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Automated Snow Monitoring

As part of the Snow Survey and Water Supply Forecasting (SSWSF) Program the National Water and Climate Center administers an automated snow monitoring program consisting of several types of automated and semi-automated data collection methods.

Snow Telemetry (SNOTEL) Network

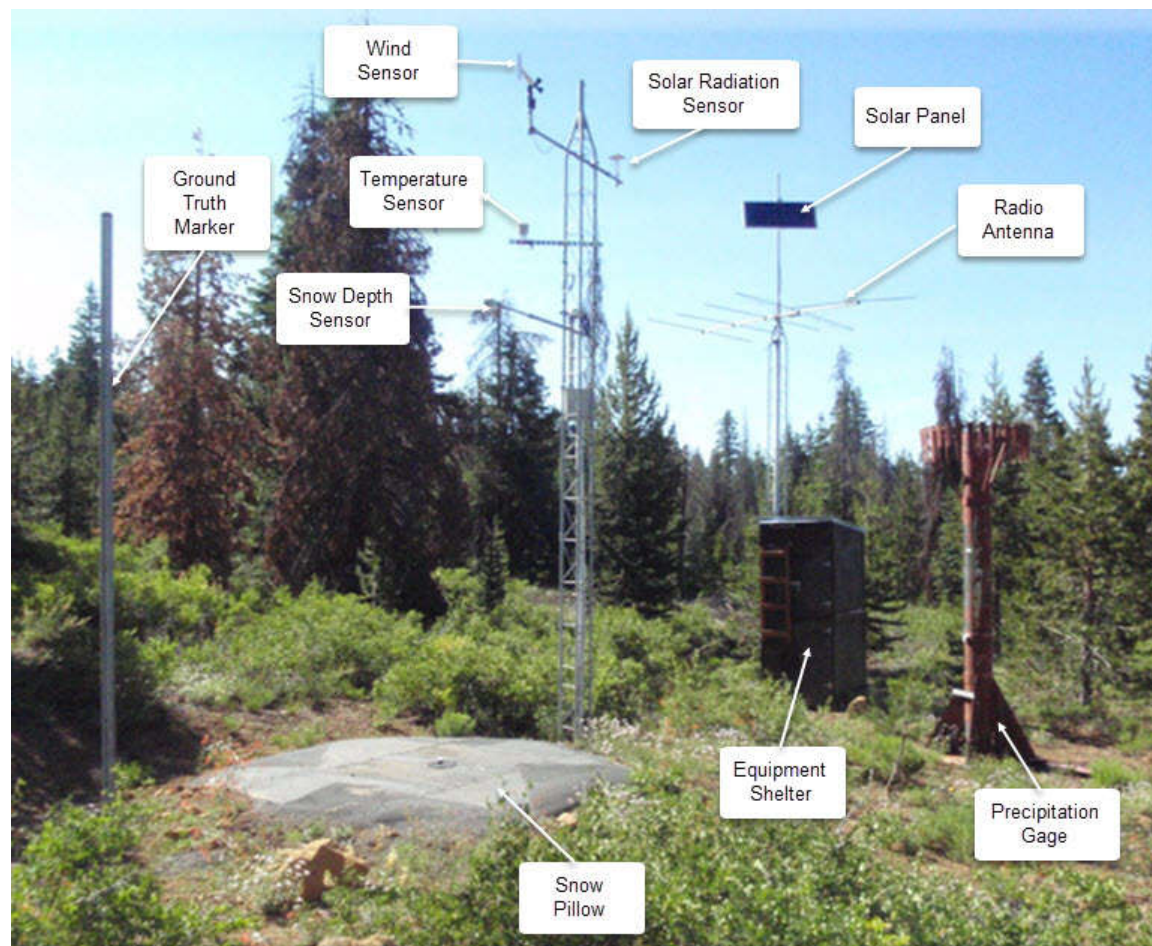
The SNOTEL network is composed of over [800 automated data collection sites](#) located in remote, high-elevation mountain watersheds in the western U.S. They are used to monitor snowpack, precipitation, temperature, and other climatic conditions. The data collected at SNOTEL sites are transmitted to a central database, called the [Water and Climate Information System](#), where they are used for water supply forecasting, maps, and reports.

