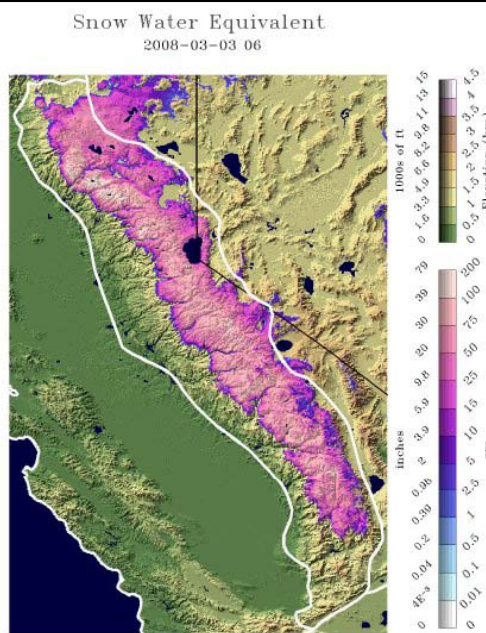


Bringing it all together: A distributed system to monitor snow water equivalence (SWE)

Jeff Frolik
University of Vermont

muse

Motivation



Present Approach 1: Snow Course



Photos: US Forest Service (L) and
Canadian National Snow Information System for Water (R)

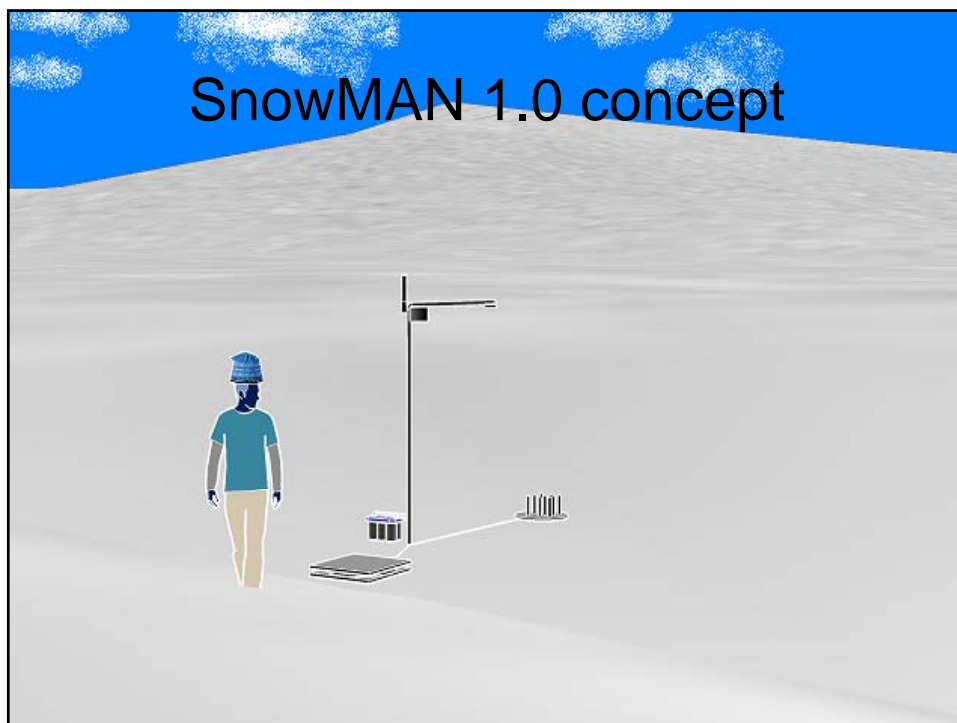
Present Approach 2: Snow Pillow



Photo: Delaware River Basin Commission

SWE Problem Statement

- How can the temporal and spatial resolution of data regarding snow packs be improved?
- How can this data be provided in a non-destructive manner?

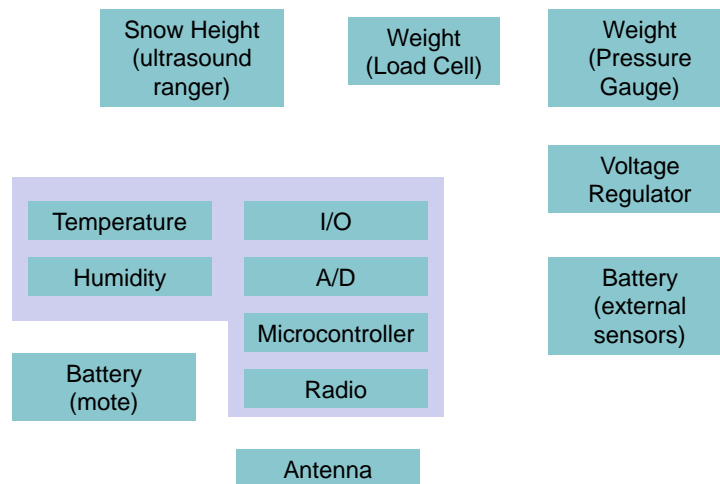


Embedded System



(photo: Moteiv tmote Sky/ Xbow TelosB)

