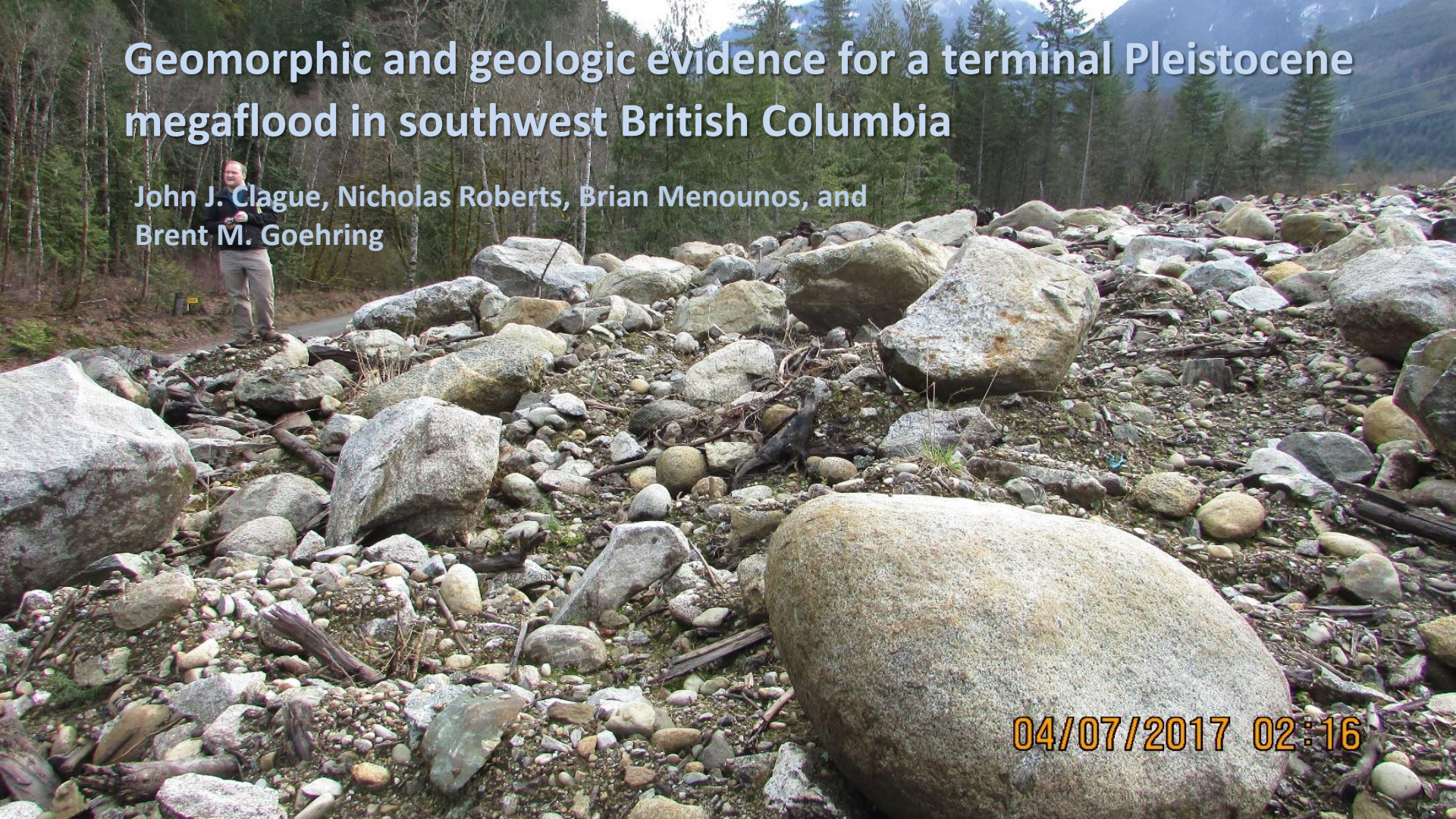
Geomorphic and geologic evidence for a terminal Pleistocene megaflood in southwest British Columbia

John J. Clague, Nicholas Roberts, Brian Menounos, and Brent M. Goehring



PERGAMON

Quaternary Science Reviews 22 (2003) 2327–2334

QSR

Record of large, Late Pleistocene outburst floods preserved in Saanich Inlet sediments, Vancouver Island, Canada

A. Blais-Stevens[a,*], J.J. Clague[b,c], R.W. Mathewes[d], R.J. Hebda[e], B.D. Bornhold[f]

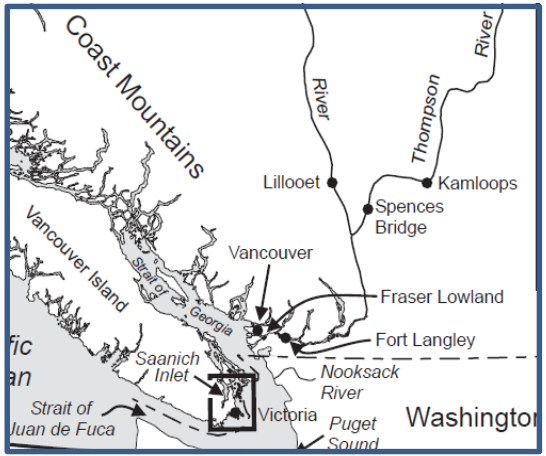
[a] Geological Survey of Canada, 601 Booth Street, Ottawa, Ont., Canada K1A 0E8
[b] Department of Earth Sciences, Simon Fraser University, Burnaby, Canada BC V5A 1S6
[c] Geological Survey of Canada, 101-605 Robson Street, Vancouver, Canada BC V6B 5J3
[d] Department of Biological Sciences, Simon Fraser University, Burnaby, Canada BC V5A 1S6
[e] Royal British Columbia Museum, P.O. Box 9815 Stn. Prov. Gov., Victoria, Canada BC V8W 9W2
[f] School of Earth and Ocean Science, University of Victoria, P.O. Box 3055, Stn. CSC, Victoria, Canada BC V8W 3P6

