

# Report as of FY2007 for 2006AK50B: "Watershed Response to Forest Fires in Cold Regions: Channel Development and Suspended Load Variation in Streams in Interior Alaska"

## Publications

- Conference Proceedings:
  - ◆ Toniolo, H., Kodial, K., Hinzman, L. and Yoshikawa, K. Climate change and its effects in Interior Alaska, USA. Proceedings of XXII Latin-American Congress of Hydraulics; Latin-American Region of the IAHR. Guyana city, Venezuela, (2006)
  - ◆ Toniolo, H. and Kodial, P. Suspended sediment load variation in a sub-arctic watershed in Interior Alaska. 4th IAHR Symposium on River, Coastal and Estuarine Morphodynamics, Urbana , IL . 2005.
- Other Publications:
  - ◆ Kodial, P., Toniolo, H., Hinzman, L. and Yoshikawa, K. Thermokarst evolution in sub-arctic Alaska : A study case. ASCE Water Resources Congress. Anchorage , AK . 2005.
  - ◆ Duvoy, P.X. & H.A. Toniolo. 2006. Watershed Response to Boreal Forest Fires in Interior Alaska. Conference presentation for American Geophysical Union, Fall Meeting 2006.

## Report Follows

**State:** AK

**Project Title:** Watershed response to forest fires in cold regions: channel development and suspended load variation in streams in Interior Alaska – Final Report.

**Project Type:** Research

**Focus Category:** Hydrology, Surface Water

**Keywords:** Suspended load, soil erosion, channel formation, mapping, discontinuous permafrost.

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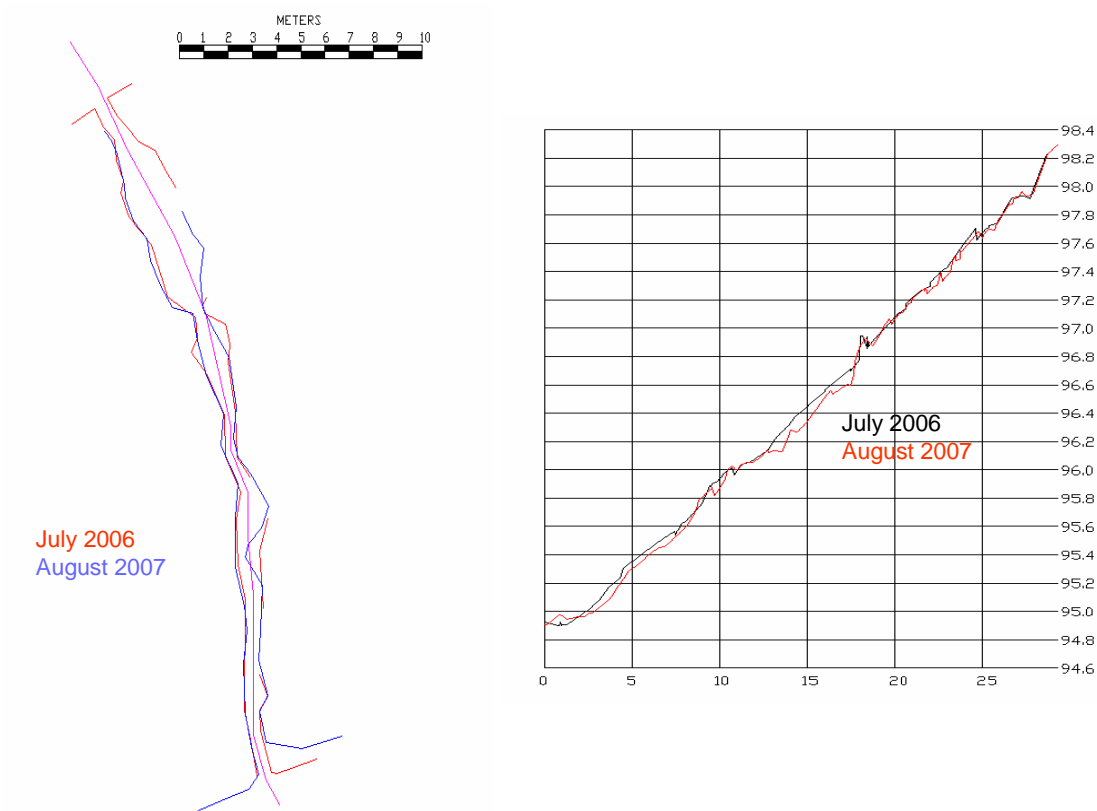
### **Summary of activities and results**

Instruments including pressure transducers, dataloggers, and autamplers were installed in two streams in the Caribou-Poker Creeks Research Watershed (CPCRW) and Boston Creek. Instruments were deployed in the field after spring breakup and removed at the end of summer of 2006 and 2007. Water samples were collected every day. Boston Creek was gaged every two weeks during the field seasons. Suspended load concentrations were determined at UAF's laboratories. Topographical surveys were conducted in an area where a small channel developed as a consequence of firefighter activities. These tasks were carried out by students Paul Duvoy (2006) and Jonathan Huchthinson (2007). Results from this work were presented at 2006 and 2007 AGU Fall Meetings. Main results and findings are described below.

