

HJ Andrews Climate Station Review Committee Field Report September 10, 2007

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Introduction

A group of interested researchers at the H.J. Andrews visited each of the benchmark stations to assess the site characteristics: vegetation, sensor location, and site management. The review of the sites was focused on making snow pack measurements and ensuring a consistent long-term climate measurement. The main objective of this field visit was to:

1. Develop guidelines for site maintenance
2. Ensure measurements will create a long-term dataset useful for analyzing climate and snowpack trends

Each benchmark site (VANMET, UPLMET, CENMET, and PRIMET) was reviewed with these objectives and decisions were made at numerous sites for action to be taken. VANMET in particular requires additional discussion to reach a consensus. Presented here is a description of decisions made at each site.

VANMET



Pictures 1 & 2. Left, VANMET 9/07; Right VANMET 1994

VANMET climate station poses the most complicated site management issues. This is due to its unique location topographically and the surrounding vegetation growth. VANMET was originally installed here as part of a reference stand experiment and became one of the first benchmark stations. The site is located in a clearcut, on a steep, south facing slope. This location makes it the windiest benchmark station. In data

analysis done by Chris Daly (pers. comm), the air temperatures measured at the site most closely represents the general air masses. However, due to the high winds at the site, collecting reliable precipitation data has been an issue in the past. A new precipitation gauge was installed (1998) in an upslope, open meadow.

The main vegetation issues at VANMET are:

1. Tree growth to the south (downslope) will affect windspeed, solar radiation, and temperature.
2. Upslope trees will also affect temperature and windspeed.

The main issues facing snow measurements

1. There is only 1 steel snow pillow.
2. The slope below the snow pillow drops abruptly.
3. Trees to the south (downslope of the snow pillow) have grown to a height of ~20-30 ft. This directly affects the melt regime of the snow pillow.
4. The transducer is buried next to pillow, due to the snow pillow location downhill from the shelter. This makes it impossible to service the transducer during the winter.

The group did not reach a definitive decision on how to move forward with vegetation management. It seems clear that the site is affected by vegetation and if action was taken to remove the vegetation, there would be a signal of change in snow, wind, and temperature data. It was recommended that an investigation into the existing data be undertaken in an attempt to detrend the data and look the affects the shelterwood has on the data.

VANMET PRECIPITATION GAUGE

The VANMET precipitation gauge site located up slope, in an open meadow. This site has been ideal for collecting precipitation data. The meadow has not been encroached by the surrounding forest and remains consistent with the initial site installation. This meadow offers an alternative site for the VANMET climate station, an additional site, or auxiliary site. The location would be ideal for snow measurements due to the protection of the surrounding forest. Windspeed data would be affected by the forest. This site was considered to be an ideal site for long-term climate data collection. The first step will be to measure the snowpack at the site this winter. It was agreed that a snow depth sensor should be mounted at the site and a snow course should be established.



Pictures 3 & 4. VANMET upper precipitation gauge and meadow

VANMET SUMMARY

1. Vegetation management suggestions:
 - Remove the first row of trees directly downslope from the site – and look for signal in the data
 - Remove upslope trees
 - Leave the site as is – and by default becomes an investigation on the vegetation effects.

2. Snow pillow suggestions:
 - Move pillows upslope next to the shelter. This would require, leveling a pillow pad, and removing trees. However, this would allow the transducer to be housed in the shelter and allow the installation of a manometer for manual snow pillow checks.

3. Establish a site in the meadow
 - Possibly in addition to VANMET
 - Include this into the LTER6 planning
 - Establish a snow course at the precipitation gauge site
 - Install a snow depth sensor

4. Review data
 - Attempt to detrend vegetation effects in the existing data

CENMET



Picture 5. CENMET 1998



Picture 6. CENMET 9/07

The CENMET station has similar issues to VANMET. The site was established in a clearcut when the seedlings were less than 3 feet tall. Since then, the trees range in height from 10 to 30 feet. These changes are very clear in the pictures following installation compared with September 2007. The growing forest will have an affect on the measurements being made, but are not likely a major influence at this point. This site has changed dramatically and will continue to change as the forest matures.

An opening has been maintained around the tower ~ 40 feet in diameter. The trees along the edge of this boundary need to be removed and the opening maintained at a larger diameter.

The snow pillow, shelter, precipitation gauge, and snow lysimeter need have the trees, brush, and vegetation removed from around them.

CENMET SUMMARY

Vegetation management

- Chris Daly outlined which trees will be removed surrounding the tower. Generally the first 2 rows of trees.
- Brush and saplings around the snow pillows needs to be removed. The taller trees to the north need to be cut down.
- Trees behind the house need to be cut.
- Trees around the precipitation need to be cut
- Brush and trees surrounding the snow lysimeter need to be removed.

UPLMET



Picture 7. UPLMET 1994



Picture 8. UPLMET 9/07 from the roof of the house

UPLMET station is the highest benchmark site within the HJA. The site was established in a clearcut and has been subject to forest regeneration. Many of the trees surrounding the site are reaching heights of 30+ feet. These trees are interrupting the sites viewshed and many of them will need to be removed. Many of the seedlings in and around the site have been maintained over time. The vegetation surrounding the snow pillow provides a sheltered location and is not negatively impacting measurements. Numerous trees surrounding the precipitation gauge need to be removed. Trees to the south of the shelter are infringing on the viewshed of the shelter top precipitation gauge and the pyranometer. Vegetation which needs to be cut was flagged.

UPLMET SUMMARY

Vegetation management

- Chris Daly and John flagged vegetation to be removed surrounding the shelter, tower, and precipitation gauge
- Shrubs and brush surrounding the snow pillow and snow lysimeter should be removed and maintained annually.
- The viewshed from the tower and shelter top should be monitored to ensure growing vegetation does not affect the measurements

PRIMET



Picture 9. PRIMET 1994

The vegetation surrounding the PRIMET station has been within the fenced in area. This has been done in accordance with past NADP monitoring. However outside the fence, trees have grown and will have an influence on site measurements. The majority of these trees are large and ~ 50-70 feet tall. The size and aesthetic impact need to be considered. The precipitation gauge is not within the fenced area and is being influence by some of the older surrounding vegetation as well as younger trees (20-30 ft tall). These trees will be removed.

PRIMET SUMMARY

- Chris Daly and John flagged the vegetation to be removed
- Some of the older trees that are far away distance wise, but encroaching on the skyview, may be left for aesthesis.

OTHER SITES

The additional meteorological stations – HI-15 and CS2MET - were not taken into consideration for this review. Both of these two stations are within closed canopies and were established under those conditions. Precipitation data at CS2MET are the longest records in the HJA and the site is affected by surrounding old growth. HI-15 is influenced by the forest canopy and the affects of the road junction.

SUMMARY

Vegetation at all of the HJA benchmark stations has become an influence on the measurements. The group has specified what needs to be done at PRIMET, UPLMET, and CENMET. The vegetation at these sites needs to be maintained on an annual basis, to avoid major impacts on the data records. It also needs to be recognized that these sites are in unnatural clearings. While it is possible to maintain a footprint for the station, the surrounding forest will develop and influence measurements in the future. It is unrealistic to manage the surrounding forest, but with careful management within the site footprint, the influence on the data records should be negligible.

Decisions on how to manage the surrounding vegetation at VANMET station need to be carefully considered. Data collected at the site is likely influenced by the vegetation and this impact will increase over time. Managing the vegetation or leaving the site to regenerate are both arguably strong options. Clear research objectives for the station need to be set before a final decision can be made. Establishing addition measurements, especially of snow at the meadow precipitation station will be of great value in a long term record.