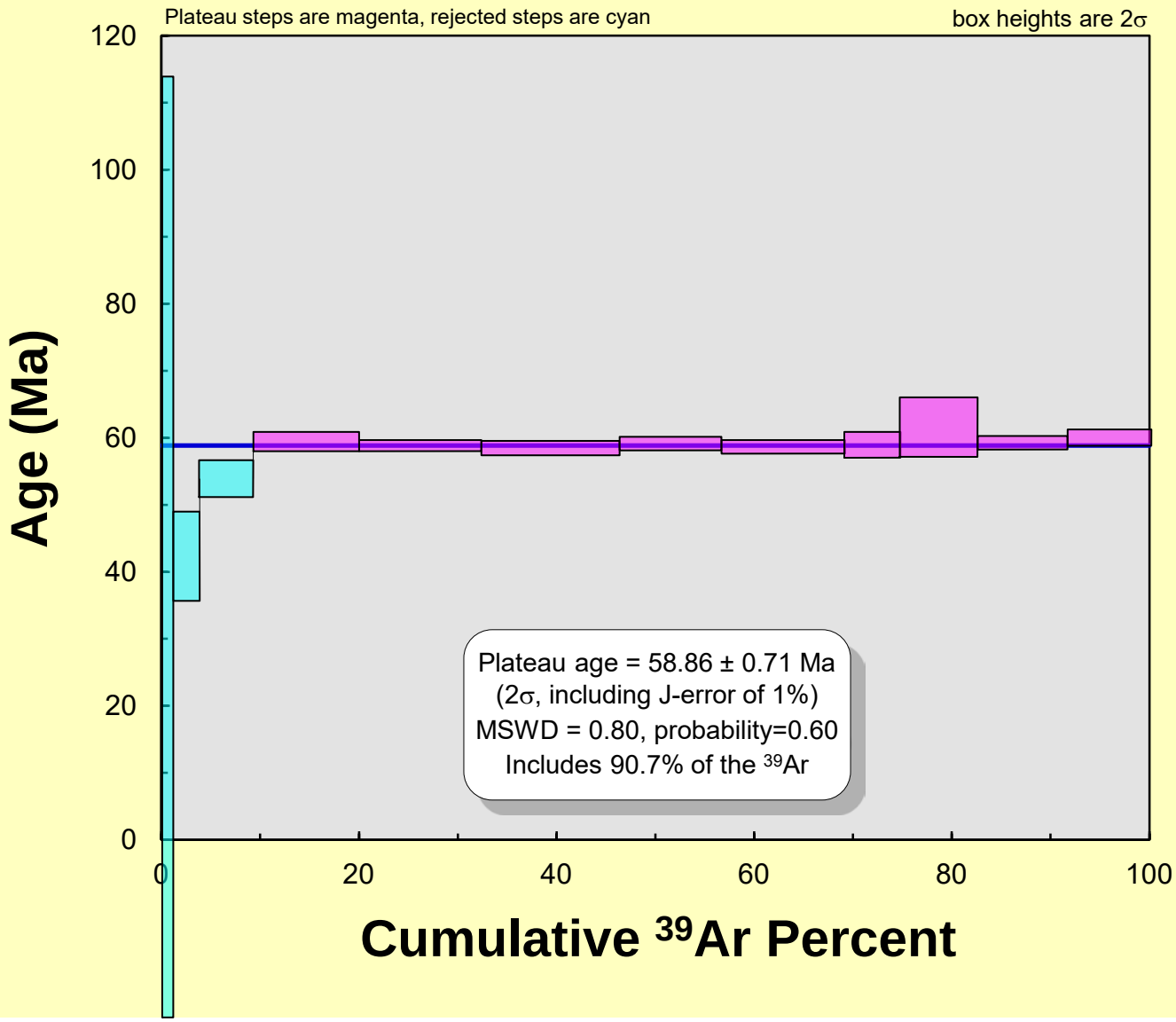
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
100.07	1.14	0.081	-0.67	± 70.96
63.18	2.63	5.132	42.05	± 6.57
24.96	5.51	6.567	53.65	± 2.86
9.07	10.64	7.265	59.26	± 1.48
6.85	12.32	7.185	58.62	± 0.86
7.89	13.94	7.138	58.24	± 1.11
6.36	10.34	7.225	58.94	± 1.06
5.52	12.43	7.169	58.48	± 1.01
6.88	5.65	7.195	58.69	± 2.00
-0.49	7.81	7.525	61.34	± 4.43
2.94	9.11	7.238	59.04	± 0.99
4.96	8.50	7.335	59.81	± 1.20

