JMA/WMO WORKSHOP ON QUALITY MANAGEMENT IN SURFACE, CLIMATE AND UPPER-AIR OBSERVATIONS IN RA II (ASIA)

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Meteorological Observations and Instrumental Systems for Meteorological services in Sri Lanka

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Sri Lanka


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Barents Sea
Novaya Zemlya (Russia)
Kara Sea
Laptev Sea
Arctic Ocean
NORTH AMERICA
Norwegian Sea
90° E
ARCTIC CIRCLE
Ostrova Anzhu (Russia)
Ural Mts
Russian Federation
European Russia
NORTH ASIA
Lake Baykal
Bering Sea
60° N
180°
Alaska
Ostrov Sakhalin (Russia)
Sea of Okhotsk
Kamchatka Peninsula
Aleutian Islands
EUROPE
Kazakhstan
Aral Sea
Mongolia
Caspian Sea
Black Sea
Uzbekistan
Turkmenistan
Kyrgyzstan
Tajikistan
ASIA
North Korea
Kuril Islands (Russia)
45° N
Sea of Japan (East Sea)
INTERNATIONAL
--DATE LINE--
MONDAY
SUNDAY
Turkey
Lebanon
Syria
Israel
Iraq
Persian Gulf
Iran
Afghanistan
Pakistan
MIDDLE EAST
China
Japan
Yellow Sea
South Korea
Pacific Ocean
Nepal
Bhutan
Bangladesh
Hong Kong (China)
Jordon
Kuwait
Qatar
Bahrain
India
Gulf of Tonkin
Macau (China)
East China Sea
Ryukyu Islands (Japan)
Bonin Islands (Japan)
30° N
TROPIC OF CANCER
Saudi Arabia
U.A.E
Oman
Gulf of Oman
Red Sea
Laccadive Sea
Burma
Laos
Hainan (China)
Taiwan
Okinawa (Japan)
Volcano Islands (Japan)
Bay of Bengal
Arabian Sea
Thailand
Vietnam
Philippines
Yemen
Gulf of Aden
Andaman and Nicobar Islands (India)
SOUTHEAST ASIA
South China Sea
15° N
Philippine Sea
Lakshadweep Islands (India)
Andaman Sea
Brunei
Sulu Sea
AFRICA
Socotra (Yemen)
Sri Lanka
Phuket (Thailand)
Cambodia
Malaysia
Gulf of Thailand
Celebes Sea
New Guinea (Indonesia)
EQUATOR
0°
Maldives
Borneo (Indo.)
Singapore
Sumatra (Indo.)
Java Sea
Banda Sea
Indonesia
WIN $100.00 HERE
OCEANIA
British Indian Ocean Territory (UK)
Indian Ocean
Java (Indo.)
Bali (Indo.)
Flores Sea
Savu Sea
East Timor
Arafura Sea
150° E
15° S
1000 mi
1000 km
Coral Sea
AUSTRALIA
60° E
90° E
120° E
180°
©GraphicMaps.com


INDIA
Tondi
Palk Strait
Devipattinam
Delft Island
Kankesanturai
Point Pedro
Jaffna
Palk Bay
Dhanushkodi
Ferry
Mannar
NORTH EASTERN
Mankulam
Mullaittivu
Bay of Bengal
Puttalam
Vavuniya
Trincomalee
Anuradhapura
NORTH CENTRAL
Kalpitiya
Gulf of Mannar
Habarana
Polonnaruwa
Batticaloa
Maho
NORTH WESTERN
Chilaw
Kurunegala
Matale
NORTH EASTERN
Ampara
Negombo
Kandy
Kegalla
CENTRAL
Nuwara Eliya
Colombo
Badulla
Monaragala
Pottuvil
UVA
Ratnapura
WESTERN
Kalutara
Opanake
SABARAGAMUWA
SOUTHERN
Hambantota
Galle
Matara
INDIAN OCEAN
Sri Lanka
National capital
Province boundary
Province capital
Railroad
Road
Source: U.S. Central Intelligence Agency, 2000.

General Introduction About Sri Lanka:

- Located in the North Indian Ocean
- Between

  $05^0\,55'N$ - $09^0\,51'N$ Latitude

  $79^0\,42'E$ - $81^0\,53'E$ Longitude
- Having an Aerial Extent of 65,610 km^2
- Mountains are confined to the Central parts of the Island

  Pidurutalagale – 2524 m

  Kirigalpotta – 2396 m

  - Population ~ 20 million
  - Ethnic division of the population : Sinhalese 74%, Tamil 18%, Moor 7%,
  - 25 Administration Districts with 246 sub-divisions.

