Flowslides and drowned, buried forests at Halden Creek, northeastern British Columbia

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ABSTRACT

Halden Creek has been frequently impounded by flowslides. The landslides are recorded in sedimentary exposures in two ways: 1) Trees died in the resultant temporary lakes and were subsequently partially buried by alluvium. The buried portions of the trees were preserved. Bank erosion exhumed these ancient drowned forests. 2) In some cases multiple organic layers in eroded slide debris record separate flowslide events. Using radiocarbon dates of trees and organic layers, we attempt to reconstruct flowslide history at Halden Creek.
Flowslides and drowned, buried forests at Halden Creek, northeastern British Columbia
Setting

Halden Creek Study Site

Fort Nelson

Prince George

Nelson

Vancouver
Setting

- Buckinghorse Formation (marine shale)
- Sikanni Formation (sandstone - shale)
- Sully Formation (marine shale)
- Dunvegan Formation (sandstone)
Fort Nelson Lowland (Buckinghorse Formation)

Setting

Sully

Dunvegan
Setting
Landslide Types

Rock fall, Rock slides
Landslide types

Translational rock ridge

Large translational bedrock slides
Landslide types

Low-angle rock flow (~ 4 km long)
Landslide types

Low-angle flowslides
(in muddy, low clast content diamicton)
Flowslides

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>sand</td>
<td>21 - 22 %</td>
</tr>
<tr>
<td>silt</td>
<td>47 - 48 %</td>
</tr>
<tr>
<td>clay</td>
<td>31 - 32 %</td>
</tr>
<tr>
<td>Liquid limit</td>
<td>37 - 41</td>
</tr>
<tr>
<td>Plastic limit</td>
<td>17.5 - 20</td>
</tr>
<tr>
<td>Plasticity Index</td>
<td>19 - 21</td>
</tr>
<tr>
<td>Activity</td>
<td>.63 - .65</td>
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- samples contain small angular rock fragments > 2mm
- samples contain some salt, but analyses are not yet complete
Flowslides

- 1997 slide
- Older slide
- Flooding (1 km upstream)
- 600 m
Drowned Forests

997 impoundment

mud up to 7 m above delta top

3.8 m of sand and pebble gravel above 97 floodplain

delta front (Sept 2000)
Holocene Flowslide Record

256 BP
Ancient drowned forest

> 5 m fluvial sand

3757 BP

Diamicton

 Logs in slide debris

Diamicton

Sand
Holocene Flowslide Record

multiple buried organics (8 at site 11) - do they represent distinct episodes of movement, or complex events?
Implications

Slope hazards and silviculture

Should we invest here?
Implications

Slope hazards and silviculture

Should we invest here?