2009 METEOROLOGICAL MEASUREMENTS

DATA ACCOMPANYING REPORT

The realization of the intensive monitoring program in Bulgaria was organized in 3 stationary areas. The stations are equipped with automatic devices collecting air quality and meteo parameters data.

The tree stations belong to different climatic regions and sub regions are situated on terrains, differing in altitude and relief, which leads to significant differences in the meteorological conditions. The territories where the monitoring stations were located are attributed to two different climatic regions: Black sea climatic region – Eastern Balkan mountain sub region (site Staro Oriahovo) and Mountainous climatic region – Middle mountain sub region (sites Yundola and Vitinia).

The stations are equipped with automatic devices collecting and transmitting meteo data in real time. More detailed information is given in the table below:

Table 1. Automatic stations equipment for a measuring and transmitting of meteo data

Sensor/ System	Manufacturer	Type	Specifications
Remote transmission	Siemens	Siemens GSM Dualband Modem TC 35T, antenna,	GSM Dualband Modem Terminal
Data logger	Infologica	Super Micro SBC-19	Data logger
Software	Project Automation	Eco Remote	Data management, Import, Export; Meteorological and Air Quality data interpretation, remote transmission
Air temperature	Rotronic	HYGROMER MP 100A	Combined thermo/ hygrosensor
Air humidity	see above		
Wind speed	Young	Y-05103 V	Combined wind speed +direction
Wind direction	see above		
Solar radiation	LI-COR	LI-200 SZ	Pyranometer

The monitoring activities in 2009 were prepared in compliance with the ICP Forests Manual and comprise the following activities:

- **Measurements of meteorological data** for air temperature, relative humidity, wind speed and direction, solar radiation and precipitation. Meteo parameter values are measured in every 1 hour. The sensor heights for each of monitored meteo parameters are as follows:

    1. Sensors for air temperature, wind speed and direction and solar radiation – 9 m sampling height
    2. Sensor for relative humidity – 3 m sampling height
    3. Sensor for precipitation – 3 m sampling height

- **Data validation** - the technical problems with some of sensors and process to data transmitting in real time, lead to high % lack of data.

- **Data submission** - the present submission report for meteorological data is based on the following % of validated data:

    - **Vitinia (SP0001)** – 94% for air temperature (AT), 87% for humidity (RH), 90% for solar radiation (SR), 96% for wind speed (WS), 96% for wind direction (WD) and 80% for precipitations (Pr);
    - **Staro Oriahovo (SP0002)** – 98% for AT and RH, 97% for solar radiation (SR), 99% for WS and WD and 0% for precipitations (Pr);
    - **Yundola (SP0003)** - 77% for air temperature (AT), 92% for humidity (RH) and solar radiation (SR), 69% for wind speed (WS) and wind direction (WD) and 46% for precipitations (Pr).

Meteorological data assessment

Air temperature

The average annual temperatures on these sample plots vary between 6.7 ºC and 11.6 ºC. A rise in these values was observed, in comparison with 2008. Temperatures at the absolute minimum were recorded on: 21/12/2009 at Vitinia (-20.26 º C) and on 01/09/2009 at Staro Oriahovo (-20.32 º C). Temperatures at the absolute maximum were recorded on: 24/07/2009 at both Vitinia (34 º C) and Staro Oriahovo (37.9 º C), and on 16.06.2009 at Yundola (25.6 º C).

Relative humidity

Assessment of the relative humidity values allows the determination of atmospheric moisture, which is an important factor for wood productivity and forest yield. Annual course of the average monthly relative humidity in the sample areas showed that: Minimum values were recorded at Vitinya in August;

at Yundola in April; and at Staro Oryahovo in June and July. Maximum values in all three stationary sample plots were observed in December and January.

Wind speed and wind direction

Wind direction and wind speed are important indicators for the transport of atmospheric pollutants. Data analysis in 2009 showed that on the territory of Vitinia the prevailing winds were with south-southeastern, southwestern and western component; and respectively in Staro Oriahovo those with south-southwestern, southern and southeastern component. The average monthly value is variable. At Vitinia was windy at the beginning of the year, near Staro Oriahovo the time was quiet over the first half of the year, and then the wind speed increases over the rest of the year.

Precipitations

Due to the large lack of data in the first months of the year, an assessment of the rainfall data cannot be done.