  Burgher, Malay, and Vedda 1%.

Climatological situation of Sri Lanka

The weather in Sri Lanka experiences could be broadly divided in to monsoonal and intermonsoonal seasons

Four Seasons

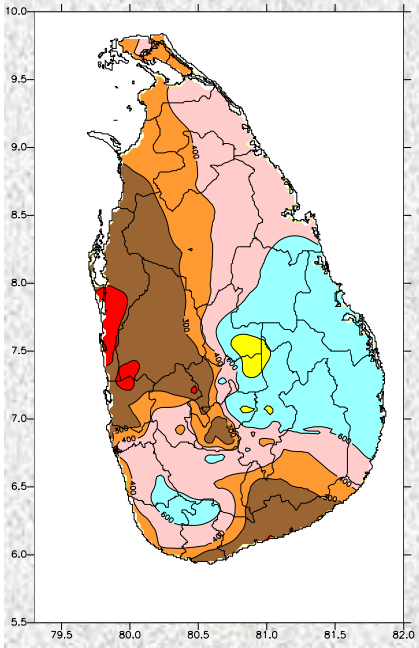
- **First Intermonsoon** — **Mar - Apr**
- **Southwest (summer) Monsoon** — **May - Sep**
- **Second Intermonsoon** — **Oct - Nov**
- **Northeast (winter) Monsoon** — **Dec - Feb**

Climatological situation of Sri Lanka cont..

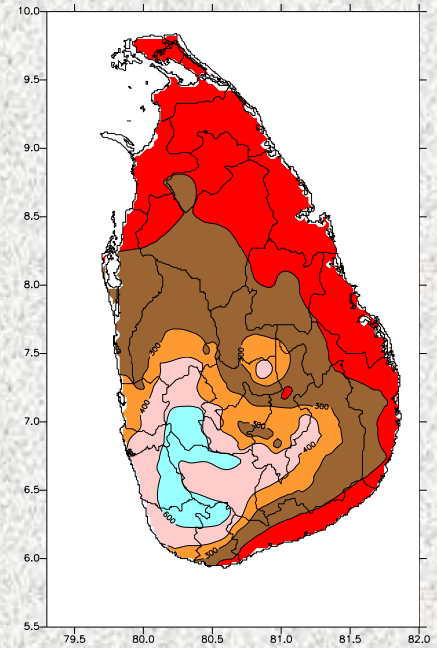
During the **Southwest Monsoon** (summer monsoon) weather is confined mainly to the southwest quarter and hill country.

- Eastern and Northern regions receive rainfall during the **northeast monsoon (winter monsoon).**
- Southwest monsoon is more effective in Sri Lanka since it gives more rain over large parts of the Island and is experienced nearly a half of the year.
- Also the amount of rainfall which Sri Lanka receives during the southwest monsoon period, contribute much to the agriculture and generation of hydro power electricity in the country.
- During the **Inter-monsoon periods**, afternoon thunder showers are experienced over most parts of the island
- The annual average rainfall varies from below 1000mm in the driest zones in the northwest and southeast of the island to over 5000mm in some areas on the western slopes of the central highlands.

