

Sri Lanka

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Meteorological Observations and Instrumental Systems for Meteorological services in Sri Lanka

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Summary and Purpose of Document

This document contains an overview of the surface and upper-air observations in Sri Lanka, with respect to instruments, Data Network, quality assurance / quality control, training, and applications.

1. Introduction

1.1 General Introduction About Sri Lanka:

Sri Lanka is an island in the North Indian ocean, just south-east of the southern tip of the Indian sub continent, having an arial extent of 65,610 square kilometers. The highlands, mostly above 300 meters, occupy the south central part of Sri Lanka with numerous peaks (Pidurutalagala -2524 m, Kirigalpotte - 2396 m), high plateaus and basins and are surrounded by an extensive lowland area. There are twenty-five (25) Administration Districts in the Country with 246 sub-divisions. The population in Sri Lanka is about 20 million and the ethnic division of the population is: Sinhalese 74%, Tamil 18%, Moor 7%, Burgher, Malay, and Vedda 1%. Major languages are: Sinhala 74% (official and national), Tamil 18% (national), other 8%. English is commonly used in government and spoken competently by about 10% of people. Population density of Sri Lanka is 792 per square miles.

1.2 Meteorological Characteristics:

Due to its location within the tropics between 5° 55' to 9° 51' North latitude and between 79° 42' to 81° 53' East longitude, and in the Asiatic monsoon region, the climate of the island could be characterized as both tropical as well as monsoonal. Topographical features mentioned above influence strongly on spatial variation of climate in the island. The mean annual rainfall varies from under 1000mm in the southeastern and northwestern parts to over 5000mm in the western slopes of the central highlands. The mean annual temperature varies from 27°C in the coastal lowlands to 16°C at Nuwara Eliya, in the central highlands (1900m above mean sea level). This relatively unique feature manifesting as sunny beaches to rain forests inland is a tourist attraction.

The island is seasonally affected by two regional scale wind regimes. The Southwest monsoon is from May to September and the Northeast monsoon from December to February. The intermonsoon periods, the transition periods between the two monsoons are, from March to April and from October to November. The rainfall during these intermonsoon periods is mainly due to convective thunderstorm activity.

It is characteristic to have long spells of dry days over most parts of the country except in the north and east during January and February, with ground frost appearing in the central hills where vegetables are grown. During the months of November to December, depressions forming in the Bay of Bengal (and Arabian Sea) tend to intensify into cyclonic storms and move closer to Sri Lanka bringing much rain and wind; but chances of land fall along east coast are very low; only 13 out of some 1,300 storms since 1891. Devastation due to cyclones thus does not top the list of natural disasters. However gust of strong winds during the southwest monsoon period cause damage to houses and other building structures in the southwest quarter of the island. Another phenomenon that increasingly threatens the life and property is lightning. Torrential rains too cause floods displacing people and, also in the other extreme, prolonged dry spells sometimes affect agriculture adversely. Landslides in the hill country are also on the increase as a natural calamity, during the recent years.

2. Organization

2.1 Present Situation

The Directorate of Meteorology consists of The Director General of Meteorology as the Head with two Directors and five Deputy Directors: all are former Meteorologists except Dututy Director administration. Most divisions are under a Meteorologist-in-Charge with NMC and International Airport Meteorological Office having four additional Meteorologists each as Forecasters, for round the clock service. In the Department Head Office there are ten (10) main Branches (Divisions) viz., National Meteorological Centre (NMC), Agro-meteorology, Computer, Radar, Instrument, Rainfall, Climate , Data Divisions and Establishment & finance Divisions.

3. The current Status of Meteorological Instrument and Observational System

3.1 Meteorological Observation Network

3.1.1 Surface observations

Department of Meteorology, Sri Lanka maintains 20 meteorological stations scattered throughout the Island, manned by trained meteorological observers. In addition to the department headquarters in Colombo, 19 outstation meteorological offices are operated.:

Surface observations at main standard time of observation (i.e 0000, 0600, 1200 and 1800 UTC) and at the intermediate time of observation (i.e. 0300, 0900, 1500 and 2100 UTC) are done at :

1). Anuradhapura	(080 20' N 800 23' E)	7).Katunayake	(070 10' N 790 53' E)
2). Batticaloa	(00 0' N 00 0' E)	*8).Nuwara Eliya	(060 58' N 800 46' E)
*3).Colombo	(060 54' N 790 52' E)	*9).Puttalam	(070 02' N 790 50' E)
4).Galle	(060 02' N 800 13' E)	10). Ratmalana	(060 49' N 790 53' E)
*5).Hambantota	(060 07' N 810 08' E)	11). Ratnapura	(060 41' N 800 24' E)
6).Katugastota	(070 20' N 800 38' E)	12).Trincomalee.	(00 0' N 00 0' E)

The following stations are done surface observations at 0300, 0600, 0900, 1200 and 1500 UTC.

