

RETE DI MONITORAGGIO CLIMATICA E ATMOSFERICA IN AREE REMOTE

Ev-K2-CNR ha sviluppato competenze di eccellenza internazionale nella realizzazione di reti di monitoraggio climatico e campagne di misura in aree montane remote d'alta quota installando e gestendo in particolare una rete di monitoraggio ambientale costituita da stazioni di rilevamento dati meteo climatici e ambientali dislocata nelle Alpi, Appennini, Hindu-Kush Himalaya Karakorum, Rwenzori, Ande. Ad oggi la rete è composta dalle seguenti stazioni:

Sito di installazione	Stazione	Tipologia dati	Quota (m)
Laboratorio-Osservatorio Internazionale Piramide (Lobuche, Valle del Khumbu, Nepal)	Nepal Climate Observatory-Pyramid (ABC-Pyramid)	<ul style="list-style-type: none"> - Numero, concentrazione e distribuzione dimensionale dell'aerosol (da 15nm a 32μm) - misura di massa del materiale particellare aerodisperso su membrane filtranti - Concentrazione del Black carbon - Coefficienti di scattering totale e di back scattering - Misura delle particelle del particolato - Concentrazione di Ozono superficiale - Concentrazione di gas serra (CFC, HFC, HCFC,...) - Massa chimica di chiusura dell'aerosol - Irradianza solare (200 - 3600 nm) - Variabili Meteorologiche Standard WMO 	5.079
	GPS Master	Parametri GPS	5.050
	Automatic weather station	Variabili Meteorologiche Standard WMO Parametri di Flusso e di Suolo	5.050
	DORIS Station	Stazione di riferimento orbito grafico delle rete DORIS	5.050
Pheriche (Valle del Khumbu, Nepal)	Automatic weather station	Variabili Meteorologiche Standard WMO	4.258
Namche Bazaar (Sede del Sagarmatha National Park, Valle del Khumbu, Nepal)	Automatic weather station	Variabili Meteorologiche Standard WMO	3.560
Lukla (Valle del Khumbu, Nepal)	Automatic weather station	Variabili Meteorologiche Standard WMO Parametri di Flusso e di Suolo	2.660
Kala Patthar (Valle del Khumbu, Nepal)	Automatic weather station	Variabili Meteorologiche Standard WMO	5.600

Colle Sud (Monte Everest, Nepal)	Automatic weather station	Variabili Meteorologiche Standard WMO	8.000
Ghiacciaio Changri Nup (Valle del Khumbu, Nepal)	Automatic weather station	Variabili Meteorologiche Standard WMO	5.700
Urdukas (Baltoro Glacier, Karakorum, Pakistan)	Automatic weather station	Variabili Meteorologiche Standard WMO	3.926
Askole (Baltoro Glacier, Karakorum, Pakistan)	Automatic weather station	Variabili Meteorologiche Standard WMO	3.015
Concordia (Baltoro Glacier, Karakorum, Pakistan)	Automatic weather station	Variabili Meteorologiche Standard WMO	4.700
Multan District (Pakistan)		<ul style="list-style-type: none"> – Misura di massa del materiale particellare aerodisperso su membrane filtranti – Concentrazione di Ozono superficiale – Variabili Meteorologiche Standard WMO 	438
Deosai (Baltoro Glacier, Karakorum, Pakistan)		<ul style="list-style-type: none"> – Misura delle particelle del particolato – Concentrazione del Black carbon – Concentrazione di Ozono superficiale – Variabili Meteorologiche Standard WMO 	4.100
Forni Glacier (Central Alps, Italia)	Automatic weather station	Variabili Meteorologiche Standard WMO	2.669
Dosdè Glacier (Central Alps, Italia)	Automatic weather station	Variabili Meteorologiche Standard WMO	2.801
Gigante Glacier (Western Alps, Italia)	Automatic weather station	Variabili Meteorologiche Standard WMO	3.430
Campo Imperatore (Gran Sasso Appennini, Italia)	Osservatorio Portella	<ul style="list-style-type: none"> – Concentrazione di Ozono superficiale – Concentrazione di NO_x – Distribuzione particolato atmosferico – Campionamento di gas atmosferici in traccia – Variabili Meteorologiche Standard WMO 	2.401
Thamel, Kathmandu (Nepal)	SUSKAT	<ul style="list-style-type: none"> – Numero, concentrazione e distribuzione dimensionale dell'aerosol (da 15nm a 32µm) – Concentrazione del Black carbon – Misura di massa del materiale particellare aerodisperso su membrane filtranti 	1.307

