Wooley Creek Batholith, California

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(1984, revised by Hollocher 2023)

Descriptive sheets for the Wooley Creek Batholith, Klamath Mountains, California

Introduction

The Wooley Creek Batholith and its satellitic sill-like body, the Slinkard Pluton, occur in the central Klamath Mountains, northern California. Vertical zonation and magma mixing are described by Barnes (1983) and Barnes and Allen (1984).

The Wooley Creek Batholith and Slinkard Pluton form a mid-Jurassic comagmatic suite that intruded rocks of the western Paleozoic and Triassic belt (TRPZ of Map 1). The plutons intruded upward through a stack of lithostratigraphic terranes that are separated by east-dipping thrust faults.

Subsequent to intrusion, the plutons were thrust westward over low-density clastic rocks of the Galice Formation, which in turn were subjected to doming which tilted the batholith 20° to 30° to the southwest.

The plutons are zoned from gabbro and diorite in the NE to granodiorite and granite in the SW. The transition from gabbro to granite is gradational but not uniform, as both diorite and granodiorite occur in areas which are predominantly quartz diorite (Map 2). Pyroxenes occur in rocks east of the dashed line, except in mafic selvages. Dikes are few but two are included in the suite.

Collected by Dr. Forbes Robertson. Thanks are due to Dr. Calvin G. Barnes who took me into the field and sowed where each specimen should be collected, and he and two graduate students assisted in collecting Wooley Creek specimens 1 to 8 because the outcrops were on forest and lumber company roads, which would have been difficult for one not familiar with the region to retrace. Many thanks!

Description and location of specimens

Specimens 1-8 for the Wooley Creek Batholith and 8-15 for the Slinkard Pluton are located on Map 2. The specimens ere collected along forest service and logging roads which are not shown on the topographic maps. Hence, the locations are sketchy.

The Wooley Creek Batholith is exposed on the Ukonom Lake and Forks of Salmon 15 minute quadrangles. The Slinkard Pluton is exposed on Seiad Valley and Scott Bar 15 minute quadrangles.

The numbers in Map 2 are Dr. Barns' numbers. Petrographic and chemical data in his published papers (Barnes, 1983; Barnes et al., 1986) use these numbers. Considerable data in addition to that already published will be forthcoming

Wooley Creek Batholith specimens 1-8

1. Two-pyroxene biotite-quartz diorite (MMB 594).
2. Hornblende-biotite quartz diorite with relic clinopyroxene (MMB 595).
3. Hornblende-biotite tonalite with small enclaves (MMB 397). Enclaves related to the parent magma, vs. xenoliths or inclusions. [KH: I take this to mean here that "enclaves" are defined as autoliths or possibly disrupted, injected and quenched mafic magma blobs.]
4. Biotite-hornblende granodiorite (MMB 471).
5. Aplite facies adjacent to granodiorite, which is the same as specimen 4. This is the largest known aplite body in the batholith (MMB 377).
6. Dark enclave in granodiorite at locality 5 (MMB 732). Enclave is related to parent magma. About 100 yards downhill from specimen 5 along logging road.
7. Hornblende diorite dike, does not cut batholith (MMB 551).

8. Two-pyroxene andesite dike (MMB 550). This dike cuts the batholith. About 200 yards north of specimen 7 on logging road.

Slinkard Pluton specimens 9-15

9. Aplitic facies of Slinkard Pluton, intrusive into coarse granite. A two-mica aplite. Collected at bridge across Girder Creek on Girder Creek Road, about 2 miles S of the town of Seiad Valley, Seiad Valley quadrangle.
10. Coarse granite, Slinkard granite. Girder Creek bridge as for specimen 9. This is the most felsic facies of the Slinkard, and is comparable to the most felsic facies of the Wooley Creek Batholith which are exposed in in an inaccessible area.
11. Foliated diorite. Near base of the pluton, from a large road cut on California 96, just NNE of Slinkard Peak. This is the main facies and contains much biotite.
12. Foliated diorite, darker facies than specimen 11. Occurs in bands and zones parallel to the foliation, ranging in thickness from a fraction of an inch wide to 12 inches or more.
13. Hornblende-biotite diorite from the bottom of the Slinkard Pluton. Bridge Flat, 0.2 miles N of the Bridge Flat sign on Scott River Road near center, NE¼, section 21, township 44N, range 11W, Scott Bar quadrangle. This is the dominant rock type.
14. Dark enclave at the same locality as 13.
15. Lighter diorite at locality 13. At this locality the light diorite occurs in patches rather than in layers or bands, but it bears a striking resemblance to the light-dark facies of the foliated diorite at locality 11.

