JMA/WMO TRAINING WORKSHOP ON CALIBRATION AND MAINTENANCE OF METEOROLOGICAL INSTRUMENTS IN RA II (ASIA)

PRESENT STATE OF METEOROLOGICAL INSTRUMENTS IN MONGOLIA

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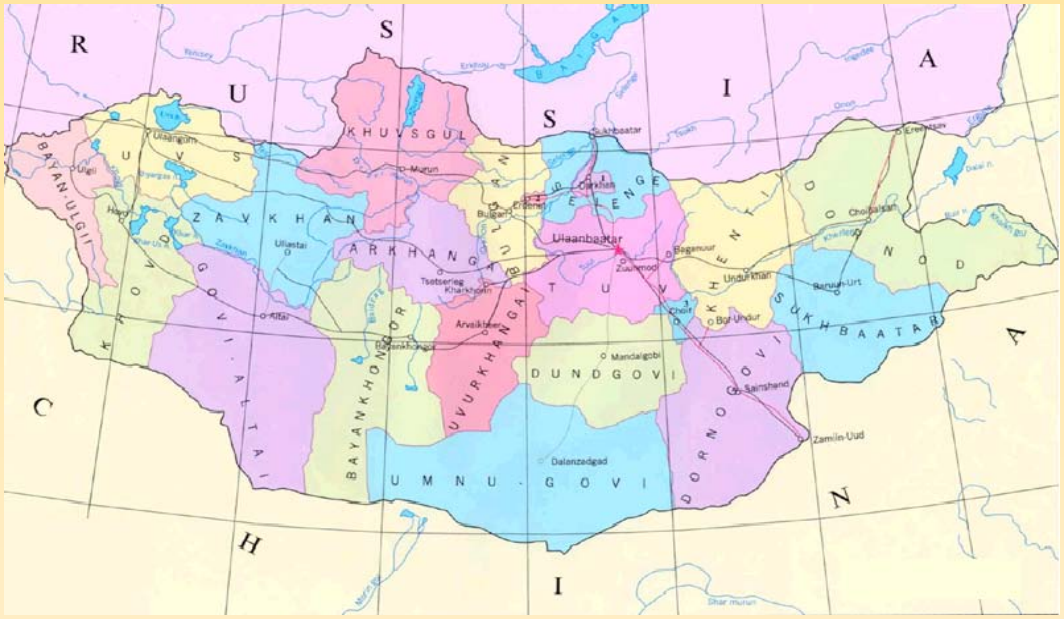
NAMEM-CLEM

Mongolia



- Mongolia is a land-locked country located in Central Asia between Russia & China. It covers an area of 1.566.5 square kilometers.

- It is one of the largest land-locked countries and the seventh largest country in the world.
- With an average height of 1,580 meters above sea level.
- The highest mountain is Tavan Bogd in Bayan Ulgii Aimag at 4374 meters.
- The lowest point is Khukh Nuur in the east at 560 meters.

Landscape and climate

- **Mongolia can be divided into 6 natural belts and zones: the Alpine, Mountain Taiga, and Mountain Forest Steppe belts; the Arid Steppe, Desert-Steppe and Desert zones.**