		<ul style="list-style-type: none"> – Concentrazione di Ozono superficiale – Misura delle particelle del particolato – Variabili Meteorologiche Standard WMO 	
Mt. Stanley (Elena Glacier, Rwenzori, Uganda)	Automatic weather station	Variabili Meteorologiche Standard WMO	4.750
Chacaltaya (Cordillera Real, Ande)	Laboratorio Chacaltaya	– Concentrazione di Ozono superficiale	5.320

RETE DI MONITORAGGIO CLIMATICA E ATMOSFERICA IN AREE REMOTE

Ev-K2-CNR Network (Nepal)

AWS Pyramid

Technical sheet

Coordinates:

Latitude: 27° 57' 33" N

Longitude: 86° 48' 46" E

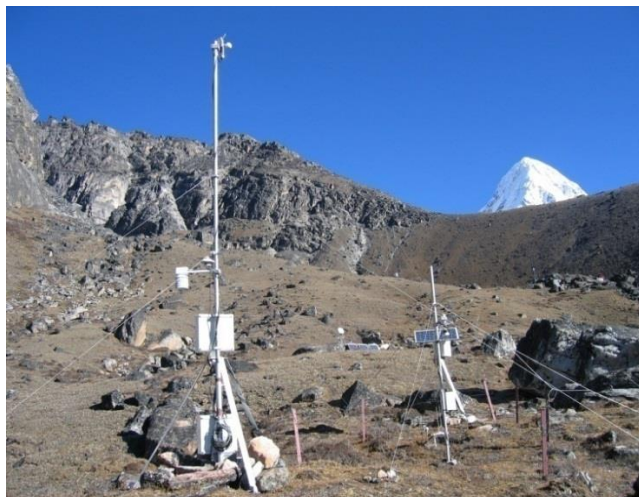
Elevation: 5.050 m a.s.l

Installation Time:

September 2000

Data Availability:

From October 1, 2000



Variable	Range	Accuracy	Recording rate	Height on Pole	Manufacturer
AWS1 Data Logger				2 m	LSI-Lastem Babuc ABC
Air Temperature	-30 - +70 °C	±0.1°C	1 min.	2 m	LSI-Lastem DMA570
Relative Humidity	0 - 100 %	±2.5%	1 min.	2 m	LSI-Lastem DMA570
Atmospheric Pressure	500 - 800 hPa (1 hPa=1 mBar)	1hPa	1 min.	2 m	Lsi-Lastem CX115P
Total Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	1 min.	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	1 min.	5 m	Lsi-Lastem DNA022
Global Solar Radiation	0-2000	-	1 min.	2 m	Kipp & Zonen CM6B
Additional Data Logger				2 m	LSI-Lastem E-Log
Heat Flux	<2000 Wm-2	3%	1 min.	-5 cm	Lsi-Lastem DPE260
Solar Radiations CNR1 sensor: (four components combined sensor+internal temperature with PT100)*	Pyranometer: 0 to 25 mV - Pyrgeometer: ±5 mV	±10% on daily totals - non linearity: < 1%	1 min.	2 m	Kipp & Zonen CM3* pyranometer - Kipp & Zonen CG3 pyrgeometer
Snow level	0 to 8 m	0,1 % (FS)	1 min.	2 m	Sommer USH-8
Soil Temperature	-20 +70°C	0,15° (at 0°C)	1 min.	-5 cm -20 cm	Lsi- Lastem DLA400
Soil Moisture	0% from saturation point	1/10 of water amount	1 min.	- 5 cm	SDEC HMS 9000