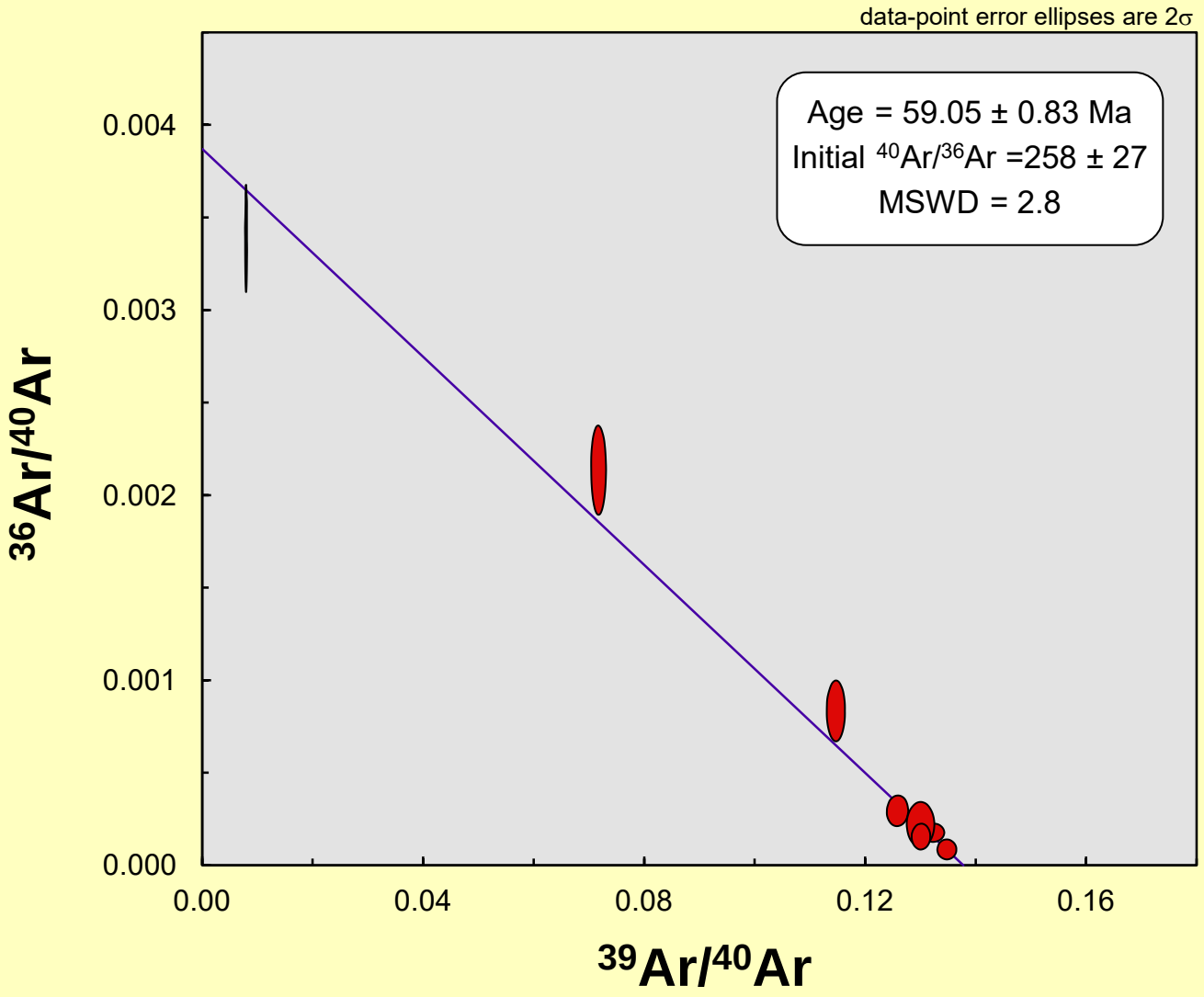
%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	7.196	0.024

Ma

Includes 90.7% of the 39Ar steps 4 through 12

0.83 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
120
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 58.86 ± 0.71 Ma
(2σ, including J-error of 1%)
MSWD = 0.80, probability=0.60
Includes 90.7% of the 39Ar


data-point error ellipses are 2σ
Age = 59.05 ± 0.83 Ma
Initial 40Ar/36Ar =258 ± 27
MSWD = 2.8
0.004
0.003
0.002
0.001
0.000
0.00
0.04
0.08
0.12
0.16
36Ar/40Ar
39Ar/40Ar

Laser	*Isotope Ratios*						
	BC-314 biotite			*(sample/mineral)*			
Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
2.30	153.27	1.21	0.03	0.00	0.523	0.033	0.05
2.50	14.91	0.09	0.01	0.00	0.029	0.001	0.02
2.80	9.75	0.05	0.00	0.00	0.008	0.000	0.01
3.10	8.20	0.05	0.00	0.00	0.003	0.000	0.01
3.40	7.91	0.05	0.01	0.00	0.002	0.000	0.01
3.70	7.47	0.05	0.01	0.00	0.001	0.000	0.01
4.00	7.49	0.05	0.01	0.00	0.000	0.000	0.02
4.50	7.52	0.05	0.02	0.00	0.001	0.000	0.04
5.50	7.84	0.08	0.01	0.01	0.002	0.001	0.03

Power(%)	*40Ar/39Ar*	*1σ*	*37Ar/39Ar*	*1σ*	*36Ar/39Ar*	*1σ*	*Ca/K*
Total/Average	8.324	0.018	0.007	0.000	0.0017	0.0001	

J = 0.0045237 ± 0.0000226 Volume 39ArK = 0.207 Integrated Date = 59.01 ± 0.40

Plateau age = 59.28 ± 0.73 Ma (2s, including J-error of 1%) MSWD = 0.84, probability=0.50

