The West Side Story of the Spokane Dome of the
Priest River Metamorphic Core Complex (PRC)
east of Mount Spokane, Washington

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Challis-age Meta. Core Complexes of the Pacific Northwest

after Foster et al., 2007, GSA SP 434, f 3
Spokane Dome”
2 parts:

- West Side
- Transition Zone

Spokane “Dome”
Mylonite Zone

Lineation in mylonite

after Doughty et al., 2016
UWP, f 6.1

20 km
Lineated Rocks of Spokane Dome Mylonite Zone

Sillimanite Lineations, Hauser Lake Gneiss
WA SR 290

Tweedie Area
Miller, 2001, USGS Map MF2354
Anatomy of Spokane Dome Mylonite Zone

most rocks < 1.5 Ga

mylonitic lineations

after Doughty et al., 2016, IWP
Buddington et al., 2016, GSA FG 31

1.58-2.68 Ga Cd’A window & 1.72-1.87 Ga SL window

top of mylonite zone
### Dates in the Central Part of Spokane Dome

<table>
<thead>
<tr>
<th>Event</th>
<th>Age Range</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mylonitization</td>
<td>&lt; 50 to &gt; 46 Ma</td>
<td>D&amp;P99, S&amp;O16</td>
</tr>
<tr>
<td>Eocene dikes and plutons</td>
<td>50 - 46 Ma</td>
<td>S&amp;O16, W&amp;L16</td>
</tr>
<tr>
<td>Peak Metamorphism</td>
<td>72, 68 - 64 Ma</td>
<td>D&amp;P99, S&amp;O16</td>
</tr>
<tr>
<td>Cret. muscovitic granites</td>
<td>MS = 76.5 Ma</td>
<td>S&amp;O16</td>
</tr>
<tr>
<td>Newman Lake orthogneiss</td>
<td>65.4 ± 0.9 Ma</td>
<td>this paper</td>
</tr>
<tr>
<td>Biotitic banded orthogneiss</td>
<td>98.9 ± 1.1 Ma</td>
<td>this paper</td>
</tr>
<tr>
<td>Hauser Lake gneiss (meta-Prichard Fm.)</td>
<td>1.43 - 1.45 Ga</td>
<td>D&amp;C08</td>
</tr>
</tbody>
</table>
Map Area

Mount Spokane

WSTZ

SDMZ

20 km

after Doughty et al., 2016 UWP, f 6.1
WEST SIDE STORY (1957, Stephen Sondheim)

And something great is coming!
Who knows?
Its only just out of reach,
Down the block, on a beach…

Hold my hand and we’re halfway there.
Hold my hand and I’ll take you there…
Somewhere!
Mount Spokane

Highest Peak in Spokane Dome

Looking E up Brickel Creek

Photo by A.M. Buddington 7/18
Topography & Simplified Geology Of Mount Spokane Quadrangle

Mt. Spokane & NE ridge

East ridge

Map crafted by HM Greenberg, 0219
Rock Units; MS Quad.

Mount Spokane 2-mica granite

Unmapped

HLG quartzite

Hauser Lake Gneiss (HLG)

Banded Gneiss

Newman Lake Gneiss

98.9 Ma
S – C Fabric
top-to- E

Newman Lake Gneiss

quartzite

Hauser Lake pelitic gneiss
Orthogneisses in West Side Transition Zone

Newman Lake Gneiss, 65.4 Ma
indicates WSTZ still active

Biotitic Banded Gneiss, 98.9 Ma
protolith older than WS metamorphism

kspar
Newman Lake Gneiss
65.4 ± 0.9 Ma

Ellipses are 2σ

Redrafted from Wash. State Univ.
**Beltian Detrital Zircons**

$^{207}\text{Pb}/^{206}\text{Pb}$ from Stevens et al., 2016, f 4c

**Prichard Formation**

**Hauser Lake Gns. #1**

**Hauser Lake Gns. #2**
Xenocrysts, Newman Lake Gneiss

Ellipses are $2\sigma$

redrafted from Wash. State Univ.
**Biotitic**

**Banded**

**Orthogneiss**

98.9 ± 1.2 Ma

Ellipses are 2σ

redrafted from Wash. State Univ.
More Info on these Igneous Rocks

Buddington et al., Poster # 25-5, Thursday AM

Cretaceous and Eocene magmatism in the southern Priest River core complex (PRC) of northeastern Washington and northern Idaho
Features of West Side Transition Zone

1) sparse lineations
2) ultramylonite
3) tension gashes
4) folds
5) relict igneous texture

banded gneiss foliation plane of HLG gneiss
Features of West Side Transition Zone

bio. banded orthogneiss

1) sparse lineations
2) ultra-mylonite
3) tension gashes
4) folds
5) relict igneous texture

Hauser Lake Gneiss
Mount Spokane
two-mica granite

76.5 Ma

WA SR 206, 10.4 km SW of summit
MS Quad.

no chlorite breccia

Mount Spokane 2-mica granite

WSTZ SDMZ

98.9 Ma

Unmapped

HLG quartzite

Hauser Lake Gneiss (HLG)

Banded Gneiss

Newman Lake Gneiss
Localities without Chlorite BX

Mount Spokane
Beacon Rock
Chester Creek

after Doughty et al., 2016 UWP, f 6.1
Chester Creek: WSTZ = Carapace Above Mylonite
relabeled from Doughty et al., 2016, UWP, f. 8.12

- Middle Cambrian Quartzite
- Ravalli Group
- Prichard Formation
- Mount Spokane 2-mica granite
**Schematic Comparison of MCCs**
*(no actual or relative scale)*

<table>
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<tr>
<th>Explanation</th>
<th>Spokane Dome</th>
<th>Common in MCC</th>
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<tbody>
<tr>
<td>Non-meta. “roof”</td>
<td></td>
<td></td>
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<tr>
<td>Chlorite Breccia</td>
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<td></td>
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<tr>
<td>Non-Mylonitic</td>
<td>WSTZ</td>
<td></td>
</tr>
<tr>
<td>Mylonite</td>
<td>SDMZ</td>
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*Legend:*
- **U**: Upward flow direction
- **WSTZ**: West Skagit Thrust Zone
- **SDMZ**: South Dry Creek Mylonite Zone

*Arrow indication:* Movement direction from non-meta. “roof” to Mylonite.
The West Side Story: conclusions

Banded orthogneiss = 98.9 Ma, Newman Lake = 65.4 Ma; ≥ 1.5 Ga gneisses likely restricted to axis of Spokane “Dome”

West Side Transition Zone (WSTZ) is pre- to syn-mylonite; meta. = 98 to 47 Ma: a carapace containing ultramylonites, tension gashes, relict folds in gneiss, relict igneous textures (including Mount Spokane two-mica granite = 76.5 Ma)

No detachment faults bound WSTZ; top is Mount Spokane granite, which intruded the sub-Cambrian unconformity