ACRE

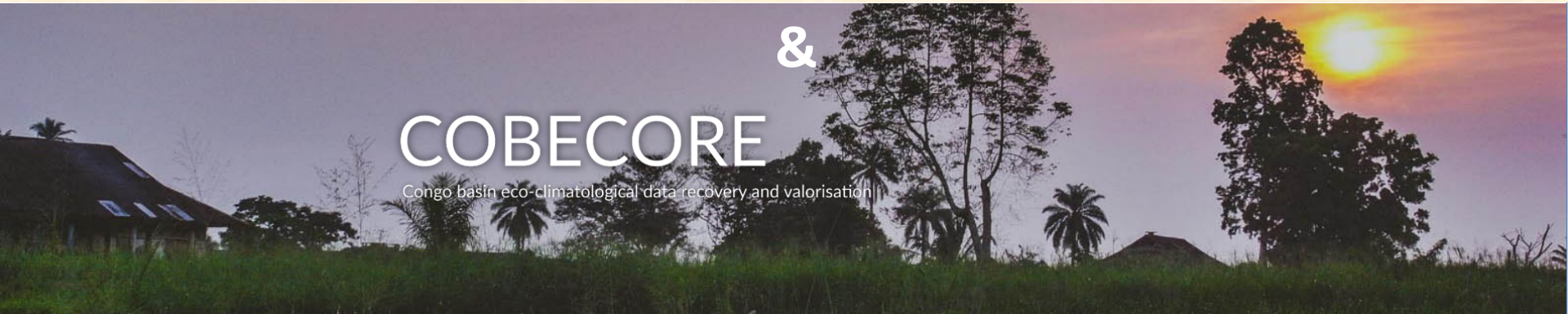
Atmospheric Circulation Reconstructions over the Earth

+

opernicus
Europe's eyes on Earth

Climate Change Service

C3S Data Rescue Service (DRS)

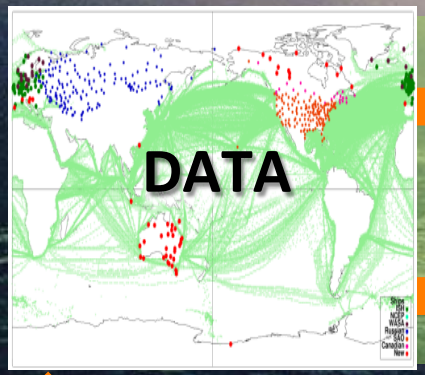


&

COBECORE

Congo basin eco-climatological data recovery and valorisation

CLIMATE SERVICES & APPLICATIONS

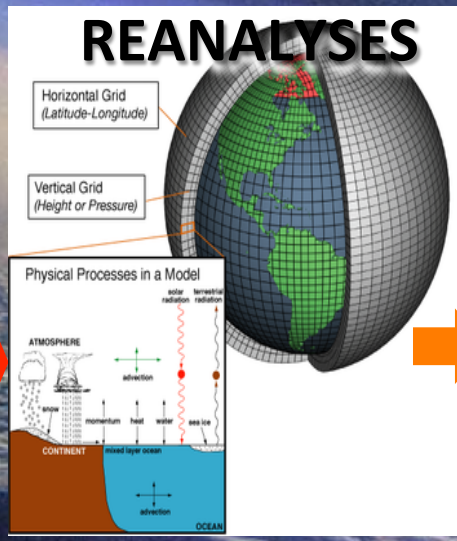


ICOADS

ISPD

Citizen Science
'Crowd Sourcing'
(eg. *Oldweather.org*
Weather Detective)

REANALYSES



20th Century Reanalysis Project (20CR)