References

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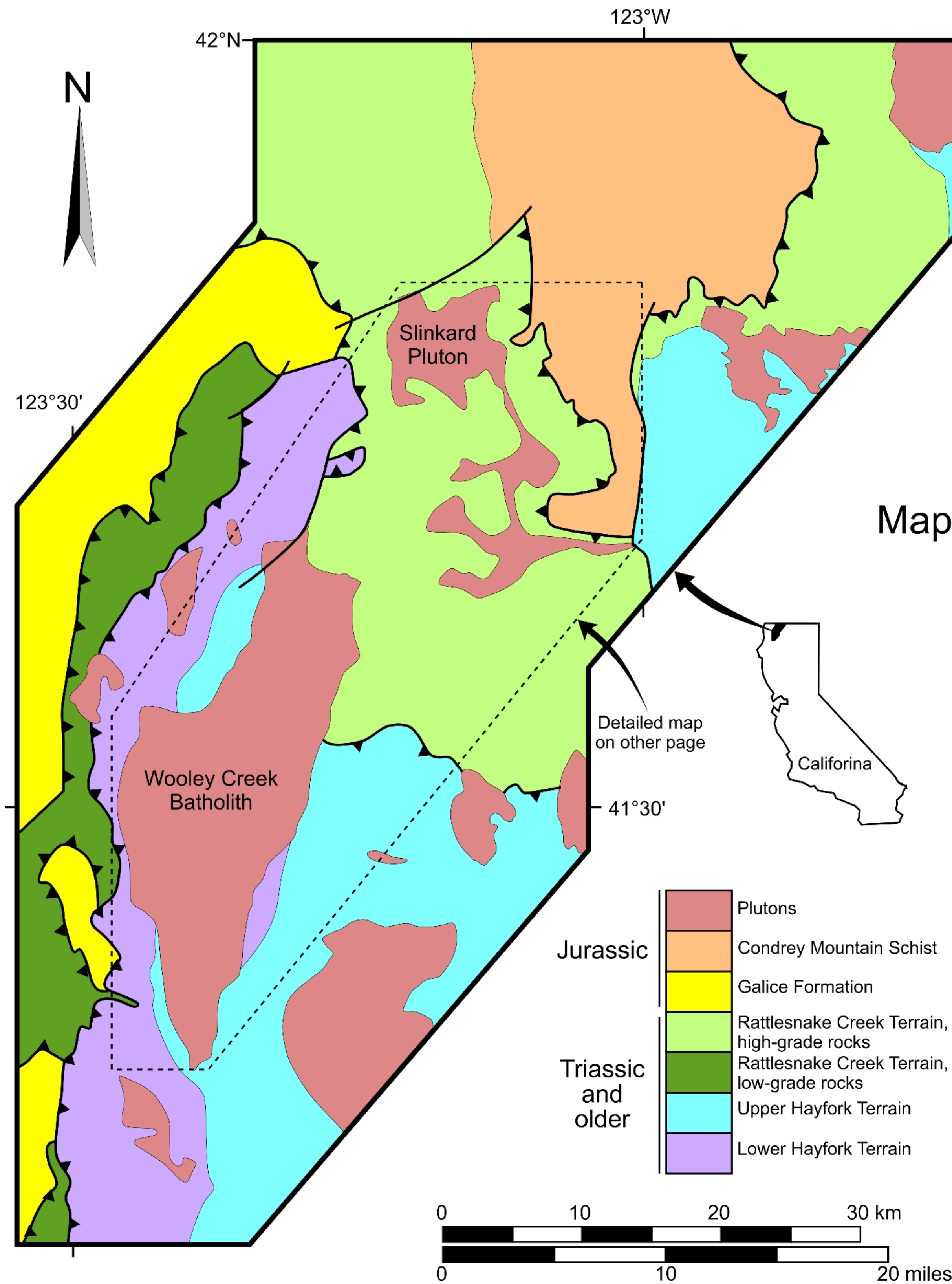
Table 1. Chemical analyses of listed samples.