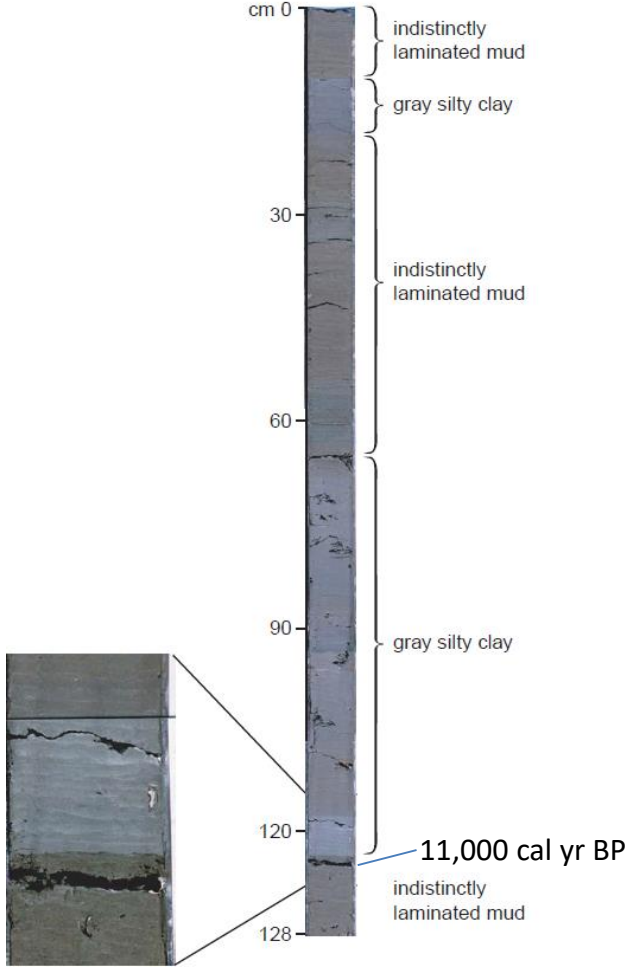
Received 23 December 2002; accepted 27 June 2003