Sensor Node Block Diagram



Integrated System



Network Topology

Station 1

Station 2

Station 3

Hub Station

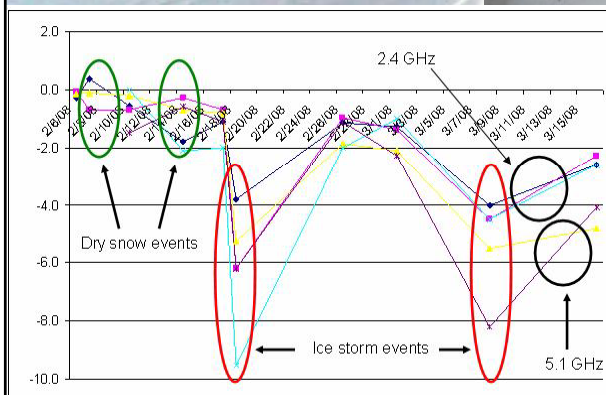
Data Mule



Lessons Learned

- Test, test, test!
- Battery technology (A-hr is not enough)
- Weight sensor issues
 - Small platform prone to snow-bridging error
 - Sensor failure

Can microwave attenuation be utilized?



Can gamma attenuation be utilized?

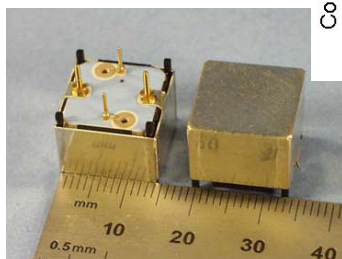
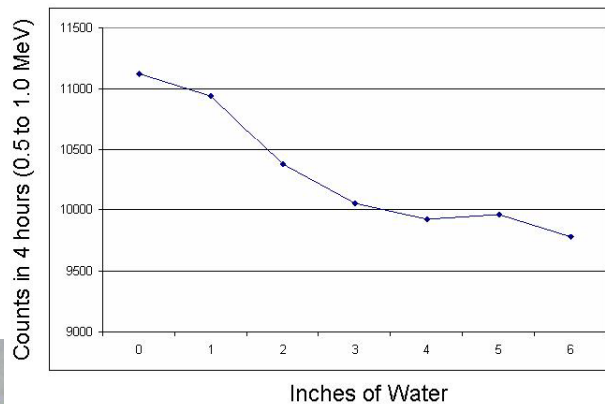
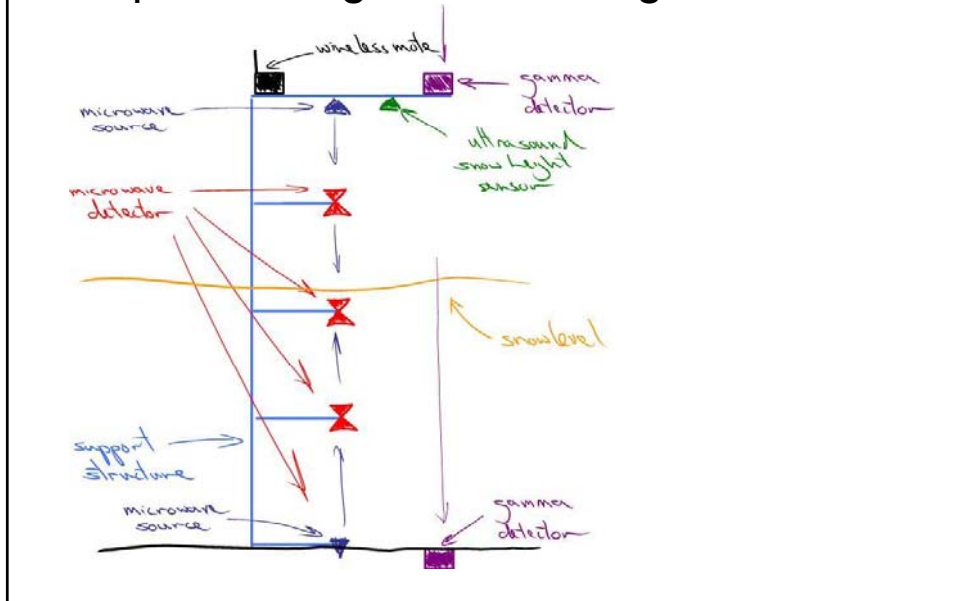
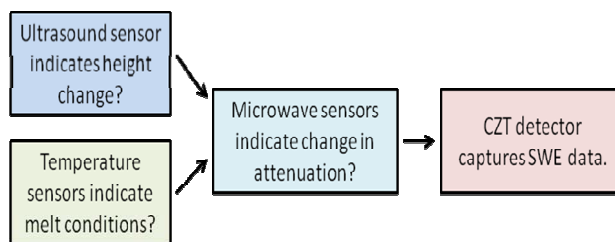


Photo: ev Products

Implementing New Sensing Modalities



Adaptive Sampling



Conclusion

- A distributed sensing approach would improve the current understanding of SWE
- New sensing modalities need to be developed
- Algorithms are needed to ensure sampling and processing is conducted efficiently

Acknowledgments

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