

## Fall 2010 CSAM Newsletter

**Title:** Something is happening out there

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I am a doctoral student in the Ph.D. in Environmental Management program at Montclair State University. This summer I had the opportunity to participate in a 21-day expedition to the Arctic: the vast tundra of the North Slope of Alaska. The trip was part of a research project funded by NASA directed by principal investigator Dr. Mark Chopping (Department of Earth and Environmental Studies). The goal was to collect ground data to calibrate and test canopy reflectance models that will allow tracking of trends in shrub abundance and biomass in arctic tundra from the year 2000 using multiangle reflectance data from NASA's Earth Observing System sensors that orbit the planet.

The trip was truly awe-inspiring – and epic: we visited 14 study sites located along the Chandler and Coldville Rivers. Our team had only three people: Ken, a PhD student at the University of Alaska, Fairbanks and experienced arctic traveler (his book *The Changing Arctic Landscape* was published recently); Jesse our assistant; and, myself. Our journey demanded physical stamina as it involved a lot of boating and hiking. Every other day, we would boat for about five hours to reach the next site, set up camp, and then go sampling (at these high latitudes there are about 11 hours of sunlight in the summer). In one day we would hike 4 to 5 miles. This does not sound like much but on tussock tundra the average walking speed is 1 (one) mph! Suffice to say, tussock tundra is not a homogeneous terrain but has gaps between the tussocks: some people say it is like walking on footballs. We collected structural and multispectral information of the vegetation under any weather condition, rain or shine, with or without mosquitoes (mostly with). From morning to evening our days were full of shrubs: knee height, breast height, or even three meters tall. In Alaskan tundra, shrubs are able to proliferate rapidly – unlike trees.



One evening we were boating when it suddenly started misting and a very strong headwind picked up. We were rowing very hard but barely making any progress. Just in time – before it started raining – we decided to stop and camp on a sand bar. For two days in a row it had rained continually, something not common according to my Alaskan colleagues. We all pitched our tents a little apart from each other and went to bed. Next morning when I woke up, I saw Jesse's tent right next to mine and all the equipment piled up near to us. The water was only five feet from us, and we were in a kind of island. The river had risen overnight and was about 10 meters closer! They later told me that Jesse had woken up at 3 am and

seen that the water had risen right up to his tent. They had called me but I didn't answer... that night I had decided to use ear plugs to isolate all sounds; lucky for me that my tent was on a higher spot and did not get flooded. After that, no more ear plugs.

Something is happening out there. During our trip, Ken and Jesse, two seasoned Alaskans, were very surprised that there were two very sunny, hot days where the air temperature was around 80° F. They even had to put on sun-block! Although one year or season cannot tell us anything about climate – even with the extremes of heat and precipitation we have seen – there is a consistent warming trend over decades. We were eyewitness to some of the changes happening in the tundra and our goal is to know at what pace these changes are happening. If shrubs expand their range and abundance rapidly over the next decade or two, it will reduce the albedo (brightness) of the tundra as the leaves of shrubs are darker than tussock grasses and lichen, making the surface absorb more sunlight (and so warm). Shrubs also increase evapotranspiration, so arctic hydrology would be affected. Clearly, the arctic is changing with but the rate and extent cannot be assessed on the ground. Our NASA-supported research will help us to map shrub expansion over huge areas from space.