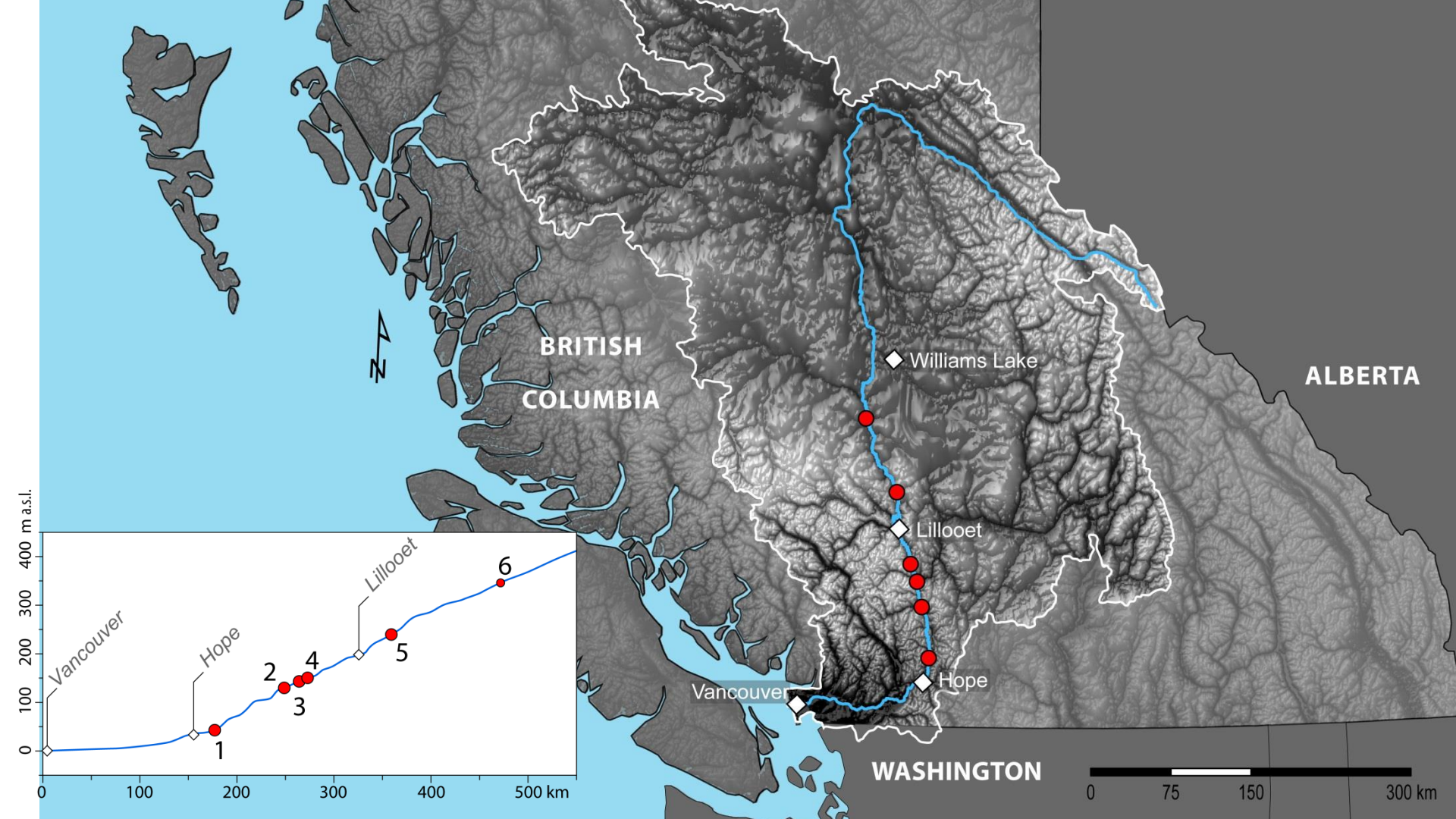
Abstract

Two anomalous, gray, silty clay beds are present in ODP cores collected from Saanich Inlet, Vancouver Island, British Columbia, Canada. The beds, which date to about 10,500 ^{14}C yr BP (11,000 calendar years BP), contain Tertiary pollen derived from sedimentary rocks found only in the Fraser Lowland, on the mainland of British Columbia and Washington just east of the Strait of Georgia. Abundant illite-muscovite in the sediments supports a Fraser Lowland provenance.

The clay beds are probably distal deposits of huge floods that swept through the Fraser Lowland at the end of the Pleistocene. Muddy overflow plumes from these floods crossed the Strait of Georgia and entered Saanich Inlet, where the sediment settled from suspension and blanketed diatom-rich mud on the fiord floor. The likely source of the floods is Late Pleistocene, ice-dammed lakes in the Fraser and Thompson valleys, which are known to have drained at about the time the floods occurred.






BRITISH
COLUMBIA
ALBERTA
WASHINGTON
Williams Lake
Lillooet
Hope
Vancouver
N
0
75
150
300 km
m a.s.l.
400
300
200
100
0
Vancouver
Hope
Lillooet
1
2
3
4
5
6
0
100
200
300
400
500 km

Key attributes of flood path

- Deep valley 1-6 km wide
- Dissected valley fill of Quaternary age
- Colluvial fans and aprons of early Holocene age
- Flights of fluvial terraces of early and middle Holocene age