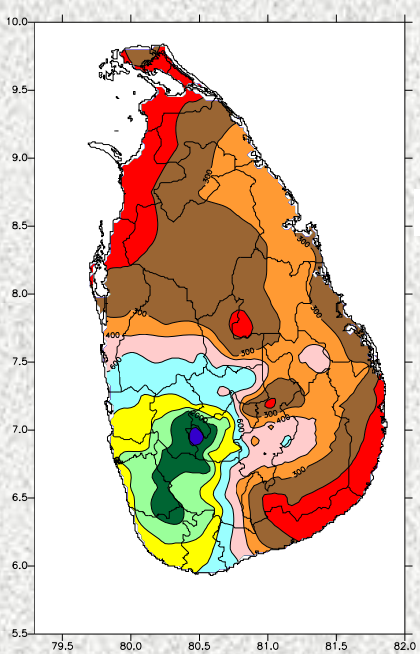
North-east Monsoon



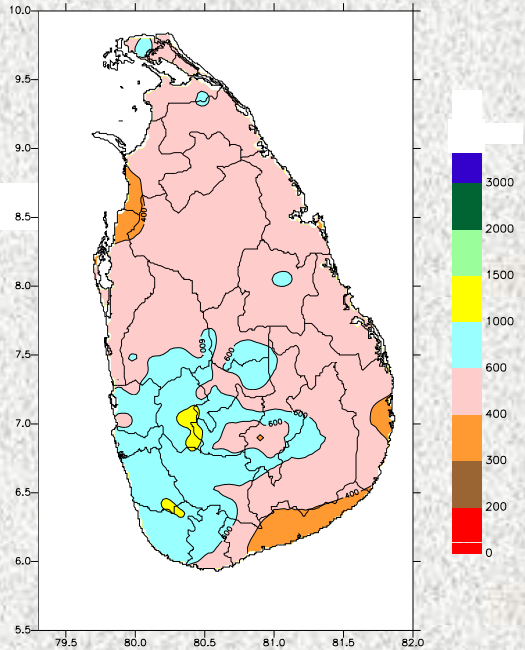
First Inter Monsoon



South-west Monsoon

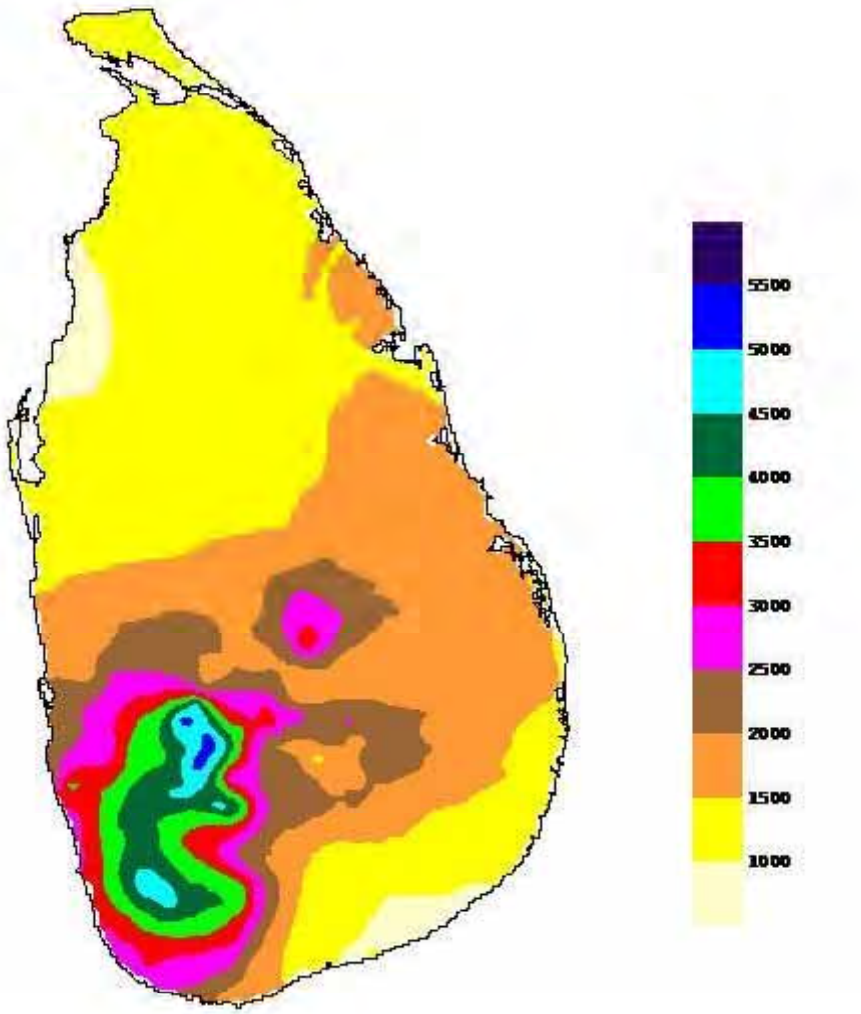


Second Inter Monsoon



Seasonal Average Rainfal in mm

Computed for the standard Averaging period 1961–1990



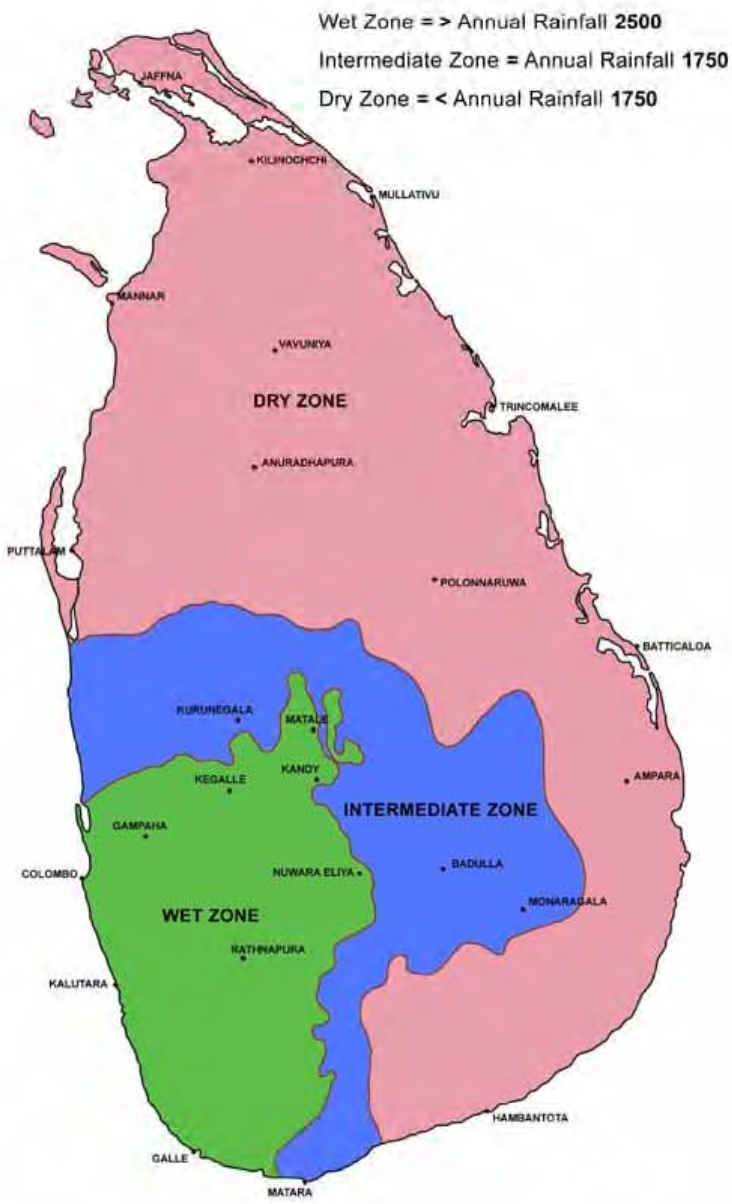
Annual Average Rainfall

(Computerized for standard averaging period of 1961-1990 in millimeters)

Sri Lanka is divided into zones guiding by its rain fall

- **Arid Zone - 1500mm or less**
- **Dry Zone - 1800-2500mm**
- **Wet Zone - more than 2500mm**

Climatic Zones of Sri Lanka



Source : Department of Agriculture Sri Lanka (DOASL), 2006

- **Due to the oceanic influence and geographical location close to the tropics, the mean monthly temperature in most parts of the island shows only a small variation**

- **Mean temperature at Colombo during the cooler months from November to February is about 27^{o}C degrees, which is only about 03^{o}C degrees lower than that of the warmest months April/ May**

- **The diurnal variation in the warmer months is about 06^{o} C and in the cooler months it is about 11^{o} C**

ENVIRONMENTAL HAZARDS

•Floods: **On-set of Southwest monsoon**
Second inter monsoon period

•**TROPICAL CYCLONES**: **October, November and December**.
a few cyclones crossed the Island and badly affected one was in November 1978 and the other in November 1992

Heavy rains and strong winds- earth slips occur in the hilly areas storm surges in the Eastern coastal areas.

Floods - mainly in the low lying areas

Sea erosion - mainly occurs during the southwest monsoon

DROUGHTS - mostly due to the failure of the Southwest or Northeast monsoon

EL NINO - Southern Oscillation (ENSO) : a global phenomena may be a reason for droughts in Sri Lanka and other South Asian Countries

Drought conditions - mostly in the NorthCentral, Northwestern and Southeastern regions

Meteorological Observation Network

Surface observations

Department of Meteorology maintains 20 meteorological stations, manned by trained meteorological observers.

