Observational Organisation along the Indian coasts

and

Climatological Normal (1991-2020)

INDEX

Introduction:

Weather and climate of a place are described by the composite effect of atmospheric factors like pressure, temperature, wind, humidity, clouds and visibility etc. These interrelated factors are termed as elements of weather and climate. Weather of a place at a given time is the instantaneous effect of these elements. Climate of the place is the average weather conditions obtained by averaging the elements over a long period of time (usually 30 to 50 years). Meteorological elements are usually measured quantitatively, for example temperature in degree Celsius and rainfall as a depth in inches or millimetres but qualitative estimates are often given as in descriptions of rain as light moderate or heavy and clouds as types such as cirrus or cumulus.

In a meteorological observatory, measurement of one or more of several meteorological elements is carried out by an observer. Meteorological observations are taken regularly and simultaneously at standard hours of observations all over the world. The routine reporting of weather is a part of Worldwide collection of data and is therefore an important and valuable service. These observations are needed for weather forecasting and also for other branches of study and application like climatology, agricultural meteorology and hydrometeorology.

Weather information is also very important requirement for the mariners during their navigation. They also need the forecast of weather during their voyage which is vital for decision making. The Weather bulletins issued by India Meteorological Department are of immense help to naval as well as commercial ships.

This volume contains all information about the types of observatories, its Meta data and a brief summary of the type of instruments for observations.

1. IMPORTANCE OF METADATA OF METEOROLOGICAL STATIONS

Metadata of a meteorological station refers to its site/location, instrumentation, observation practices, calibration reports, site layout, site condition, site exposure, changes of location etc. Complete metadata describe the history of a station since its establishment to the present and onwards to the future. Meteorological data are influenced by a wide variety of observational practices. Data depend on the instrument, its exposure, recording procedures and many other factors. There is a need to keep a record of all these metadata to make the best possible use of the data. Good metadata are needed to ensure that the final user of the data has no doubt about the conditions in which data have been recorded, gathered and transmitted, in order to extract accurate conclusions from their analysis.

There can be various components in Metadata of meteorological stations. Some of them include,

i. **Station Identifiers and Geographical Data:** The first thing a user has to be informed about is, the data belongs to which place. For this purpose, a station has to be identified by names and uniquely identifiable codes. It is also important to keep record of the geographical coordinates of the station, in terms of its latitude, longitude, altitude and information about its relocation in the past.

ii. **Local Environment:** Meteorological data are hugely influenced by certain factors such as, proximity and size of large water surfaces, urbanized areas and mountain ranges, terrain slope, forests, crops and other roughness, any nearby obstacles such as trees or houses etc.

iii. **Instrumentation:** It is very important to document the kind of instrument the measurements are taken with. Good metadata should contain information on instrument manufacturer, model of instrument, installation & calibration dates, output type and sensitivity etc. Changes in instruments can also have a big impact on meteorological data.

iv. **Observing Practices:** The observing practices such as, list of meteorological elements observed, observation times and number of observations in a day, seasons in which observation is taken for some special cases, in-situ corrections made by the observers also have important role in performing studies related to meteorological data.

v. **Data Processing:** It is very important to keep information on how the data have been processed, validated, archived and transmitted, for example, the units employed when observing, archiving and transmitting each one of the measured elements; calculations other than those made on-site by the observers; Quality Control (QC) procedures applied to detect and identify the errors etc.

In the realm of scientific analysis, the significance of good metadata cannot be overstated. Therefore, metadata should be as complete as possible, as up to date as possible, and as readily available as possible. In view of the importance of Metadata, the Climate Monitoring Principle of Global Climate Observing System's (GCOS) states that "The details and history of local conditions, instruments, operating procedures, data processing algorithms and other factors pertinent to interpreting data (i.e. metadata) should be documented and treated with the same care as the data themselves."

The metadata of the observatories at the coastal station are given in the appendices 3.1 to 3.7.

2. Coastal Surface Meteorological Instruments and Their Importance

List of Abbreviations:

- IMD- India Meteorological Department
- AWS- Automatic Weather Station
- ARG- Automatic Rain Gauge
- HWSR – High Wind Speed Recorder
- PTO- Part-Time Observatory

2.1 Introduction:

The India Meteorological Department (IMD) plays a crucial role in monitoring and forecasting weather conditions across the country, including the coastal regions. To enhance its capabilities, the IMD employs a variety of sophisticated instruments designed specifically for coastal observations. These instruments provide vital data to understand and predict atmospheric conditions, ensuring the safety and well-being of coastal communities. This includes the significance of various coastal surface meteorological instruments utilized by the IMD, including Surface Observation (Departmental Observatory), Part-Time Observatory (Non-Departmental Observatory PTO), Automatic Weather Station (AWS), Automatic Rain Gauge (ARG) Station, and High Wind Speed Recorder (HWSR). During severe weather events and cyclone monitoring, these instruments become indispensable tools for the IMD. They play a crucial role in tracking the intensity and movement of cyclones, providing real-time data on parameters such as wind speed, atmospheric pressure, and precipitation. The instruments enable the computation of rain rates and the determination of the highest wind speeds, offering valuable insights into the severity of the weather event. Timestamps associated with these measurements enhance the accuracy and timeliness of the data, allowing meteorologists to make informed decisions and issue timely warnings to coastal communities. In this way, the IMD's coastal surface meteorological instruments not only contribute to scientific understanding but also serve as frontline tools for disaster preparedness and response.

1. Surface Observation by Department and Part-Time Observatory
2. Automatic Weather Station (AWS)
3. Automatic Rain Gauge (ARG) Station
4. High Wind Speed Recorder (HWSR)

2.2. Surface Observation by Department and Part-Time Observatory (PTO):

Surface observation forms the backbone of meteorological data collection by manual observation. The IMD operates a network of surface observation stations along the coastline, equipped with instruments to measure parameters such as temperature, humidity, pressure, and wind speed, wind direction, precipitation, evaporation rate, solar radiation. These stations provide manual recorded observational data, enabling meteorologists to analyse local weather patterns, track changes, and issue timely warnings. **Part-time observatories (PTO)** reports two observations daily, operated by non-departmental offices contribute to additional coverage and enhance the density of the observational network. These stations are equipped with both manual and self-recording mechanical meteorological instruments.

2.3 Automatic Weather Station (AWS):

Automatic Weather Stations (AWS) are automated systems designed to continuously monitor and record meteorological parameters such as temperature, humidity, pressure, wind speed, wind direction, precipitation, etc., using highly accurate digital sensors. These stations send data to a central server through TDMA and GPRS transmission facilities. In coastal areas, AWS are strategically positioned to gather data on surface temperature, atmospheric pressure, wind speed and direction, precipitation and other relevant variables. The automatic nature of these stations allows for real-time data transmission, aiding meteorologists in monitoring evolving weather conditions, assessing trends, and making accurate predictions. During severe weather events and cyclone monitoring, these instruments become indispensable tools for the IMD. They play a crucial role in tracking the intensity and movement of cyclones, providing real-time data.

2.4. Automatic Rain Gauge (ARG) Station:

Coastal regions are often prone to heavy rainfall, posing a threat of flooding and other weather-related hazards. Automatic Rain Gauge Stations are instrumental in quantifying precipitation levels. These stations automatically measure and record rainfall, providing critical information on precipitation patterns, intensity, and duration. This data is essential for flood forecasting and early warning systems, helping authorities and communities prepare for potential disasters.

2.5 High Wind Speed Recorder (HWSR):

High wind speeds are a frequent phenomenon in coastal areas, particularly during cyclonic events. The High Wind Speed Recorder (HWSR) is specifically designed to accurately measure pressure and record wind speeds. This instrument plays a vital role in monitoring storm intensity, capturing wind speeds during cyclones, and facilitating the timely issuance of warnings to coastal communities.

The strategically positioned coastal surface meteorological instruments by the India Meteorological Department reflect a commitment to enhancing observational capabilities and improving the accuracy of weather forecasts in coastal regions, cyclone monitoring, and extreme weather observations. These instruments, ranging from traditional surface observation stations to advanced automatic systems, contribute to the overall resilience of coastal communities by providing timely and reliable data. By investing in state-of-the-art technology and maintaining a robust observational network, the IMD plays a pivotal role in safeguarding lives and property in the face of dynamic coastal weather conditions.

3 Metadata of Observatories/Instruments and climatology of the coastal surface observatories:

This section contains the meta data of all surface observatories and instruments.

Definition of coastal station

To identify the coastal stations, WMO Document No. “Guide to Meteorological Instruments and Methods of Observation”, is referred to. In this guide it is written as “At coastal stations, it is desirable that the station command a view of the open sea. However, the station should not be too near the edge of the cliff because the wind eddies created by the cliff will affect wind and precipitation measurements”.

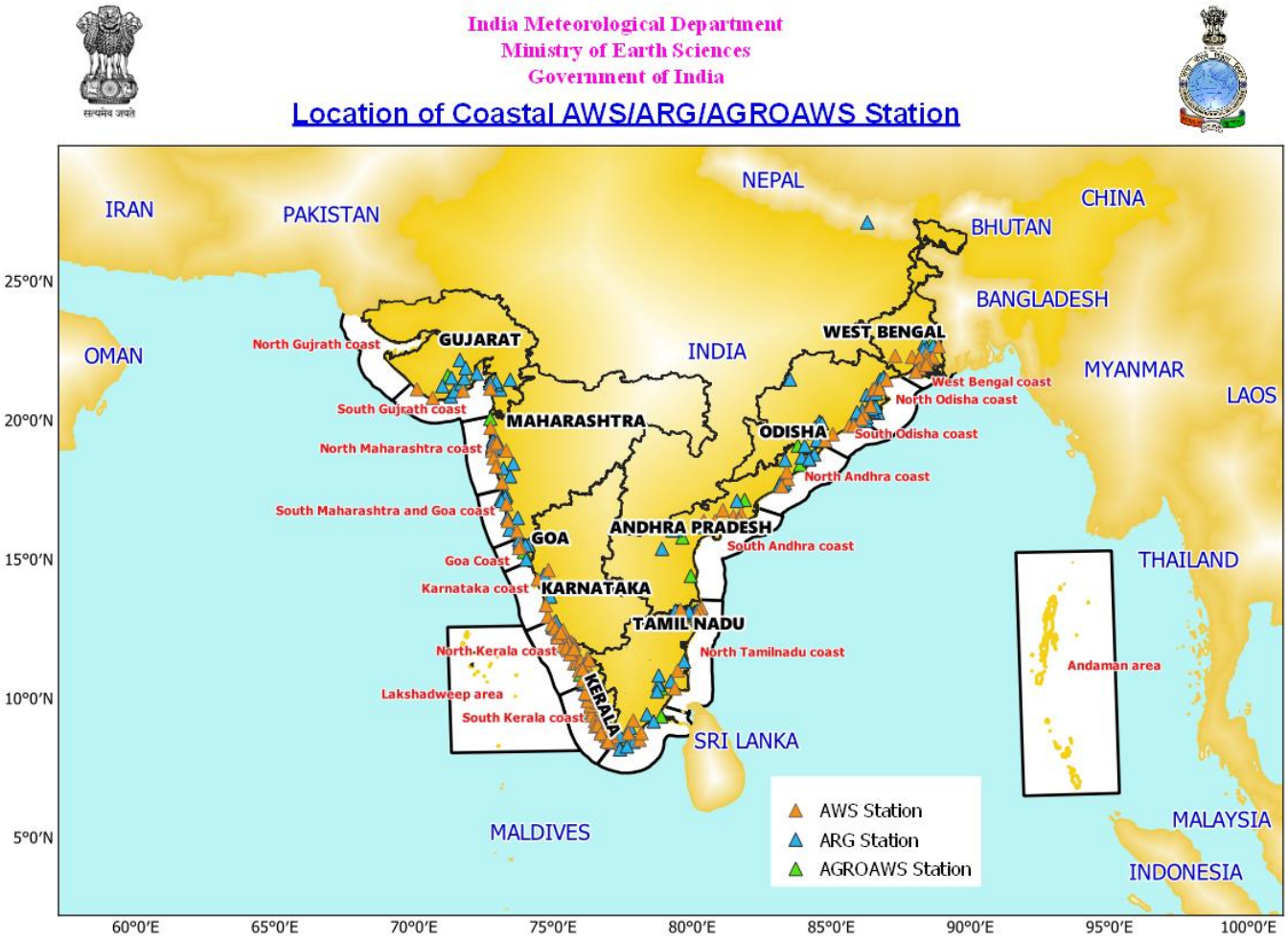

Figure 2.1 Combine locations of Coastal AWS/ARG/AGRO AWS Stations.