Inverse isochron (correlation age) results, plateau steps: Model 1 Solution (±95%-conf.) on 9 points Age = 59.06 ± (

Initial 40Ar/36Ar =284 ± 32 MSWD = 2.7 Probability = 0.0097

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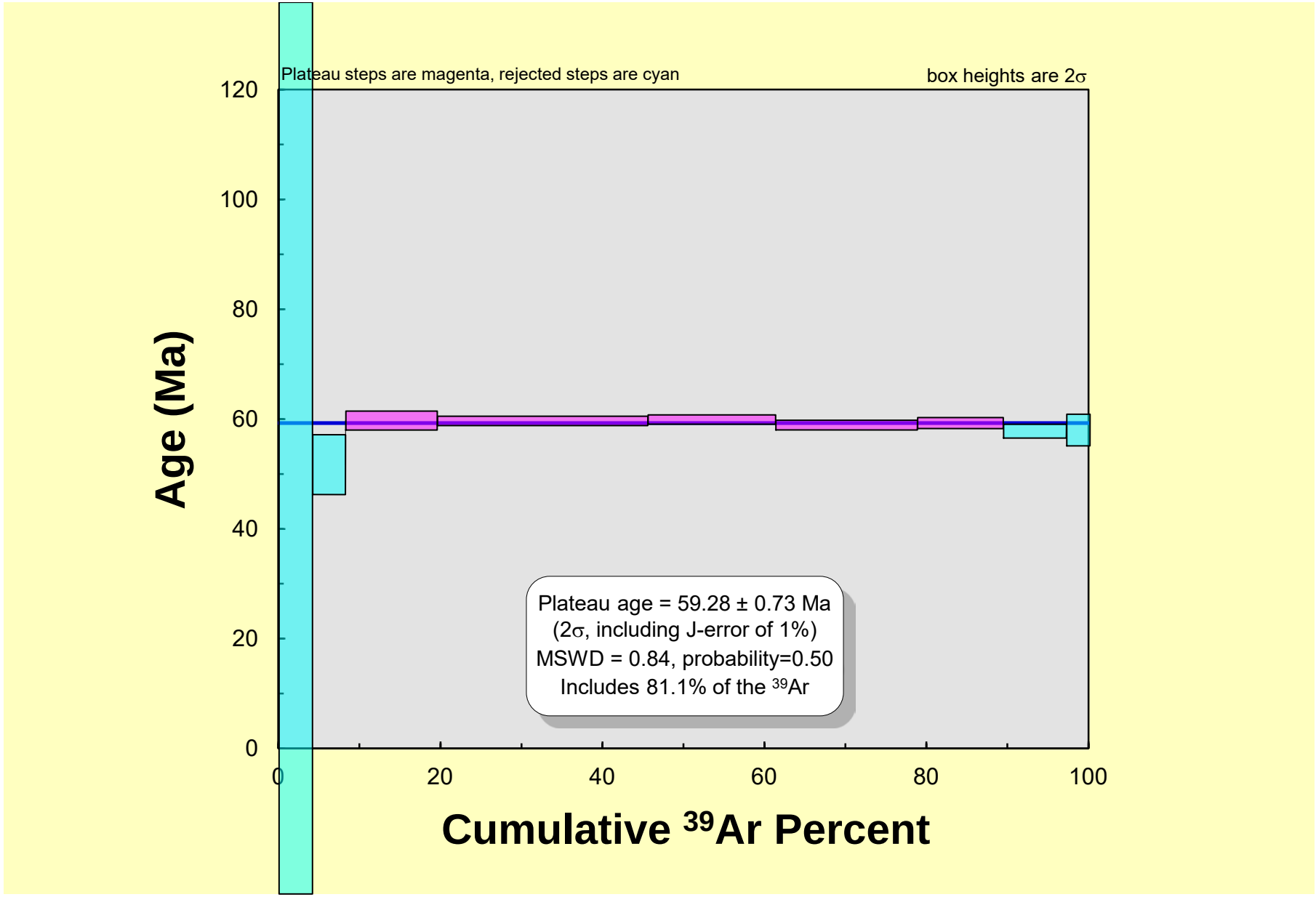
%40Ar atm	f 39Ar	40Ar*/39ArK	Age	2 σ
100.93	4.15	1.427	-11.71	± 161.41
57.26	4.00	6.374	51.40	± 5.40
24.10	11.29	7.398	59.52	± 1.70
9.89	25.94	7.390	59.46	± 0.83
6.24	15.84	7.421	59.71	± 0.83
2.40	17.50	7.291	58.68	± 0.88
1.97	10.57	7.339	59.06	± 1.02
4.91	7.82	7.151	57.57	± 1.18
8.46	2.88	7.178	57.78	± 2.86

%40Ar atm	f 39Ar	40Ar*/39ArK	1 σ
	100.00	7.333	0.025

Ma

Includes 81.1% of the 39Ar steps 3 through 7

0.93 Ma


Plateau steps are magenta, rejected steps are cyan
box heights are 2σ
Age (Ma)
120
100
80
60
40
20
0
0
20
40
60
80
100
Cumulative 39Ar Percent
Plateau age = 59.28 ± 0.73 Ma
(2σ, including J-error of 1%)
MSWD = 0.84, probability=0.50
Includes 81.1% of the 39Ar