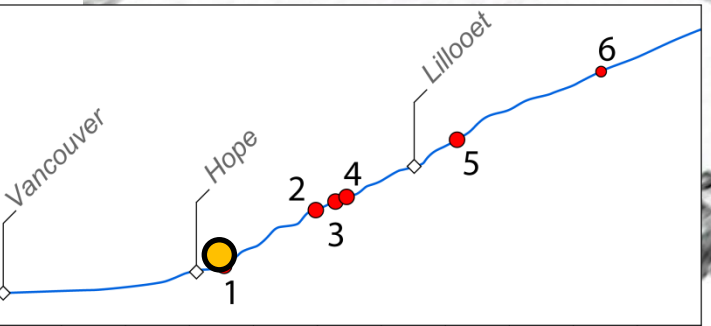
Yale

Boulder

Kettle

Fraser River

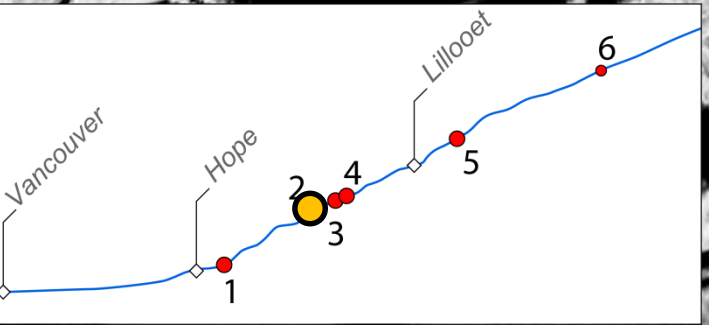
250 m

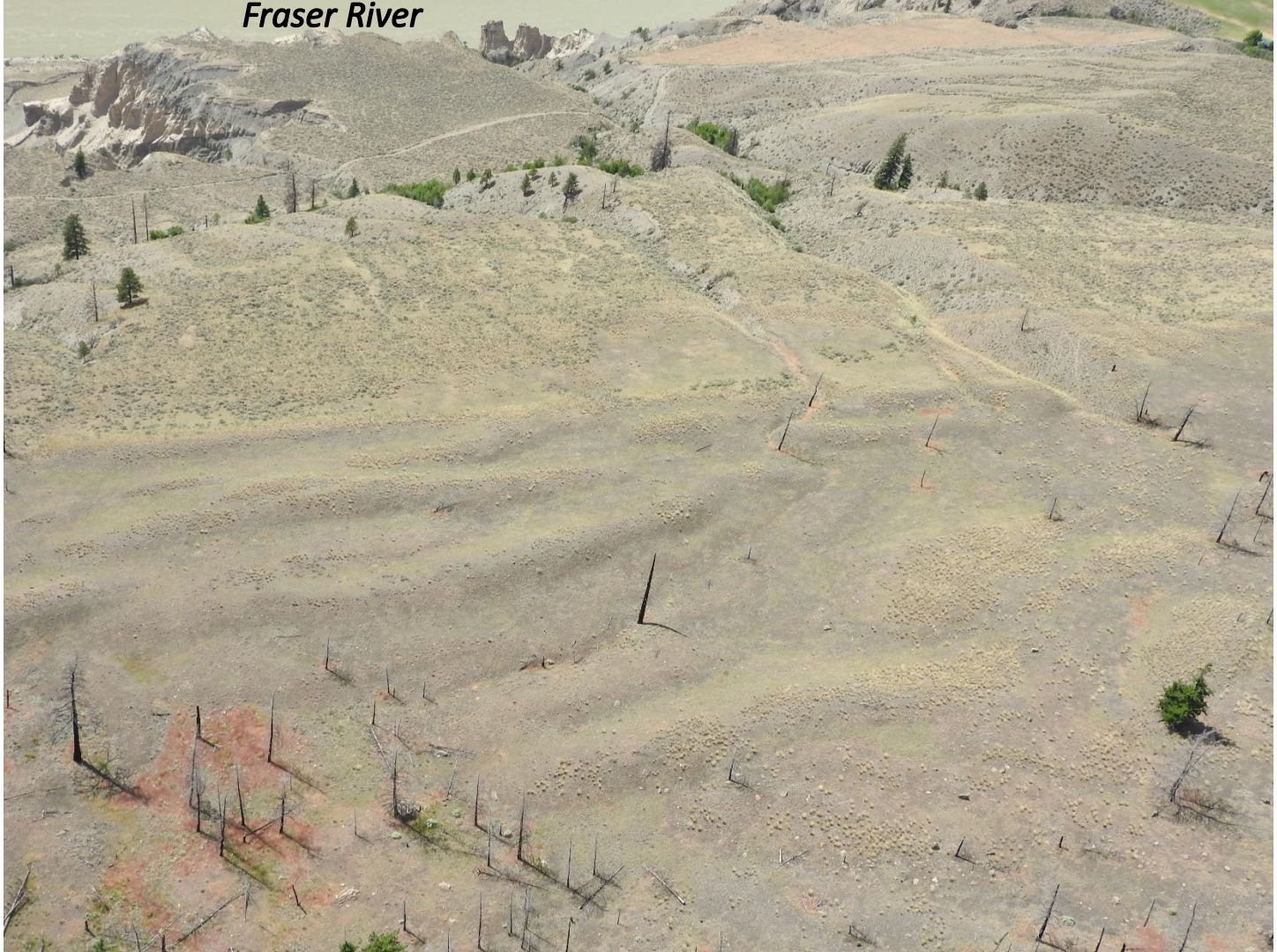


Stein River