Appendix 3.1

3.1 Metadata of coastal surface observatory department and non departmental (PTO)

KOLKATA REGION (RMC HQ)																
DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Met. Sub Division ---Andaman & Nicobar Island																
Nicobar	Car Nicobar	43367	09 10	92 50	10	IIb	21.04.1952	Non-deptl		Y			Y			
	Nancowry	43382	07 59	93 32	26	IIb	23.03.1952	Non-deptl		Y			Y			
North & Middle Andaman	Long Island	43310	12 25	92 56	25	IIb	08.04.1952	Non-deptl		Y			Y			
	Mayabunder	43309	12 55	92 55	28	IIb	00.04.1952	Non-deptl		Y			Y			
South Andaman	Hutbay	43364	10 35	92 33	7.16	IIb	01.07.1966	Non-deptl		Y			Y			
	Port Blair	43333	11 40	92 43	79	I	01.06.1868	Deptl	Y	Y	Y	Y	Y	Y	Y	Y

Met. Sub Division --- Gangetic West Bengal																
DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
North 24 Paraganas	Basirhat (E. M.O.)	42810	22 39	88 52	4	I	11.08.1997	Non-deptl (EMO)		Y	Y	Y	Y			
	Dum Dum	42809	22 39	88 27	6	I	01.09.1939	Deptl.	Y	Y	Y	Y	Y	Y	Y	Y
Purba Medinipur	Contai	42900	21 47	87 45	11	IIb	04.07.1948	Non-deptl		Y			Y			
	Digha	42901	21 50	87 30	6	I	04.01.1982	Deptl.	Y	Y	Y	Y	Y	Y	Y	Y
	Haldia	42806	22 04	88 04	11	I	14.12.1981	Deptl.	Y	Y	Y	Y	Y	Y	Y	Y

DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
South 24 Parganas	Canning (P.E.T.)	42812	22 15	88 40	4	IIa	23.10.1981	Deptl.		Y			Y			
	Diamond Harbour	42811	22 11	88 12	7	I	03.07.1978	Deptl.	Y	Y	Y	Y	Y	Y	Y	Y
	Sagar Island	42903	21 45	88 03	3	IIb	21.08.1865	Non-deptl		Y			Y			
1. Met. Centre Bhubaneswar																
Met. Sub Division ---Orissa																
Balasore	Balasore	42895	21 31	86 56	20	I	22.05.1883	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Bhadrak	Chandbali	42973	20 47	86 44	6	I	06.06.1929	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Ganjam	Gopalpur	43049	19 16	84 53	17	I	01.06.1881	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Jagatsinghpur	Paradeep CDR	42976	20 18	86 41	8	IIa	26.10.1962	Deptl		Y	Y	Y	Y			

MUMBAI REGION (RMC HQ)																
DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Met. Sub Division ---Konkan & Goa																
Goa	Mormugao	43196	15 25	73 47	61.60	I	01.08.1890	Deptl		Y	Y	Y	Y			
	Panjim	43192	15 29	73 49	59.96	I	00 .1860	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Greater Mumbai	Mumbai (Colaba)	43057	18 54	72 49	10.70	I	00 .1841	Deptl	Y	Y	Y	Y	Y	Y		
	Mumbai (Santacruz)	43003	19 07	72 51	14.20	I	00.04.1944	Deptl	Y	Y	Y	Y	Y	Y	Y	Y

Raigad	Alibag	43058	18 38	72 52	7	IIb	00.05.1929	Non-deptl		Y			Y			
	Bhira	43062	18 27	73 24	96	IIb	00 .1932	Non-deptl		Y			Y			
	Matheran	43060	18 59	73 17	696	IIc	18.02.1974	Non-deptl		Y			*Y*			
Ratnagiri	Harnai	43109	17 49	73 06	17.50	IIa	01.05.1943	Deptl		Y	Y	Y	Y			
	Ratnagiri	43110	16 59	73 20	91.25	I	01.01.1877	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Sindudurg	Devgad	43153	16 23	73 21	35.70	IIb	27.05.1944	Non-deptl		Y			Y			
	Vengurla	43193	15 52	73 38	16	IIc	20.11.1941	Non-deptl		Y			Y			
Thane	Dahanu	43001	19 58	72 43	4.60	I	28.06.1943	Deptl	Y	Y	Y		Y		Y	
	T.B.I.A.	43005	19 09	73 00	14.85	Io	01.04.1993	Non-deptl		Y	Y		Y			

1. Met. Centre Ahmedabad																
Met. Sub Division ---Gujarat Region, Daman, Dadra & Nagar Haveli																
Ahmedabad	Ahmedabad	42647	23 04	72 38	55.50	I	18.01.1893	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Gandhinagar	42654	23 14	72 43	81.27	IIb	10.10.1973	Non-deptl		Y			Y			
Amreli	Amreli	42834	21 36	71 13	113	IIb	28.06.1973	Non-deptl		Y			Y			
Valsad	Valsad	42915	20 37	72 56	15.09	IIb	01.05.1974	Non-deptl		Y			Y			
Surat	Surat	42840	21 06	72 44	7.82	I	02.04.1877	Deptl	Y	Y	Y	Y	Y	Y	Y	Y

Met. Sub Division ---Saurashtra, Kutch & Diu																
Bhavnagar	Bhavnagar (A)	42838	21 45	72 12	10.60	I	28.08.1951	Deptl		Y	Y	Y	Y			
	Mahuva	42837	21 05	71 47	9	IIb	30.03.1952	Non-deptl		Y			Y			
Jamnagar	Dwarka	42731	22 14	68 57	11.30	I	12.01.1901	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Okha	42730	22 29	69 07	7	I	12.12.1962	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Junagad	Porbandar (A)	42830	21 39	69 40	7.30	I	16.02.1957	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Veraval	42909	20 54	70 22	11.90	I	01.02.1890	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Kutch	Bhuj	42634	23 15	69 48	118.90	I	01.12.1876	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Mandvi	42729	22 49	69 16	10	IIb	21.11.1954	Non-deptl		Y			Y			
Kutch	Naliya	42631	23 15	68 51	22.10	I	17.03.1958	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	New Kandla	42639	23 09	70 13	14	IIb	06.05.1950	Non-deptl		Y			Y			

CHENNAI REGION (RMC HQ)																
DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Met. Sub Division ---Tamil Nadu & Pondicherry																
Chennai	Meenambakkam A.P	43279	13 00	80 11	15.52	I	13.09.1943	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Chennai	Nungambakkam	43278	13 04	80 15	6.40	I	00.00.792	Deptl	Y	Y	Y		Y			
Cuddalore	Parangipettai	15207	11 30	79 46	2.88	IIb	16.03.1967	Non-deptl		Y			Y			
	Cuddalore	43329	11 46	79 46	5.71	I	01.03.1889	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Kanyakumari	Kanyakumari	43377	08 05	77 03	36.50	I	10.11.1960	Deptl		Y	Y	Y	Y			

DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Nagapattinam	Nagapattinam	43347	10 46	79 51	9.40	I	01.06.1868	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Vedaranyam	43349	10 22	79 51	4.16	IIb	05.09.1960	Non-deptl		Y			Y			
Karaikal	Karaikal	43346	10 55	79 50	6.95	I	16.03.1973.	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Puducherry	Puducherry	43331	10 58	79 49	38.25	I	02.11.1995.	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Pudukottai	Kudimianmalai.	43345	10 24	78 40	122.63	IIdo	07.10.1978	Non-deptl		*Y*			Y			
	Manamelkudi.	15218	10 00	79 10	4.30	IIb	15.07.1996	Non-deptl		Y			Y			
Ramanathapuram	Tondi	43361	09 44	79 02	5.18	I	15.06.1959	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Pamban	43363	09 16	79 18	11.28	I	02.01.1891.	Deptl	Y	Y	Y	Y	Y	Y	Y	Y

DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Thanjavur	Adiramapattinam	43348	10 20	79 23	6.08	I	01.04.1960	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Koradacheri.	15212	10 45	79 21	20 +	IIdo	01.02.1975	Non-deptl		Y			Y			
	Thanjavur.	43330	10 47	79 08	68	IIbo	01.02.1975	Non-deptl		Y			Y			
Thoothukudi	Thoothukudi New Port.	43379	08 45	78 11	2.80	Io	01.08.1979	Non-deptl		Y	Y	Y	Y			
Tirunelveli	Palayamkottai.	43376	08 44	77 49	50.90	IIb	00.02.1892	Non-deptl		Y			Y			
Tiruvallur	Tiruttani.	43277	13 09	79 32	87.85	IIbo	01.01.1975	Non-deptl		Y			Y			

Met. Sub Division ---Coastal Karnataka																
Dakshina Kannada	Panambur	43285	12 30	74 30	32.10	I	20.06.1964	Deptl		Y		Y	Y			
Dakshina Kannada	Mangalore (Bajpe)	43284	12 30	74 30	105.60	I	00.02.1953	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Uttara Kannada	Honavar	43226	14 06	74 12	59.79	I	07.02.1935	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Karwar	43225	14 24	74 00	4.10	I	24.10.1877	Deptl		Y	Y	Y	Y			
	Shirali	43229	14 00	74 18	45.29	IIb	22.03.1974	Non-deptl		Y			Y			

2. Met. Centre Hyderabad																
Met. Sub Division --- Coastal Andhra Pradesh																
East Godavari	Kakinada	43189	16 57	82 14	7.92	I	00.04.1880	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
East Godavari	Tuni	43147	17 21	82 33	17.98	I	15.5.1995	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Guntur	Bapatla	43220	15 54	80 28	5.70	I	18.9.1978	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Rentachintala	43177	16 33	78 33	103.60	IIb	00.02. 1936	Non-deptl		Y			Y			
Krishna	Gannavaram	43181	16 32	80 48	21	I	00.03.1945	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Machilipatnam	43185	16 12	81 09	3.05	I	01.08.1968	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Nandigama	43182	16 47	80 17	51.55	IIb	08.03.1987	Non-deptl		Y			Y			
	Vijayawada	43180	16 31	80 37	20	IIb	10.10.1968.	Non-deptl		Y			Y			

DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Nellore	Kavali	43243	14 54	79 59	17	I	15.02.1995	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Nellore	43245	14 27	79 59	18.60	I	00.09.1886	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Prakasam	Ongole	43221	15 34	80 03	10.40	I	00.08.1944	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Srikakulam	Calingapatnam	43105	18 20	84 08	4.50	I	00.07.1906	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Visakhapatnam	Visakhapatnam	43150	17 41	83 18	2.20	I	01.06.1963	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
West Godavari	Narsapur	43187	16 26	81 42	4	I	31.3.1988	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
	Nidadavole	43184	16 50	81 35	11.30	IIb	06.10.1955.	Non-deptl		Y			Y			

3. Met. Centre --- Thiruvananthapuram

DISTRICT	STATION	INDEX No / IDN No	LAT Deg. Min	LONG Deg.Min.	ALT in meters	CLASS OF OBSY	DATE OF STARTING	CATEGORY	OBSERVATION SCHEDULE IN UTC							
									0	3	6	9	12	15	18	21
Met. Sub Division --- Kerala																
Alappuzha	Alappuzha	43352	09 33	76 25	4	IIa	19.03.1937.	Deptl		Y			Y			
Ernakulam	AMS CIAL Kochi	43336	10 09	76 24	9.10	I	23.05.1999	Deptl		Y	Y	Y	Y			
Kannur	Kannur	43315	11 50	75 20	12.70	IIa	01.01.1977	Deptl		Y			Y			
Kollam	Punalur	43354	09 00	76 55	33.80	IIb	27.02.1956	Non-deptl		Y			Y			
Kottayam	Kottayam	43355	09 32	76 36	77.90	IIb	23.11.1970	Non-deptl		Y			Y			
Kozhikode	Kozhikode	43314	11 15	75 47	5.03	I	01-08-1880	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Malappuram	AMS Kozhikode	43320	11 08	75 57	106.90	IIa	01.04.1988.	Deptl		Y			Y			

	Nilambur	43316	11 17	76 14	31	IIb	21.09.1987.	Non-deptl		Y			Y			
Thiruvananthapuram	Thiruvananthapuram	43371	08 29	76 57	58.20	I	00.01.1853	Deptl	Y	Y	Y	Y	Y	Y	Y	Y
Thiruvananthapuram	Thiruvananthapuram (A)	43372	08 28	76 57	5.20	IIa	14.01.1949	Deptl		Y			Y			
Thrissur	Thrissur (Vellanikkara)	43357	10 31	76 13	40.30	IIbo	28.08.1981	Non-deptl		Y			Y			