Alpine

Mountain taiga

Mountain forest steppe

Arid steppe

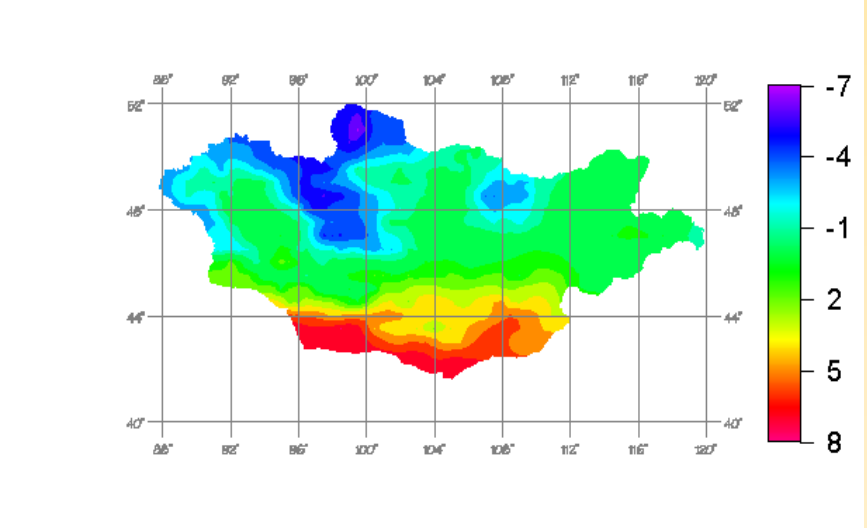
Desert steppe

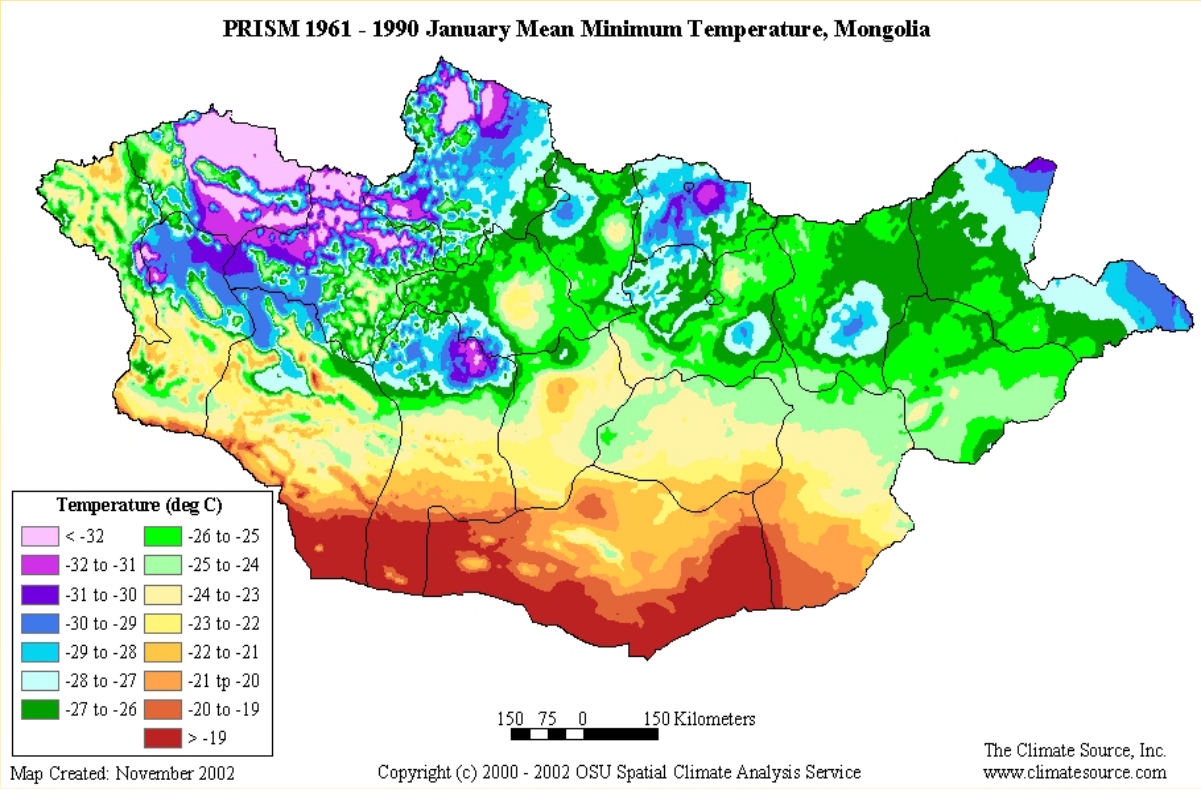
Desert

- **Mongolia's climate is dry with extreme continental temperatures. It has mild summers and long, severe winters. Summers last from mid May to mid August and winters from mid November till April. Spring and fall are relatively short.**