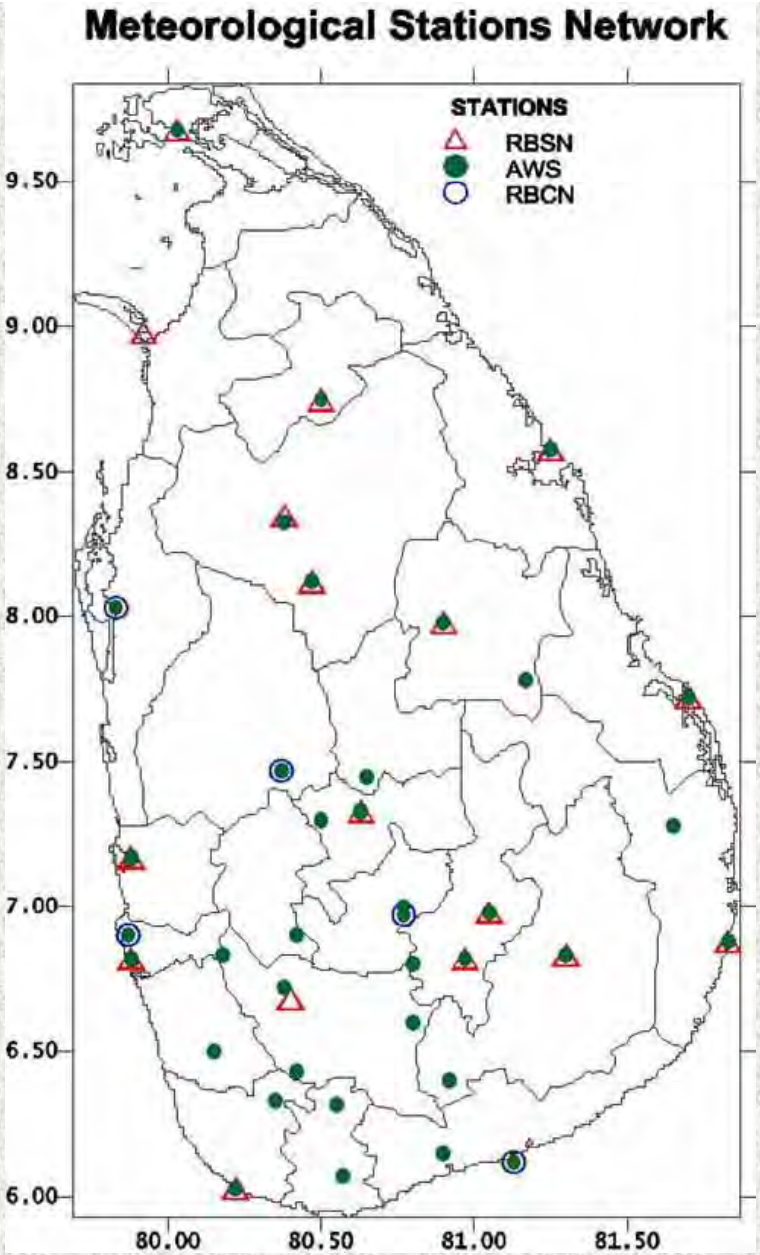
Following stations do the sfc observations at main **standard time of observation** (i.e 0000, 0600, 1200 and 1800 UTC) and **intermediate time of observation** (i.e. 0300, 0900, 1500 and 2100 UTC)

1). Anuradhapura
2). Batticaloa
*3). Colombo)
4). Galle
*5). Hambantota
6). Katugastota
7). Katunayake
*8). Nuwara Eliya
*9). Puttalam
10). Ratmalana
11). Ratnapura
12). Trincomalee.