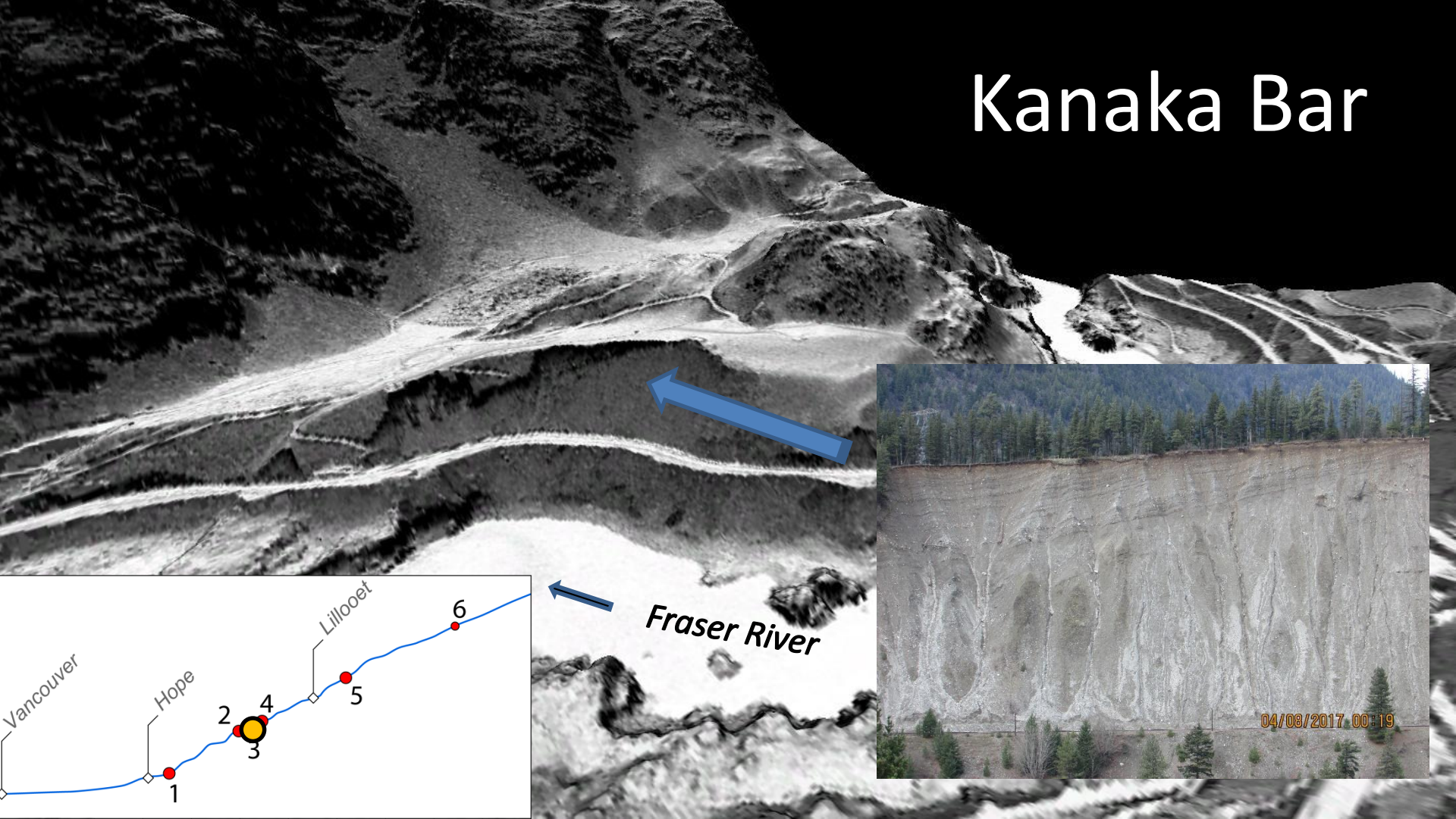
Fraser River

250 m



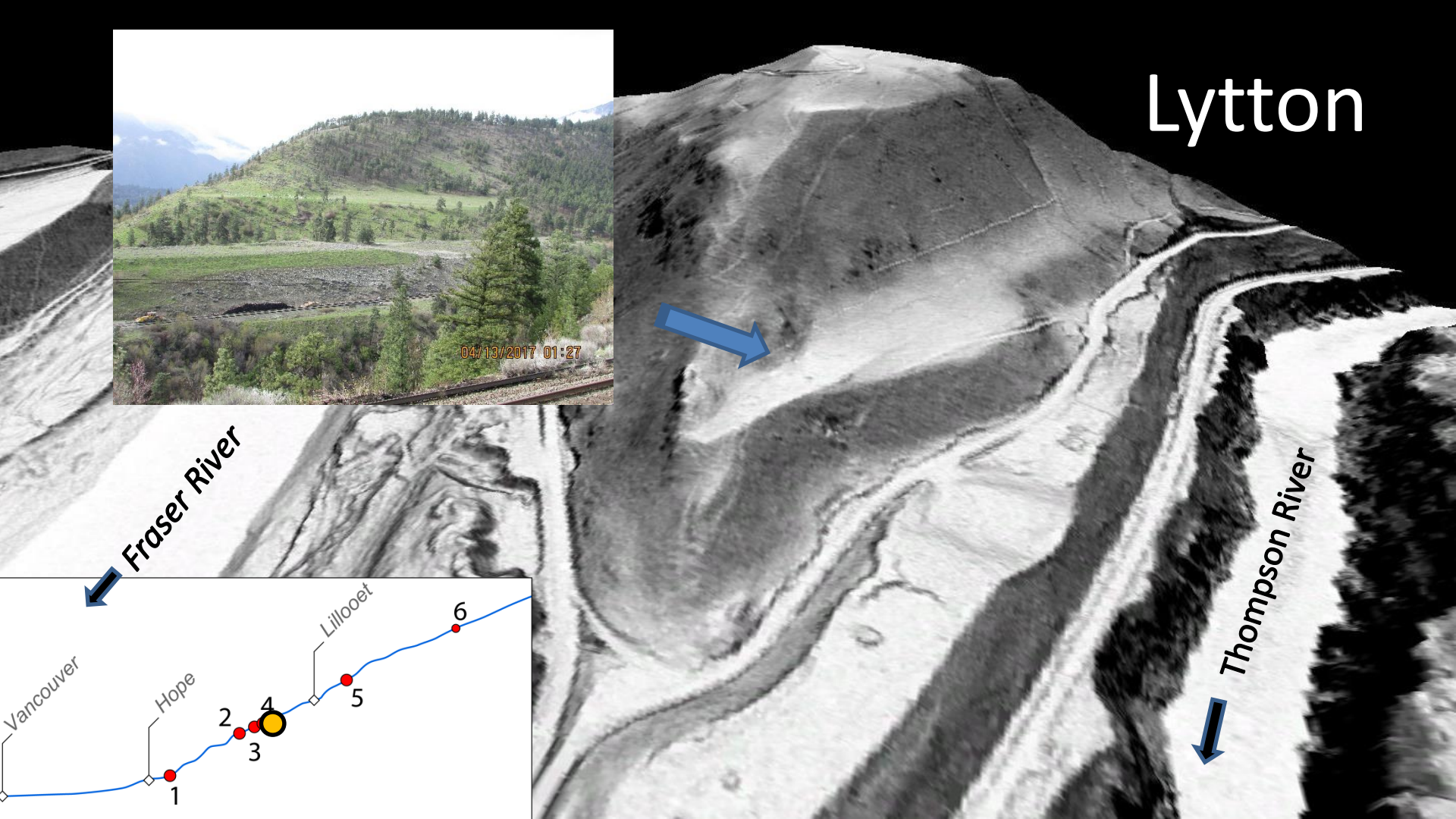

Fraser River

Kanaka Bar

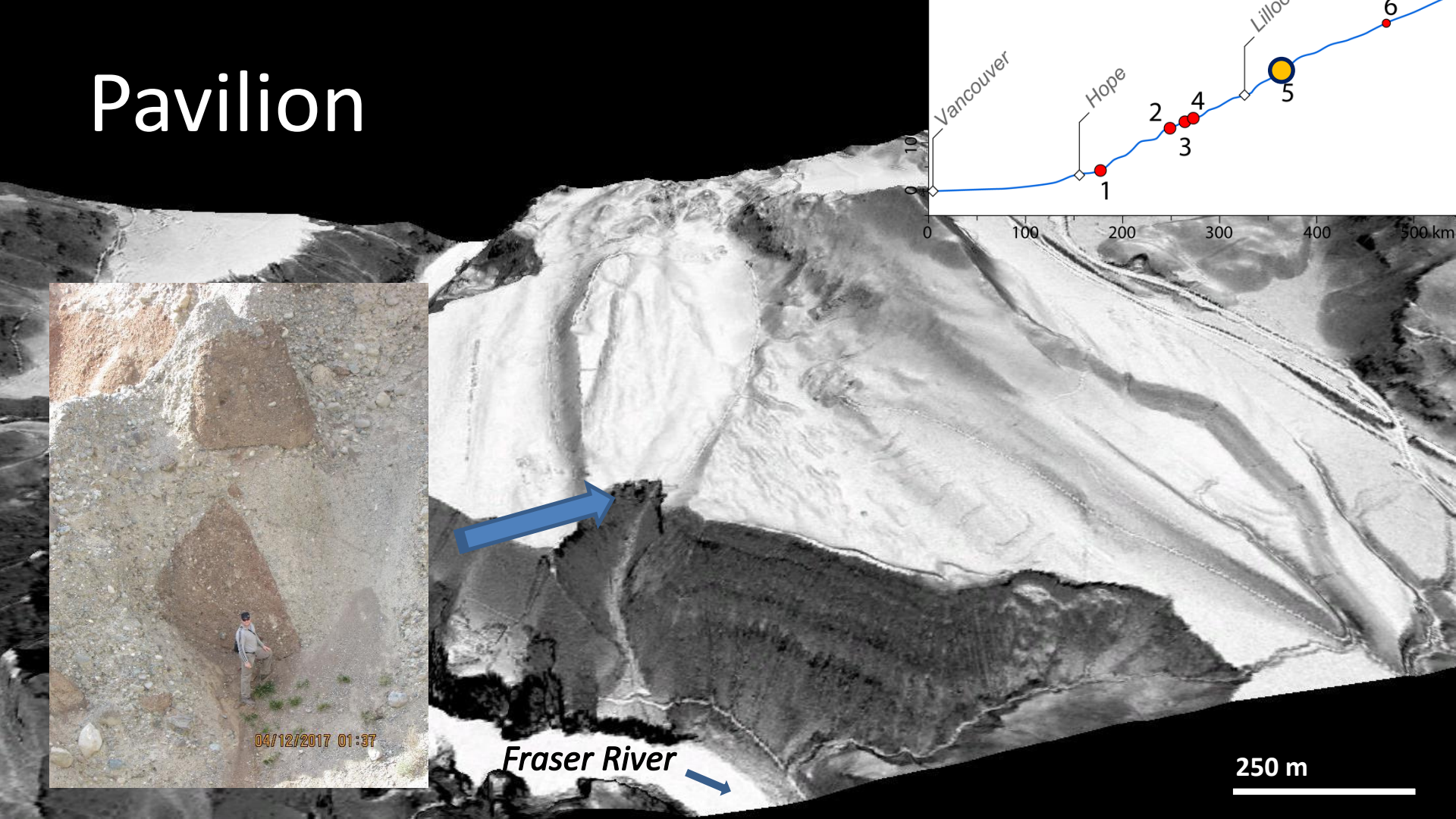