Temperature

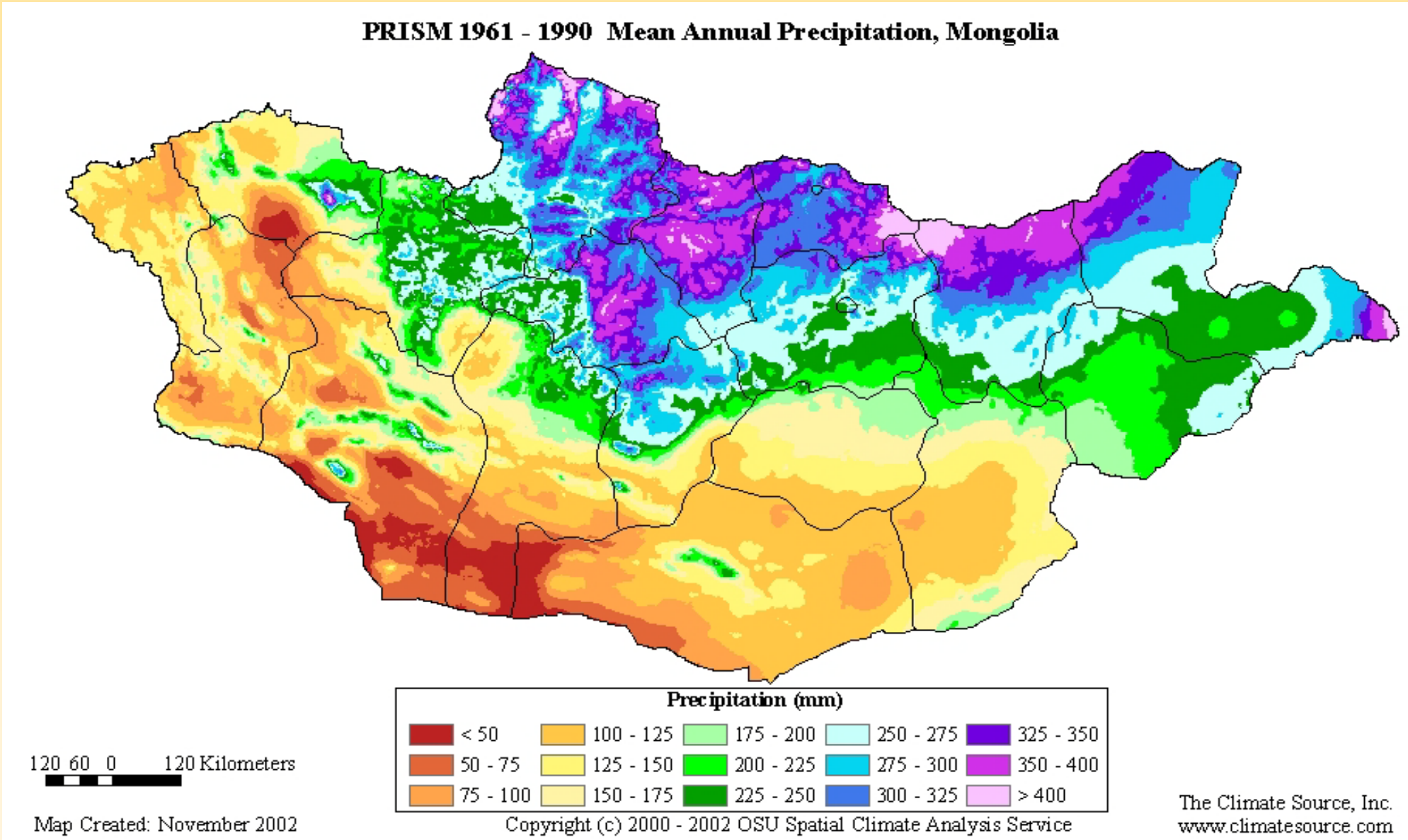
Mean annual temperature

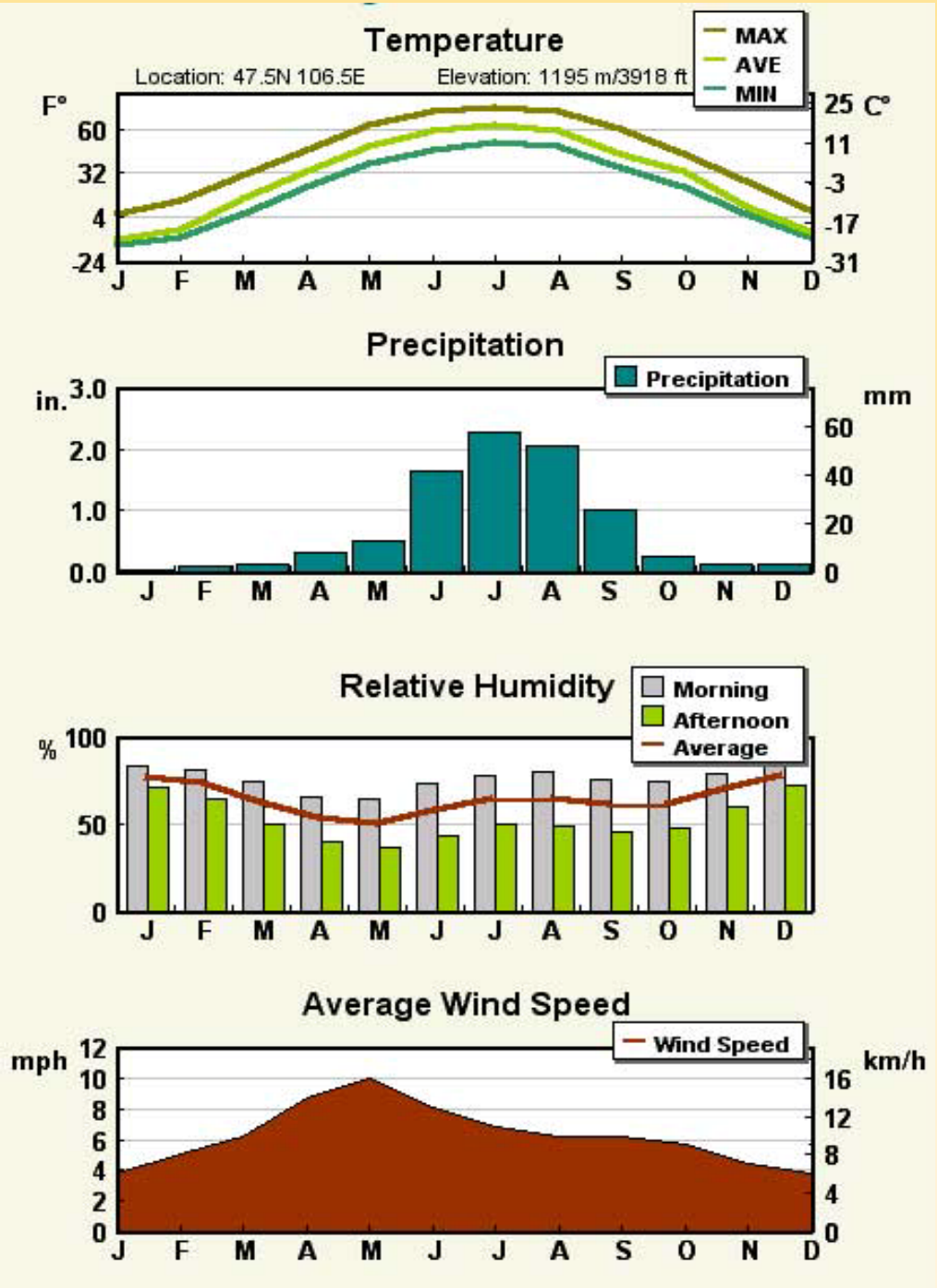


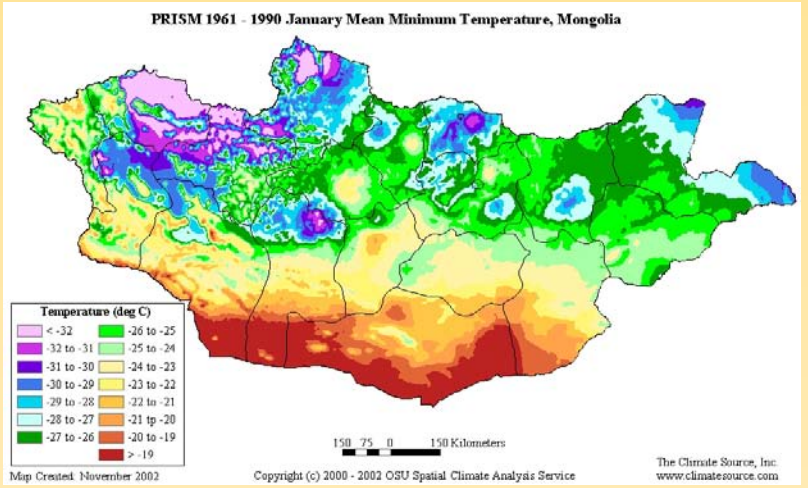


- The climate of Mongolia is harsh continental with sharply defined seasons, high annual and diurnal temperature fluctuations, and low rainfall. Because of high altitude and latitude, it is generally colder than of other countries of the same latitude.
- Average annual temperatures range between 8.5^{0}C in the Gobi and -7.8^{0}C in the high mountains areas. The mean annual precipitation is 50-400mm