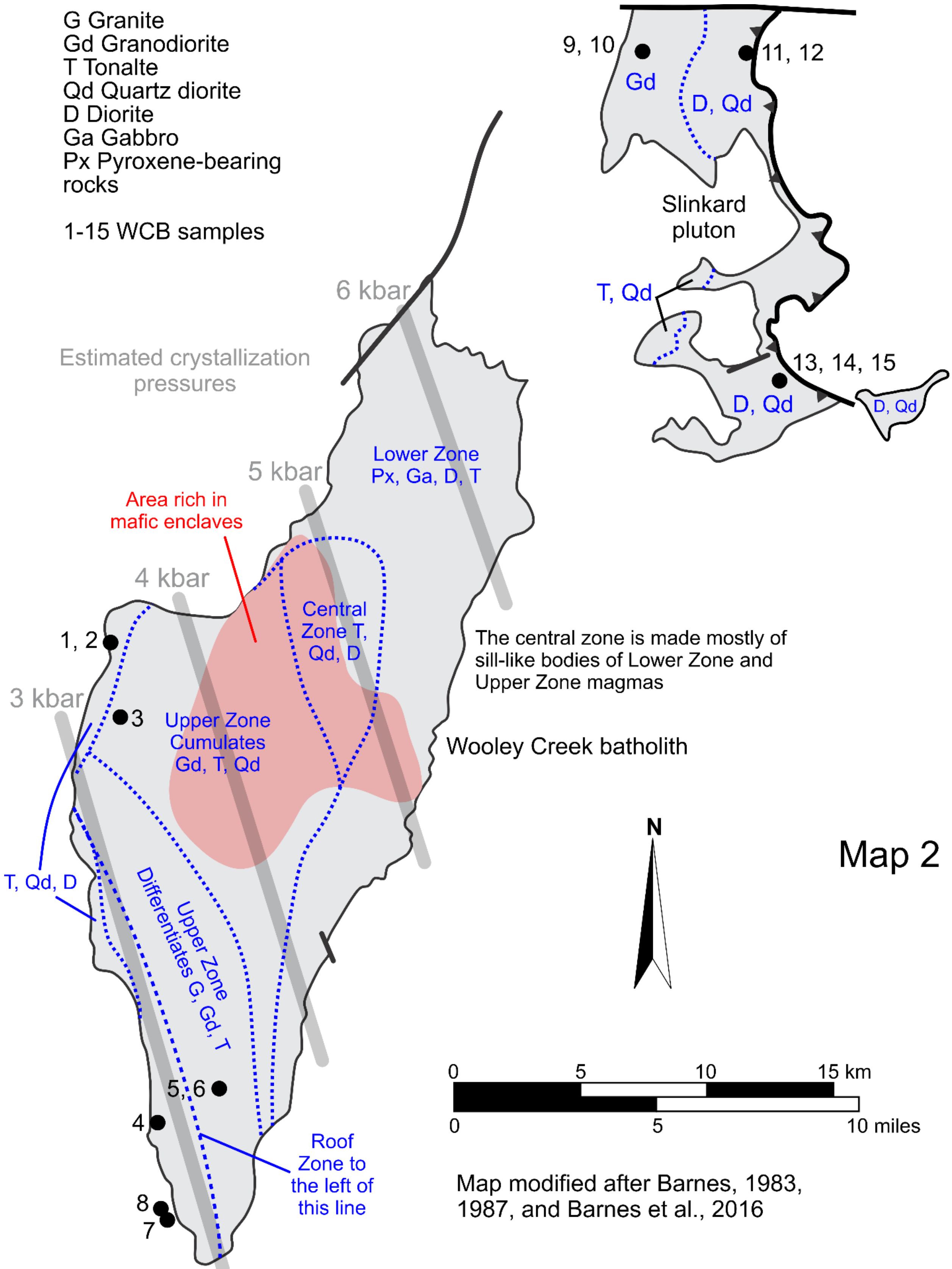
	4	7	8	10	11	13
SiO_2	63.45	66.57	58.51	77.34	58.46	63.45
TiO_2	0.48	0.36	0.73	0.07	0.55	0.48
Al_2O_3	15.75	14.69	15.19	13.78	16.09	15.75
Fe_2O_3	5.38	3.34	7.78	1.42	6.78	5.38
MnO	0.10	0.06	0.14	0.03	0.12	0.10
MgO	2.79	1.92	4.54	0.14	5.11	2.79
CaO	5.39	4.20	7.02	1.76	7.33	5.49
Na_2O	3.33	3.34	2.48	4.13	2.95	3.33
K_2O	2.54	2.93	2.20	2.68	1.44	2.54
P_2O_5	0.13	0.09	0.10	0.01	0.11	0.13
H2O+	0.68	0.82	1.44	0.31	0.51	0.68
H2O-	0.09			0.08	0.13	0.09
Total	100.21	98.31	100.22	101.76	99.57	100.21

All Fe as Fe_2O_3.

H_2O values for specimens 7 and 8 are actually loss on ignition (LOI).

Analyses are from Barnes (1983) and later.


123°W
42°N
N
123°30'
Slinkard
Pluton
Map 1
Wooley Creek
Batholith
Detailed map
on other page
California
41°30'
Jurassic
Plutons
Condrey Mountain Schist
Galice Formation
Triassic
and
older
Rattlesnake Creek Terrain,
high-grade rocks
Rattlesnake Creek Terrain,
low-grade rocks
Upper Hayfork Terrain
Lower Hayfork Terrain
0
10
20
30 km
0
10
20 miles


G Granite
Gd Granodiorite
T Tonalte
Qd Quartz diorite
D Diorite
Ga Gabbro
Px Pyroxene-bearing rocks
1-15 WCB samples
Estimated crystallization pressures
6 kbar
5 kbar
4 kbar
3 kbar
Area rich in mafic enclaves
Lower Zone Px, Ga, D, T
Central Zone T, Qd, D
Upper Zone Cumulates Gd, T, Qd
Upper Zone Differentiates G, Gd, T
T, Qd, D
Roof Zone to the left of this line
1, 2
3
4
5, 6
7
8
The central zone is made mostly of sill-like bodies of Lower Zone and Upper Zone magmas
Wooley Creek batholith
9, 10
11, 12
Gd
D, Qd
Slinkard pluton
T, Qd
13, 14, 15
D, Qd
D, Qd
N
Map 2
0 5 10 15 km
0 5 10 miles
Map modified after Barnes, 1983, 1987, and Barnes et al., 2016