Geophysical Research Abstracts
Vol. 13, EGU2011-8653, 2011
EGU General Assembly 2011

Combined thermal and soil moisture TDT standalone unit.

Martin Šanda (1), Tomáš Haase (2), and Jan Wild (3)

(1) Czech Technical University in Prague, Faculty of Civil Engineering, Prague, Czech Republic, martin.sanda@fsv.cvut.cz , (2) TOMST s.r.o., Prague, Czech Republic, (3) Institute of Botany, Academy of Sciences of the Czech Republic, Průhonice, Czech Republic

New combined affordable thermal and soil moisture unit coded TMS2 is presented. It is a prototype designed by TOMST Ltd based on good experience with TMS1 model manufactured by the same company. The device combines three thermometers MAXIM/DALLAS Semiconductor DS7505U+ for use approximately at -10, 0 and +15 cm relative to soil surface when installed vertically. Soil moisture measurement is performed based on time domain transmission (TDT) principle for the full range of soil moisture. Presented upgraded version TMS2 incorporates lifetime power supply for approximately 5 year operation and life time permanent data storage (0.5 mil logs). Data are retrieved by contact portable pocket collector with a diode bar indicator for downloads. Retrieved data are managed by utility software designed for the TMS2 device. Installation of the whole unit under the soil surface is also possible thanks to additional communication interface on demand.
Original model TMS1, employing the same technology of measurements proved durability in harsh outdoor environment with good functioning in wet conditions withstanding mechanical destruction. Extended testing in the sandstone area of the National Park Bohemian Switzerland, Czech Republic is performed since 2009 by the Institute of Botany of the ASCR. Results of long-term measurement at hundreds of localities are successfully used for i) evaluation of species-specific environmental requirements (for different species of plants, bryophytes and fungi) and ii) extrapolation of microclimatic conditions over large areas of rugged sandstone relief with assistance of accurate, LiDAR based, digital terrain model. TMS1 units are also applied for continuous measurement of temperature and moisture of coarse woody debris, which serves as an important substrate for establishment and growth of seedlings and is thus crucial for natural regeneration of many forest ecosystems.
The TMS1 sensors have been tested and calibrated in soil laboratories of Czech Technical University in Prague for three soil materials: arenic cambisol, podzol and quartz sand, showing good linearity and minor influence of the temperature and soil salinity on the resulting values.
The research is supported by the Technology Agency of the Czech Republic projects No. TA01021283