3.2 Metadata of coastal AWS stations

S. No.	STATE	DISTRICTS	STATION	ID	CALL SIGN	COMM.	Tx_time	Latitude	Longitude	Altitude
1	ANDHRA_PRADESH	GUNTUR	LAM_AMFU	A0AF08A4	LAM	TDMA	0:08:50	16.3783	80.4333	38.1
2	ANDHRA_PRADESH	KRISHNA	KV_GOPALNAGAR_MACHILIPATNAM	APMCP000	YEL	GPRS	0:00:00	16.1983	81.1258	6
3	ANDHRA_PRADESH	KRISHNA	VUYYURU	A0AEB702	VUY	TDMA	0:08:39	16.3783	80.8367	14.9
4	ANDHRA_PRADESH	VISAKHAPATNAM	BHIMUNIPATTINAM	AAACC4E0	BHM	TDMA	0:21:50	17.8883	83.45	26.8
5	ANDHRA_PRADESH	VISAKHAPATNAM	GANGAVARAM_PORT	APGGV000	GGV	GPRS	0:00:00	17.6247	83.2283	65
6	ANDHRA_PRADESH	VIZIANAGARAM	VIZIANAGARAM	AAACD944	VZM	PRBS	0:00:01	18.1417	83.415	63.8
7	ANDHRA_PRADESH	WEST_GODAVARI	BHIMAVARAM	APBHV000	BHV	GPRS	0:00:00	16.5449	81.4932	5
8	ANDHRA_PRADESH	WEST_GODAVARI	KV_GOPANNAPALEM_ELURU	APGPA000	GPA	GPRS	0:00:00	16.7687	81.1191	22
9	ANDHRA_PRADESH	WEST_GODAVARI	MARUTERU	A0AE8C4A	MAT	TDMA	0:08:33	16.6467	81.7633	8.7
10	ANDHRA_PRADESH	WEST_GODAVARI	NARSAPUR	APNAK000	NAK	GPRS	0:00:00	16.4365	81.6944	9.2
11	GOA	NORTH_GOA	PANAJI	AAAF0822	GOA	PRBS	0:00:01	15.4922	73.8251	56
12	GOA	SOUTH_GOA	MORMUGAO	A0B52656	MRM	TDMA	0:16:30	15.4117	73.7861	62.2
13	GUJARAT	BHAVNAGAR	MAHUVA	AAADC8C8	MHV	PRBS	0:00:01	21.0667	71.7667	19.8
14	GUJARAT	GIR SOMNATH	KODINAR	A0A4D3B6	KDR	TDMA	0:03:54	20.8	70.6833	12.1
15	GUJARAT	GIR SOMNATH	VERAVAL	AAAE19AE	VVL	PRBS	0:00:01	21.1167	70.1167	11
16	GUJARAT	SURAT	SURAT	A0A53C6C	SRT	TDMA	0:03:47	21.1439	72.75	7.4
17	KARNATAKA	DAKSHINA_KANNADA	MANGALORE	A0ADC69C	MNG	TDMA	0:07:14	12.94	74.82	33
18	KARNATAKA	UDUPI	BRAHMAVAR	B48A27B8	BRV	PRBS	20:00:00	13.35	74.75	10
19	KARNATAKA	UTTARA_KANNADA	HONAVAR	A0ADDB38	HNW	TDMA	0:07:17	14.2828	74.4608	59.8
20	KARNATAKA	UTTARA_KANNADA	SIRSI_AMFU	A0AE5A22	SIR	TDMA	0:07:30	14.6111	74.8461	588
21	KERALA	ALAPPUZHA	CHERTHALA	KEKAC000	KAC	GPRS	0:00:00	9.62	76.332	14
22	KERALA	ALAPPUZHA	KARUMADI	KEKUF000	KUF	GPRS	0:00:00	9.382	76.3898	4
23	KERALA	ALAPPUZHA	KAYAMKULAM	AAAD6830	KYM	PRBS	40:00:00	9.1767	76.5167	8.8
24	KERALA	ALAPPUZHA	NOORANAD	KENOO000	NOO	GPRS	0:00:00	9.17	76.62	38
25	KERALA	ALAPPUZHA	THYCATTUSSERY	KETHY000	THY	GPRS	0:00:00	9.74	76.36	5
26	KERALA	ERNAKULAM	ALUVA	KEALU000	ALU	GPRS	0:00:00	10.1053	76.3567	21
27	KERALA	ERNAKULAM	CHOONDI	KECDX000	CDX	GPRS	0:00:00	9.96692	76.4409	34
28	KERALA	ERNAKULAM	IDAMALAYAR DAM	KEIDA000	IDA	GPRS	0:00:00	10.2065	76.71	60

29	KERALA	ERNAKULAM	KALAMASSERY	KEKSZ000	KSZ	GPRS	0:00:00	10.0557	76.3317	20
30	KERALA	ERNAKULAM	KOOTHATTUKULAM	KEKOH000	KOH	GPRS	0:00:00	9.8616	76.5957	25
31	KERALA	ERNAKULAM	MATTANCHERRY	KEMTN000	MTN	GPRS	0:00:00	9.91	76.26	2
32	KERALA	ERNAKULAM	NORTH_PARAVUR	KENPA000	NPA	GPRS	0:00:00	10.144	76.23	10
33	KERALA	ERNAKULAM	ODAKKALI	KEODA000	ODA	GPRS	0:00:00	10.093	76.559	62
34	KERALA	KANNUR	ARALAM	KEARM000	ARM	GPRS	0:00:00	11.939	75.766	114
35	KERALA	KANNUR	AYYANKUNNU	KEAYY000	AYY	GPRS	0:00:00	12.0074	75.6825	268
36	KERALA	KANNUR	CHEMBERI	KECEM000	CEM	GPRS	0:00:00	12.0964	75.5614	74
37	KERALA	KANNUR	CHERUVANCHERY	KECER000	CER	GPRS	0:00:00	11.82	75.66	16
38	KERALA	KANNUR	IRIKKUR	KEIRI000	IRI	GPRS	0:00:00	11.984	75.555	45
39	KERALA	KANNUR	KANNUR AIRPORT	KEKNB000	KNB	GPRS	0:00:00	11.728	75.5455	104
40	KERALA	KANNUR	KANNUR-ICAR	KEKNF000	KNF	GPRS	0:00:00	11.8851	75.3477	7
41	KERALA	KANNUR	PERINGOME	KEPGZ000	PGZ	GPRS	0:00:00	12.2216	75.3073	159
42	KERALA	KANNUR	PINARAYI	KEPIY000	PIY	GPRS	0:00:00	11.8107	75.4918	14
43	KERALA	KASARAGOD	BAYAR	KEBYY000	BYY	GPRS	0:00:00	12.6917	75.0305	105
44	KERALA	KASARAGOD	KUDLU_AFMU	A0AD7512	KUD	TDMA	0:07:04	12.65	74.96	14.2
45	KERALA	KASARAGOD	MADIKKAI	KEMDZ000	MDZ	GPRS	0:00:00	12.3006	75.1587	84
46	KERALA	KASARAGOD	MULIYAR	KEMYZ000	MYZ	GPRS	0:00:00	12.5061	75.0908	85
47	KERALA	KASARAGOD	PADANNAKKAD	KEPDZ000	PDZ	GPRS	0:00:00	12.1875	75.1783	21
48	KERALA	KASARAGOD	PANATHUR	KEPAJ000	PAJ	GPRS	0:00:00	12.456	75.3671	101
49	KERALA	KASARAGOD	PILICODE	AAAD66E2	PIL	PRBS	40:00:00	12.2	75.1667	19.4
50	KERALA	KASARAGOD	VELLARIKKUNDU	KEVEK000	VEK	GPRS	0:00:00	12.357	75.296	222
51	KERALA	KOLLAM	CHAVARA	KECAV000	CAV	GPRS	0:00:00	8.9944	76.5331	4
52	KERALA	KOLLAM	PARIPPALLY	KEPAX000	PAX	GPRS	0:00:00	8.8136	76.7461	29
53	KERALA	KOLLAM	PUNALUR	KEPUN000	PUN	GPRS	0:00:00	9.01333	76.9433	25.4
54	KERALA	KOLLAM	WEST KALLADA	KEVAA000	VAA	GPRS	0:00:00	9.029	76.629	16
55	KERALA	KOZHIKODE	KAKKAYAM	KEKAE000	KAE	GPRS	0:00:00	11.553	75.889	58
56	KERALA	KOZHIKODE	KOZHIKODE	A0AD68B6	KOZ	TDMA	0:07:03	11.26	75.77	6.6
57	KERALA	KOZHIKODE	KUNNAMANGALAM	KEKUJ000	KUJ	GPRS	0:00:00	11.28	75.87	58
58	KERALA	KOZHIKODE	URUMI	KEURU000	URU	GPRS	0:00:00	11.34	76.01	159

59	KERALA	KOZHIKODE	VADAKARA	KEVDA000	VDA	GPRS	0:00:00	11.59	75.62	97
60	KERALA	KOZHIKODE	VILANGAD	KEVIA000	VIA	GPRS	0:00:00	11.7803	75.7639	89
61	KERALA	MALAPPURAM	MUNDERI	KEMUF000	MUF	GPRS	0:00:00	11.4472	76.2494	58
62	KERALA	MALAPPURAM	NILAMBUR	A0AD6664	NBR	GPRS	0:00:00	11.2283	76.1894	28
63	KERALA	MALAPPURAM	PALEMAD	KEPLB000	PLB	GPRS	0:00:00	11.381	76.3061	58
64	KERALA	MALAPPURAM	THENNALA	KEPEA000	PEA	GPRS	0:00:00	10.9933	75.9442	14
65	KERALA	MALAPPURAM	VAKKAD	KEVAK000	VAK	GPRS	0:00:00	11.05	76.084	108
66	KERALA	THIRUVANANTHAPURAM	ARUVIKKARA	KEAUV000	AUV	GPRS	0:00:00	8.57361	77.0208	47
67	KERALA	THIRUVANANTHAPURAM	NEYYATTINKARA	KENET000	NET	GPRS	0:00:00	8.408	77.082	31
68	KERALA	THIRUVANANTHAPURAM	PALODE	KEPAF000	PAF	GPRS	0:00:00	8.75333	77.0264	102
69	KERALA	THIRUVANANTHAPURAM	PEPPARA	KEPEP000	PEP	GPRS	0:00:00	8.6249	77.1442	100
70	KERALA	THIRUVANANTHAPURAM	PIRAPPANCODE	KEPIR000	PIR	GPRS	0:00:00	8.65944	76.9114	44
71	KERALA	THIRUVANANTHAPURAM	PONMUDI	KEPOD000	POD	GPRS	0:00:00	8.7599	77.1169	1100
72	KERALA	THIRUVANANTHAPURAM	THATTATHUMALA	KETTT000	TTT	GPRS	0:00:00	8.79972	76.8803	88
73	KERALA	THIRUVANANTHAPURAM	THIRUVANANTHAPURAM	B489C344	TRV	PRBS	10:00:00	8.4667	76.95	59.8
74	KERALA	THIRUVANANTHAPURAM	VARKALA	KEVAF000	VAF	GPRS	0:00:00	8.73222	76.7317	59
75	KERALA	THIRUVANANTHAPURAM	VELLAYANI	A0AD9832	VEL	TDMA	0:07:09	8.4433	76.9883	30.2
76	KERALA	THRISSUR	ATHIRAPPILLY	KEKNZ000	KNZ	GPRS	0:00:00	10.2879	76.5558	92
77	KERALA	THRISSUR	CHALAKKUDY	KECHY000	CHY	GPRS	0:00:00	10.308	76.333	20
78	KERALA	THRISSUR	KUNNAMKULAM	KEKUQ000	KUQ	GPRS	0:00:00	10.6466	76.075	45
79	KERALA	THRISSUR	LOWER_SHOLAYAR	KELWR000	LWR	GPRS	0:00:00	10.3187	76.734	812
80	KERALA	THRISSUR	MUNAKKAL	KEMUC000	MUC	GPRS	0:00:00	10.1808	76.1628	2
81	KERALA	THRISSUR	PEECHI	KEPEC000	PEC	GPRS	0:00:00	10.5303	76.3997	78
82	KERALA	THRISSUR	PERINGALKUTHU	KEPON000	PON	GPRS	0:00:00	10.312	76.634	440
83	KERALA	THRISSUR	VELLANIKKARA	A0AD96E0	VLK	TDMA	0:07:08	10.5617	76.285	37.7
84	MAHARASHTRA	MUMBAI_CITY	MUMBAI_COLABA	B489A6A2	COL	TDMA	0:25:53	18.8978	72.8128	12
85	MAHARASHTRA	MUMBAI_CITY	MUMBAI_SANTA_CRUZ	B489804E	SCZ	TDMA	0:25:10	19.1006	72.8583	25.5
86	MAHARASHTRA	PALGHAR	PALGHAR	A0A455A2	PLG	TDMA	0:03:18	19.73	72.76	6
87	MAHARASHTRA	RAIGAD	IIG_MO_ALIBAG	MAALE000	ALE	GPRS	0:00:00	18.6452	72.8696	2.4
88	MAHARASHTRA	RAIGAD	KARJAT	A0A45B70	KJT	TDMA	0:03:19	18.9102	73.328	58