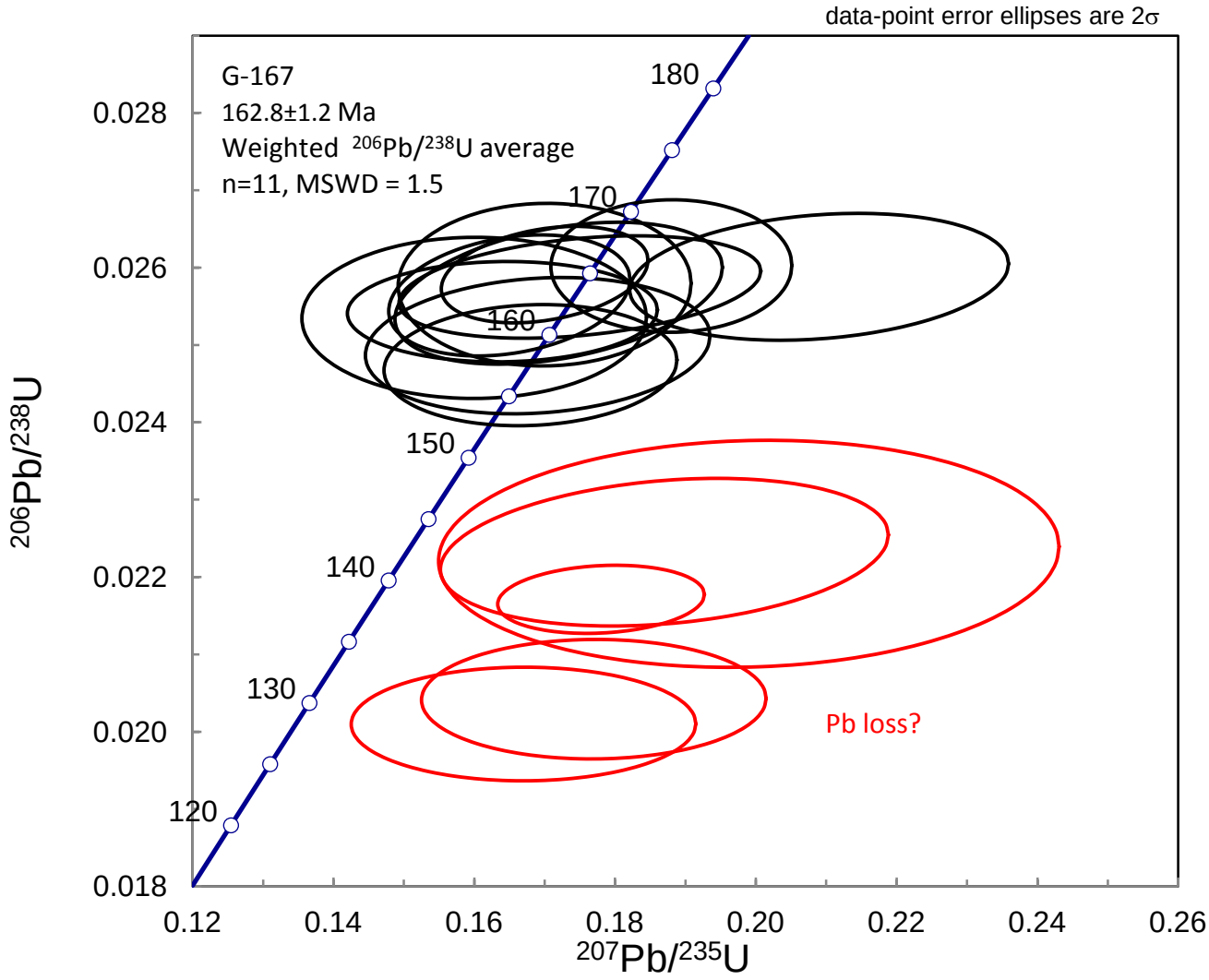
APPENDIX 2

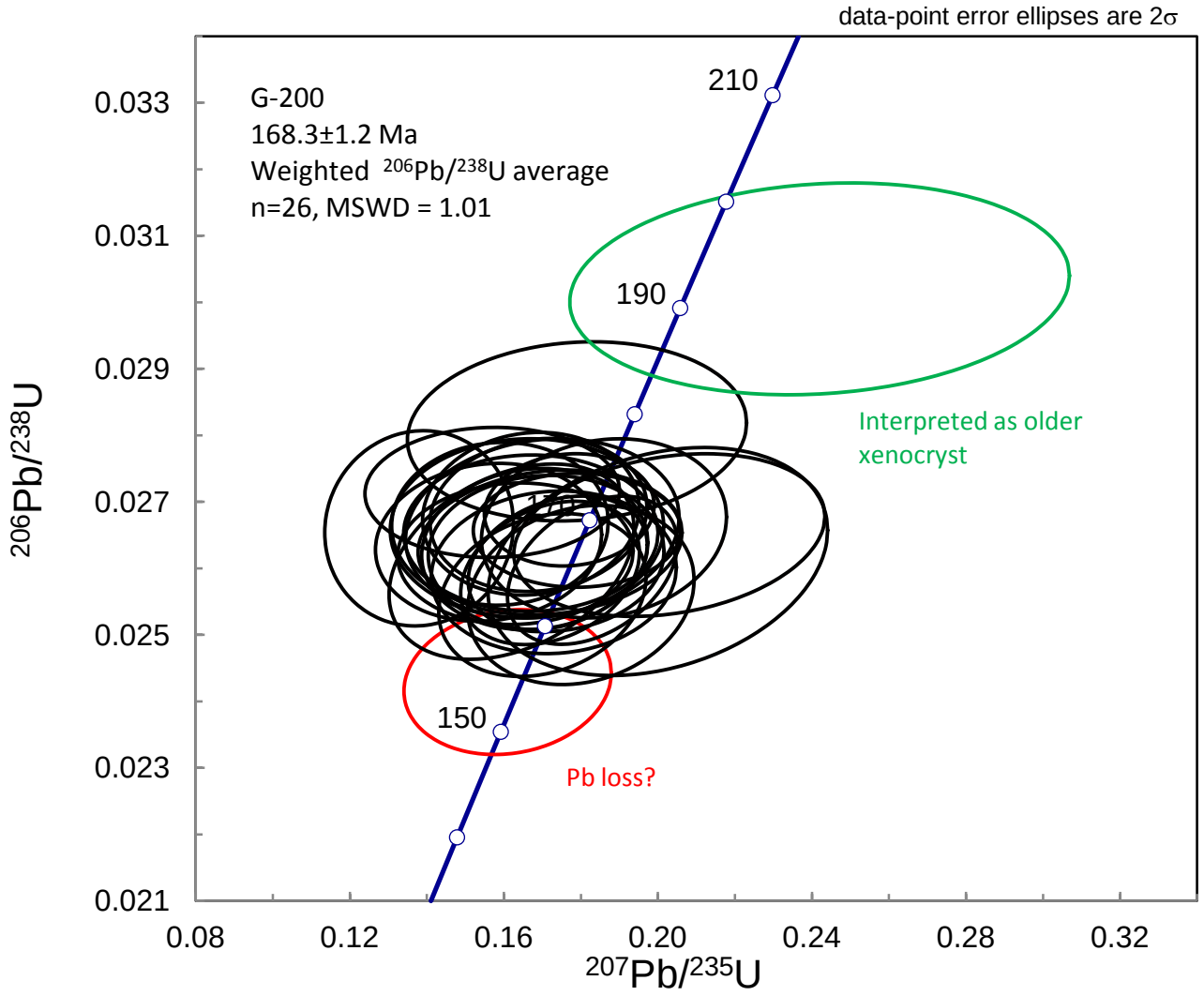
U-Pb zircon dating of selected intrusive rock samples from the Greenwood (082E/02) and Christian Valley (082E/10) map sheets, Penticton east-half project, B.C., Canada.

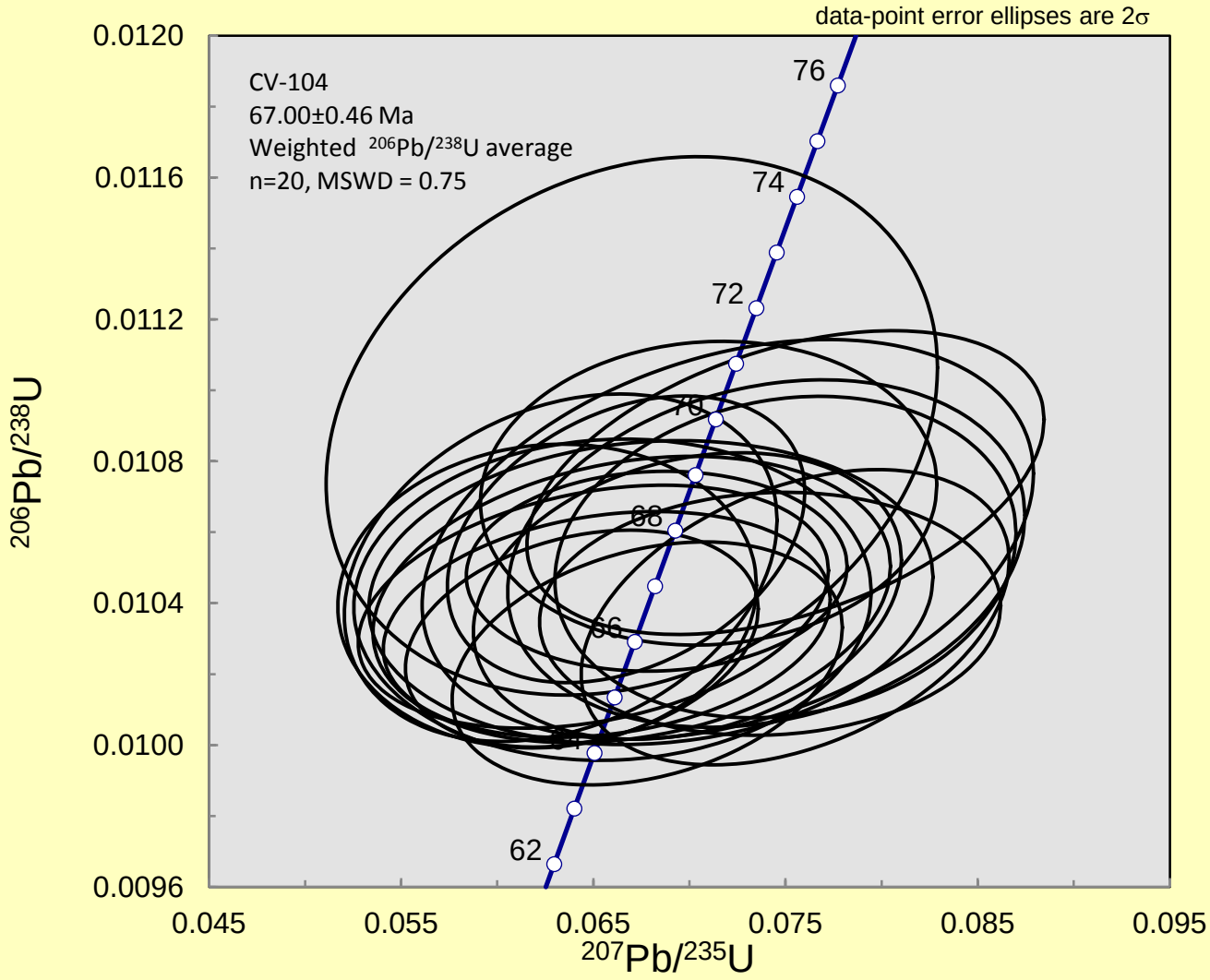
By: R. Friedman (Ph.D., P. Geo)