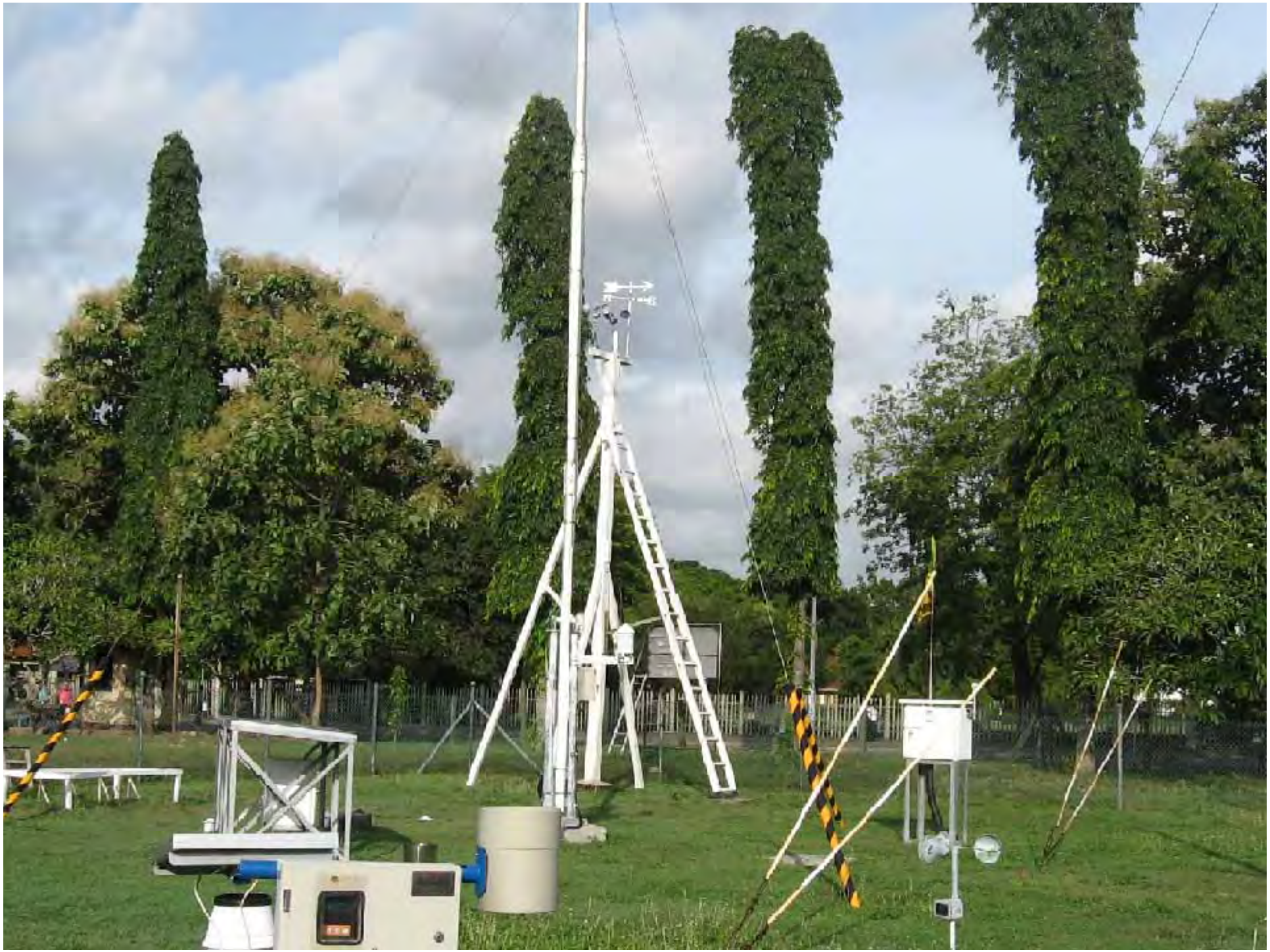
The following stations are done surface observations at 0000, 0600, 0900, 1200 and 1500 UTC.

1). Badulla
2). Bandarawela
3). Jaffna
*4). Kurunegala
5). Maha Illupallama
6). Mannar.
7). Pottuvil.
8). Vauniya