Fraser River

Vancouver
Hope
Lillooet
1
2
3
4
5
6

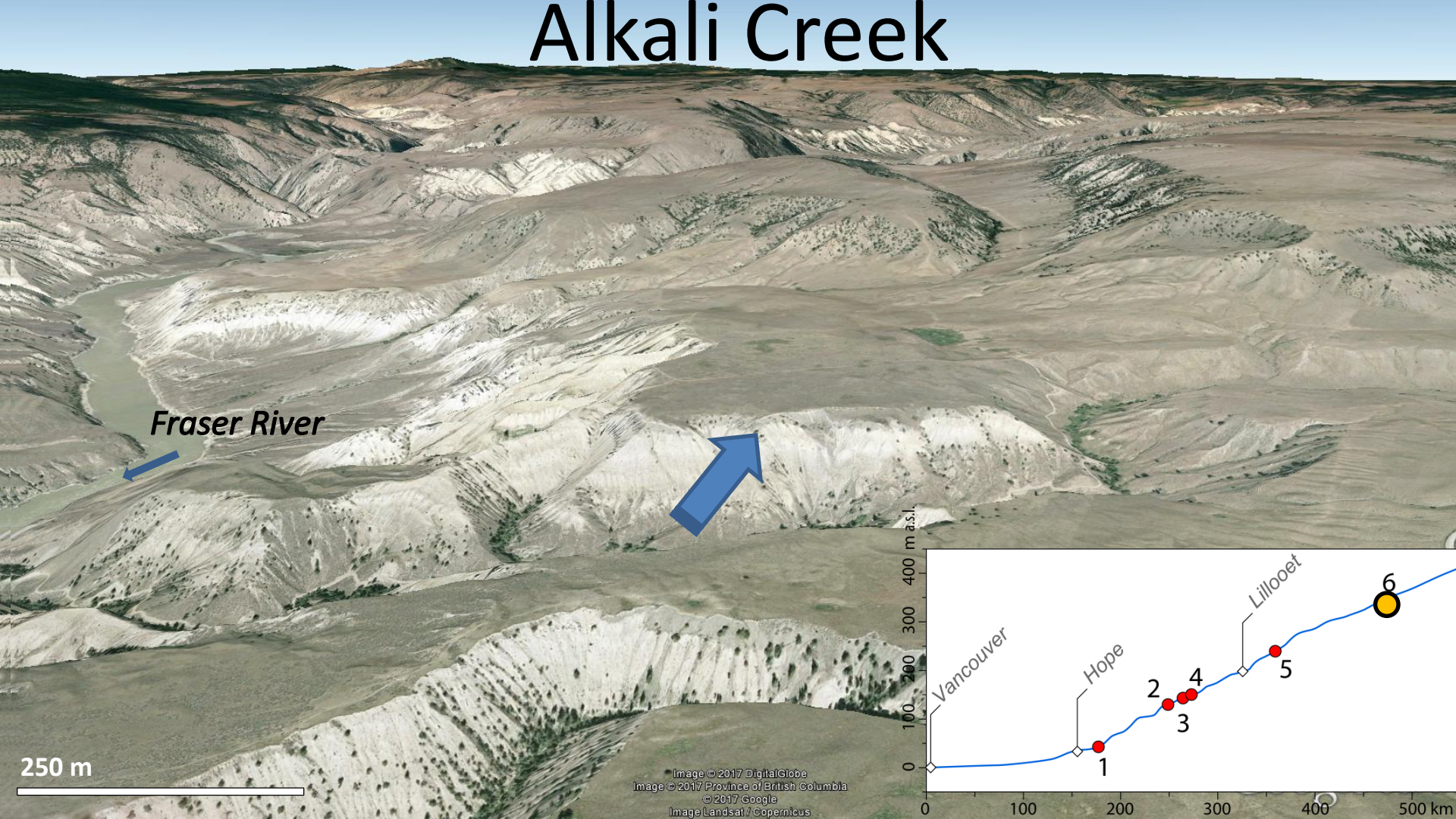
04/08/2017 00:19

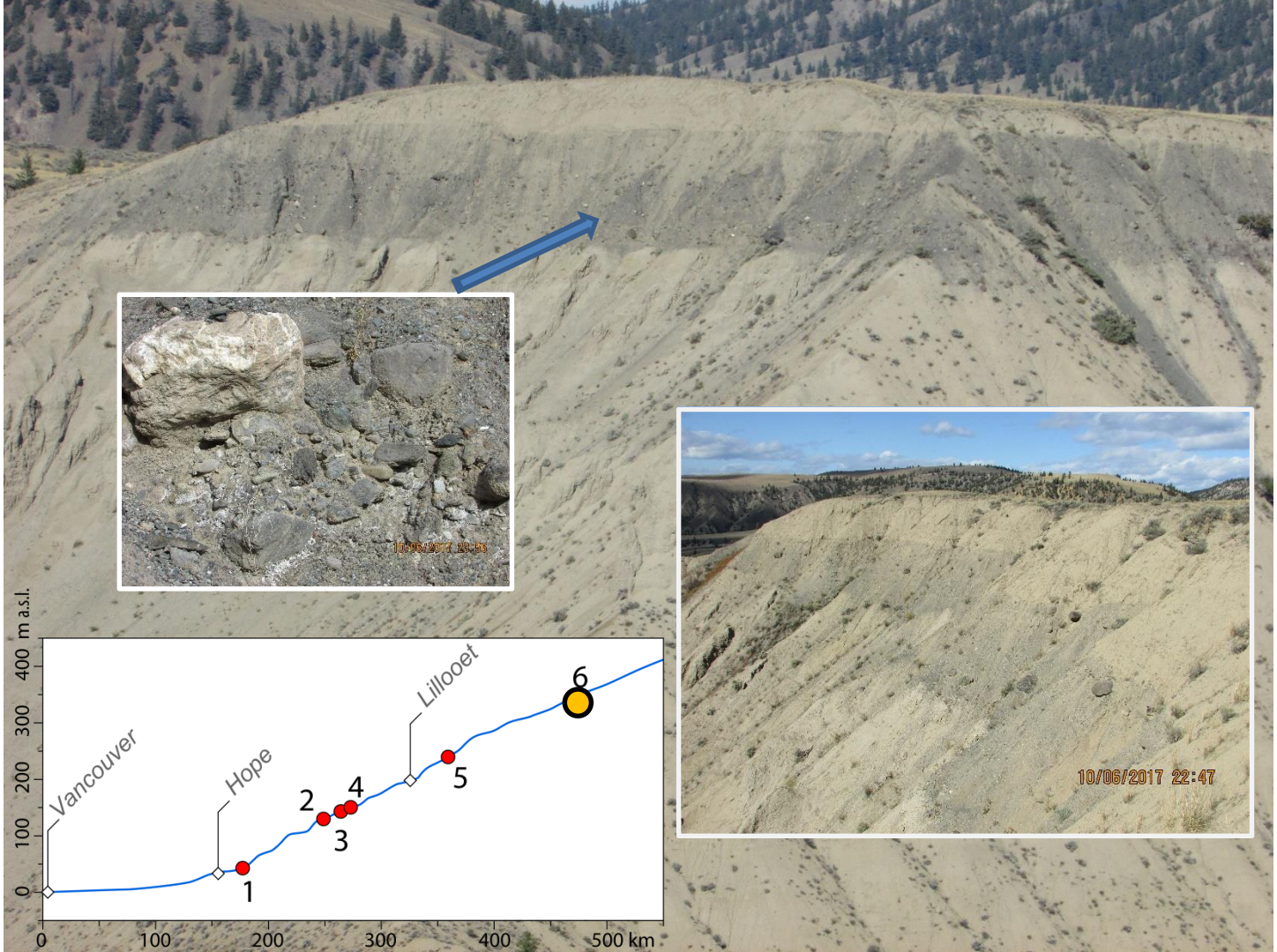

Lytton
04/13/2017 01:27
Fraser River
Thompson River
Vancouver
Hope
Lillooet
1
2
3
4
5
6

Pavilion


Vancouver
Hope
Lillooet
1
2
3
4
5
6
0
100
200
300
400
500 km
04/12/2017 01:37
Fraser River
250 m