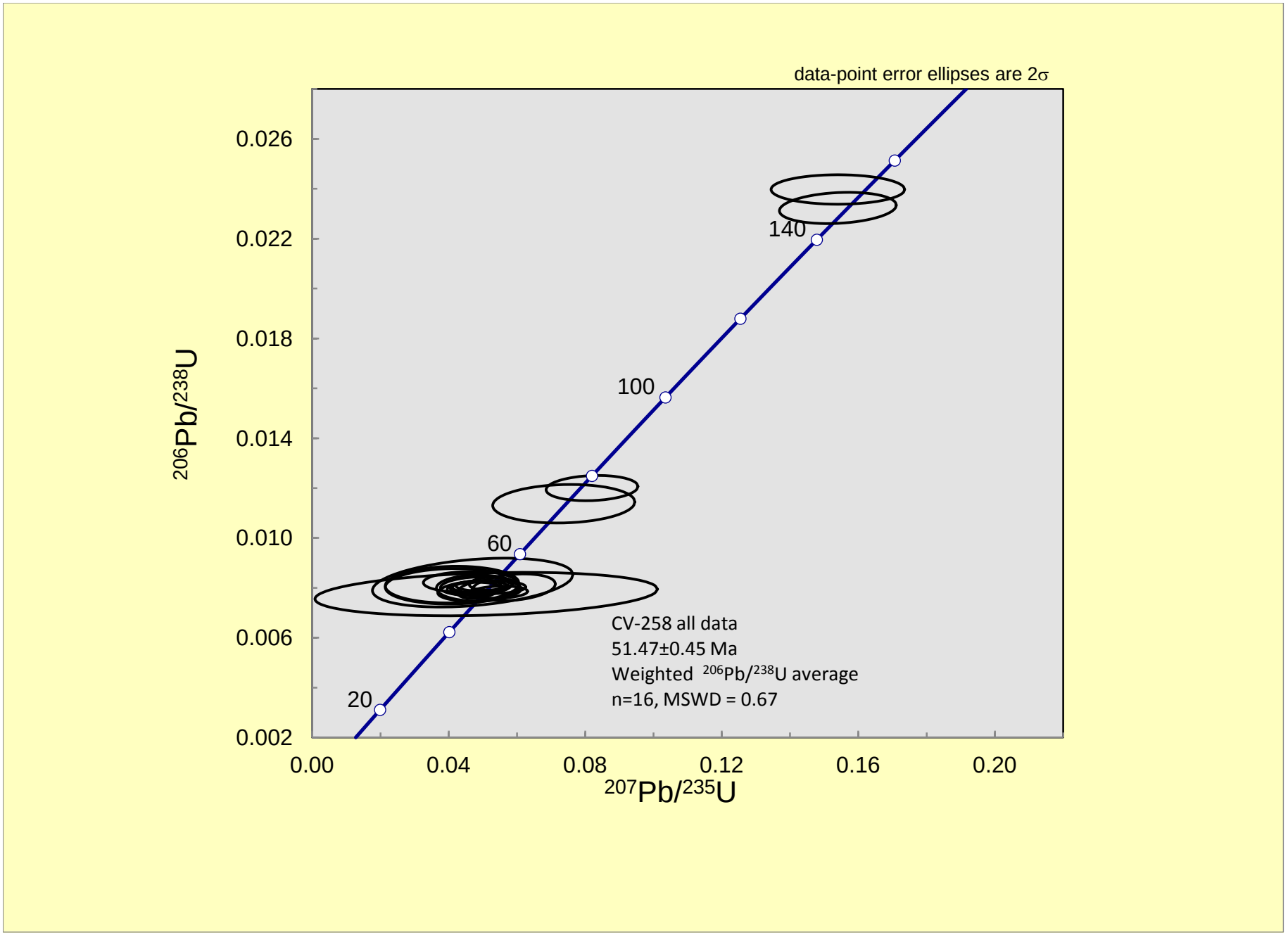
Notes:

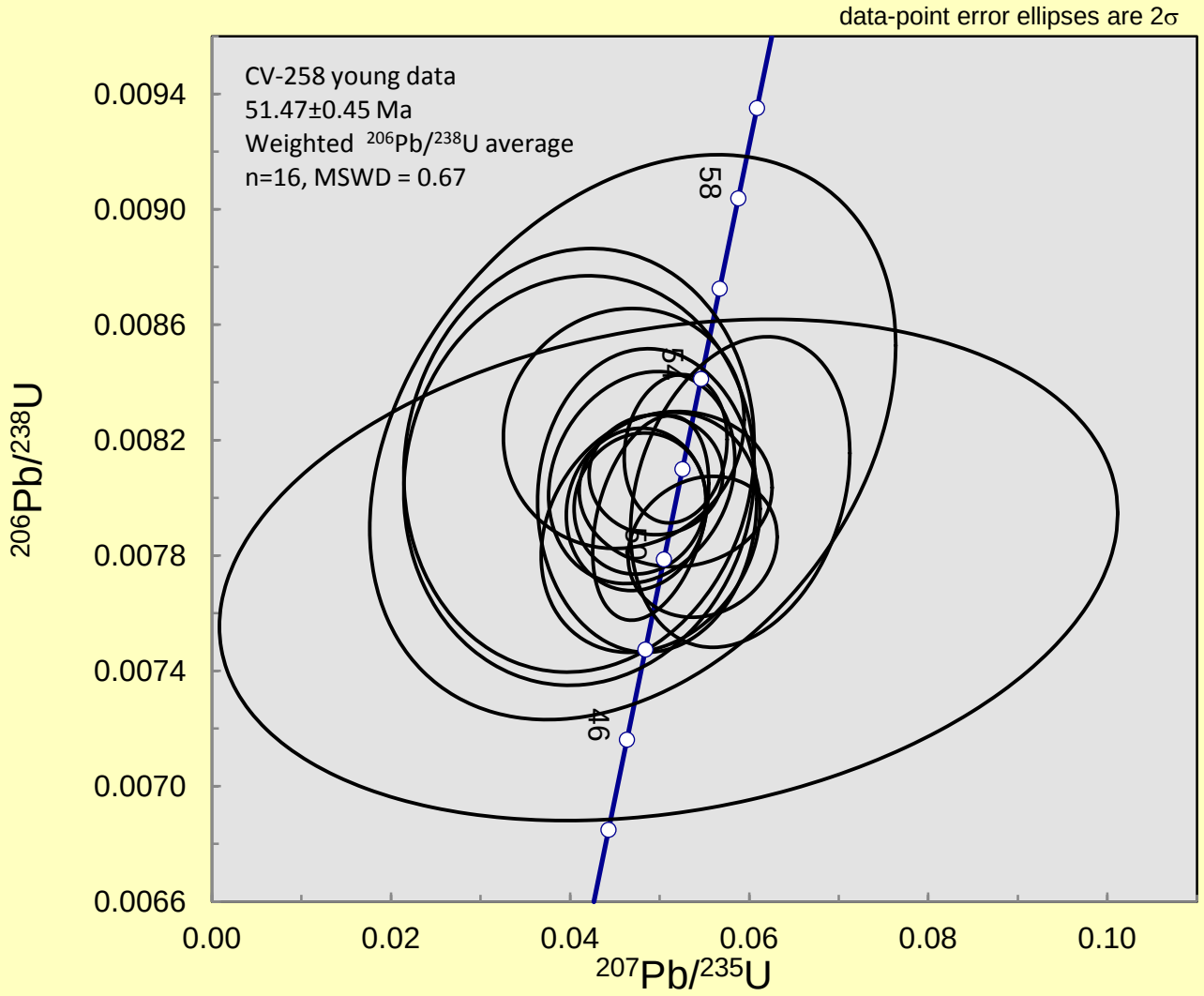
1. All samples were collected by T. Hoy during regional mapping of the 1:50,000 sheets;
2. Petrographic analyses of selective samples by K.P.E. Dunne are shown in appendices 1 and 2.