Precipitation



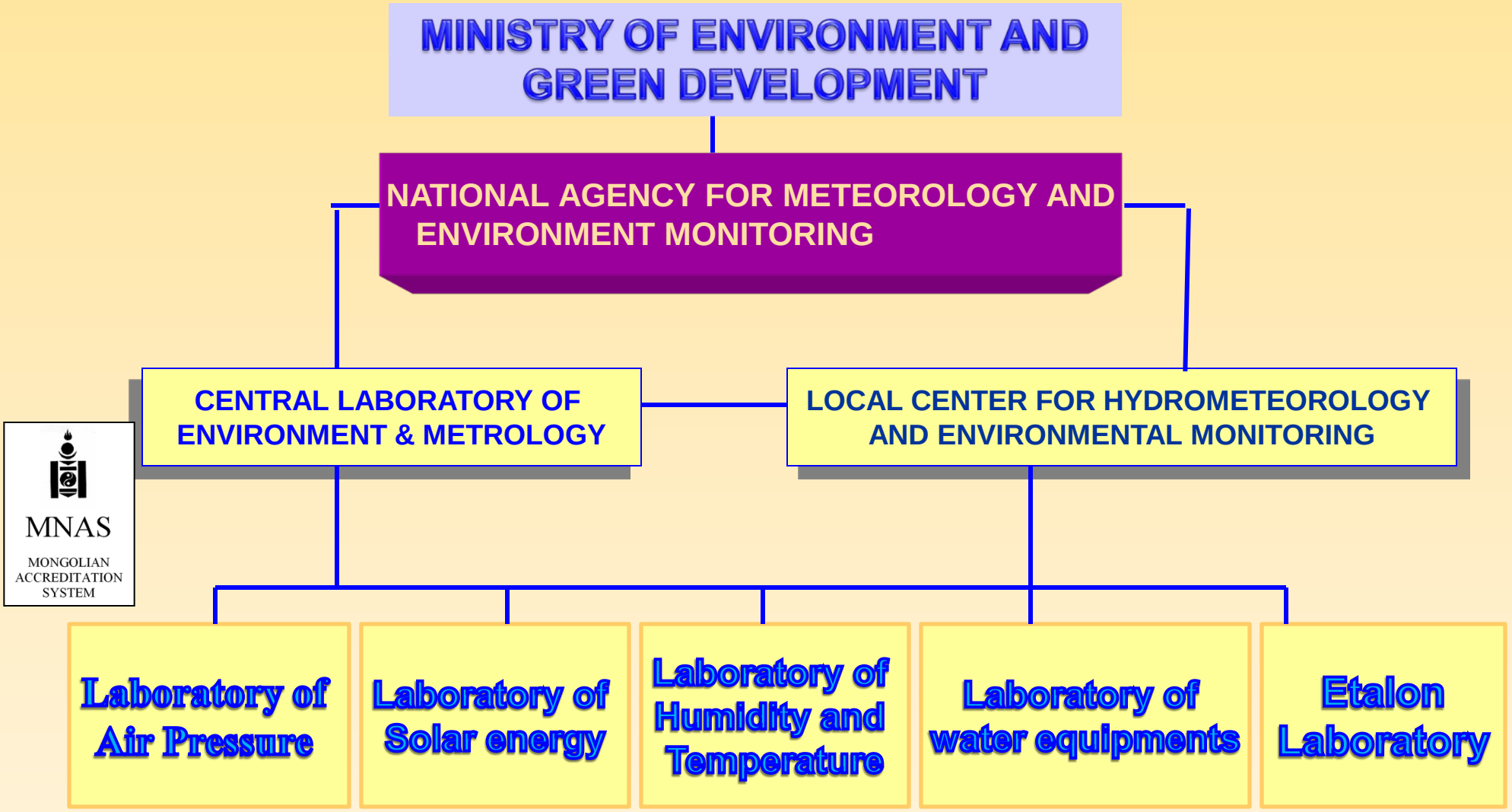




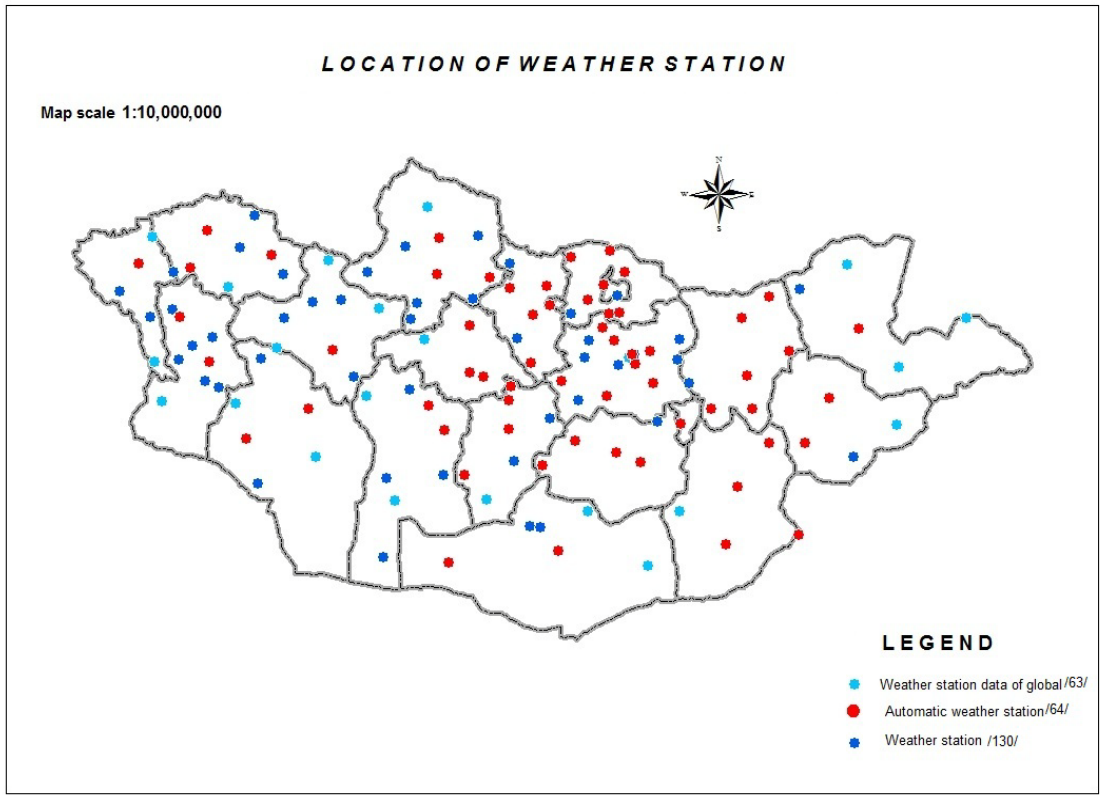
January and February averages of -20° C are common, with winter nights of -40° C occurring most years. Summer extremes reach as high as 38° C in the southern Gobi region and 33° C in Ulaanbaatar.

The most of precipitation falls in summer season. Study on precipitation and relative humidity, which are main climatic parameters, is very important to determine the Mongolian climate change.

ENVIRONMENTAL QUALITY MONITORING NETWORK



Number of surface observation



Weather station – 130

- Weather station connected to Global data– 63
- Automatic weather station –97

Instruments of Calibration

Wind speed and direction	No
Air pressure	Yes
Temperature and humidity	Yes
Solar radiation	Yes
Hydrology instruments	Yes

Instruments of air pressure
PTB-220 /Finland/

Instruments of Solar energy

PMO-06CC /Switzerland/

CHP1 pyrheliometer with Suntracker

/Holland/

Instruments of Humidity and air temperature

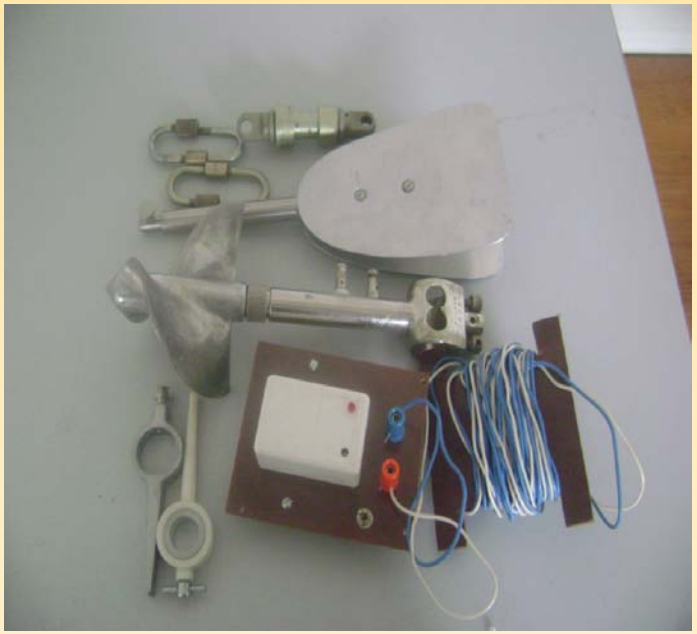
HJ6A/3A /Chinese/

Range of measurements /-60 ~ +80^{0}C/

Instruments of water flow

LS25-3A /Chinese/
0.04-10 m/s

Counter /Chinese/



GR-21 /Russia/
0.04-10 m/s

Quality assurance/Quality control activities

- **Define the acceptable limit of etalon measuring instrument.**
- **If permanent adjustment of etalon measuring instrument is exceeded from acceptable limit, calibration has to be done.**
- **Comparative counting of measuring instrument has to be saved.**
- **External check and compiled monitoring has to be done for exported metrology instrument to be used in hydro meteorological network.**

Internal monitoring

- **To make assessment and summary for the coverage of recurrent check on meteorological instruments which are used at hydro meteorological stations**
- **To organize internal audit at the activity of laboratory annually**

External monitoring

- **ADORC experiment**
- **WMO experiment**

Training and workshops are organized for hydro meteorological engineers and technical staffs every year.