Alkali Creek

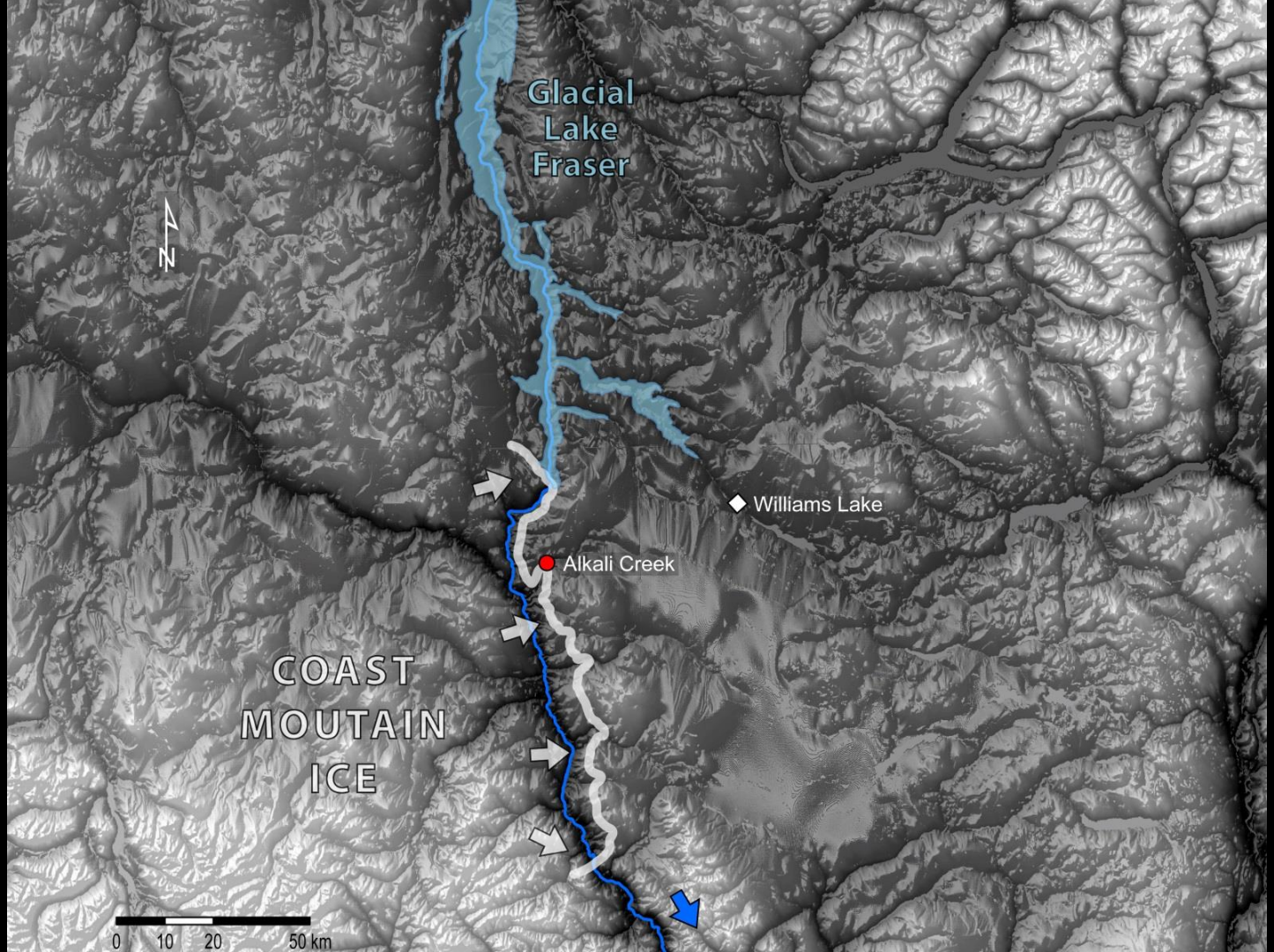



10/06/2017 22:47
m a.s.l.
400
300
200
100
0
Vancouver
Hope
Lillooet
1
2
3
4
5
6
0
100
200
300
400
500 km


Till rip-up
Vancouver
Hope
Lillooet
1
2
3
4
5
6
400 m a.s.l.
300
200
100
10/07/2017 23:08


Boulder,
ca. 20 m across
10/07/2017 23:52


Glaciolacustrine silts
Jokulhlaup deposit


Glacial
Lake
Fraser
N
Williams Lake
Alkali Creek
COAST
MOUTAIN
ICE
0 10 20 50 km

Key questions

- What is the age of the flood?

Key questions

- What is the age of the flood?
- Were there two floods, separated by years or decades?

Key questions

- What is the age of the flood?
- Were there two floods, separated by years or decades?
- What effect did the variable morphology of the valley have on the flood(s)

Key questions

- What is the age of the flood?
- Were there two floods, separated by years or decades?
- What effect did the variable morphology of the valley have on the flood(s)
- What were the peak discharges and durations of the flood(s)?

Key questions

- What is the age of the flood?
- Were there two floods, separated by years or decades?
- What effect did the variable morphology of the valley have on the flood(s)
- What were the peak discharges and durations of the flood(s)?
- How was the Fraser Lowland impacted by the flood(s)?

Key questions

- What is the age of the flood?
- Were there two floods, separated by years or decades?
- What effect did the variable morphology of the valley have on the flood(s)
- What were the peak discharges and durations of the flood(s)?
- How was the Fraser Lowland impacted by the flood(s)?
- What is the explanation for the upriver-sloping benches?


Questions