SNOTEL sites are designed to operate unattended and without maintenance for a year or more. A typical SNOTEL remote site consists of measuring devices and sensors, an equipment shelter for the radio telemetry equipment, and an antenna that also supports the solar panels used to keep batteries charged.

A standard sensor configuration includes a snow pillow, a storage precipitation gage, and a temperature sensor. The snow pillow measures how much water is in the snowpack by weighing the snow with a pressure transducer. Devices in the shelter convert the weight of the snow into the snow's water equivalent -- that is, the actual amount of water in a given volume of snow.

SNOTEL stations also collect data on snow depth, all-season precipitation accumulation, and air temperature with daily maximums, minimums, and averages. Many enhanced SNOTEL sites are equipped to take soil moisture and soil temperature measurements at various depths, as well as solar radiation, wind speed, and relative humidity. The configuration at each site is tailored to the physical conditions, the climate, and the specific requirements of the data users.

The data collected at SNOTEL sites are generally reported multiple times per day, with some sensors reporting hourly. [More on SNOTEL sensors](#)



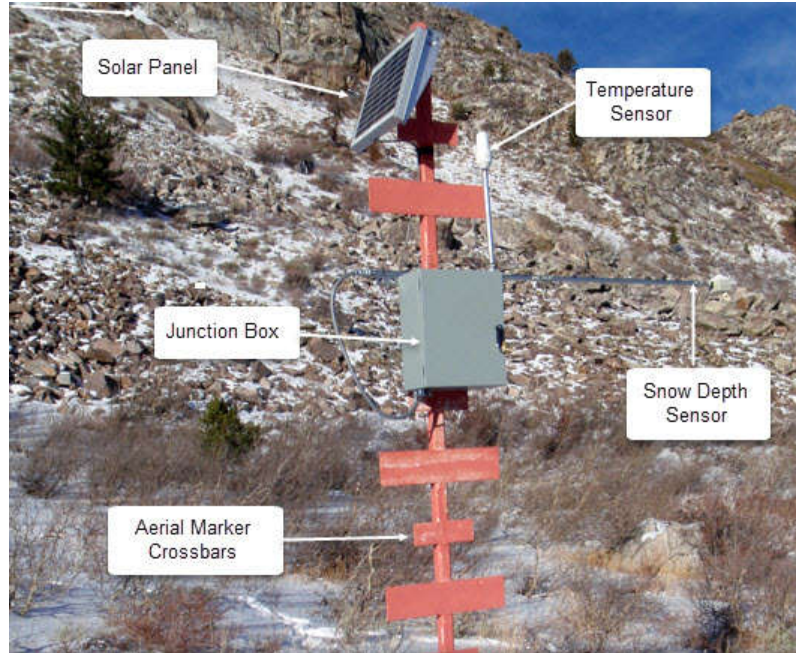
SNOTEL automated data collection site

[What is SNOTEL? Infographic](#)

Snolite Network

Since the early days of the snow survey program, [aerial markers](#) have been used to measure snowpack in very remote areas where accessibility is limited.

In the last few years, some aerial markers have been outfitted with basic sensors, such as temperature and snow depth, and telemetered using the [Iridium Satellite System](#). Aerial markers with these sensors are called **Snolite** sites.



Snolite automated aerial marker

Telemetry and Data Transmission

Data at SNOTEL and Snolite sites are collected and stored by a data logger installed in the equipment shelter or in a junction box. Depending on the location of the site, data are transmitted back to the Water and Climate Information System using one of several telemetry systems:

[Meteor Burst](#)

[Cellular](#)

[Satellite \(GOES, Iridium\)](#)