AWS Lukla

Technical sheet

Coordinates:

Latitude: 27° 41' 48" N

Longitude: 86° 43' 17" E

Elevation: 2,660 m a.s.l

Installation Time:

September 2002

Data Availability:

From November 2, 2002



Variable	Range	Accuracy	Recording rate	Height	Manufacturer
AWS3 Data Logger				2 m	LSI-Lastem Babuc ABC
Air Temperature	-30 - +70 °C	± 0,1°C (0°C)	10 min.	2 m	LSI-Lastem DMA572
Relative Humidity	0 - 100 %	1,5% (5÷95%, 23°C)	10 min.	2 m	LSI-Lastem DMA572
Atmospheric Pressure	50 - 1100 hPa (1 hPa=1 mBar)	1hPa	10 min.	2 m	Vaisala-PTB330
Total Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	10 min.	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0,4-75 m/s For direction: 0 ÷ 360	Accuracy (within range 0.4 ... 60 m/s) transfer function ± 0.17 m/s For direction: 1% FS (Full scale)	10 min.	5 m	VAISALA
Global Solar Radiation	0-2000	-	10 min.	2 m	Kipp & Zonen CMP3
Additional Data Logger				2 m	LSI-Lastem E-Log
Heat Flux	<2000 Wm-2	3%	10 min.	-5 cm	Lsi-Lastem DPE260
Solar Radiations CNR4 sensor: (four components combined sensor+internal temperature with PT100)*	Pyranometer: 10 to 20 mV - Pyrgeometer: 5 to 10 mV	< 5% on daily totals - non linearity: < 1%	10 min.	2 m	Kipp & Zonen CM3* pyranometer - Kipp & Zonen CG3 pyrgeometer
Soil Temperature	-20 +70°C	0,15° (at 0°C)	10 min.	-5 cm -20 cm	Lsi- Lastem DLA400
Soil Moisture	0% from saturation point	1/10 of water amount	10 min.	- 5 cm	SDEC HMS 9000

AWS NP-Namche

Technical sheet

Coordinates:

Latitude: 27° 48' 8.6" N

Longitude: 86° 42' 52" E

Elevation: 3,570 m a.s.l

Installation Time:

October 2001

Data Availability:

From October 27, 2001



Variable	Range	Accuracy	Recording rate	Height	Manufacturer
Data Logger				2 m	LSI-Lastem E-Log
Air Temperature	-30 - +70 °C	±0.1°C	10 min.	2 m	LSI-Lastem DMA570
Relative Humidity	0 - 100 %	±2.5%	10 min.	2 m	LSI-Lastem DMA570
Atmospheric Pressure	500 - 800 hPa (1 hPa=1 mBar)	1hPa	10 min.	2 m	Lsi-Lastem CX115P
Total Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	10 min	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	10 min	5 m	Lsi-Lastem DNA022
Global Solar Radiation	0-2000	-	10 min	2 m	Kipp&Zonen CM6B pyranometer

AWS Pheriche

Technical sheet

Coordinates:

Latitude: 27° 53' 43" N

Longitude: 86° 49' 7.5" E

Elevation: 4,260 m a.s.l

Installation Time:

October 2001

Data Availability:

From October 25, 2001



Variable	Range	Accuracy	Recording rate	Height	Manufacturer
Data Logger				2 m	LSI-Lastem Babuc ABC
Air Temperature	-30 - +70 °C	± 0,1°C (0°C)	1 min.	2 m	LSI-Lastem DMA572
Relative Humidity	0 - 100 %	1,5% (5÷95%, 23°C)	1 min.	2 m	LSI-Lastem DMA572
Atmospheric Pressure	50 - 1100 hPa (1 hPa=1 mBar)	0,45 hPa	1min.	2 m	Vaisala BAROCAP PTB330
Rain Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	1 min	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	1 min	5 m	Lsi-Lastem DNA022
Global Solar Radiation	0-2000	-	1 min	2 m	Kipp & Zonen CM6B pyranometer