Instruments of observation stations

- Automatic Weather station - 97
- We are using following AWS:
  - **CAMS620** – 30 (Huatron of Chinese)
  - **CK-4100** - 6 (Japanese)
  - **MAWS301** - 8 (Vaisala of Finland)
  - **QLI50** - 8 (Vaisala of Finland)
  - **AWS330** - 40 (Vaisala of Finland)
  - **MMS-01** – 5 (Mongolia)

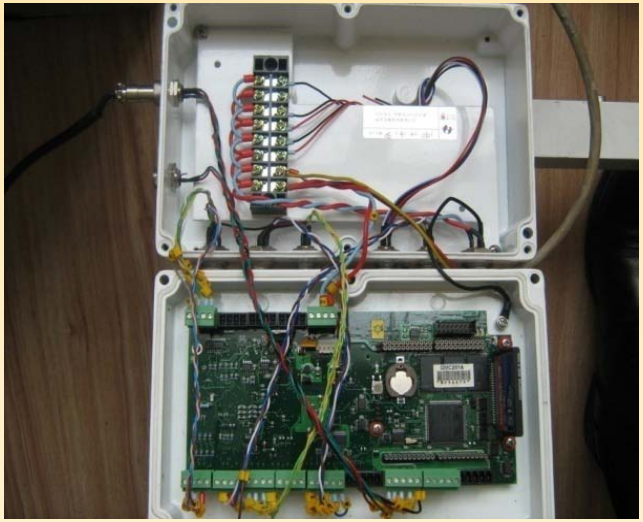
Data logger of MAWS-301

QML102 AWS LOGGER

- 32-bit Motorola CPU
- 16 BIT A/D Convertor
- 1.7 Мб RAM and 4 MB program
- 10 analog inputs (20 single-ended inputs)
- 2 counter/frequency inputs
- Internal channels for BARO-1 pressure transducer
- RS-232 and RS-485
- Terminal software and Your View

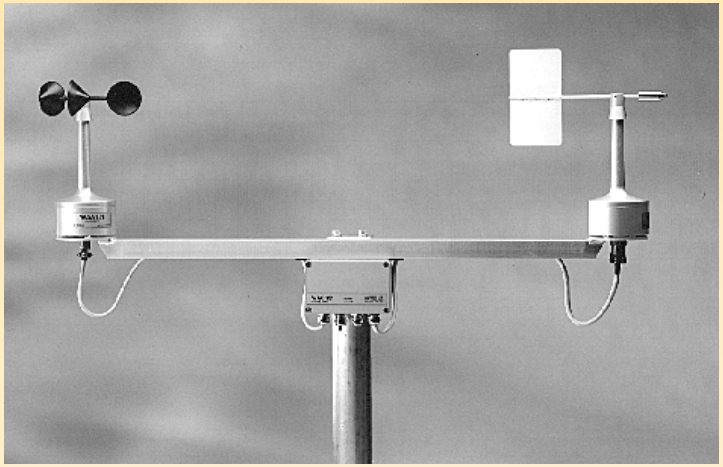
Data logger of CAMS-620

CAMS620- Data logger



Wind sensor

WAA151 – Wind speed sensor
WAV151 – Wind direction sensor

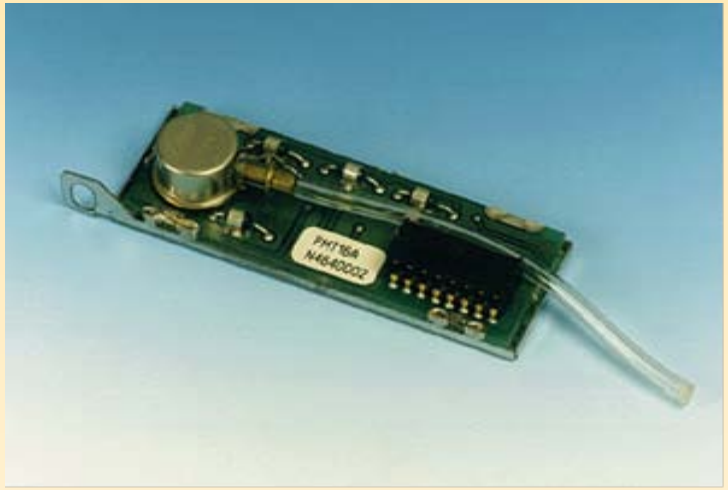


WAS425A – Ultrasonic sensor

Technical specification	Speed	Direction
Measurement range	0.4÷75 м/с	$0\text{-}360^0$
Accuracy	0.1 м/с	5.6^0
Starting threshold	<0.5 м/с	
Operating temperature	$-50^0C \div +50^0C$	

Air pressure sensor

- **PMT16A** — Air pressure sensor

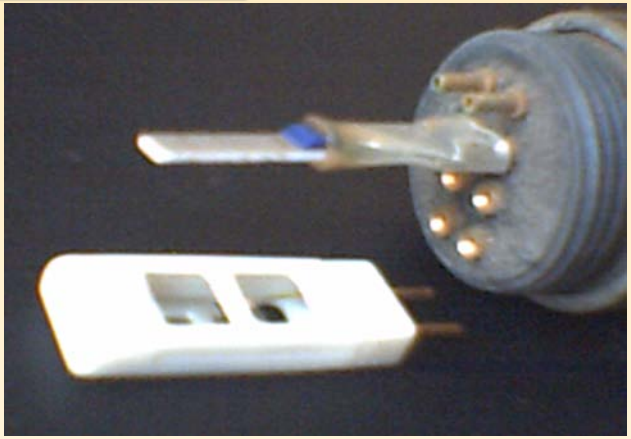


- Measuring range - 500-1100hPa
- Resolution - 0.1Hpa
- Operating temperature -40 - +60 Celsius

Temperature and humidity sensor

HMP45D

•Measurement range	- 0÷100%
•Accuracy	±2%
• RH	0…90% ±3%
•RH	90…100% ±0.3 ^{0}C
•Pt	100
•IEC	751. 1/3 classB



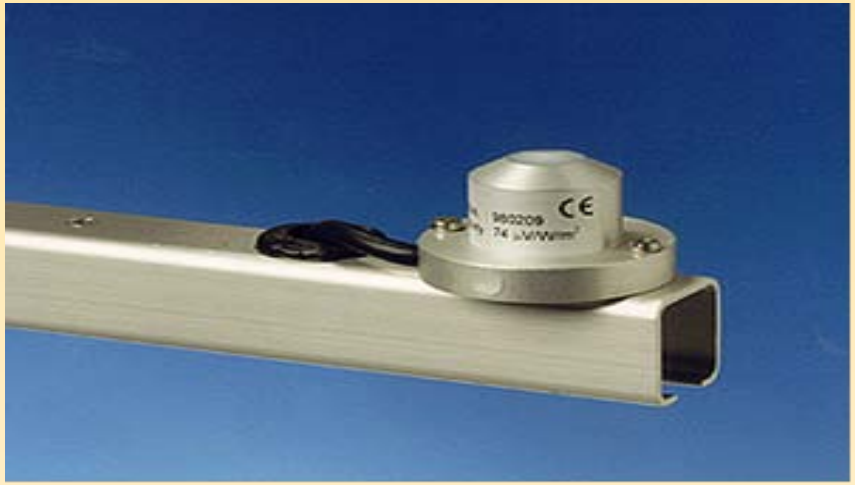
Presipitation sensor

QMR102 — Precipitation sensor

Sensitivity	0.2 mm
Capacity	250 mm/hours
Diameter	254 mm
Weight	1000 gr
Operating temperature	-40..... +55 ^{0}C