89	MAHARASHTRA	RAIGAD	MURUD	4953BFC4	MRD	TDMA	0:25:31	18.3311	72.9544	6.8
90	MAHARASHTRA	RATNAGIRI	DAPOLI	AAAD7594	DAP	TDMA	0:25:32	17.7542	73.1767	172
91	MAHARASHTRA	RATNAGIRI	RATNAGIRI	AAAF45FA	RTN	TDMA	0:15:03	16.9858	73.3283	92
92	MAHARASHTRA	SINDHUDURG	DEVGAD	AAAD400E	DVD	TDMA	99:32:11	16.3789	73.3822	49.9
93	MAHARASHTRA	SINDHUDURG	MULDE_AMFU	A0A446D4	MLD	TDMA	0:09:55	16.0128	73.7167	36.7
94	ODISHA	BHADRAK	BHADRAKH	A0A57F66	BHK	TDMA	0:04:03	21.1	86.5	15
95	ODISHA	BHADRAK	RANITAL_AMFU	A0A64320	RNT	TDMA	0:04:28	21.13	86.57	30
96	ODISHA	GANJAM	BERHAMPUR	A0A5A7DC	BER	TDMA	0:04:08	19.2833	84.8	39
97	ODISHA	GANJAM	RAMBHA	AAAD5DAA	RMB	PRBS	40:00:00	19.5	85.0667	8.6
98	ODISHA	JAGATSINGHPUR	JAGATSINGHPUR	A0A5A90E	JGS	TDMA	0:04:09	20.23	86.18	12
99	ODISHA	KENDRAPARA	KENDRAPARA	A0A5C23A	KEN	TDMA	0:04:12	20.52	86.43	5
100	ODISHA	PURI	NIMPARA	AAAD5378	NPR	PRBS	30:00:00	20.05	86.1	15
101	OTHERS	BALASORE	CHANDIPUR	AAAE6F3E	CHP	PRBS	0:00:01	21.45	87	6
102	OTHERS	BHADRAK	BASUDEVPUR	AAAE729A	BAS	PRBS	0:00:01	21.13	86.75	4.7
103	OTHERS	MALAPPURAM	MALAPPURAM	KEMLQ000	MLQ	GPRS	0:00:00	11.0392	76.0678	14
104	OTHERS	PURI	BRAMHAGIRI	AAAE61EC	BRG	PRBS	0:00:01	19.8	85.6667	2.5
105	OTHERS	PURI	PURI	A0A5F7A0	PRI	TDMA	0:04:18	19.8	85.83	6
106	OTHERS	THANE	THANE	A0A3A9C0	THN	TDMA	0:02:57	19.18	72.98	7
107	OTHERS	WEST_GODAVARI	NARSAPUR	AAAE8CCC	NSR	PRBS	0:00:01	16.4333	81.7	6.4
108	TAMIL_NADU	CHENNAI	CHENNAI	B4898E9C	CHN	PRBS	30:00:00	13.075	80.2633	8.7
109	TAMIL_NADU	CHENNAI	CHENNAI_RIMC_LAB	B48AA1AC	CGP	PRBS	20:00:00	13.075	80.2633	8.7
110	TAMIL_NADU	CHENNAI	ENNORE_PORT	A0A69B9A	EPT	TDMA	0:09:02	13.2567	80.3467	10.7
111	TAMIL_NADU	CHENNAI	MADHAVARAM_AMFU	A0A6AE00	MVM	TDMA	0:09:04	13.1533	80.2633	6.8
112	TAMIL_NADU	CHENNAI	MEENAMBAKKAM_ISRO	A0B3A08C	MEE	TDMA	0:15:41	12.99	80.1983	16.5
113	TAMIL_NADU	KANCHIPURAM	KANCHIPURAM_ISRO	A0B39516	KCP	TDMA	0:15:39	12.8333	79.7017	84.2
114	TAMIL_NADU	THANJAVUR	ADIRAMAPATTINAM	AAACAFD4	ADI	PRBS	40:00:00	10.36	79.3883	6.1
115	TAMIL_NADU	THANJAVUR	ADUTHURAI_AMFU	A0A6A0D2	ADT	TDMA	0:09:03	11	79.4967	20.4
116	TAMIL_NADU	THOOTHUKUDI	KOVILPATTI_AMFU	A0A6BD76	KOV	TDMA	0:09:06	9.205	77.895	80
117	TAMIL_NADU	THOOTHUKUDI	THIRUCHENDUR	AAAD25E8	TCN	PRBS	40:00:00	8.5083	78.1217	4.2
118	TAMIL_NADU	THOOTHUKUDI	TUTICORIN_PORT	AAAC9A4E	TPT	PRBS	30:00:00	8.7517	78.1883	3.8

119	TAMIL_NADU	TIRUNELVELI	TIRUNELVELI	A0A67868	TIU	TDMA	0:08:57	8.745	77.7117	40.1
120	TAMIL_NADU	TIRUVALLUR	TIRUTTANI_PTO_ISRO	A0B3D8CE	TUT	TDMA	0:15:48	13.1867	79.5917	88.8
121	WEST_BENGAL	EAST_MEDINIPUR	TAMLUK	A0AD256E	TLK	TDMA	0:15:52	22.2786	87.9222	104.3
122	WEST_BENGAL	NORTH_TWENTY_FOUR_PARGANAS	BASIRHAT	A0B4414A	BSH	TDMA	0:16:02	22.6625	88.8725	20
123	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	BARUIPUR_AMFU	A0B43908	BUI	TDMA	0:16:01	22.375	88.4358	32
124	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	CANNING	AAAD369E	CAN	PRBS	40:00:00	22.26	88.6667	4
125	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	DIAMOND HARBOUR	WBDIA000	DIA	GPRS	0:00:00	22.2575	88.1961	16.6
126	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	KAKDWIP	AAAD4EDC	KKD	PRBS	30:00:00	21.8667	88.1833	4.5
127	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	NIMPITH	AAAE7C48	NTH	PRBS	40:00:00	22.1667	88.45	4.5
128	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	RAIDIGHI	AAAD2B3A	RDH	PRBS	0:00:01	22.0012	88.4354	2.1
129	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	SAGAR_ISLAND	4952FE34	SGL	PRBS	50:00:00	21.75	88.05	3
130	WEST_BENGAL	WEST_MEDINIPUR	KHARAGPUR_AMFU	A0B47A02	KHG	TDMA	0:16:09	22.3153	87.3153	49.6

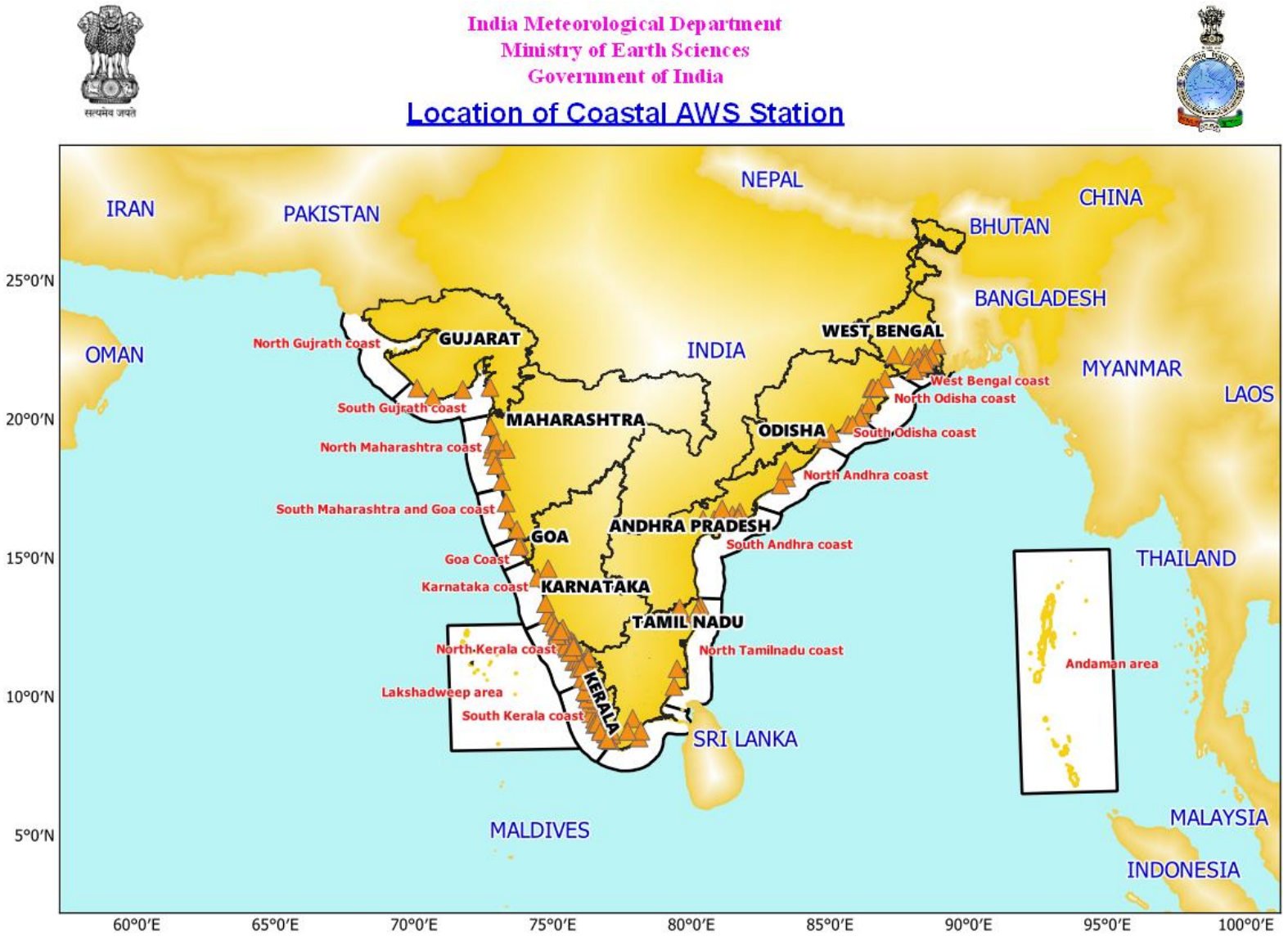

Figure 3.1: Location of Coastal AWS Stations

3.3 Metadata of coastal ARG stations

S no	State	District	Station	Id	CALL_SIGN	Comm	Tx_time	Latitude	Longitude
1	ANDHRA_PRADESH	EAST_GODAVARI	RAJAHMUNDRY	55D9086E	RJY	TDMA	00:12:10	17.1003	81.6239
2	ANDHRA_PRADESH	GUNTUR	PRATTIPADU	55FC50EE	PDV	TDMA	00:13:40	16.17	80.33
3	ANDHRA_PRADESH	PRAKASAM	GIDDALUR	55E3ECBE	GID	TDMA	00:20:08	15.3789	78.9272
4	ANDHRA_PRADESH	PRAKASAM	VINUKONDA	55FC4D4A	VNK	TDMA	00:13:39	16.05	79.44
5	ANDHRA_PRADESH	PRAKASAM	YERRAGONDAPALEM	55E3F11A	YRM	TDMA	00:20:09	16.0402	79.3069
6	ANDHRA_PRADESH	SRIKAKULAM	GOTTABARRIEGE	55FF3206	GTB	TDMA	00:00:50	18.67	83.95
7	ANDHRA_PRADESH	SRIKAKULAM	PALASA_MANDAL	55E34294	PLS	TDMA	00:19:47	18.77	84.4058
8	ANDHRA_PRADESH	SRIKAKULAM	RAJAM	55FF2170	RJA	TDMA	00:00:48	18.6	84.23
9	ANDHRA_PRADESH	SRIKAKULAM	TEKKALI	55FF2FA2	TKL	TDMA	00:00:49	18.6	84.22
10	ANDHRA_PRADESH	VISAKHAPATNAM	ANANDAPURAM_ARG	55FCA06A	ANM	TDMA	00:14:32	17.89	83.37
11	ANDHRA_PRADESH	VISAKHAPATNAM	CDR_DOLPHINS_NOSE	55FC6574	CDE	TDMA	00:14:20	17.67	83.28
12	ANDHRA_PRADESH	VISAKHAPATNAM	KAILASHGIRI	55FC6BA6	KGI	TDMA	00:14:21	17.74	83.34
13	ANDHRA_PRADESH	VISAKHAPATNAM	MEHADRIGADDA_DAM	55FC7602	MIM	TDMA	00:14:22	17.75	83.19
14	ANDHRA_PRADESH	VISAKHAPATNAM	SAIL_VISAKHAPATNAM	55FCE360	STP	TDMA	00:19:12	17.66	83.16
15	ANDHRA_PRADESH	VIZIANAGARAM	BOBBILI	55FF1A38	BOB	TDMA	00:00:47	18.57	83.35
16	GOA	NORTH_GOA	MAPUSA	55D831DC	MPS	TDMA	00:13:54	15.59	73.81
17	GOA	NORTH_GOA	OLD_GOA	55D83F0E	OLD	TDMA	00:13:55	15.48	73.92
18	GOA	NORTH_GOA	PERNEM	55D82C78	PRM	TDMA	00:13:53	15.71	73.79
19	GOA	NORTH_GOA	VALPOI	55CFFFBA	VLP	TDMA	00:09:31	15.51	74.13
20	GOA	SOUTH_GOA	CANACONA	55D8474C	CNC	TDMA	00:13:56	14.99	74.05
21	GUJARAT	AMRELI	DHARI	55D0CB2C	DHI	TDMA	00:09:57	21.23	71.03
22	GUJARAT	AMRELI	JAFRABAD	55D086F4	JAF	TDMA	00:09:48	20.86	71.3333
23	GUJARAT	AMRELI	RAJULA	55D09B50	RAJ	TDMA	00:09:51	21.044	71.4614
24	GUJARAT	AMRELI	SAVARKUNDLA	55D0A018	SVK	TDMA	00:09:52	21.32	71.71
25	GUJARAT	BHAVNAGAR	BOTAD	55D078A2	BOA	TDMA	00:09:47	22.17	71.66

