TECHNICAL SPECIFICATIONS

The offered equipment must meet the minimum technical specifications stated below or provide superior performance.

LOT 1: Weather Station

General Requirements

The Contracting Authority already operates ten meteorological stations manufactured by **METER Group** with **ZL6 Basic** data loggers. Data from the stations are collected manually via a Bluetooth wireless connection and subsequently integrated into a common research database.

To ensure continuity of long-term meteorological measurements and comparability of data, the new stations must enable data collection at comparable time intervals and in comparable measurement units, as well as manual data transfer without an internet connection. Data must be available in a documented, machine-readable format suitable for integration into the existing research database.

The Contracting Authority allows components from different manufacturers, as well as compact or integrated measurement solutions, provided that the tenderer demonstrates, through appropriate technical documentation, their compatibility, compliance with all required measurement and functional characteristics, and the proper operation of the complete measurement system.

Due to long-term outdoor use and previous damage to measuring equipment caused by wildlife, separate replacement of the temperature, relative humidity and barometric pressure measurement unit, and the wind speed and direction measurement unit, must be possible. Integrated solutions are also acceptable if they allow independent replacement of the specified units without replacement of another, undamaged unit. The tenderer shall demonstrate replaceability through technical and/or service documentation.

The tenderer shall specify the manufacturer and model of each component included in the offer and submit the relevant technical documentation.

The tender must include **three complete and identical meteorological station sets**

Each meteorological station must include:

- Data logger;
- Air temperature, relative humidity and barometric pressure sensor, or a measurement unit including these functions;
- Rain gauge;
- Ultrasonic wind speed and wind direction sensor, or a measurement unit including these functions;

- Autonomous power supply system;
- All required connection cables, connectors and mounting elements or adapters for installation on the intended supports.

Data Logger

- Capability to simultaneously connect at least six independent sensor units. The Contracting Authority plans future upgrades with sensors for solar and UV radiation, soil water content, soil temperature and soil electrical conductivity. The logger must enable connection and recording of data from these sensor types without replacing or purchasing an additional logger, using available inputs or an equivalent functional solution. The possibility of future upgrades must be demonstrated through technical documentation.
- Support for appropriate digital, analog and/or pulse measurement signals according to the offered sensors.
- Data storage interval: 60 minutes.
- Measurement sampling at least once per minute, with calculation and storage of hourly averages and/or totals depending on the measured parameter.
- Internal memory capable of storing at least six months of measurements from all supplied sensors with an hourly storage interval.
- Retention of previously stored data in the event of power interruption.
- Direct transfer of stored measurement data to a computer via USB and export into a documented, machine-readable file without internet access.
- Direct wireless communication with a mobile device (Android or iOS) via Bluetooth or an equivalent local wireless technology. The connection must allow viewing of current measurements, logger status and settings, logger configuration, time synchronization, and manual transfer of stored data to a mobile application.
- Field operation, viewing of current measurements, and logger configuration without mobile network coverage or a permanent internet connection.
- Battery-powered or other autonomous power supply system, including a solar module, battery and charge controller. The system must enable at least six months of uninterrupted operation of the entire supplied configuration with all supplied sensors without connection to the power grid and without battery replacement. The required autonomy must be demonstrated through technical documentation or an energy balance calculation considering expected seasonal conditions. All required power supply components must be included in the price.
- Weather-resistant and UV-resistant enclosure with at least IP55 protection rating or equivalent.
- Suitable for long-term outdoor operation.

Rain Gauge

- Automatic measurement and recording of precipitation.
- Measurement resolution not exceeding 0.2 mm of precipitation per measurement increment.
- Capability to calculate hourly and daily precipitation totals.
- Construction and materials suitable for permanent outdoor installation and resistant to moisture and UV radiation.
- Sensor levelling capability during installation.
- Documented measurement resolution and procedure for verification of measurement accuracy.
- Compatibility with the offered data logger.
- Tipping-bucket rain gauge or other functionally equivalent measurement technology meeting all required measurement and functional characteristics.
- Heating of the rain gauge is not required.

Air Temperature, Relative Humidity and Barometric Pressure Sensor

Air Temperature

- Measurement range: at least -40 °C to +60 °C.
- Resolution: 0.1 °C or better.
- Accuracy: ±0.3 °C or better under the reference conditions declared by the manufacturer.

Relative Humidity

- Measurement range: 0-100 % RH.
- Resolution: 0.1 % RH or better.
- Accuracy: maximum ±2 % RH within the range 20-80 % RH at temperatures from 0 °C to 40 °C.
- Documented response time and long-term measurement stability.

Barometric Pressure

- Measurement range: at least 30-110 kPa.
- Resolution: 0.01 kPa or better.
- Accuracy: ±0.05 kPa or better at 25 °C.

Vapour Pressure

- Vapour pressure data must be obtainable from the measured meteorological variables, including calculation from air temperature and relative humidity within the logger or software using a documented and recognized methodology (e.g. FAO-56 or WMO-No. 8).
- Measurement range: at least 0-20 kPa.
- Display or export resolution: 0.01 kPa or better.

Additional Requirements

- The air temperature and relative humidity sensor must be equipped with an appropriate radiation shield to minimize the impact of direct solar radiation on measurements.
- The sensor must be suitable for long-term field research measurements.
- The tenderer must provide documentation of measurement accuracy and factory calibration and/or verification procedures

Ultrasonic Wind Speed and Direction Sensor

- Wind speed: measurement range at least 0-30 m/s, resolution 0.01 m/s or better, accuracy ±0.3 m/s or ±3% of the measured value (whichever is greater), or better.
- Wind direction: measurement range 0-359°, resolution 1° or better, accuracy ±5° or better.
- Wind gusts: capability to record maximum wind gusts with a documented measurement and averaging methodology.
- Tilt measurement: monitoring of sensor tilt in two mutually perpendicular axes (X and Y), with the possibility of recording and exporting the data together with wind measurements.
- The tilt measurement is intended for monitoring the horizontal alignment of the anemometer during long-term field measurements and supporting measurement quality control. An integrated or equivalent solution is acceptable.
- The sensor must be suitable for long-term outdoor operation, compatible with the offered logger, and supplied with documented measurement characteristics and calibration/verification procedures.

Scope of Supply and Installation

Installation and commissioning of the meteorological stations at the research locations will be carried out by the Contracting Authority. The supply of support poles or stands, foundations and anchoring works is not included in the scope of this procurement.

The offered equipment must be suitable for installation on support poles with an external diameter of 48 mm. All necessary mounting elements or adapters required for installation on these poles must be included in the supply.

Planned installation heights:

- Air temperature and relative humidity sensor: 2.0 m above ground level;
- Rain gauge opening: 1.5 m above ground level;
- Ultrasonic wind sensor: installation height to be determined according to the characteristics of the individual research location.

The tenderer shall ensure the structural and functional suitability of the offered equipment for the specified installation method. In the case of compact or integrated solutions, compliance with the specified installation heights and other technical requirements must be ensured

Technical Documentation and Functional Verification

When submitting the tender, the tenderer shall provide technical datasheets or equivalent documentation enabling verification of compliance with all required measurement, communication, power supply and construction characteristics. For integrated solutions, evidence of independent replacement of the required measurement units must also be provided.