20CRv2c 1851-2012

Global historical reanalysis

56 realizations every 6 hours

2^{o} x 2^{o} spatial resolution

IRI

NCAR

NOAA ESRL

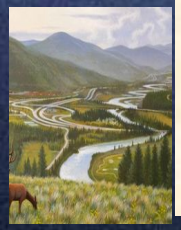
NERSC

KNMI

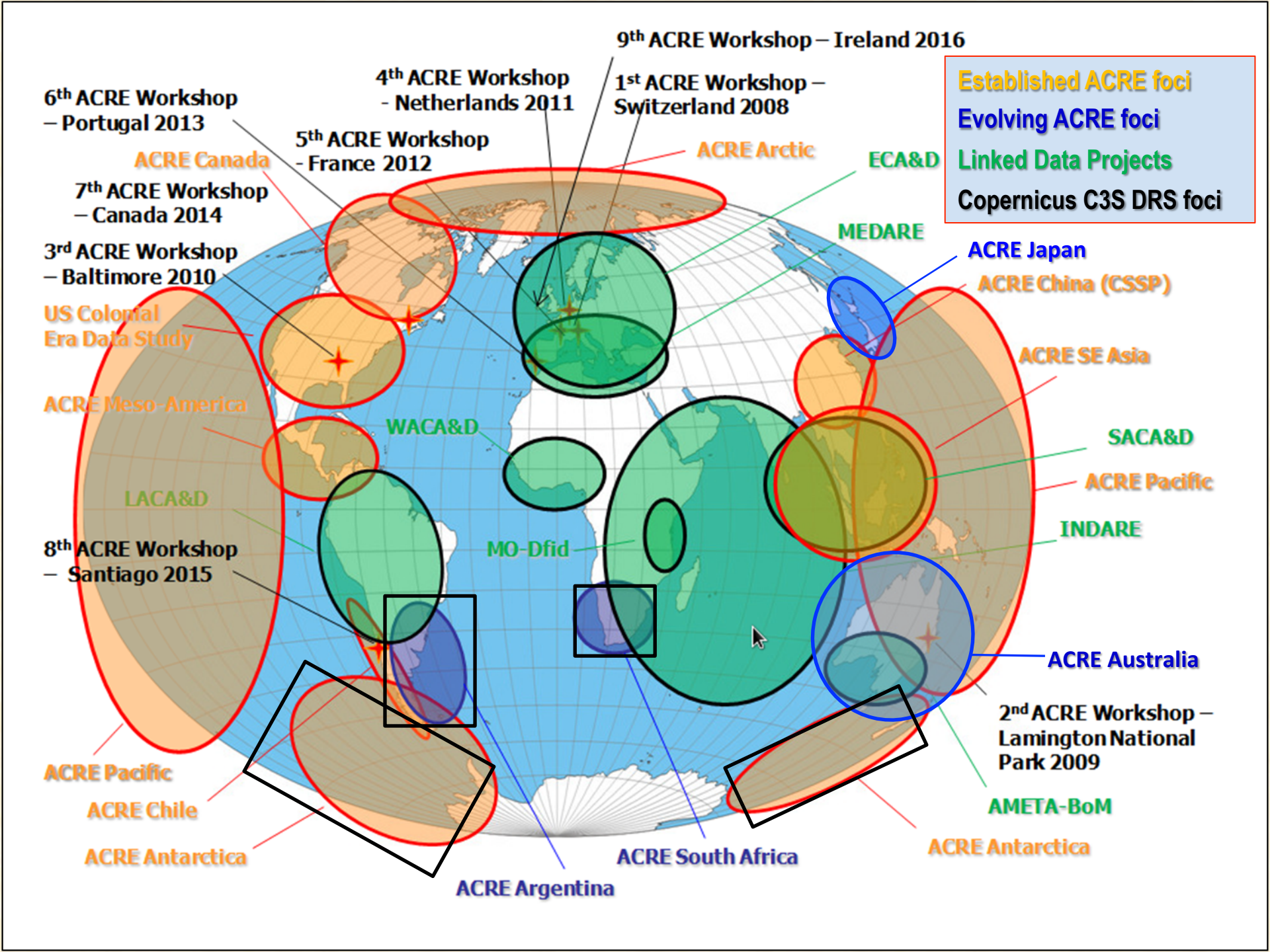
BADC

MO PRECIS Downscaling => Higher Resolution

MELDING: historical climatology, climate history, climate reconstructions, modelling and reanalyses

