Modelling coseismic deformation of the 2014 Mw 6.0 Jinggu, Yunnan Earthquake with Radarsat-2 observations

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2014 Mw 6.0 Jinggu Earthquake

(23.383°N, 100.470°E)

- 2 months after Ludian earthquake
- Active seismicity since 2007 in Pu’er region
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(23.383°N, 100.470°E)

- 2 months after Ludian earthquake
- Active seismicity since 2007 in Pu’er region

Independent event

Which fault?
Data

![Graphs showing data plots](image)

![Map with geographic location](image)
Coseismic modelling

Two-step inversion:

- Fault parameter—Multipeak particle swarm optimization
- Slip distribution
Coseismic modelling – fault parameter

Two-step inversion:

- Fault parameter—Multipeak particle swarm optimization
- Slip distribution

<table>
<thead>
<tr>
<th>Model</th>
<th>Location</th>
<th>Focal</th>
<th>Length (km)</th>
<th>Width (km)</th>
<th>Depth (km)</th>
<th>Mw</th>
</tr>
</thead>
<tbody>
<tr>
<td>USGS</td>
<td>100.47 23.383</td>
<td>151 90 -178</td>
<td>-</td>
<td>-</td>
<td>8.5</td>
<td>6.1</td>
</tr>
<tr>
<td>GCMT</td>
<td>100.54 23.38</td>
<td>329 81 174</td>
<td>-</td>
<td>-</td>
<td>12.1</td>
<td>6.1</td>
</tr>
<tr>
<td>Uniform model</td>
<td>100.476 23.392</td>
<td>144.1 88.1 5.0</td>
<td>8.3</td>
<td>4.2</td>
<td>3.2</td>
<td>6.08</td>
</tr>
</tbody>
</table>
Coseismic modelling – optimized dip angle

\[
\begin{bmatrix}
G_0 \\
\alpha^2 L
\end{bmatrix}S = [D]_0
\]

Roughness \( \Psi = \sum_{i=1}^{n} (|P_i|/2n) \)

RMSE \( \xi = \sqrt{(W(D - GS))^2/N} \)

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Coseismic modelling – slip distribution

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Patch</th>
<th>Dip</th>
<th>Max_slip</th>
<th>Std of slip (strike)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>10</td>
<td>140</td>
<td>85</td>
<td>1.4m</td>
<td>0.9cm</td>
</tr>
</tbody>
</table>
Coseismic modelling – uncertainty
Coseismic modelling – result

Uniform model

Distributed model
Fault Property
Fault property

Lancang river fault:
10±1.8 mm/yr
Conclusion

- The rupture occurred on a vertical pure left-lateral strike slip fault with a strike of ~145°.
- The maximum slip is 1.4 m at depth of 3.5 km, equal to a moment magnitude of 6.08.
- It is the first recorded event on the West Lancang river fault (LRF), indicating a hidden fault on the NW of LRF.
- Two Mw5.6 aftershocks occurred on 5 and 6 December 2014, many aftershocks indicate it might be more active than ever.
- Postseismic deformation should be investigated to learn more moment accumulation and release in this region along the fault.