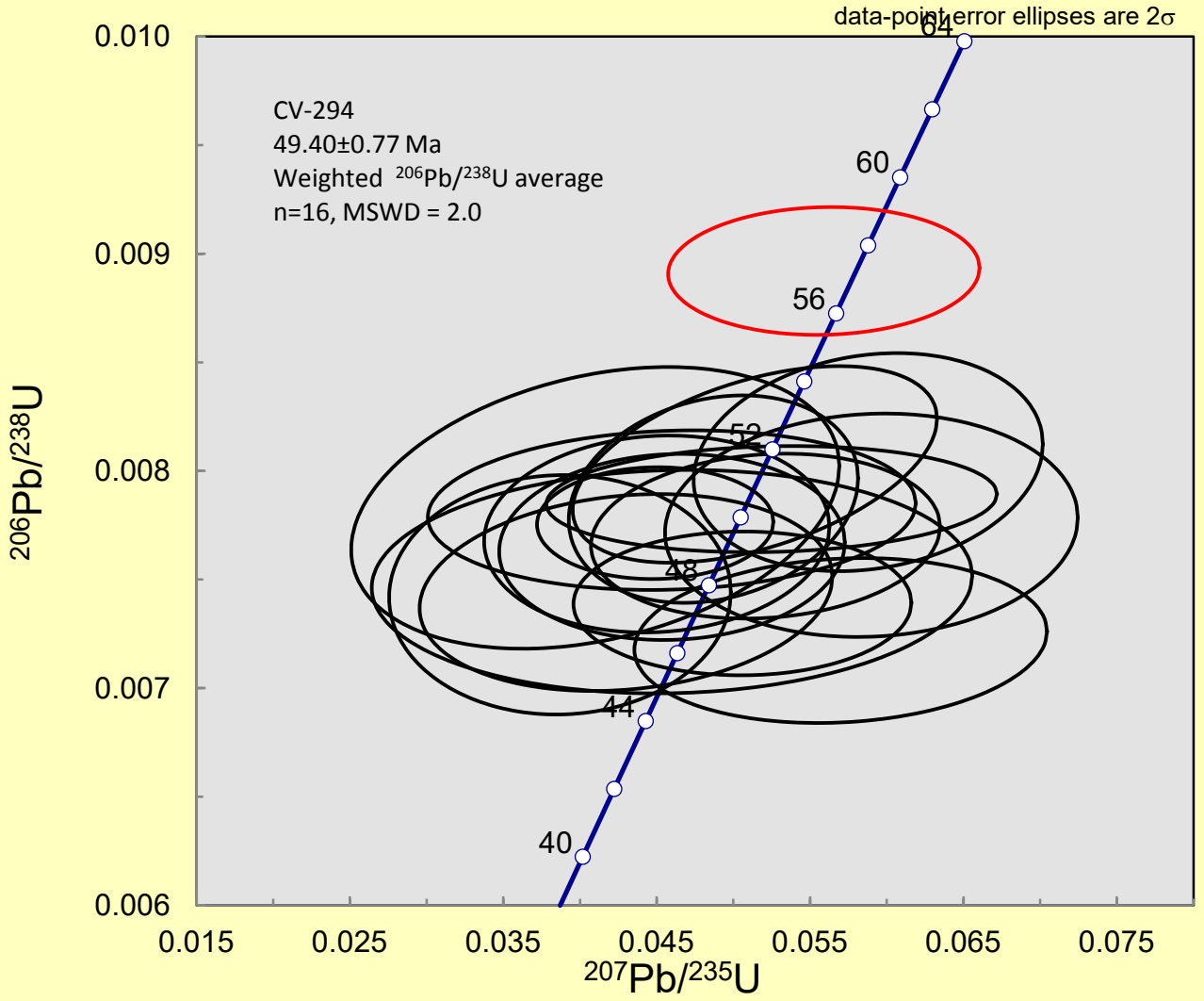

data-point error ellipses are 2σ
G-167
162.8±1.2 Ma
Weighted 206Pb/238U average
n=11, MSWD = 1.5
180
170
160
150
140
130
120
Pb loss?
0.028
0.026
0.024
0.022
0.020
0.018
206Pb/238U
0.12
0.14
0.16
0.18
0.20
0.22
0.24
0.26
207Pb/235U


data-point error ellipses are 2σ
G-200
168.3±1.2 Ma
Weighted 206Pb/238U average
n=26, MSWD = 1.01
210
190
170
150
Interpreted as older xenocryst
Pb loss?
0.033
0.031
0.029
0.027
0.025
0.023
0.021
206Pb/238U
0.08
0.12
0.16
0.20
0.24
0.28
0.32
207Pb/235U


data-point error ellipses are 2σ
CV-104
67.00±0.46 Ma
Weighted 206Pb/238U average
n=20, MSWD = 0.75
76
74
72
70
68
66
64
62
0.0120
0.0116
0.0112
0.0108
0.0104
0.0100
0.0096
206Pb/238U
0.045
0.055
0.065
0.075
0.085
0.095
207Pb/235U


data-point error ellipses are 2σ
0.026
0.022
0.018
0.014
0.010
0.006
0.002
$^{206}Pb/^{238}U$
0.00
0.04
0.08
0.12
0.16
0.20
$^{207}Pb/^{235}U$
20
60
100
140
CV-258 all data
51.47±0.45 Ma
Weighted $^{206}Pb/^{238}U$ average
n=16, MSWD = 0.67


data-point error ellipses are 2σ
CV-258 young data
51.47±0.45 Ma
Weighted 206Pb/238U average
n=16, MSWD = 0.67
58
54
50
46
0.0094
0.0090
0.0086
0.0082
0.0078
0.0074
0.0070
0.0066
206Pb/238U
0.00
0.02
0.04
0.06
0.08
0.10
207Pb/235U


data-point error ellipses are 2σ
CV-294
49.40±0.77 Ma
Weighted 206Pb/238U average
n=16, MSWD = 2.0
64
60
56
52
48
44
40
0.010
0.009
0.008
0.007
0.006
0.015
0.025
0.035
0.045
0.055
0.065
0.075
206Pb/238U
207Pb/235U