26	GUJARAT	BHAVNAGAR	GHOGHA	55D1D472	GHG	TDMA	00:10:30	21.68	72.27
27	GUJARAT	BHAVNAGAR	LILIYA	55D0E312	LIL	TDMA	00:10:00	21.53	71.36
28	GUJARAT	BHAVNAGAR	PALITANA	55D0EDC0	PAI	TDMA	00:10:02	21.51	71.82
29	GUJARAT	BHAVNAGAR	VALBHIPUR	55D1C9D6	VAL	TDMA	00:10:29	21.88	71.87
30	GUJARAT	SURAT	BARDOLI	55D1748A	BRD	TDMA	00:10:18	21.11	73.11
31	GUJARAT	SURAT	KAMREJ	55E577C0	KAM	TDMA	00:20:57	21.28	72.97
32	GUJARAT	SURAT	MOTI_NAROLI	55E56A64	MOT	TDMA	00:20:56	21.4	72.96
33	GUJARAT	SURAT	OLPAD	55E564B6	OLP	TDMA	00:20:55	21.33	72.75
34	GUJARAT	SURAT	UMARPADA	55E58996	URD	TDMA	00:21:00	21.46	73.47
35	KARNATAKA	DAKSHINA_KANNADA	SULYA	55CBE9F6	SLI	TDMA	00:07:21	12.55	75
36	KARNATAKA	DAKSHINA_KANNADA	VITLA	55CBDC6C	VIT	TDMA	00:07:19	12.77	75.11
37	KARNATAKA	UDUPI	SIDDAPURA	55CD4712	SAU	TDMA	00:08:04	13.66	74.91
38	KARNATAKA	UTTARA_KANNADA	NILKUND	55CD5AB6	NLK	TDMA	00:08:07	14.4484	74.6927
39	KERALA	ALAPPUZHA	ALAPPUZHA	55CE401C	AZA	TDMA	00:08:36	9.49	76.31
40	KERALA	ERNAKULAM	KEERAMPARA	55CE25FA	KRR	TDMA	00:08:32	10.1	76.6672
41	KERALA	ERNAKULAM	MAVATTUPUZAH	55E9652A	MVZ	TDMA	00:23:03	9.99	76.56
42	KERALA	ERNAKULAM	NEELESWARAM	55E96BF8	NLM	TDMA	00:23:04	10.18	76.46
43	KERALA	ERNAKULAM	NERYAMANGALAM	55E9765C	NGM	TDMA	00:23:05	10.05	76.77
44	KERALA	ERNAKULAM	PALLURUTHY	55CE4ECE	KDN	GPRS	00:08:37	9.9264	76.2621
45	KERALA	KOLLAM	ANCHAL	55CE536A	ANC	TDMA	00:08:38	8.93	76.92
46	KERALA	KOLLAM	THENMALA	55CE5DB8	THE	TDMA	00:08:39	8.95	77.06
47	KERALA	KOZHIKODE	PERUVANNAMUZHI	55CDDCA2	PZI	TDMA	00:28:23	11.61	75.82
48	KERALA	MALAPPURAM	ANAKAYAM	55CDFA4E	ANA	TDMA	00:08:27	11.09	76.11
49	KERALA	THIRUVANANTHAPURAM	AIRPORT(CHAKKA)	55CDE7EA	TMS	TDMA	00:28:24	8.467	76.95
50	KERALA	THIRUVANANTHAPURAM	PERINGAMALA	55E9788E	PGA	TDMA	00:23:06	8.75	77.04
51	KERALA	THIRUVANANTHAPURAM	PERUMKADAVILA	55CD2C26	PER	TDMA	00:08:01	8.44	77.11
52	KERALA	THRISSUR	CHIMONI	55CE368C	CII	TDMA	00:28:34	10.44	76.46
53	KERALA	THRISSUR	ENAMAKKAL	55E95E62	ENB	TDMA	00:23:02	10.5	76.1
54	KERALA	THRISSUR	VILANGANKUNNU	55CE7B54	VGK	TDMA	00:08:43	10.55	76.16
55	KERALA	THRISSUR	VYANTHALA	55CE66F0	VYA	TDMA	00:08:40	10.26	76.29
56	MAHARASHTRA	MUMBAI SUBURBAN	BANDRA	558004A2	BBD	TDMA	00:28:11	19.067	72.8409
57	MAHARASHTRA	MUMBAI SUBURBAN	DAHISAR	5580224E	DAS	TDMA	00:28:15	19.2495	72.8597

58	MAHARASHTRA	MUMBAI SUBURBAN	JUHU_AIRPORT	MAJUH000	JUH	GPRS	00:00:00	19.098	72.8341
59	MAHARASHTRA	MUMBAI SUBURBAN	MUMBAI AIRPORT	MAMUM000	MUM	GPRS	00:00:00	19.0931	72.8568
60	MAHARASHTRA	MUMBAI SUBURBAN	RAM_MANDIR	55802C9C	RAM	TDMA	00:28:16	19.1531	72.8497
61	MAHARASHTRA	MUMBAI SUBURBAN	TATA POWER CHEMBUR	MACHF000	CHF	GPRS	00:00:00	19.0044	72.9045
62	MAHARASHTRA	MUMBAI SUBURBAN	VIDYAVIHAR	MAVIY000	VIY	GPRS	00:00:00	19.0784	72.8967
63	MAHARASHTRA	MUMBAI SUBURBAN	VIKHROLI	MAVIH000	VIH	GPRS	00:00:00	19.1096	72.9282
64	MAHARASHTRA	MUMBAI_CITY	BYCULLA_MUMBAI	MABYC000	BYC	GPRS	00:00:00	18.9836	72.8345
65	MAHARASHTRA	MUMBAI_CITY	CSMT_MUMBAI	MACST000	CST	GPRS	00:00:00	18.9462	72.839
66	MAHARASHTRA	MUMBAI_CITY	MAHALAXMI	55800A70	MLX	TDMA	00:28:12	18.9799	72.8231
67	MAHARASHTRA	MUMBAI_CITY	MATUNGA_MUMBAI	MAMAQ000	MAQ	GPRS	00:00:00	19.032	72.8532
68	MAHARASHTRA	MUMBAI_CITY	SION_MUMBAI	MASIQ000	SIQ	GPRS	00:00:00	19.052	72.8668
69	MAHARASHTRA	RAIGAD	BHIRA	55CE8502	BHR	TDMA	00:27:02	18.27	73.23
70	MAHARASHTRA	RAIGAD	IIGHQ_NEWPANVEL	MAIIG000		GPRS	00:00:00	19.0088	73.106
71	MAHARASHTRA	RAIGAD	POLADPUR	55CE98A6	PDP	TDMA	00:08:47	17.984	73.465
72	MAHARASHTRA	RATNAGIRI	CHIPLUN	55CEBE4A	CPN	TDMA	00:08:51	17.31	73.32
73	MAHARASHTRA	RATNAGIRI	JAYGAD	55DFF824	JYG	TDMA	00:09:29	17.17	73.13
74	MAHARASHTRA	RATNAGIRI	POWARWADI(BHAMBHED)	55CEAD3C	PWW	TDMA	00:08:49	16.49	73.37
75	MAHARASHTRA	RATNAGIRI	SAVARDE(GOLWANE)	55CEB098	SVD	TDMA	00:08:50	17.23	73.29
76	MAHARASHTRA	SINDHUDURG	AWALEGAON	55CED57E	AWG	TDMA	00:08:54	16.07	73.45
77	MAHARASHTRA	SINDHUDURG	VAIBHAVWADI	55FFF9CA	VVW	TDMA	00:00:46	16.49	73.74
78	MAHARASHTRA	SINDHUDURG	VENGURLA	55CEC8DA	VGR	TDMA	00:08:53	15.51	74.02
79	MAHARASHTRA	THANE	BHAYANDER	558017D4	BYR	TDMA	00:28:13	19.3147	72.852
80	MAHARASHTRA	THANE	KOPARKHAIRANE	55FBE154	KKH	TDMA	00:24:20	19.1	72.99
81	MAHARASHTRA	THANE	MIRA_ROAD	55801906	MMI	TDMA	00:28:14	19.2799	72.8557
82	MAHARASHTRA	THANE	NERUL	55FBEF86	NRU	TDMA	00:24:25	19.0092	73.0203
83	ODISHA	BALASORE	GOVINDPUR	55C1468E	GDP	TDMA	00:01:40	21.55	86.91
84	ODISHA	BALASORE	NILGIRI	55C1485C	NIL	TDMA	00:01:41	21.46	86.77
85	ODISHA	BALASORE	RAJGHAT	55C155F8	RAG	TDMA	00:01:42	21.47	83.53
86	ODISHA	BALASORE	REMUNA	55C58878	RMN	TDMA	00:03:57	21.52	86.88
87	ODISHA	BALASORE	SORO	55C15B2A	SOR	TDMA	00:01:43	20.27	86.69
88	ODISHA	BHADRAK	AKHUAPADA	55C13ECC	AKP	TDMA	00:01:39	20.91	86.28
89	ODISHA	BHADRAK	BONTH	55C02F40		TDMA	00:01:05	27.12	86.31

90	ODISHA	BHADRAK	DHAMNAGAR	55C578FC	DHN	TDMA	00:03:55	20.92	86.44
91	ODISHA	BHADRAK	TIHIDI	55C5762E	TDI	TDMA	00:03:54	20.96	86.63
92	ODISHA	GANJAM	BELGUNTHA	55C059D0	BGT	TDMA	00:01:11	19.08	84.06
93	ODISHA	GANJAM	BHANJANAGAR	55C53BF6	BJN	TDMA	00:03:47	19.9333	84.5833
94	ODISHA	GANJAM	JAGANATH_PRASAD	55C2849E	JPD	TDMA	00:02:20	19.9	84.6833
95	ODISHA	GANJAM	MADHABARIDA	55C28A4C	MDB	TDMA	00:02:21	19.55	84.38
96	ODISHA	GANJAM	PURUSHOTTAMPUR	55C297E8	PSP	TDMA	00:02:22	19.9	85.8
97	ODISHA	GANJAM	SURADA	55C2993A	SRD	TDMA	00:02:23	19.75	84.43
98	ODISHA	JAGATSINGHPUR	ALIPINGAL	55C11820	APL	TDMA	00:01:35	20.22	86.14
99	ODISHA	JAGATSINGHPUR	KUJANG	55C543B4	KJG	TDMA	00:03:48	20.32	86.52
100	ODISHA	JAGATSINGHPUR	TIRTOL	55C06298	TTL	TDMA	00:01:12	20.48	86.62
101	ODISHA	KENDRAPARA	DERABISH	55C550C2	DBH	TDMA	00:03:50	20.52	86.38
102	ODISHA	KENDRAPARA	GARADPUR	55C12368	GRP	TDMA	00:01:36	20.38	86.36
103	ODISHA	KENDRAPARA	MARSHAGHAI	55C5D6D6	MSG	TDMA	00:04:06	20.42	86.47
104	ODISHA	PURI	ASTRANGA	55C3284E	ASR	TDMA	00:02:41	19.98	86.27
105	ODISHA	PURI	SATYABADI	55C3FE26	SYP	TDMA	00:03:07	19.9	85.8
106	OTHERS	GANJAM	DIGAPAHANDI	55C2A272	DGI	TDMA	00:02:24	19.2833	84.5
107	OTHERS	JAGATSINGHPUR	BALIKUDA	55C4FC12	BLK	TDMA	00:03:39	20.12	86.28
108	OTHERS	JAGATSINGHPUR	RAGUNATHPUR	55C116F2	RNP	TDMA	00:01:34	20.36	86.1333
109	OTHERS	PURI	GOP	55C0CCB2	GOP	TDMA	00:01:25	19.9789	86.0189
110	OTHERS	PURI	PIPLI	55C335EA	PPL	TDMA	00:02:42	20.29	85.94
111	OTHERS	RAIGAD	PEN	55CE8BD0	PEN	TDMA	00:08:45	18.44	73.5833
112	OTHERS	RATNAGIRI	MALGUND	55CEA3EE	MGN	TDMA	00:08:48	17.1	73.16
113	OTHERS	THANE	SHAHAPUR	55CEC608	SHP	TDMA	00:08:52	19.22	73.01
114	TAMIL_NADU	CHENNAI	ANNA_UNIVERSITY	55CA7E6E	ANN	TDMA	00:06:35	13.0112	80.2355
115	TAMIL_NADU	CHENNAI	MRC NAGAR	TNCMA000	CMA	GPRS	00:00:00	13.0212	80.2747
116	TAMIL_NADU	CHENNAI	RIMCLABARG	55807232	RCZ	GPRS	00:00:00	13.075	80.2633
117	TAMIL_NADU	CHENNAI	TARAMANI	55CA70BC	TAA	TDMA	00:06:34	12.9833	80.2333
118	TAMIL_NADU	CHENNAI	YMCANANDNAM	TNNAM000	NAM	GPRS	00:00:00	13.0262	80.2393
119	TAMIL_NADU	KANCHIPURAM	ACS MEDICAL COLLEGE	TNACS000	ACS	GPRS	00:00:00	13.068	80.2469
120	TAMIL_NADU	KANCHIPURAM	CHEMBARAMBAKKAM	55CA8EEA	CHE	TDMA	00:06:37	13	80.0833
121	TAMIL_NADU	KANCHIPURAM	HINDUSTAN_UNIVERSITY	55CA9D9C	HIN	TDMA	00:06:39	12.78	80.52