* **indicate RBCN**



	RBSN	RBCN	GSN	Manned Stations	AWS
Number	20	5	20	20	33

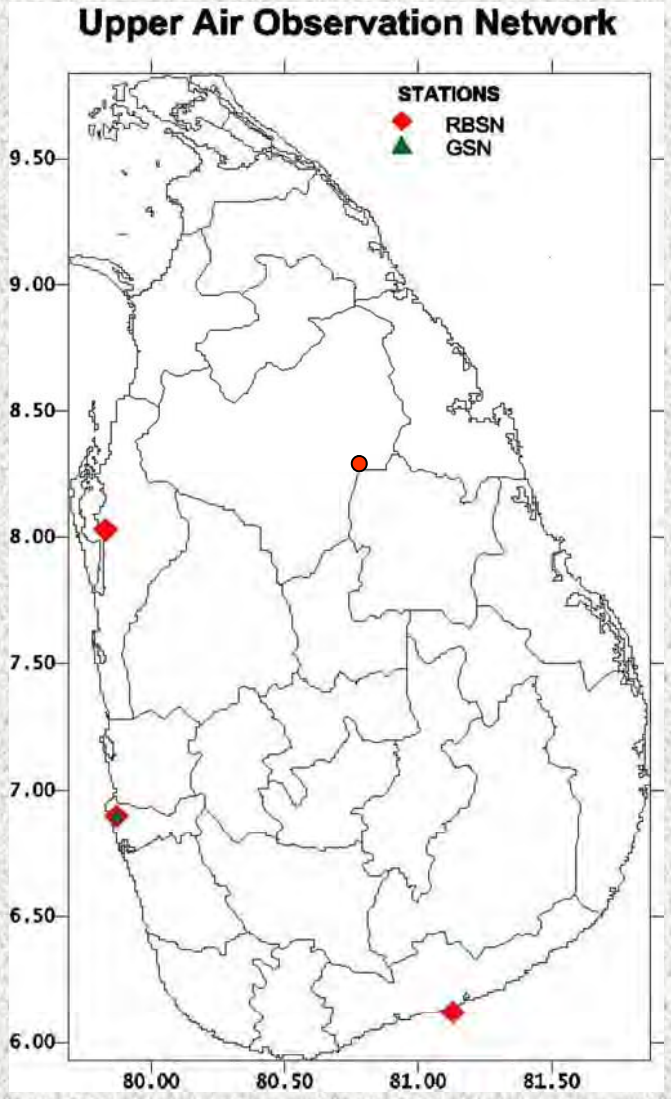


Upper Air Observations

Upper Air Observations are done 0000, 0600 & 1200 UTC at :

- Hambantota (extreme south,)
- Puttalam (west)
- Colombo (southwest coast)
- Polonnaruwa (inland – new station, still this station's data not send to GTS).

Radar and Radio-sonde Observations at 0600 & 1200 UTC are done only at Colombo



	RBSN	RBCN	GSN	Manned Stations	Automated system stations
Number	03	03	01	04	0

Data Flow to Users and Archives

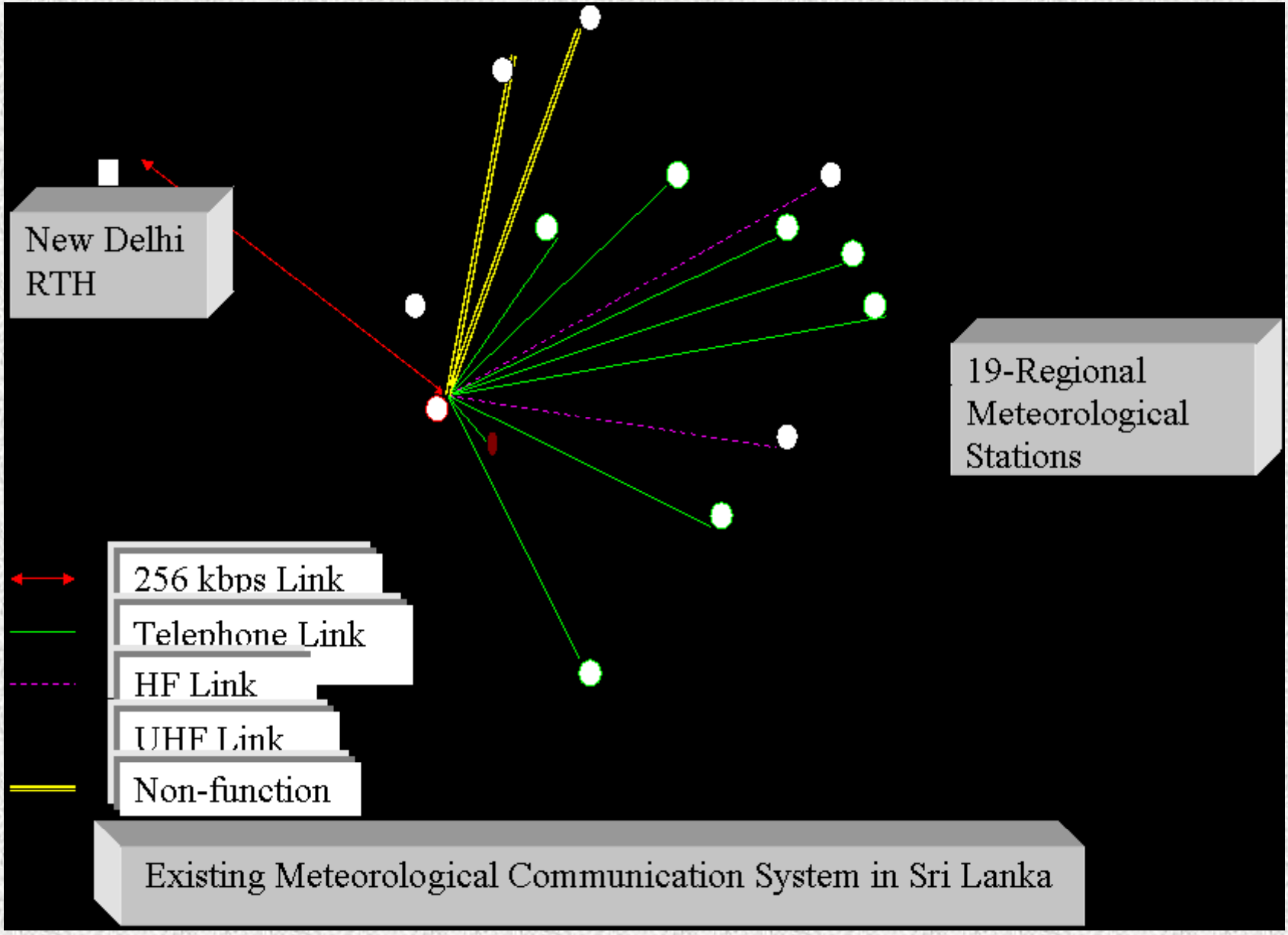
- Local Meteorological stations's data are received in every three hour time by over the telephone .
- Regional weather observations are received at the NMC via the Regional Telecommunication Centre at New Delhi over the dedicated telecommunication circuit established for this purpose.
- The NMC is responsible for the collection and processing of Meteorological Data received from field offices, and outside via GTS.
- Synoptic and Upper Air data are plotted and analyzed manually every six hourly (local data 3 hourly).
- The weather forecasts are issued using subjective methods by looking at the analyzed charts (synoptic & upper air), satellite images etc, by experienced meteorologists.