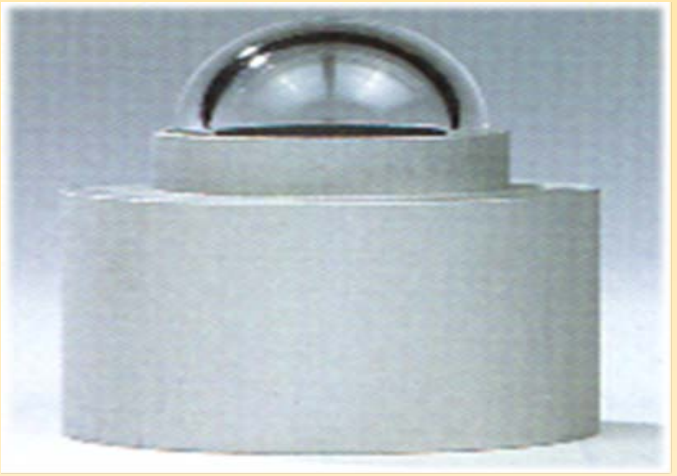
Global radiation sensor

QMS101 — Pyranometer



Sensitivity	100 μV/W/m^2
Response time	< 1 сек
Measuring range	0÷2000 Вт/м^2
Spectral range	0,4-1,1 микрон
Temperature dependence of sensitivity	±0,15% /^{0}C
Non-stability	≤ +2% /year
Non-Linearity:	< 1%, (1000W/m^2)
Operating temperature:	-30...+70 ^{0}C

QMS102 — Pyranometer



KIPP & ZONEN'S CM3

Sensitivity	10 ... 35 μV-W/m^2
Spectral range	305 ... 28000 нм (50%)
Response time	18 s (95%)
Measuring range	2000 W/м^2
Temperature dependence of sensitivity	6% (-10 ...+40^{o}C)

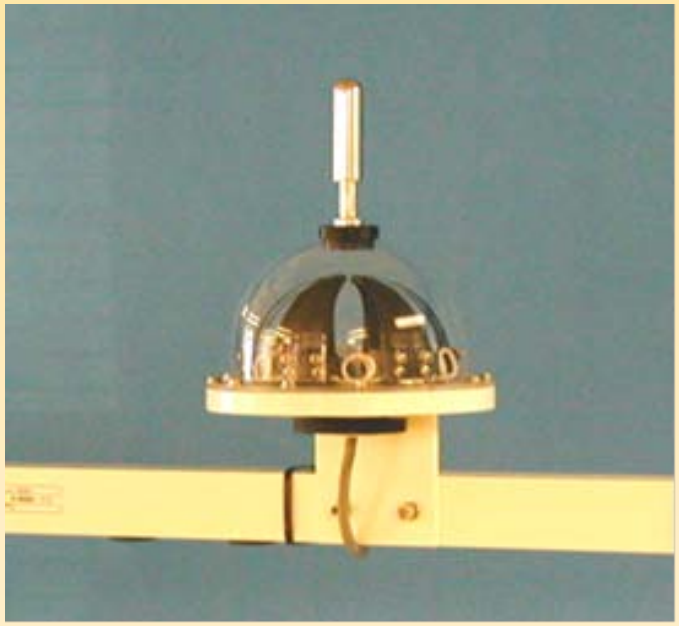
Net radiometer

•KIPP & ZONEN'S

Technical specification:

sensitivity	10 μВ/Вт/м^2
Spectral range	0,2 ... 100 μ
Response time (1/e)	< 20 s
Measuring range	-2000 ... +2000W/м^2
Non-stability	≤ +2% жилд
Non-Linearity	<1% 2000 W/м^2
Operating temperature	-30^0 ... +70^{0}C

Sunshine duration sensor



DSU12 sunshine duration sensor

- Starting threshold 120 W/м^2

Surface temperature sensor

QMT103

- **Pt-100 High accuracy platinium sensor**
- Performance 1/4 DIN 43760B
- Operating temperature -50^{0}C ... +90^{0}C
- Sensitivity 0.385 ohm/^{0}C
- Material Stainless steel

Ceilometer and Present weather sensor

•**CT25K** -Ceilometer

•**FD12P** (Present Weather Sensor)

Water temperature sensors

QMV101

Technical specification:

Measuring range	1.5 ... 60 m
Accuracy	0.25% of FS
Material	Stainless steel
Operating range	-20 ... +60 ^{0}C

