Detecting Snow Cover on GPS Antenna

ASEN6090 Final Project

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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:
  - How much of an effect will Snow cover directly over the antenna have on received signal power from lower elevation angles.

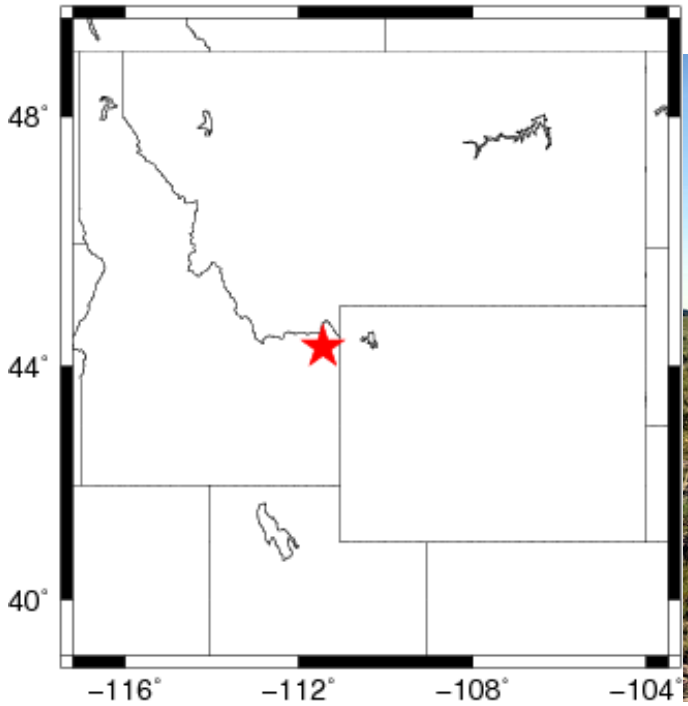
Sites

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
  - has L2c

Parameters

- MP_1
- Signal to Noise Ratio (SNR)
- Position Time Series

SNR

Heuristic

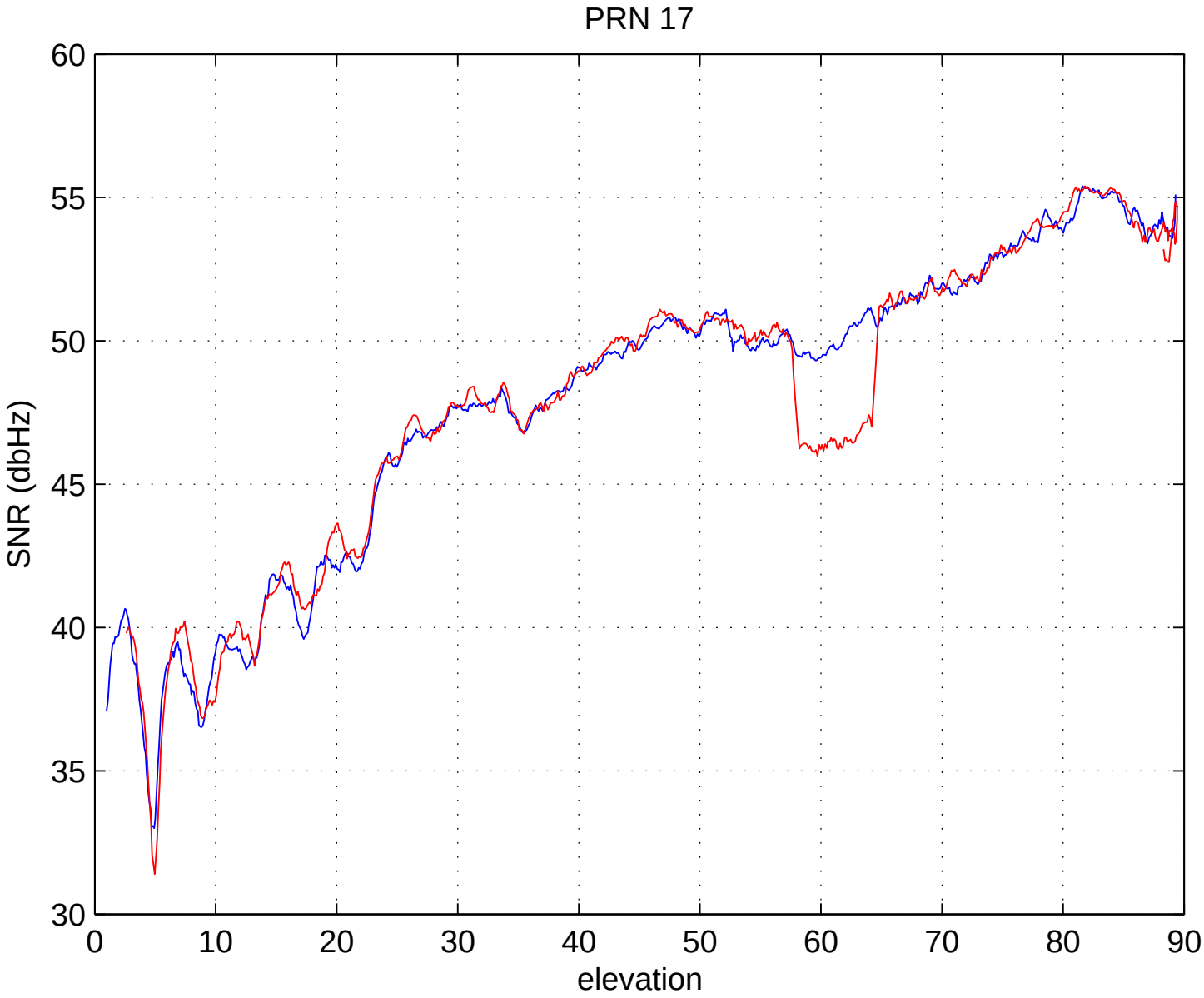
- Accumulate SNR data as a function of elevation and PRN to generate an expectation map.
- Use above data as a control data set to indicate if received signal power is lower than expected.
- Can indicate snow cover.