1). Badulla	(060 59' N 810 03' E)	5). Maha Illupallama	(080 07' N 800 28' E)
2). Bandarawela	(060 49' N 800 58' E)	6). Mannar.	(00 0' N 00 0' E)
3). Jaffna	(00 0' N 00 0' E)	7). Pottuvil.	(00 0' N 00 0' E)
*4). Kurunegala	(070 28' N 800 22' E)	8). Vauniya	(00 0' N 00 0' E)

* indicate RBCN. See the Table-1 and Fig. 1.

Table -1 Number of stations

	RBSN	RBCN	GSN	Manned stations	AWS *
number	20	05	20	20	33

- **Automatic Weather Stations (AWS)**

Under the JICA granted project (“ the project for Improvement of Meteorological and Disaster Information Network “) Department has being received 38 AWS systems and 33 AWS’s already installed and these data is being used for

forecasting purposes and mitigation of disaster due to heavy rainfall even-though they are in experimental stage. National forecasting centre receive these data in every 10 minute period of time. The remaining 05 AWS system will be installed within this year.

3.1.1 Upper Air Observations

Upper air observations are done at Hambantota in the extreme south, Puttalam in the west and Colombo in the southwest coast and Polonnaruwa(new station, still this station data not send to GTS). See the Table-2 and Fig.-2.

Radar and Radiosonde Observations (upper air observation which give wind, temperature and pressure data up to about 20,000 metres or more) are done only at Colombo.

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Table - 2 Number of stations

