Tsunami Source Issues that Alaska could use help with
Alaska coastal communities at risk of tsunamis
Rupture geometry is defined by Slab 1.0

http://earthquake.usgs.gov/research/data/slab/
Comparing the candidates

The location of maximum slip in this rupture is based on the results of the sensitivity study. It coincides with the eastern part of the 1957 rupture and is at the depth of 40-45 km.

This is the $M_w 9.0$ Tohoku-type rupture with the distribution of slip parameterized using the SAFRR Tohoku-type scenario. 

$M_w 8.8$

Maximum slip = 29.4m
Average slip = 10.3m

$M_w 9.0$

Maximum slip = 53.1m
Average slip = 22.1m
Some questions about the USGS plate interface.

USGS Plate interface **seems to dip to fast within the PWS region**. There is no southward bend in the north west corner.

Previous reconstructions of the plate interface:

Compare 20 and 50 km depth isolines at these reconstructions.
Sources of local waves in 1964

Local tsunamis

<table>
<thead>
<tr>
<th>Location</th>
<th>Max runup (m)</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aialik Bay</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Blackstone Bay</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Homer</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Jack Bay</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Kenai Lake</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Chenega</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Seward</td>
<td>12.5</td>
<td>12</td>
</tr>
<tr>
<td>Valdez</td>
<td>52</td>
<td>31</td>
</tr>
<tr>
<td>Whittier</td>
<td>32</td>
<td>13</td>
</tr>
</tbody>
</table>

Total volume of slide material:

- Seward: 0.2 km³
- Valdez: 1 km³

The Alaska coastline has the greatest tsunami potential in the US. The Great Alaska earthquake of March 28, 1964, generated a major tectonic tsunami (25 fatalities) and about 20 local landslide tsunamis (81 fatalities).
**Repeat of the 1964 event:**

**Scenario 13:** Repeat of the 1964-type event: an underwater slide at the head of Port Valdez (HPV-64t slide), V=75-100 million m³.

**Scenario 14:** Repeat of the 1964-type event: an underwater slide at the Shoup Bay moraine (SBM-64t slide), V=115-140 million m³.

**Other hypothetical Scenarios:**

**Scenario 15:** An underwater slide offshore of the Mineral Creek (MC slide), V=20 million m³.

**Scenario 16:** An underwater slide offshore of the Gold Creek (GC slide), V=8 million m³.

**Scenario 17:** An underwater slide offshore of the Lowe River (LR slide), V=8 million m³.

**Scenario 18:** An underwater slide at the Shoup Bay moraine (SBM slide), V=16 million m³.

**Scenario 19:** Simultaneous failure of underwater slide complexes described by scenarios 13–16 (Combined slide), V=270 million m³.
Tsunami Source Issues

• Upper bounds of the maximum and average slip for maximum credible events (on the megathrusts and other local faults); constraints for the up---dip and low---dip limits of the hypothetical ruptures.
• Are a Tohoku---type and outer---rise events possible along AA subduction zone? What would be their maximum slip, magnitude, variation along strike?
• Location of potential splay faults? Slip partitioning between megathrust and splay faults.
• Parameterization of the SLAB 1.0 near Alaska's Prince William Sound region.
• Geodetic, paleoseismic constrains on the tsunami sources.

• Locations for potential submarine mass failures (SMF) along the continental slope in the Pacific Ocean? How to choose appropriate rheology models to use in modeling events.
• Locations for potential mass failures in fjords and along the river deltas?