SNR

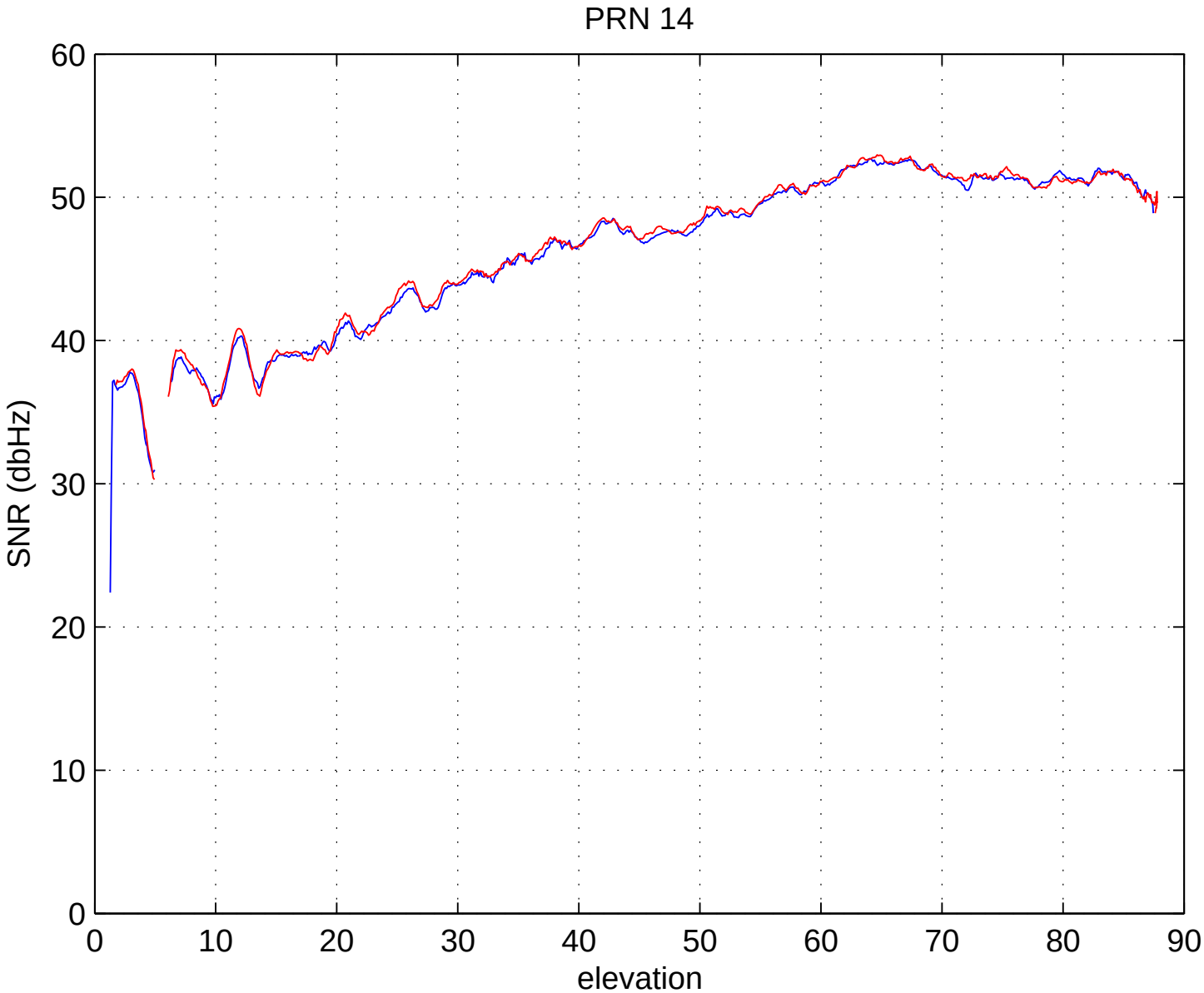
Model

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

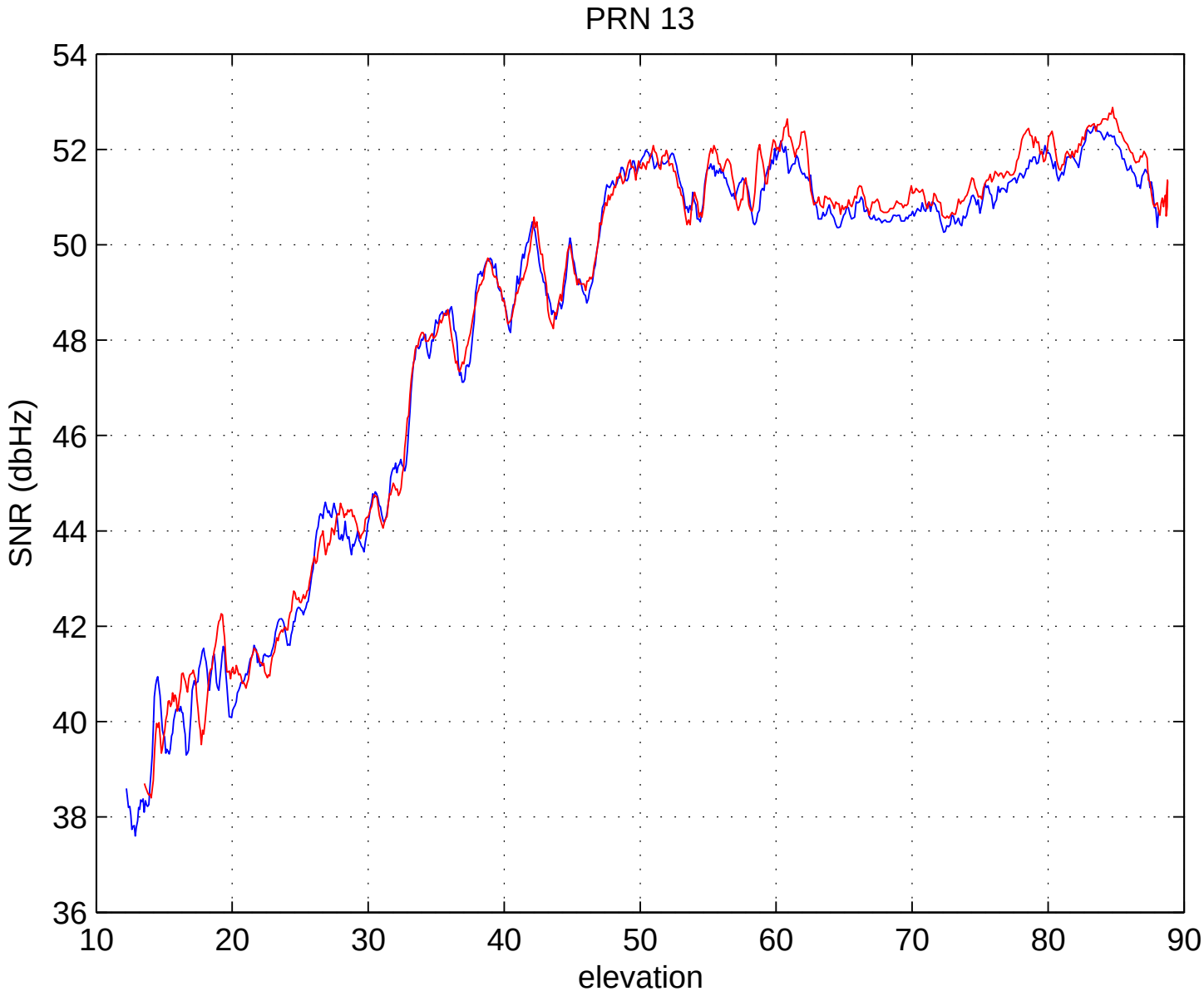
SNR Plots


PRN 17
SNR (dbHz)
elevation
60
55
50
45
40
35
30
0
10
20
30
40
50
60
70
80
90

SNR Plots



SNR Plots


PRN 13
SNR (dbHz)
elevation
54
52
50
48
46
44
42
40
38
36
10
20
30
40
50
60
70
80
90