- The quality of the forecast certainly depends on the skill and the experience of the meteorologists.

- This Division is manned 24 hours by a Meteorologist for Weather Forecasting. All queries on current and forecast weather are dealt by this Division.

- Issue of weather warnings during Bad Weather periods is done by the NMC for general public and by the Airport Meteorological Office for Aviation.

Data transmission



Quality controlling of data

Quality controlling of data is done subjectively at the observatory, NMC, Data branch and at the Climate branch.

Following checking are carried out .

- **Check for coding errors**
- **Check for physical reasonableness of observation**
- **Check against it's neighbours, spatial and temporal consistency**
- **Check against self recording charts**

- Computer Division archives all the data under CLICOM Project.
- Monthly and annual climatological means are calculated for various parameters.
- Presently data are stored in CDs and the computer hard disk.

Agro-Meteorological Stations

- 40 Agro-meteorological stations are maintained in collaboration with other government institutions such as the Agriculture Department, Tea Research Institute, Rubber Research Institute, Coconut Research Institute, Mahaweli Authority etc.
- Agro-Data are received at the end of the month.

Rain-Gauge Stations

- Nearly 400 rainguage stations scattered over the island are maintained with the co-operation of various other govt institutions and many individuals
- Daily rainfall data from these stations are received at the end of the month.
- In addition, rainfall data are **collected daily from about 80** of these stations by phone for weather forecasting purposes.
- Rainfall Branch looks after deficiencies at rain gauge stations and keep records of timely reception of data monthly and checking for authenticity.

- **Instrument Branch** attends to defects and deficiencies in instrumentation and also calibration.
- These services are extended to Agro-meteorological Stations too whenever possible.

- **Data and Climate** Branches examine and quality control Meteorological data received from all the Meteorological Stations.
- Astronomical information to the general public, such as phases of moon, sunrise, sunset, eclipses, etc., are also provided by the Climate Division.

Training

About once a year training programme is organized at the Head Office for observers

- to upgrade their knowledge and skill about the observations
- to give proper knowledge to handle and maintenance of conventional and AWS instruments.

Current issues

- Many sensors (specially wind sensors) and VSAT instruments of the AWS system are malfunctioned very frequently.
- Department is not having expertise to rectify this problem.
- But the system is under warranty period, suppler is doing replacement.
- Therefore, department is needed external expertise assistance for maintenance of the system.


Thank You !