122	TAMIL_NADU	KANCHIPURAM	LMOIS__KOLAPAKKAM	55CA8038	LMO	TDMA	00:06:36	13	80.1333
123	TAMIL_NADU	KANCHIPURAM	SATHYABAMA__UNIVERSITY	55CAB5A2	STH	TDMA	00:06:42	12.8667	80.2
124	TAMIL_NADU	KANYAKUMARI	LOWER_KOTHAIYAR	55C9C43C	LWK	TDMA	00:06:12	8.5	77.3
125	TAMIL_NADU	KANYAKUMARI	NAGERCOIL	55C97960	NCL	TDMA	00:06:03	8.1667	77.4167
126	TAMIL_NADU	NAGAPATTINAM	KOLLIDAM	55CA6D18	KIM	TDMA	00:06:33	11.33	79.72
127	TAMIL_NADU	PUDUKKOTTAI	PUDUKOTTAI	55CA3D64	PTT	TDMA	00:06:27	10.4833	78.8
128	TAMIL_NADU	PUDUKKOTTAI	THIRUMAYAM	55CA4526	TMM	TDMA	00:06:28	10.25	78.75
129	TAMIL_NADU	RAMANATHAPURAM	KAMUDHI	55CA63CA	KMU	TDMA	00:06:32	9.4167	78.3833
130	TAMIL_NADU	RAMANATHAPURAM	VALINOKKAM	55C9515E	VAI	TDMA	00:05:58	9.17	78.63
131	TAMIL_NADU	THANJAVUR	GRAND_ANAICUT	55CA2E12	GRN	TDMA	00:06:25	10.82	78.81
132	TAMIL_NADU	THANJAVUR	ORATHANADU	55CA155A	OTH	TDMA	00:06:22	10.61	79.25
133	TAMIL_NADU	THOOTHUKUDI	KAYATHAR	55C9D74A	KAY	TDMA	00:06:14	8.95	77.7667
134	TAMIL_NADU	THOOTHUKUDI	SATTANKULAM	55C9CAEE	SKM	TDMA	00:06:13	8.4333	77.9
135	TAMIL_NADU	TIRUNELVELI	MANIMUTHAR_DAM	55C98736	MMR	TDMA	00:06:04	8.65	77.4167
136	TAMIL_NADU	TIRUNELVELI	RADHAPURAM	55CBAAFC	RAA	TDMA	00:07:13	8.2669	77.6689
137	TAMIL_NADU	TIRUVALLUR	GOOD WILL SCHOOL VILLIVAKKAM	TNVIL000	VIL	GPRS	00:00:00	13.1144	80.2025
138	TAMIL_NADU	TIRUVALLUR	HVF_AVADI	55CABB70	AVA	TDMA	00:06:43	13.1167	80.1
139	TAMIL_NADU	TIRUVALLUR	POONAMALLEE	55C8EEF8	PUR	TDMA	00:05:45	13.05	80.0833
140	TAMIL_NADU	TIRUVALLUR	PUZHAL	55CA934E	PZL	TDMA	00:06:38	13.15	80.1833
141	TAMIL_NADU	TIRUVALLUR	R.K.PET	55C8C814	RKP	TDMA	00:05:41	13.15	79.4167
142	TAMIL_NADU	TIRUVALLUR	TIRUVALLUR	55C8F35C	TVA	TDMA	00:05:46	13.1167	79.9
143	WEST_BENGAL	NORTH_TWENTY_FOUR_PARGANAS	BARRACKPORE	55C66C84	BCP	TDMA	00:04:25	22.76	88.36
144	WEST_BENGAL	NORTH_TWENTY_FOUR_PARGANAS	CGWB BIDHANNAGAR	WBCGW000	CGW	GPRS	00:00:00	22.5767	88.4386
145	WEST_BENGAL	NORTH_TWENTY_FOUR_PARGANAS	DEGANGA	55C67120	DEA	TDMA	00:04:26	22.6933	88.6781
146	WEST_BENGAL	SOUTH_TWENTY_FOUR_PARGANAS	ALIPORE	55D92050	ALP	TDMA	00:12:20	22.5358	88.33

India Meteorological Department
Ministry of Earth Sciences
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Location of Coastal ARG stations

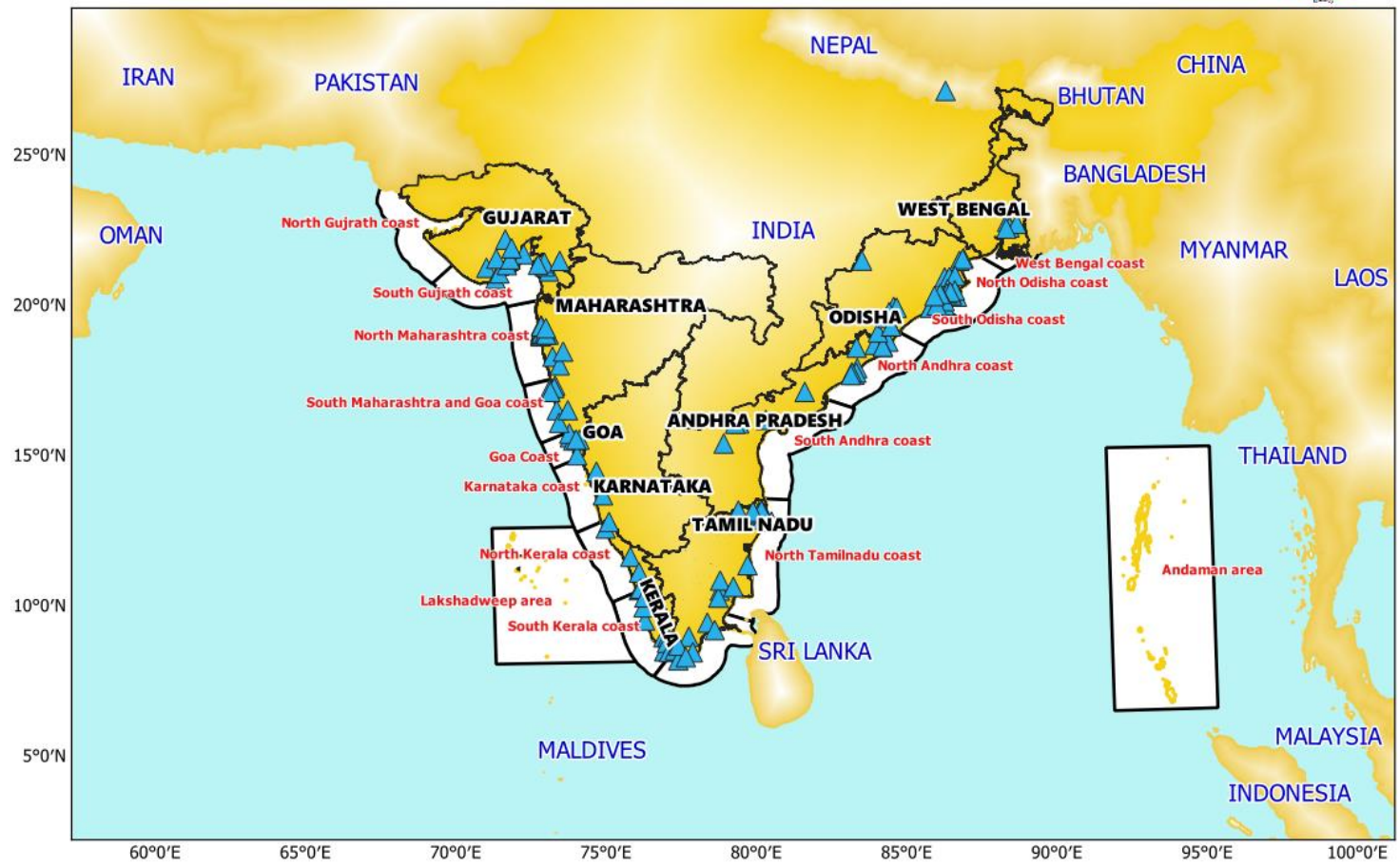

Figure 3.2: Location of Coastal ARG Stations

3.4 Metadata of coastal AGROAWS stations

S. No.	STATE	DISTRICTS	STATION	ID	CALL SIGN	COMM.	Tx_time	Latitude	Longitude	Altitude
aLTITUDE	ANDHRA_PRADESH	EAST_GODAVARI	KALAVACHARLA_KVK	APKLE000	KLE	GPRS	00:00:00	17.1369	81.9007	40.2
2	ANDHRA_PRADESH	NELLORE	NELLORE_KVK	APNEC000	NEC	GPRS	00:00:00	14.4046	79.9641	21.9
3	ANDHRA_PRADESH	PRAKASAM	DARSI_KVK	APDAD000	DAD	GPRS	00:00:00	15.7893	79.6622	124.2
3	ANDHRA_PRADESH	PRAKASAM	DARSI_KVK	APDAD000	DAD	GPRS	00:00:00	15.7893	79.6622	124.2
4	ANDHRA_PRADESH	SRIKAKULAM	AMADALAVALASA_KVK	APAME000	AME	GPRS	00:00:00	18.3976	83.8974	34.2
5	GOA	NORTH_GOA	ELA_NORTH GOA_KVK	GOOLG000	OLG	GPRS	00:00:00	15.4893	73.9196	59.3
6	GOA	SOUTH_GOA	MADGAON_KVK	GOMGM000	MGM	GPRS	00:00:00	15.2662	73.9626	17.3
7	GUJARAT	AMRELI	AMRELI_KVK	GUAMI000	AMI	GPRS	00:00:00	21.6021	71.2276	123.6
8	GUJARAT	SURAT	SURAT_KVK	GUATH000	ATH	GPRS	00:00:00	21.1677	72.8032	8.3
9	KERALA	KOLLAM	KOTTARAKKARA_KVK	KEKLU000	KLU	GPRS	00:00:00	8.98324	76.808	80.1
10	KERALA	MALAPPURAM	THAVANUR_KVK	KEMPU000	MPU	GPRS	00:00:00	10.852	75.9855	25.6
11	MAHARASHTRA	PALGHAR	PALGHAR_KVK	MATHH000	THH	GPRS	00:00:00	20.0561	72.7524	54.8
12	ODISHA	GANJAM	BENAKUDA_KVK	ORBEN000	BEN	GPRS	00:00:00	19.9508	84.5929	102.6
13	ODISHA	JAGATSINGHPUR	JAGATSINGHPUR_KVK	ORJAH000	JAH	GPRS	00:00:00	20.2902	86.3698	13.2
14	ODISHA	PURI	PURI_KVK	ORSAC000	SAC	GPRS	00:00:00	19.9335	85.8181	5.7
15	ODISHA	RAYAGADA	GUNUPUR_KVK	ORGUP000	GUP	GPRS	00:00:00	19.0871	83.8144	84.4
16	TAMIL_NADU	KANCHIPURAM	KATTAPAKKAM_KVK	TNKTT000	KTT	GPRS	00:00:00	12.82	80.0334	39.6
17	TAMIL_NADU	PUDUKKOTTAI	VAMBAN_KVK	TNPUD000	PUD	GPRS	00:00:00	10.3626	78.9016	108.7
18	TAMIL_NADU	RAMANATHAPURAM	RAMNADU_KVK	TNRMM000	RMM	GPRS	0:00:00	9.3462	78.8981	7.7
19	TAMIL_NADU	TIRUVALLUR	TIRUR_KVK	TNTRO000	TRO	GPRS	0:00:00	13.1198	79.9567	16.7
20	WEST_BENGAL	NORTH_24_PARGANAS	ASHOKNAGAR_KVK	WBASO000	ASO	GPRS	0:00:00	22.8382	88.6347	13.8