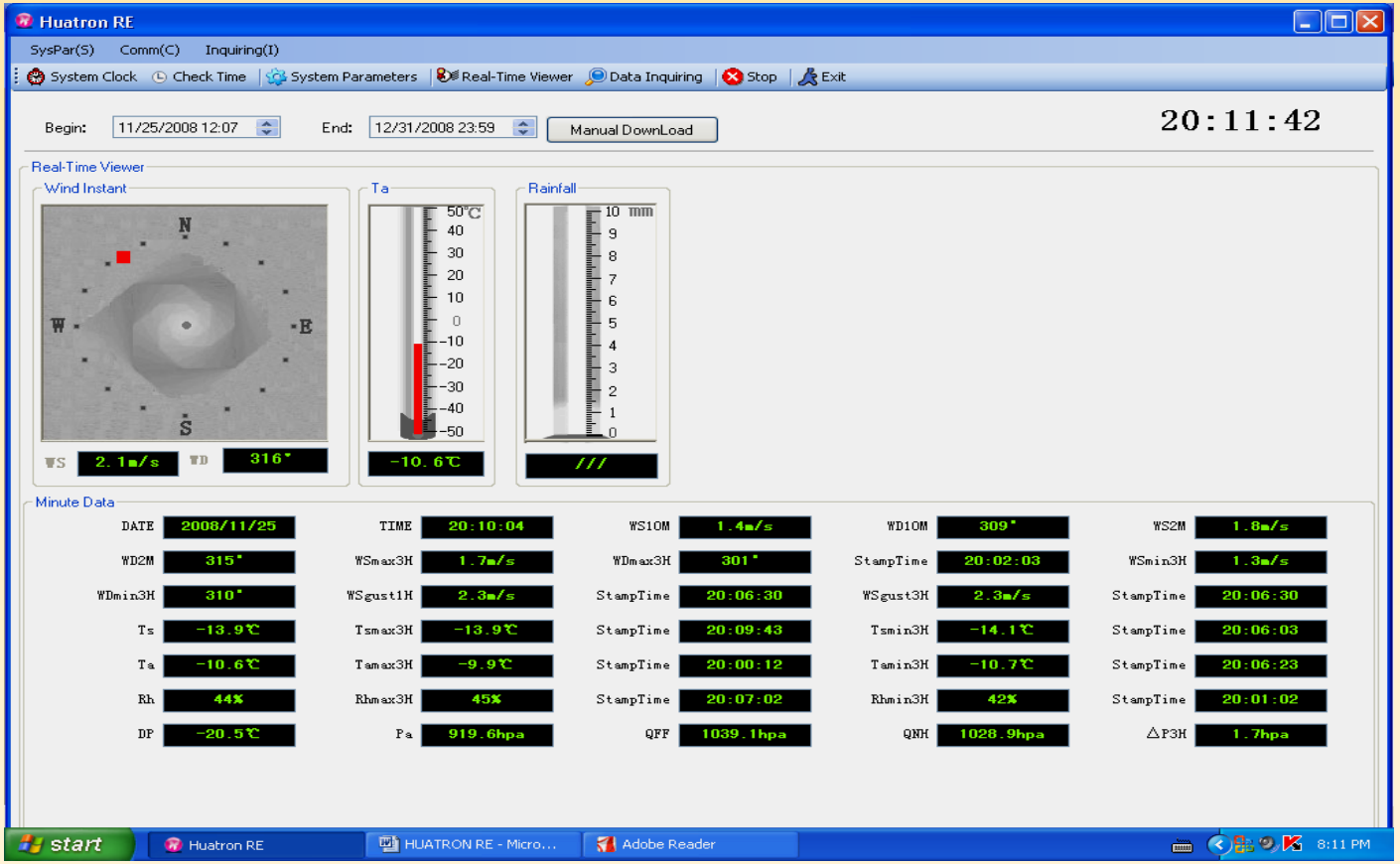
Water level sensor

- **DCU7110** – Water level sensor

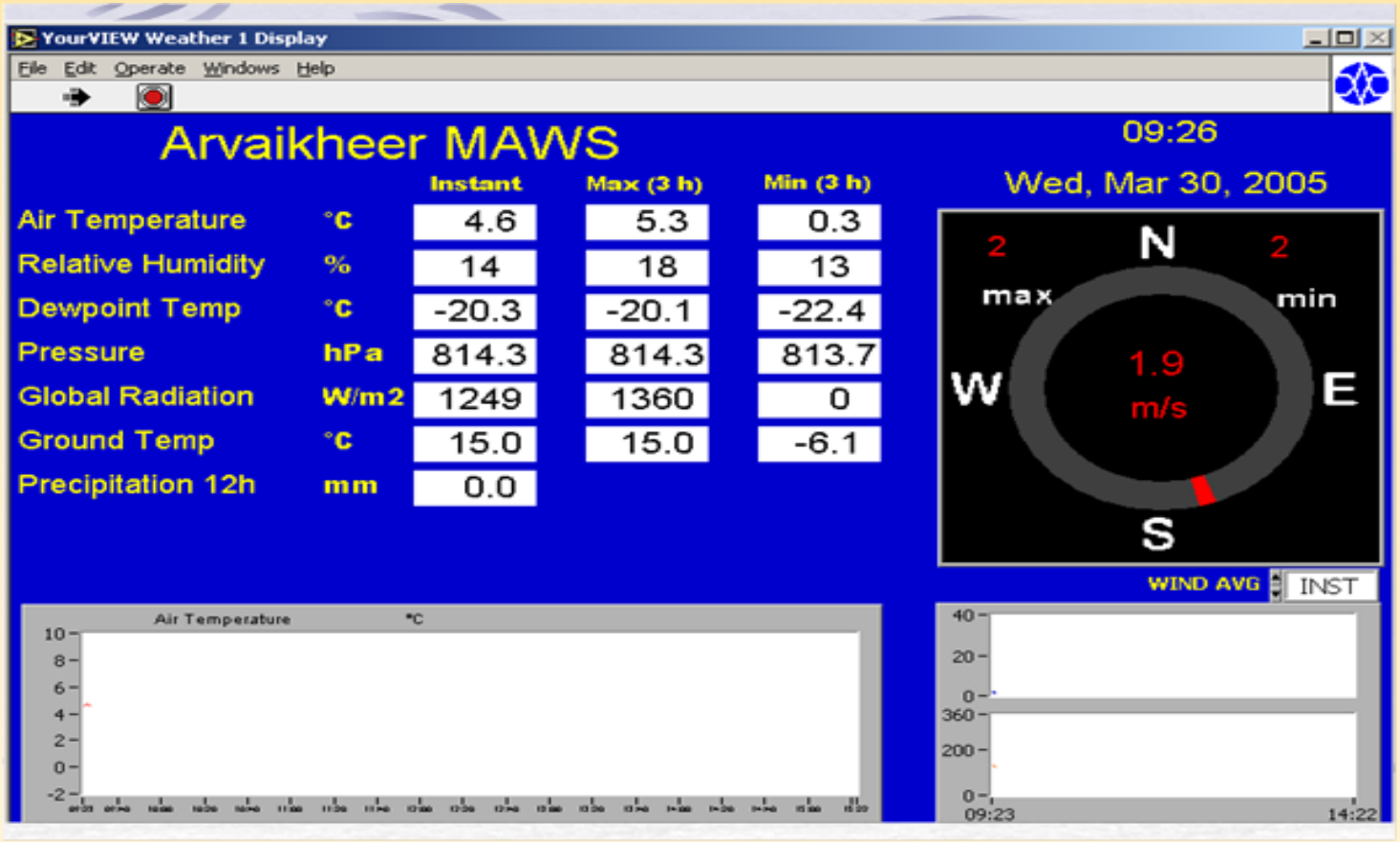
Measuring range	0,3 ... 4,8 м
Accuracy	1,3 мм
Resolution	±0,2 %
Material	PVC
Operating temperature	-30^0 ... $+60^0$C

