Amphibolite Inclusions Within the 2.65 Ga Pend Oreille Gneiss, Priest River Complex, Northern Idaho

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Inland Northwest MCC’s (Foster et al., 2007)
Pend Oreille Gneiss

2.65 Ga

Doughty, et al., 1998
Pend Oreille Gneiss
Amphibolite inclusions
Amphibolite inclusions
Priest River inclusions (1.87 Ga) - this study

Cougar Gulch Amphibolites
- Group 1 (2.65 Ga)
- Group 2 (1.47 Ga)
- Group 3 (no date)

after Pearce, 1996
Group 1 - Archean
Group 2 - Belt/Moyie
Group 3 - unknown

McDonough & Sun, 1995
Mean = 1868.3 ± 5.6 [0.30%] 95% conf. Wtd by data-pt errs only, 0 of 20 rej. MSWD = 1.19, probability = 0.26 (error bars are 2σ)
AI-2 (basaltic andesite)

Upper intercept: 1839 ± 26 [±27] Ma
MSWD = 10.0, Probability of fit = 0.000

Upper intercept: 2574 ± 170 Ma
MSWD = 44, Probability of fit = 0.000
Priest River Complex

Spokane dome mylonite lineation. Arrow indicates the sense of shear, or if a long arrow, the structural plunge.

- Fine-grained mylonites
- Foliation, mylonite zone (ball on upper plate), detachment fault (teeth on upper plate), respectively
- Valley fill in the Purcell Trench
- Eocene sedimentary rocks
- Eocene plutons
- Metamorphic rocks and Cretaceous igneous rocks
- Pre-Belt basement localities

Modified after Doughty et al., 2016
Cougar Gulch, ID  
(Buddington, et al., 2017)

Hauser Lake Gneiss  
(meta-Belt, 1.48 Ga)

Razorback quartzite  
(graphitic)

Cougar Gulch gneiss  
(1.85 Ga)  
& amphibolite

Priest River, ID  
(Doughty, et al 1998)

Hauser Lake Gneiss  
(meta-Belt)

Laclede Gneiss*  
(1.58 Ga)

Gold Cup Quartzite  
(graphitic)

Pend Oreille Gneiss  
(2.65 Ga)  
& amphibolite inclusions  
(1.85 Ga)
<table>
<thead>
<tr>
<th>Sample</th>
<th>Number of analyzed grains</th>
<th>$^{207}\text{Pb}/^{206}\text{Pb}$ age (Ma)</th>
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<tbody>
<tr>
<td></td>
<td>Total</td>
<td>&lt;10% discordance</td>
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<tr>
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</table>

Ages labeled with \textsuperscript{+} indicate analyses of inheritance

(from Wang, 2015)
Cougar Gulch & Priest River Trace Elements

Primitive mantle, McDonough & Sun, 1995
Cougar Gulch & Priest River REEs

Chondrite values from Boynton, 1984
Tectonic Discrimination
after Pearce, et al., 1984

Post-COLG: post-collisional granite
SyN-COLG: syn-collisional granite
VAG: volcanic arc granite
ORG: orogenic granite
PR inclusions
WPG: within plate granite

Cougar Gulch
Kidd Creek tonalite
PR inclusions
POG
Tectonic Discrimination

TTG Affinity

Tonalite-Trondhjemite-Granodiorite
Basement rocks of western North America (Foster et al., 2006)

- Priest River Complex: 2.65-1.85 Ga
- Clearwater Complex: 2.65-1.86 Ga
- 125 miles
Summary

• 1.85 Ga amphibolite inclusions in 2.65 Ga Pend Oreille Gneiss
• mafic dikes dismembered during Eocene (?) or Cretaceous (?)
• 1.85 Ga magmatic signatures correlate ➔ PRC & CC
• bimodal 1.85 - 2.65 Ga basement ➔ 125 mile extent
Questions/Implications

• 1.85 Ga subduction signature real or inherited?

• significant Paleoproterozoic arc?

• assembly component of supercontinent Columbia?
Thank You!