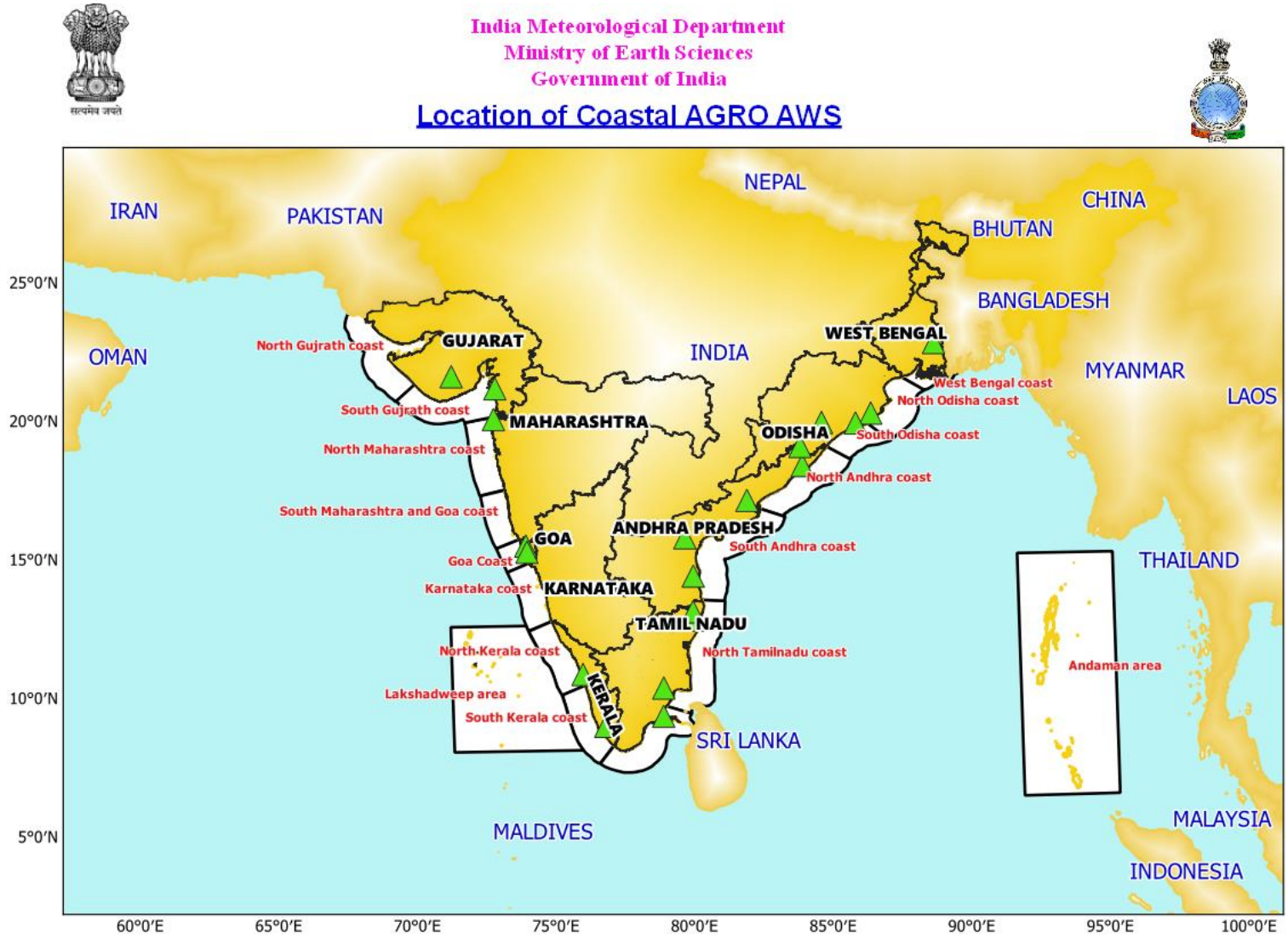

Figure 3.3: Location of Coastal AGRO AWS Stations

3.5 Metadata of coastal HWSR stations

SNO	STATION ID	STATIONNAME	Lat	Lon	Region	State
1	43278CHN	CHENNAI	13.0603	80.2323	CHENNAI	TAMILNADU
2	43150VSK	VISHAKHAPATNAM	17.6868	83.2185	CHENNAI	ANDHRA PRADESH
3	43105KLN	KALINGPATNAM	18.3335	84.1166	CHENNAI	ANDHRA PRADESH
4	43221ONG	ONGOLE	15.4825	80.0327	CHENNAI	ANDHRA PRADESH
5	43363PBN	PAMBAN	09.2869	79.2300	CHENNAI	TAMILNADU
6	43185MPT	MACHLIPATNAM	16.1800	81.1505	CHENNAI	ANDHRA PRADESH
7	43189KND	KAKINADA	16.9500	82.2200	CHENNAI	ANDHRA PRADESH
8	43346KKL	KARAIKAL	10.9024	79.8313	CHENNAI	TAMILNADU
9	43243KVL	KAVALI	14.9130	79.9900	CHENNAI	ANDHRA PRADESH
10	43329CDL	CUDDALORE	11.7569	79.7661	CHENNAI	TAMILNADU
11	43377KYK	KANYAKUMARI	08.0816	77.5461	CHENNAI	TAMILNADU
12	43348ADM	ADIRAMPATTINAM	10.3439	79.3880	CHENNAI	TAMILNADU
13	43245NLR	NELLORE	14.4501	79.9622	CHENNAI	ANDHRA PRADESH
14	43361TON	THONDI	09.7301	79.0026	CHENNAI	TAMILNADU
15	43331PUD	PUDUCHERRY	11.9305	79.8304	CHENNAI	PUDUCHERRY
16	43347NPT	NAGAPATTINAM	10.7826	79.8308	CHENNAI	TAMILNADU
17	42895BLS	BALASORE	21.4950	86.9427	KOLKATA	ODISHA
18	43049GPL	GOPALPUR	19.2500	84.8833	KOLKATA	ODISHA
19	42976PDP	PARADEEP	20.2514	86.6506	KOLKATA	ODISHA
20	43053PRI	PURI	19.7820	85.8113	KOLKATA	ODISHA
21	42806HLD	HALDIA	22.0691	88.1419	KOLKATA	WEST BENGAL
22	42901DGA	DIGHA	21.6111	87.5010	KOLKATA	WEST BENGAL
23	42971BWN	MC BHUBANESHWAR	20.2502	85.8105	KOLKATA	ODISHA
24	42973CBL	CHANDBALI	20.7609	86.7310	KOLKATA	ODISHA
25	42816SLC	SALT LAKE	22.5833	88.4333	KOLKATA	WEST BENGAL
26	43333PBL	PORTBLAIR	11.6700	92.7200	KOLKATA	ANDAMAN & NICOBAR
27	43192PJM	PANJIM	15.4813	73.8113	MUMBAI	GOA
28	42731DWK	DWARKA	22.2311	68.9516	MUMBAI	GUJARAT
29	42909VRL	VERAVAL	20.9012	70.3511	MUMBAI	GUJARAT

30	42634BHJ	BHUJ	23.2422	69.6461	MUMBAI	GUJARAT
31	42631NLY	NALIYA	23.2500	68.8500	MUMBAI	GUJARAT
32	43110RTN	RATNAGIRI	16.9804	73.3119	MUMBAI	MAHARASHTRA
33	43057CLB	COLABA	18.8823	72.8021	MUMBAI	MAHARASHTRA
34	43196MRM	MORMUGAO			MUMBAI	GOA
35	42027SRN	SRINAGAR	34.0500	74.8006	DELHI	JAMMU & KASHMIR

Appendix 3.6

3.6 Metadata of coastal RS/RW stations

Sn	RC		State	District	Station	Index	Lat	Lon	Elevation	Started
1	Kolkata	RMC	West Bengal	North 24 Parganas	Kolkata	42809	22.39	88.27	6	3/16/1944
2	Chennai	RMC	Tamil Nadu	Chennai	Chennai	43279	12.99	80.18	15	6/29/1946
3	Chennai	RSRW	Kerala	Thiruvananthapuram	Thiruvananthapuram	43371	8.30	76.60	52.2	1/1/1947
4	Chennai	RSRW	Andaman & Nicobar Islands	South Andaman	Port Blair	43333	11.40	92.43	79	12/4/1949
5	Mumbai	RMC	Maharashtra	Greater Mumbai	Mumbai (SCZ)	43003	19.10	72.51	13	9/7/1954
6	Chennai	RMC	Andhra Pradesh	Visakhapattanam	Visakhapattanam	43150	17.68	83.00	15	10/17/1956
7	Mumbai	RSRW	Gujarat	Ahmedabad	Ahmedabad	42647	23.04	72.38	55	7/20/1961
8	Chennai	RSRW	Union Territory	Lakshadweep	Minicoy	43369	8.18	73.00	2	3/12/1963
9	Chennai	RSRW	Kerala	Ernakulam	Kochi	43353	9.92	76.26	2	8/1/1966
10	Mumbai	RSRW	Goa	North Goa	Panjim	43192	15.48	73.82	60	6/7/1971
11	Kolkata	RSRW	Odisha	Khurda	Bhubaneswar	42971	20.15	85.49	45.72	7/22/1971
12	Chennai	RSRW	Karnataka	Dakshina Kannada	Mangalore	43285	12.89	74.87	80	1/1/1975
13	Chennai	RSRW	Tamil Nadu	Tamil Nadu	Karaikal	43346	10.91	79.84	25	11/26/1978
14	Chennai	RSRW	Union Territory	Lakshadweep	Amini	43311	11.07	72.44	2	7/20/1979
15	Chennai	RSRW	Andhra Pradesh	Krishna	Machilipatanam	43185	16.12	81.09	22	9/23/1982
16	Mumbai	RSRW	Maharashtra	Ratnagiri	Ratnagiri	43110	16.59	73.19	92.87	6/22/2016
17	Mumbai	RSRW	Gujarat	Kutch	Bhuj	42634	23.24	69.67	118.9	7/1/2019
18	Kolkata	RSRW	Odisha	Ganjam	Gopalpur	43049	19.26	84.86	17	7/15/2019
19	Chennai	RSRW	Andhra Pradesh	Nellore	Kavali	43243	14.91	79.99	20	10/1/2019

