Detecting Snow Cover on GPS Antenna

ASEN6090 Final Project

Kyle Wolma
Logan Finch
Praveen Vikram

Department of Aerospace Engineering Sciences
Colorado University
kyle.wolma@colorado.edu
logan.finch@colorado.edu
praveen.vikram@colorado.edu

April 13, 2012

Outline

- Goals
- Sites
- Parameters
- Site Photos
- Preliminary Plots

Goals

- Generate an index representative of snow cover over GPS antenna
- Considerations for Reflections study:
  - Snow cover directly over the antenna is not going to affect received signal power from lower elevation angles.

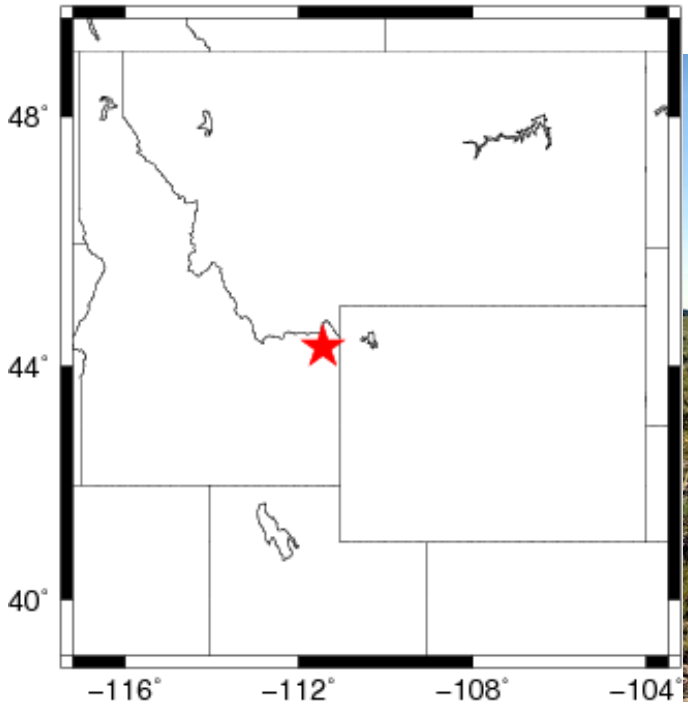
Sites

Sites for Primary Study

- P360
- P101

Both the above sites have a digital camera installed on site.

P360 Summary



- Station Installation Date: 2005-06-29 00:00:00
- Monument Installation Date: 2005-06-29 00:00:00
- Trimble NetRS Receiver
- TRM29659.00 Antenna with a Radome

P360 - Feb 21

P360 - Feb 22

Data Used

- Data with snow on antenna: Feb 21
- Data without any snow on antena: Feb 22
- Satellite Track Used: PRN17
  - visible around the same time the photos were taken
  - rises upto 89.4^o

Parameters

- MP_1
- Signal to Noise Ratio (SNR)
- Phase Cycle Slips

SNR

Heuristic

- Accumulate expected SNR data as a function of elevation and PRN.
- Use above data as a control data set to estimate power loss due to snow cover on antenna.

SNR

Modeled I

- Use simple EM model to calculate signal loss through a slab of snow.
- estimate the snow cover over antenna, using the signal loss from direct signal power.