AWS Kala Patthar

Technical sheet

Coordinates:

Latitude: 27° 59' 24" N

Longitude: 86° 49' 48" E

Elevation: 5,600 m a.s.l

Installation Time:

May 2008

Data Availability:

From May 13, 2008



Variable	Range	Accuracy	Recording rate	Height	Manufacturer
Data Logger			1 min	2 m	LSI-Lastem E-Log
Air Temperature	-30 - +70 °C	± 0,1°C (0°C)	1 min	2 m	LSI-Lastem DMA572
Relative Humidity	0 - 100 %	1,5% (5÷95%, 23°C)	1 min	2 m	LSI-Lastem DMA572
Atmospheric Pressure	500 - 800 hPa (1 hPa=1 mBar)	1hPa	1 min	2 m	Lsi-Lastem CX115P
Rain Precipitation	Max 10 mm/min	1÷10mm/min: ±1%	1 min	1.5 m	Lsi-Lastem DQA030
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	1 min	5 m	Lsi-Lastem DNA022
Global Solar Radiation	0-2000	-	1 min	2 m	Kipp & Zonen CM6B pyranometer
UVA Radiation	0.100 Wm-2	5%±/°C	1 min		Lsi-Lastem DPA-516 C502

AWS Changri Nup

Technical sheet

Coordinates:

Latitude: 27° 58' 54.5" N

Longitude: 86° 45' 53.8" E

Elevation: 5,700 m a.s.l

Installation Time:

February 2010

Data Availability:

From February 24, 2010



Variable	Range	Accuracy	Recording rate	Height	Manufacturer
Data Logger			1 min	2 m	LSI-Lastem E-Log
Air Temperature	-30 - +70 °C	± 0,1°C (0°C)	1 min	2 m	LSI-Lastem DMA572
Relative Humidity	0 - 100 %	1,5% (5÷95%, 23°C)	1 min	2 m	LSI-Lastem DMA572
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	1 min	5 m	Lsi-Lastem DNA022
Solar Radiations CNR1 sensor: (four components combined sensor+internal temperature with PT100)*	Pyranometer: 0 to 25 mV - Pyrgeometer: ±5 mV	±10% on daily totals - non linearity: < 1%	1 min.	2 m	Kipp & Zonen CM3* pyranometer - Kipp & Zonen CG3 pyrgeometer

Ev-K2-CNR AWS Network (Pakistan)

AWS Askole

Technical sheet

Coordinates:

Latitude: 35° 40' 50" N

Longitude: 75° 48' 55" E

Elevation: 3,000 m a.s.l

Installation Time:

October 2007

Data Availability:

From October 7th, 2002



Variable	Range	Accuracy	Recording rate	Height	Manufacturer
Data Logger				2 m	LSI-Lastem Babuc ABC
Air Temperature	-30 - +70 °C	± 0,1°C (0°C)	60 min.	2 m	LSI-Lastem DMA572
Relative Humidity	0 - 100 %	1,5% (5÷95%, 23°C)	60 min.	2 m	LSI-Lastem DMA572
Atmospheric Pressure	500 - 800 hPa (1 hPa=1 mBar)	1hPa	60 min.	2 m	Lsi-Lastem CX115P
Total Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	60 min	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	60 min	5 m	Lsi-Lastem DNA022
Global Solar Radiation	0-2000	-	60 min	2 m	Kipp & Zonen CM6B pyranometer

AWS Urdukas

Technical sheet

Coordinates:

Latitude: 35° 43' 41" N

Longitude: 76° 17' 10" E

Elevation: 3,926 m a.s.l

Installation Time:

June 2004

Data Availability:

From June 17, 2004



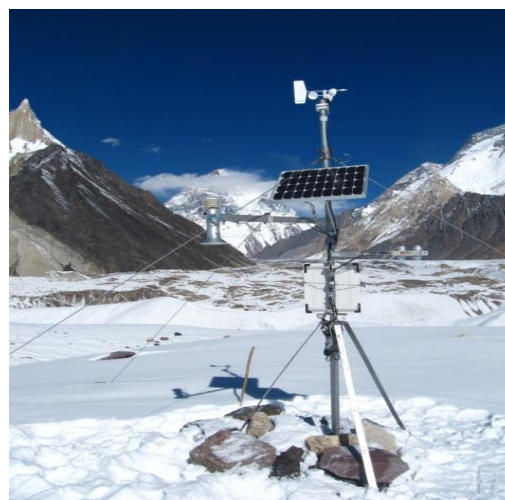
Variable	Range	Accuracy	Recording rate	Height on Pole	Manufacturer
AWS Data Logger				2 m	LSI-Lastem E-Log
Air Temperature	-80 - +60 °C	-80 ... +20 °C±(0.226 - 0.0028 x temperature) °C +20 ... +60 °C±(0.055 + 0.0057 x temperature) °C	60 min.	2 m	Vaisala-HMP155
Relative Humidity	0 - 100 %	±1%+15 ... +25 °C (+59 ... +77 °F) ±1 %RH (0 ... 90 %RH)	60 min.	2 m	Vaisala-HMP155
Atmospheric Pressure	500 - 800 hPa (1 hPa=1 mBar)	1hPa	60 min.	2 m	Lsi-Lastem CX115P
Total Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	60 min	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0.4-75 m/s For direction: 0 ÷ 360	For speed: 0,5 m/s For direction: ±3% FS (Full scale)	60 min	5 m	Vaisala -Wind Set WA15
CNR1 Data Logger					LSI-Lastem E-Log
Solar Radiations CNR1 sensor: (four components combined sensor+internal temperature with PT100)*	Pyranometer: 0 to 25 mV - Pyrgeometer: ±5 mV	±10% on daily totals - non linearity: < 1%	60 min.	2 m	Kipp & Zonen CM3* pyranometer - Kipp & Zonen CG3 pyrgeometer
Snow level	0 to 8 m	0,1 % (FS)	60 min.	2 m	Sommer USH-8

AWS Concordia

Technical sheet

Coordinates:
Latitude: 35°44'38.98"N
Longitude: 76°30'49.71"E
Elevation: 4,700 m a.s.l.

Installation Time:
July 2011
Data Availability:
From January 2012



Variable	Range	Accuracy	Recording rate	Height on Pole	Manufacturer
Data Logger				2 m	LSI-Lastem E-Log
Air Temperature	-30 - +70 °C	±0.001°C	60 min.	2 m	LSI-Lastem DMA570
Relative Humidity	0 - 100 %	±1%	60 min.	2 m	LSI-Lastem DMA570
Total Precipitation	180 mm/hr	0-1 mm/min: 1% 1-3 mm/min: 2% 3-5 mm/min: 4% 5-10 mm/min: 8%	60 min	1.5 m	Lsi-Lastem DQA035
Wind Speed and Direction	For speed: 0-60 m/s For direction: 0 ÷ 360	For speed: 0,1 m/s+1%VL For direction: 1% FS (Full scale)	60 min	5 m	Lsi-Lastem DNA022
Data Logger					LSI-Lastem E-Log
Solar Radiations CNR4 sensor: (four components combined sensor+internal temperature with PT100)*	From 300 to 2800 nm (shortwave radiation) From 4500 to 42000 nm (longwave radiation)	From 5 to 20 μV/W/m2	60 min.	2 m	Kipp & Zonen CM3* pyranometer - Kipp & Zonen CG3 pyrgeometer
Snow level	0 to 8 m	0,1 % (FS)	60 min.		Sommer USH-8