Figure 1 shows the temporal evolution of the small channel and the recovery of vegetation in an area affected by fire suppression activities, near the access to C4 in the



**Figure 1.** *Landscaped evolution in the area affected by fire suppression activities; channel developed in August 2005 after rainfall events (left), channel in June 2006 (center), reestablished vegetation in August 2007 (left).*



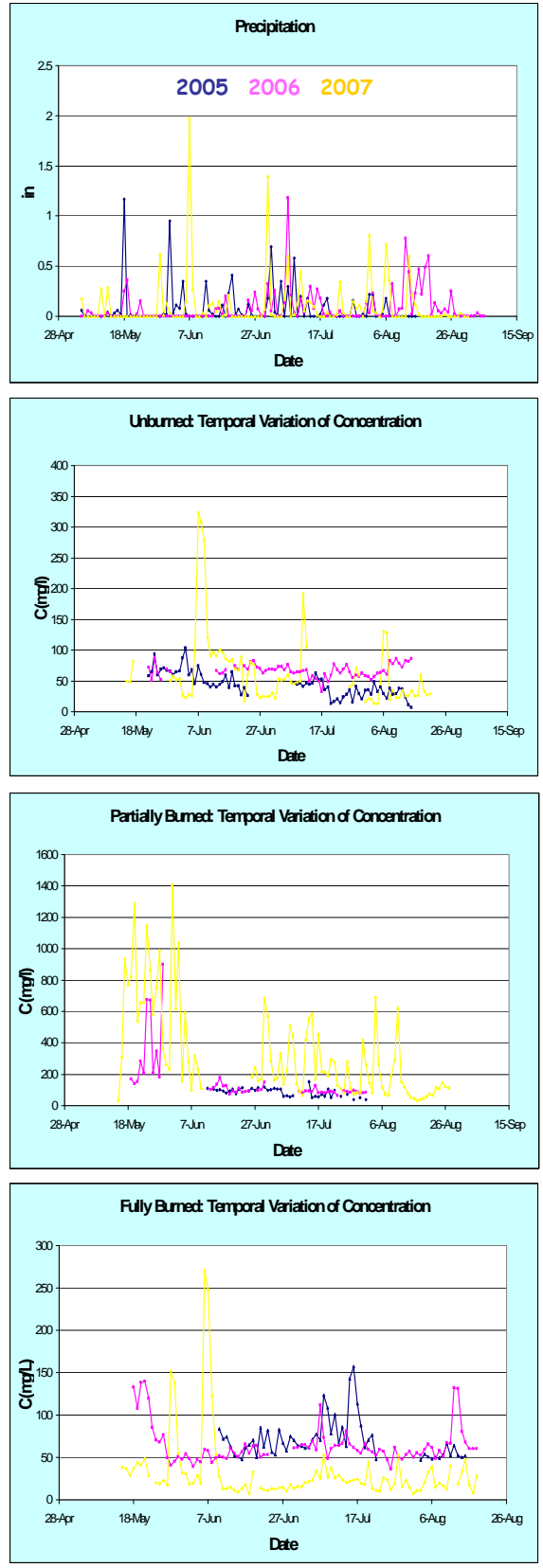
**Figure 2.** *Channel topography. Plan view (left), longitudinal profile (right). Channel widening and deepening is evident. Datum elevation is 100 m (arbitrary).*

CPCRW. Available data suggests that vegetation is reestablished in the area. Figure 2 shows the channel plan view and thalweg longitudinal profile.

The channel is continuing its development. The channel depth is increasing along the entire reach; channel widening is evident near the mouth. While erosion continues to be an active process, natural recovery is also evident, and the development of the channel seems to be slowing down.

Initial work on suspended load in streams in the CPCRW (C4, fire-free; P6, partially burned) and Boston Creek (fully burned) was initiated by Kodial and Toniolo during the summer of 2005. These streams were systematically sampled during 2006 and 2007. Also, the response of suspended load in streams to rainfall events was investigated last year. Precipitation data corresponding to 2005, 2006 and 2007 come from a weather station located near the Boston Creek.

Figure 3 shows the precipitation records and suspended loads for C4, P6, and Boston Creek from top to bottom respectively. Data covers a period of three years after the initial fire, which occurred in 2004. Graphs indicate that, in some watersheds, the concentrations decreased from 2005 to 2007, particularly in the fully burned watershed. The unburned zone has remained relatively constant. Data for the partially burned stream indicates enormous changes in the concentration during the summer of 2007. These changes are attributed to local-channel instability conditions in the sampling area. Last year (2007) experienced a higher amount of rainfall than the previous two years. In general, peaks in sediment concentrations are in phase with precipitation events.



**Figure 3.** Temporal variation of precipitation and suspended loads in studied streams.