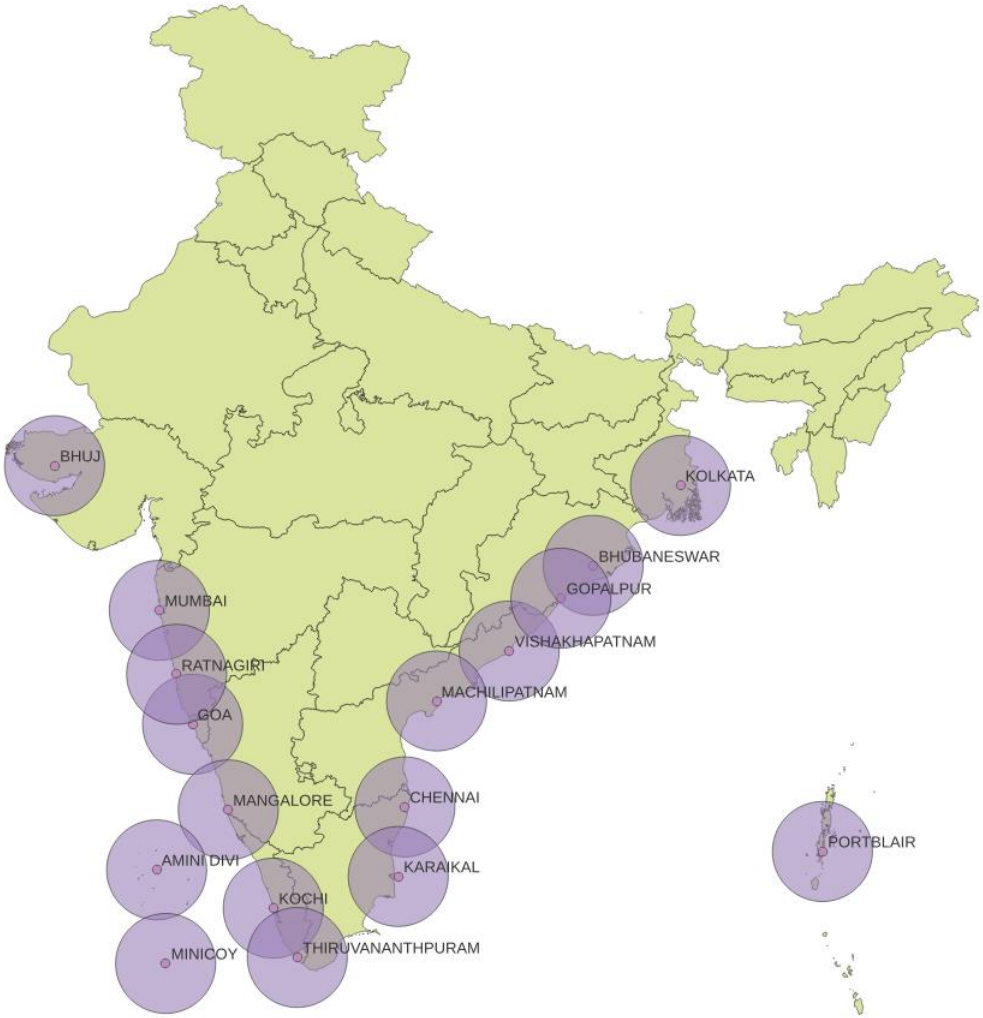

Figure 3.4: Location of Coastal RS/RW Stations

3.7 Metadata of Coastal Pilot Balloon Observatories (source: https://cdsp.imdpune.gov.in/home_metadata.php#metadata)

S.no	stations	state	district	index	msl height	kat	lon
1	AHMEDABAD	GUJARAT	AHMEDABAD	42647	55.50 m	23° 4' N	72° 38' E
2	AMINIDIVI	UNION TERRITORY	LAKSHADWEEP	43311	11.7 m	11° 7' N	72° 44' E
3	BAJPE / MANGALORE (A)	KARNATAKA	DAKSHINA KANNADA	43284	101.8 m	12° 30' N	74° 30' E
4	BALASORE	ORISSA	BALASORE	42895	20 m	21° 31' N	86° 56' E
5	BHUBANESWAR	ORISSA	KHURDAH	42971	46 m	20° 15' N	85° 50' E
6	BHUJ	GUJARAT	KUTCH	42634	118.9 m	23° 15' N	69° 48' E
7	DABOLIM N.A.S.	GOA	SOUTH GOA	43194	56 m	15° 22' N	73° 49' E
8	DUM DUM	WEST BENGAL	NORTH 24 PARGANAS	42809	6 m	22° 39' N	88° 27' E
9	GANNAVARAM	ANDHRA PRADESH	KRISHNA	43181	21 m	16° 32' N	80° 48' E
10	GOPALPUR	ORISSA	GANJAM	43049	17 m	19° 16' N	84° 53' E
11	KARAIKAL	TAMIL NADU	KARAIKAL	43346	6.95 m	10° 55' N	79° 50' E
12	KOCHI (NAS)	KERALA	-----	43353	-----	-----	-----
13	MACHILIPATNAM	ANDHRA PRADESH	KRISHNA	43185	3 m	16° 12' N	81° 9' E
14	MANGALORE RS/RW (PANAMBUR)	KARNATAKA	DAKSHINA KANNADA	43285	32.1 m	12° 30' N	74° 30' E
15	MEENAMBAKKAM CHENNAI (A)	TAMIL NADU	CHENNAI	43279	15.52 m	13° 0' N	80° 11' E
16	MINICOY	UNION TERRITORY	LAKSHADWEEP	43369	1.8 m	8° 18' N	73° 9' E
17	MUMBAI SANTACRUZ	MAHARASHTRA	GREATER MUMBAI	43003	14.20 m	19° 7' N	72° 51' E
18	NAGAPATTINAM	TAMIL NADU	NAGAPATTINAM	43347	9.4 m	10° 46' N	79° 51' E
19	PANJIM	GOA	GOA	43192	59.6 m	15° 29' N	73° 49' E
20	PORT BLAIR	ANDAMAN & NICOBAR	SOUTH ANDAMAN	43333	79 m	11° 0' N	92° 43' E
21	RATNAGIRI	MAHARASHTRA	RATNAGIRI	43110	91.25 m	16° 59' N	73° 20' E
22	SURAT	GUJARAT	SURAT	42840	7.82 m	21° 6' N	72° 44' E
23	THIRUVANANTHA PURAM	KERALA	THIRUVANANTHA PURAM	43371	64.31 m	8° 29' N	76° 57' E
24	THOOTHUKUDI NEW PORT	TAMIL NADU	THOOTHUKUDI	43379	2.8 m	8° 45' N	78° 11' E
25	VENGURLA	MAHARASHTRA	SINDHUDURG	43193	16 m	15° 52' N	73° 38' E
26	VERAVAL	GUJARAT	GIR SOMNATH	42909	11.04 m	20° 54' N	70° 22' E
27	VISAKHAPATNAM	ANDHRA PRADESH	VISAKHAPATNAM	43150	2.2 m	17° 41' N	83° 18' E
28	VISAKHAPATNAM AIRPORT	ANDHRA PRADESH	VISAKHAPATNAM	43149	3.3 m	17° 43' N	83° 14' E

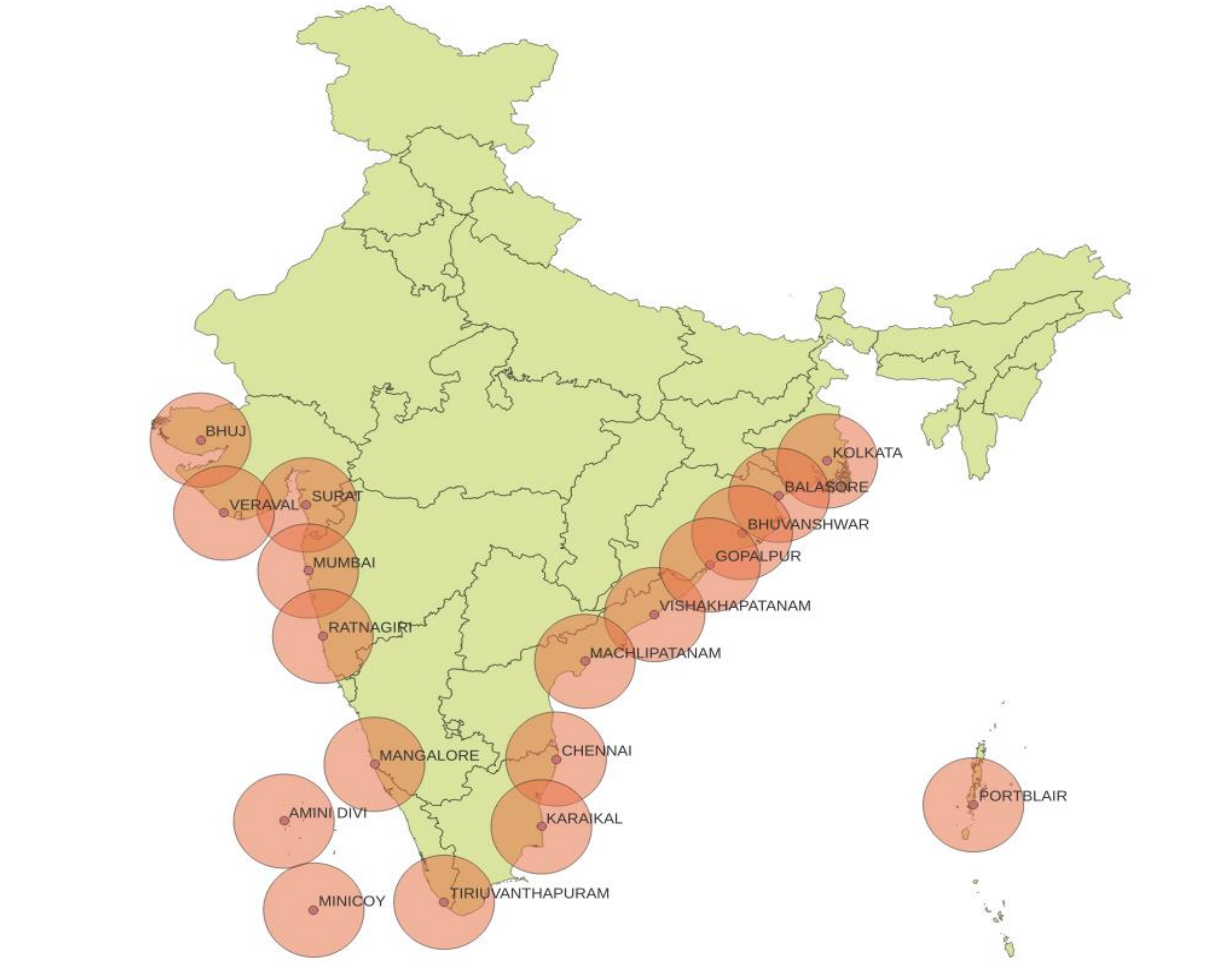

Figure 3.5: Location of Coastal Pilot Stations

3.8 Metadata of coastal Doppler Weather Radar Observatories

Doppler Weather Radar (DWR) Network in Coastal Areas

East Coast DWR

S. NO.	State	District	DWR Site	DWR Band	Index	Lat	Lon	Altitude (m)
1	Tripura	West Tripura	Agartala	S	42724	23° 53’	91° 15’	35
2	West Bengal	Kolkata	Kolkata	S	42809	22° 34’	88° 21’	35
3	Odisha	Jagatsingpur	Paradip	S	42976	20° 15’	86° 39’	44
4	Odisha	Ganjam	Gopalpur	S	43049	19° 16’	84° 52’	17
5	Andhra Pradesh	Visakhapatnam	Visakhapatnam	S	43150	17° 44’	83° 20’	170
6	Andhra Pradesh	Krishna	Machilipatnam	S	43385	16° 10’	81° 9’	35
7	Andhra Pradesh	Tirupati	Sriharikota	S				
8	Tamil Nadu		Chennai	S	43279	13° 4’	17° 3’	35
9	Tamil Nadu		Chennai NIOT	X				
10	Tamil Nadu		Karaikal	S	43346	10° 54’	79° 50’	20

West Coast DWR

S. NO.	State	District	DWR Site	DWR Band	Index	Lat	Lon	Altitude (m)
1	Gujarat	Kutch	Bhuj	S	42624	23° 14’	69° 38’	100
2	Maharashtra	Greater Mumbai	Mumbai	S	43003	18° 54’	72° 48’	100
3	Gujarat	Gir Somnath	Veraval	C	42909			
4	Goa	North Goa	Goa	S	43192	15° 29’	73° 49’	82
5	Kerala	Ernakulam	Cochin	S	43353	9° 55’	76° 16’	30
6	Kerala	Thiruvananthapuram	VSSC Thiruvananthpuram	C	43371			

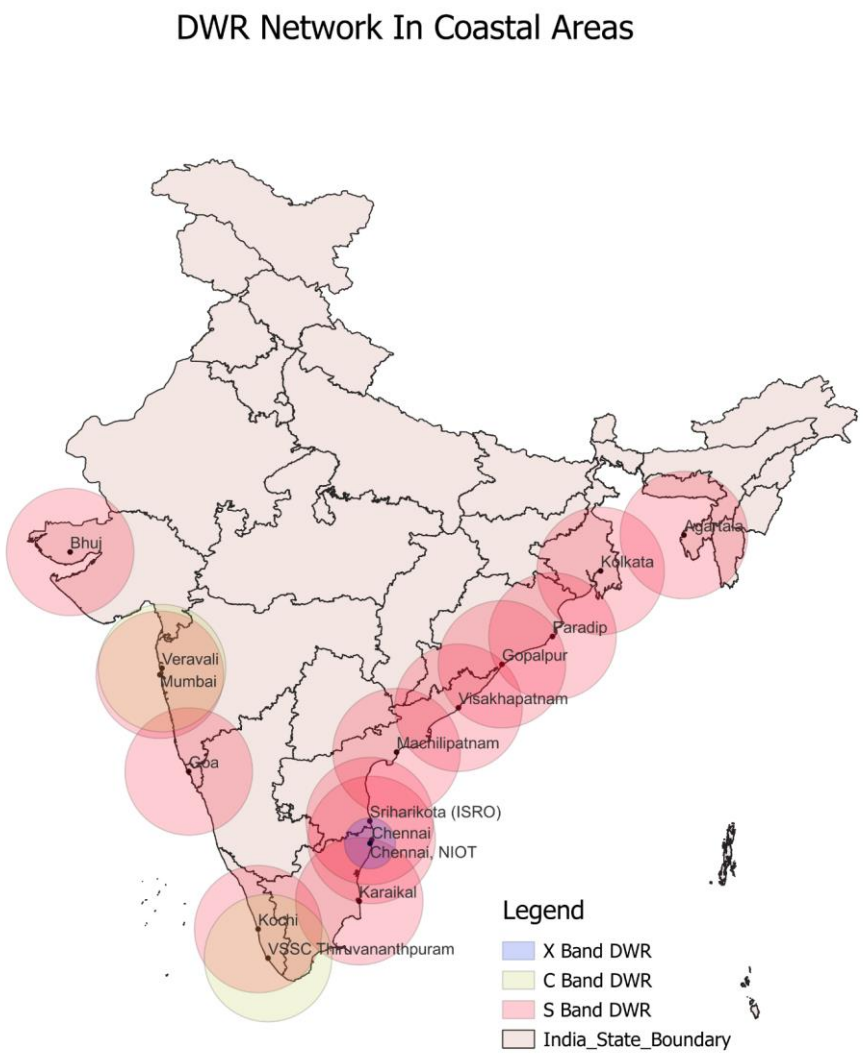

Figure 3.6: Location of Coastal AGRO AWS Stations

4. Climatological tables of coastal observatories

The normal values of temperature, rainfall and various other weather parameters of 12 coastal observatories for the period (1991-2020) are given separately as Annexure I. The metadata of the coastal observatories are given below:

S. No	Station	Index	District	Lat	Lon	Altitutde	Class	Starting Date
1	Puri	43053	Puri	19 48	85 49	6.0	I	27th April 1988
2	Harnai	43109	Ratnagiri	17 49	73 06	2.76	I	5 Jan. 1943
3	Kozhikode	43314	Kozhikode	11 15	75 47	5.03	I	1 Aug. 1880
4	Dwarka	42731	Devbhoomi Dwarka	22 14	68 57	11.30	I	1 Dec. 1901
5	Karwar	43225	Uttara Kannada	14 48	74 08	4.10	I	24 Oct. 1877
6	Mormugoa	43196	South Goa	15 25	73 47	61.60	I	1 Aug. 1890
7	Kakinada	43189	Kakinada	16 57	82 14	2.40	I	April 1889
8	Minicoy	43369	Lakshadweep	08 18	73 09	1.80	I	21 Jan 1891
9	Veraval	42909	Junagad	20 54	70 22	11.90	I	1 Feb. 1890
10	Okha	42730	Jamnagar	22 29	69 07	7.0	I	12 Dec. 1962
11	Alibag	43058	Raigad	18 38	72 52	7.0	IIb	May1929
12	Visakhapatnam	43150	Visakhapatnam	17 41	83 18	2.20	I	6 Jan. 1963

Double Click on the pdf icon to view the tables

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