	RBSN	RBCN	GSN	Manned stations	Automated system stations
number	03	03	01	03	0

Meteorological Stations Network

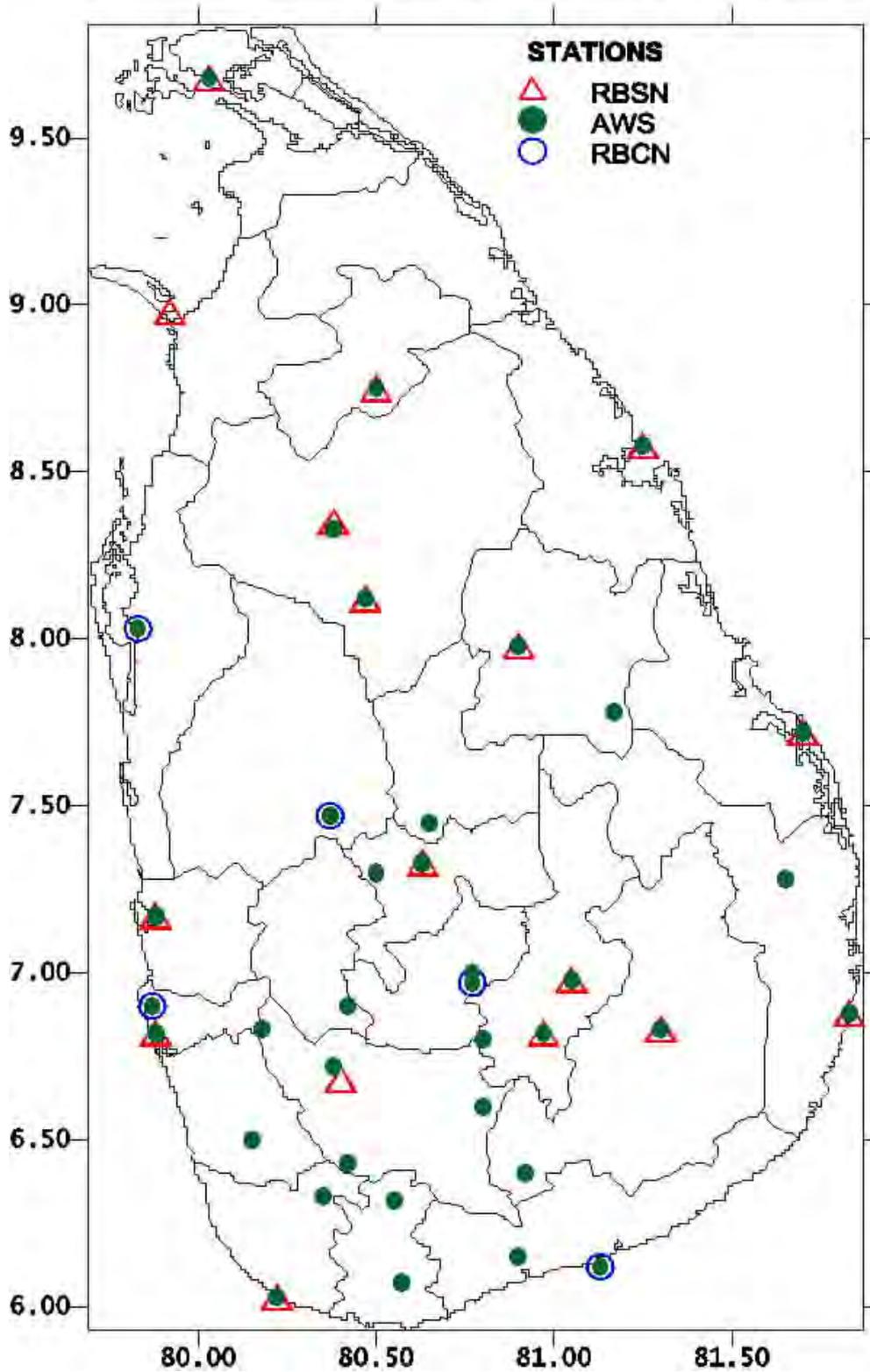


Fig. 1 Map showing locations of the RBSN, RBCN, GSN, manned and AWS stations.

