Progressive Growth, Modulated Supply:
Slump/Fan interaction dictates the timing of sediment supply from a retrogressive thaw slump along the Selawik River, Northwest Alaska

Benjamin T Crosby - Idaho State University - crosby@isu.edu

Water Quality Impacts

Water Quality Data:
3 sondes installed 09
- temp/ conductivity
- turbidity / stage
- dissolved oxygen
Freq: 30 min  Duration: 07/26 - 10/01

Water Quality Data:

-27 m Erosion
+6 m Fill

Topographic Form and Evolution

Pre-Slump July, 2007 July, 2009

Topographic Change:

Dimensions
200 X 220th
25m headwall
540,000 m3 eroded
- 184,000 m3 in fan
356,000 m3 /lux

Repeat surveys from 2007 and 2009:
33m headwall retreat
No elevation change

Interval cameras record timing and magnitude of fluxes at 4 hr intervals

Lag in sediment delivery is correlated with stage
Downstream decrease in amplitude of turbidity signal

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Acknowledgements
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- National Science Foundation (ARCSS - Award 0806465)
- Idaho State University - FRC

Pan-Arctic Temperature Anomaly (°C)

Selawik Slump:
- Northwest Alaska
- Selawik River
- First observed in 2004
- Largest thaw slump feature known in Alaska
- Selawik village ~140 km dstm.
- River is a key fish hatchery and flow through a National Wildlife Refuge

Arctic warming rates are the fastest globally for both past records AND future predictions

Thermal Erosion Features ("Thermokarst")
1. Warming thickens the active layer above the permafrost table
2. Shallow mass movements strip tundra insulation
3. Exposure allows rapid thaw of frozen ground. Accelerates growth

200% Increase in failure frequency in the last 25 years

Explicit impact on hillslope hydrology & sediment delivery to channels and lakes.

Lag Time (days)

River Stage (m)

Headwall

River/Fan Toe

Time

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