METLIFT: A new device for accurate measurements in a snow rich environment

A deep snow pack, remote locations, no external power supply and very low temperatures are often the main ingredients when it comes to the deployment of meteorological stations in mountainous terrain. The accurate position of the sensor related to the snow surface is normally not known. A new device called METLIFT recently deployed close to the Conrad Observatory overcomes the problems. A snow height sensor measures the distance to the snow surface. If certain limits are exceeded the whole station is adapted accordingly.

WMO recommends a height between 1.2 m and 2 m above ground level for the measurement of air temperature and humidity. The height above ground level is specified to take care of the possible strong vertical temperature and humidity gradients at the lowest layers in the atmosphere. Especially in snow rich and remote locations it may be hardly possible to follow this advice. Therefore most of the meteorological stations in mountainous terrain are situated at mountain tops where strong winds will blow off the snow or in valleys where a daily inspection of the sensors is possible. In other unpopulated mountainous areas, e.g. basins, plateaus, the distance of the sensor to the snow surface is not known or the sensor will be snow-covered.

In close cooperation with the technical high school in Waidhofen/Ybbs, Lower Austria, a new device was developed to guarantee the sensor height above surface within the WMO limits in harsh and remote environments. An ultrasonic snow height sensor measures the distance to the snow surface. If it exceeds certain limits due to snow accumulation or snow melt the lift adapts its height accordingly.

Figure 1 shows the prototype of METLIFT installed in the vicinity of the Conrad Observatory. The lift is 6 m high and can pull out for another 4 m. Sensor arms are mounted every meter to allow the connection of additional sensors or to measure a profile of a certain parameter of the lowest 5 m above surface. Sensors can be added easily since cable wiring is provided to each sensor arm. Horizontal winds are measured at 7 m height above surface.

METLIFT is independent of external power supply. Three lead gel accumulators recharged by three solar panels provide the energy necessary for the sensors, the data loggers, the data transmission components and for the electromotor to lift the system. METLIFT is energy optimised to keep the energy consumption at low levels. The components of the lift device consist of a cable winch and a 12V electromotor with a worm gear with a transmission rate of 2856:1. This means that the lift moves extremely slowly

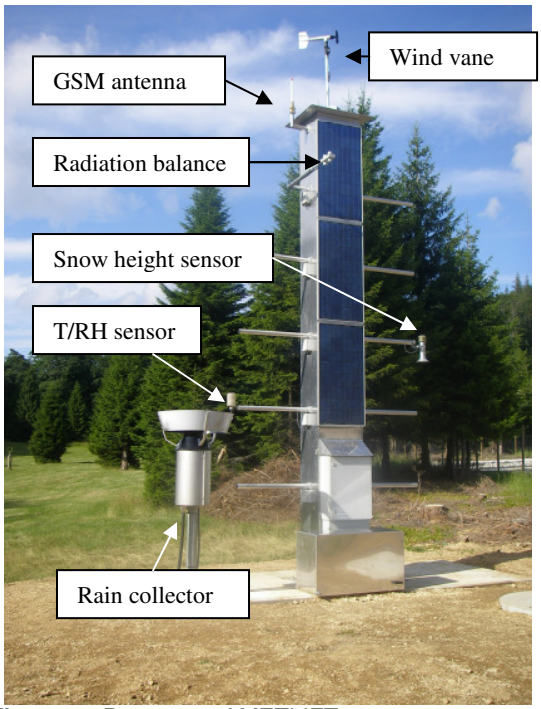

Figure 1. Prototype of METLIFT.

The data logger can be programmed via the GSM connection from remote locations, the data flow is also conducted via this connection.

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