Upper Air Observation Network

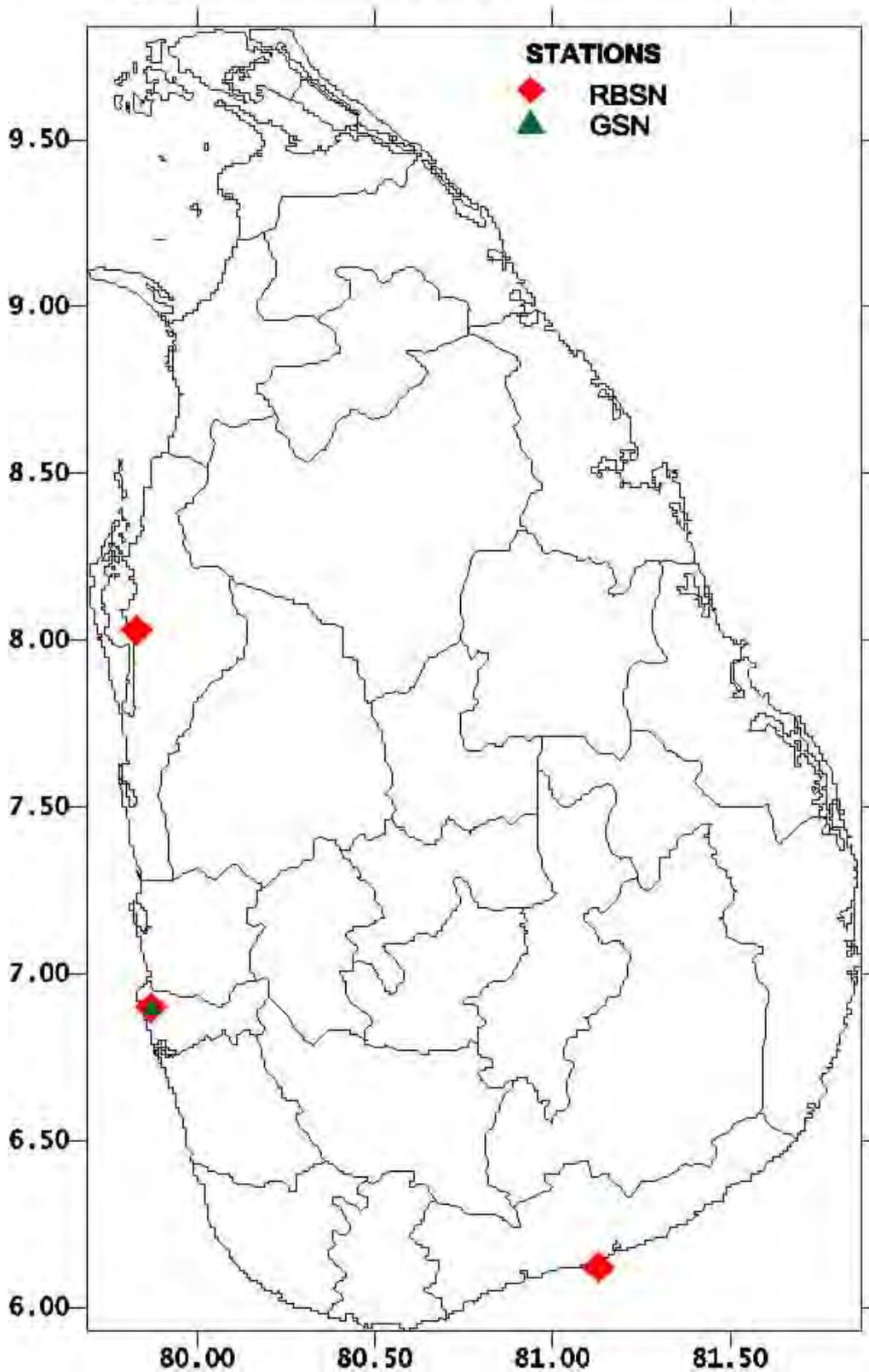


Fig. 2 Map showing locations of the Upper Air Observation Network

3.2 Agrometeorological Station Network

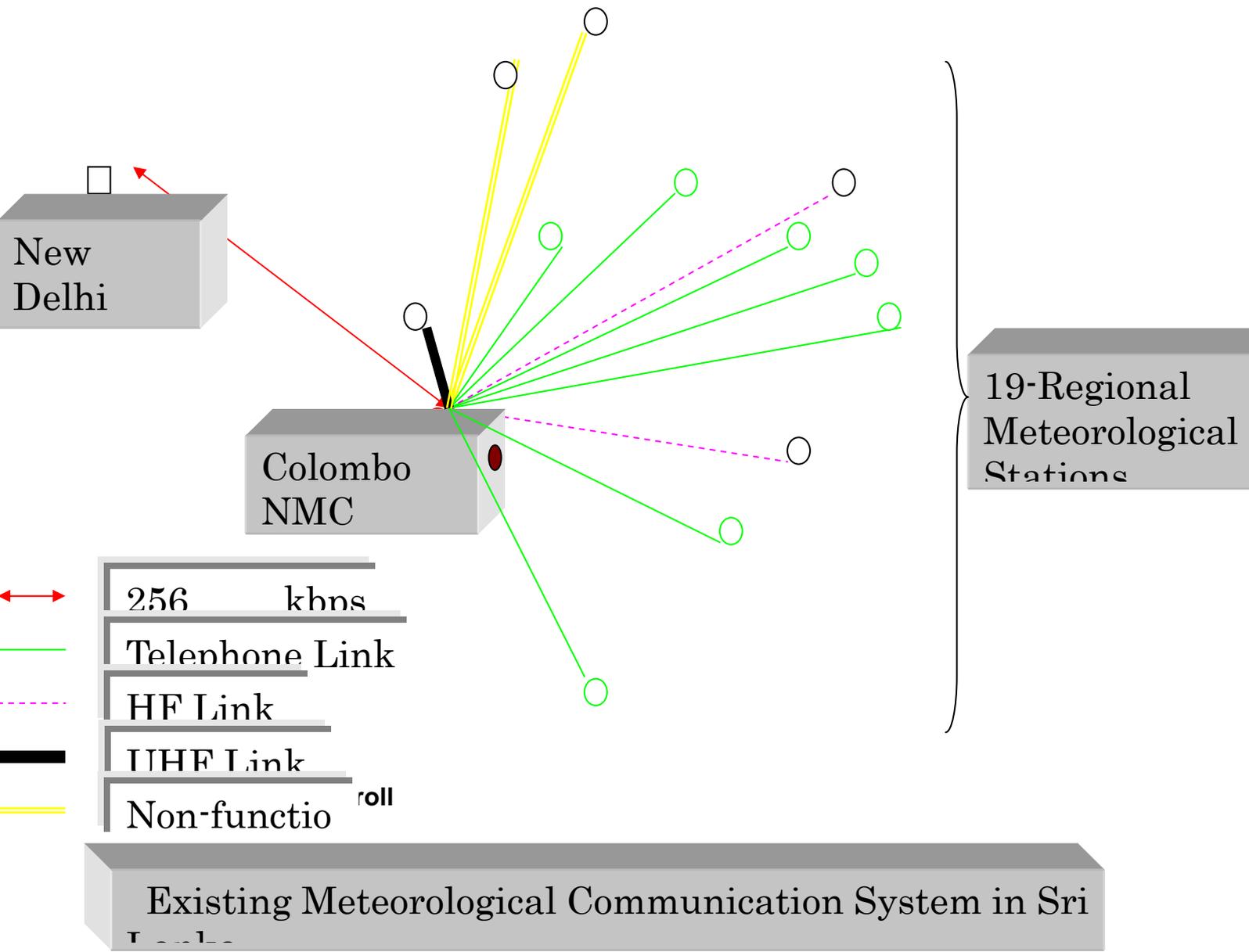
Agrometeorological stations are maintained in different parts of the island in collaboration with other government institutions such as the Agriculture Department, Tea Research Institute, Rubber Research Institute, Coconut Research Institute, Mahaweli Authority etc.