HUATRON RE20081106

- CAMS620 - Terminal of AWS

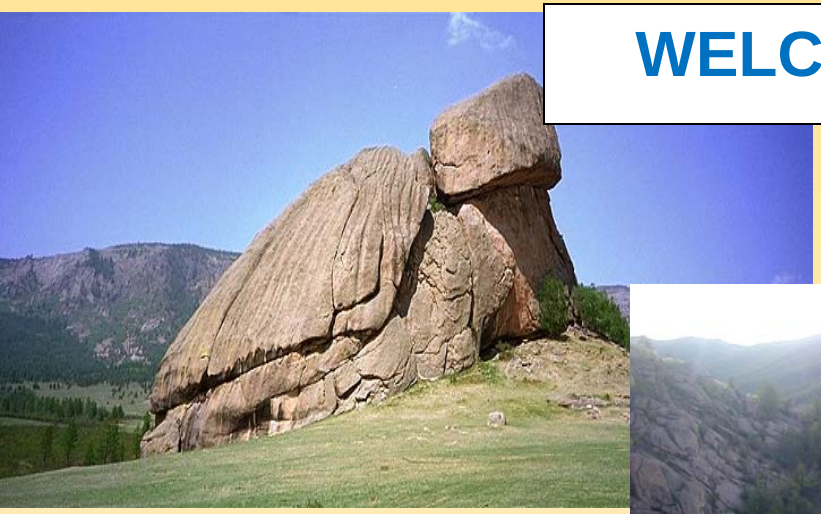


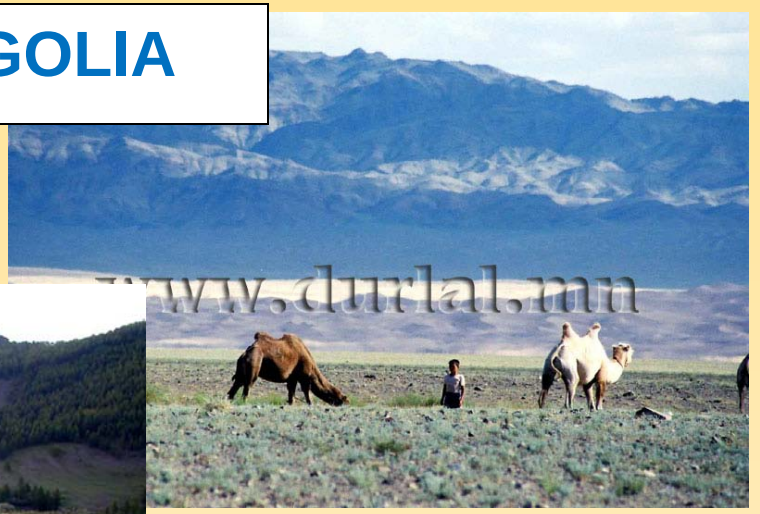
YOURVEIW of Vaisala AWS

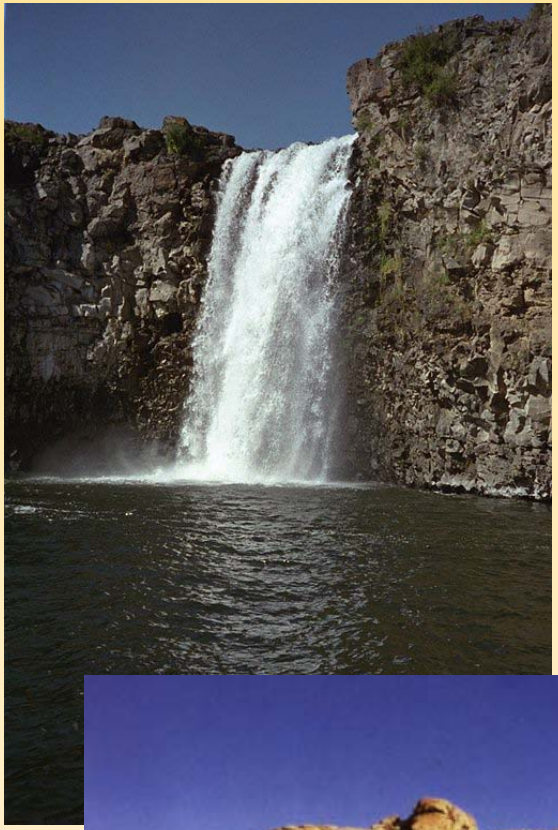


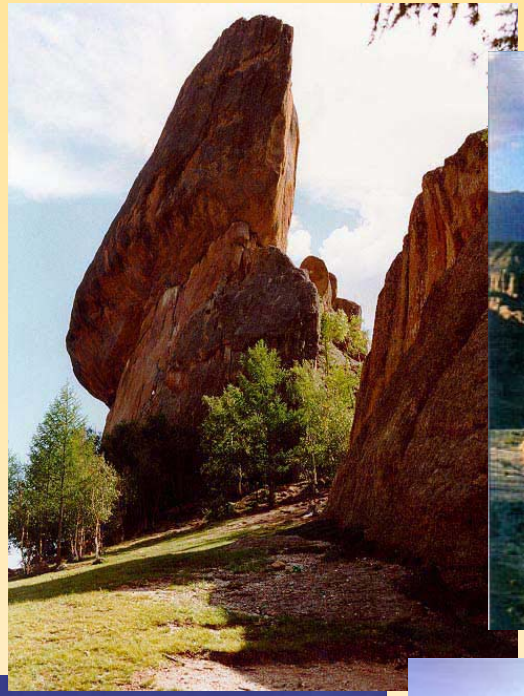
YourVIEW Weather 1 Display

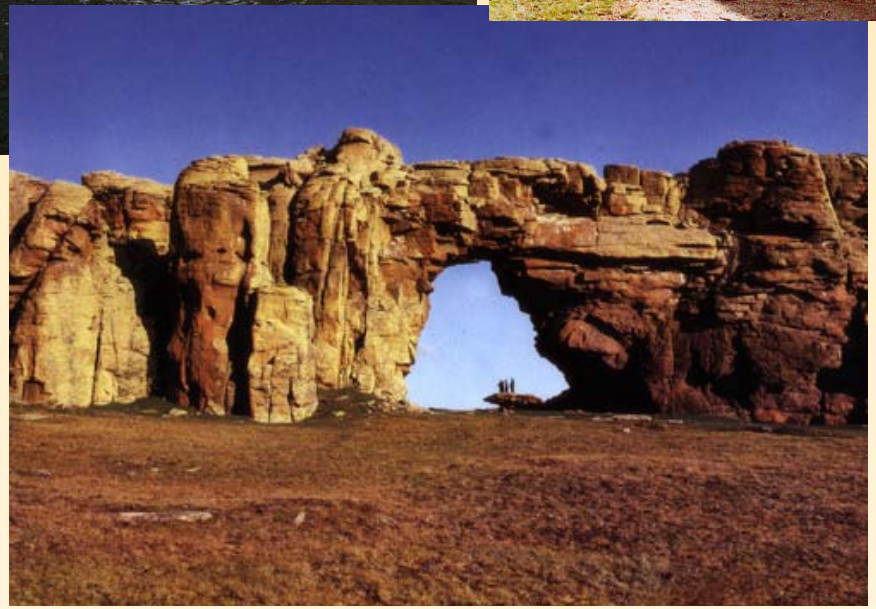
WELCOME TO MONGOLIA












THANK YOU FOR YOUR
ATTENTION