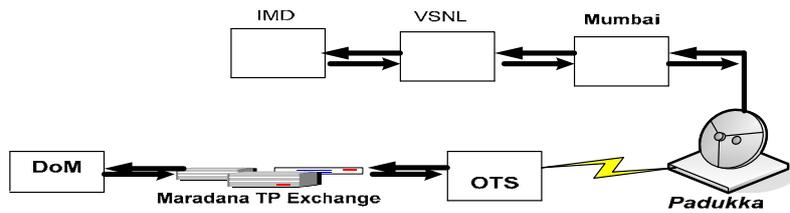
3.3 Raingauge Station Network

Nearly 400 raingauge stations scattered over the island are maintained with the co-operation of various other govt institutions and many individuals who have volunteered to do the observations. 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.

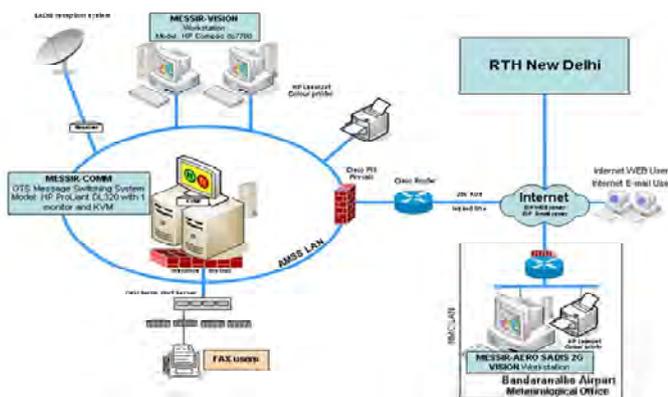
4. Data Flow to Users and Archives

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. 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.





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4.1 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

5. Utilization of Meteorological Observation and Instruments

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. One Meteorological (field) station serves for the International Aviation while another serves for the Domestic.

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

collects data from the relevant stations and is to be examined and quality controlled by Observers. These data are then condensed as weekly values and used to calculate long-term means. Every type of data is supplied to Researchers and other interested parties such as Industrialists.

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

Rainfall Branch looks after deficiencies at rain gauge stations and keep records of timely reception of data monthly and checking for authenticity. 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.

The first step in the planning and designing of development projects like irrigation schemes, hydropower generation projects etc., is a feasibility study, which involves, *inter alia*, an analysis of climatological data. The Department of Meteorology plays an important role in these studies by supplying meteorological data, which have been systematically recorded over many years.

Data are also sought for the designing of building, towers, factories, roadways, establishment of agricultural farms, designing of drainage systems, disaster mitigation studies, research studies etc. This responsibility is shared among the Data, Climate and Agro-meteorology Divisions.

Meteorological Office at the International airport, Katunayake is responsible for all aeronautical met services. Half hourly METAR are done and necessary TAF, SIGMET are issued according to the ICAO regulations. WAFS products down loaded from SADIS are also provided with manually prepared windtemp and sigwx charts. Training courses on aeronautical Meteorology are also conducted for the airline personnel.

6. Training

Nearly once a year training programme is organized at the Head Office for observers for upgrade their knowledge and skill about the observations and to give proper knowledge to handle and maintenance of conventional and AWS instruments.

7. Current issues and future plans

Most of the sensors (specially wind sensors) of the present AWS system (donated by Japan's Government - under JICA project) are malfunctioned very frequently. But the department is not having expertise to rectify this problem. Due to the system is under warranty period, supplier is helping to replace these sensors.

Therefore department is needed external expertise assistance for maintenance of the system.

Department is does not having proper archiving system, in future it is essential establish a proper system for data archiving.

Organizing of Instrumentation training programme regionally will be used full for calibration of instruments and verification of data.

The Quality management system in Sri Lanka is not in WMO standard as such the Department of Meteorology is seeking the ways to improve the QMS. Firstly we are going to establish a quality core team with a quality Manager. This core group will prepare the required document. In the meantime discussion are going on with Aeronautical authorities to implement QMS for the Meteorological office at the Airport. Quality inspector will be nominated.