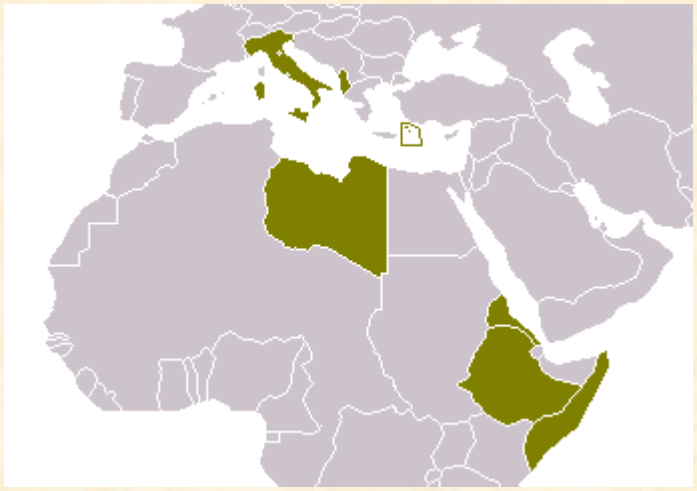


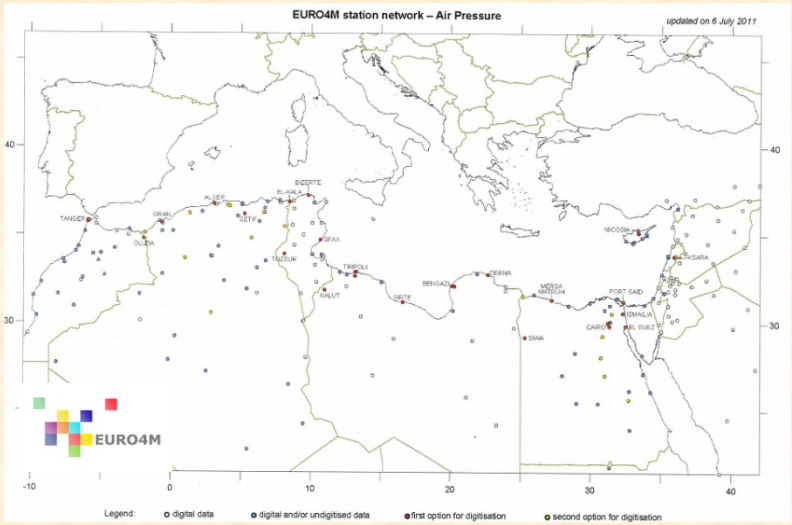
- Environmental Assessments
- Extremes, Impacts & Risks
- Water resources
- Agricultural
- Forestry
- Energy
- Marine operations
- Fisheries
- Cultural landscapes and built heritage
- Education
- Ecological
- Phenological
- Health & Disease
- Reinsurance
- Climate Monitoring
- Model Validation


9th ACRE Workshop – Ireland 2016
4th ACRE Workshop - Netherlands 2011
1st ACRE Workshop – Switzerland 2008
6th ACRE Workshop – Portugal 2013
5th ACRE Workshop - France 2012
ACRE Canada
7th ACRE Workshop – Canada 2014
3rd ACRE Workshop – Baltimore 2010
US Colonial Era Data Study
ACRE Meso-America
LACA&D
8th ACRE Workshop – Santiago 2015
ACRE Pacific
ACRE Chile
ACRE Antarctica
ACRE Argentina
ACRE South Africa
ACRE Arctic
ECA&D
MEDARE
ACRE Japan
ACRE China (CSSP)
ACRE SE Asia
SACA&D
ACRE Pacific
INDARE
ACRE Australia
2nd ACRE Workshop – Lamington National Park 2009
AMETA-BoM
ACRE Antarctica
WACA&D
MO-Dfid
Established ACRE foci
Evolving ACRE foci
Linked Data Projects
Copernicus C3S DRS foci

African Historical Data Rescue Activities

ACRE is working with data rescue activities in Africa by IEDRO, MEDARE, MedCLIVAR, EURO4M, ERA-CLIM, CNMCA & the University of Giessen

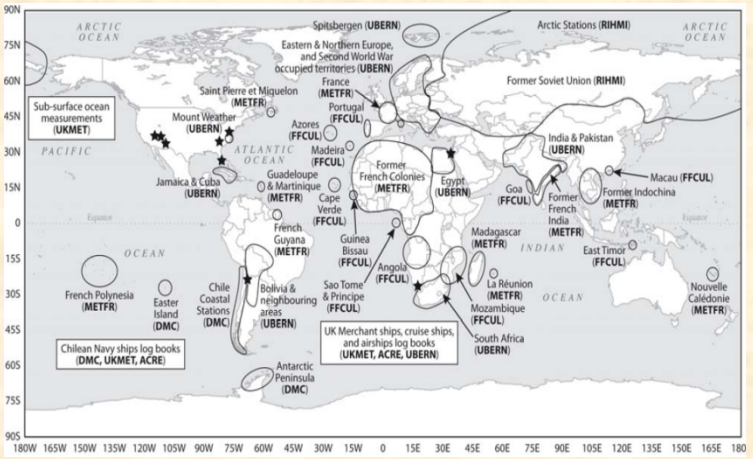




Old Italian Colonies: Centro Nazionale di Meteorologia e Climatologia Aeronautica (CNMCA) - III Servizio (Climatologia), Italy

WMO MEDARE initiative

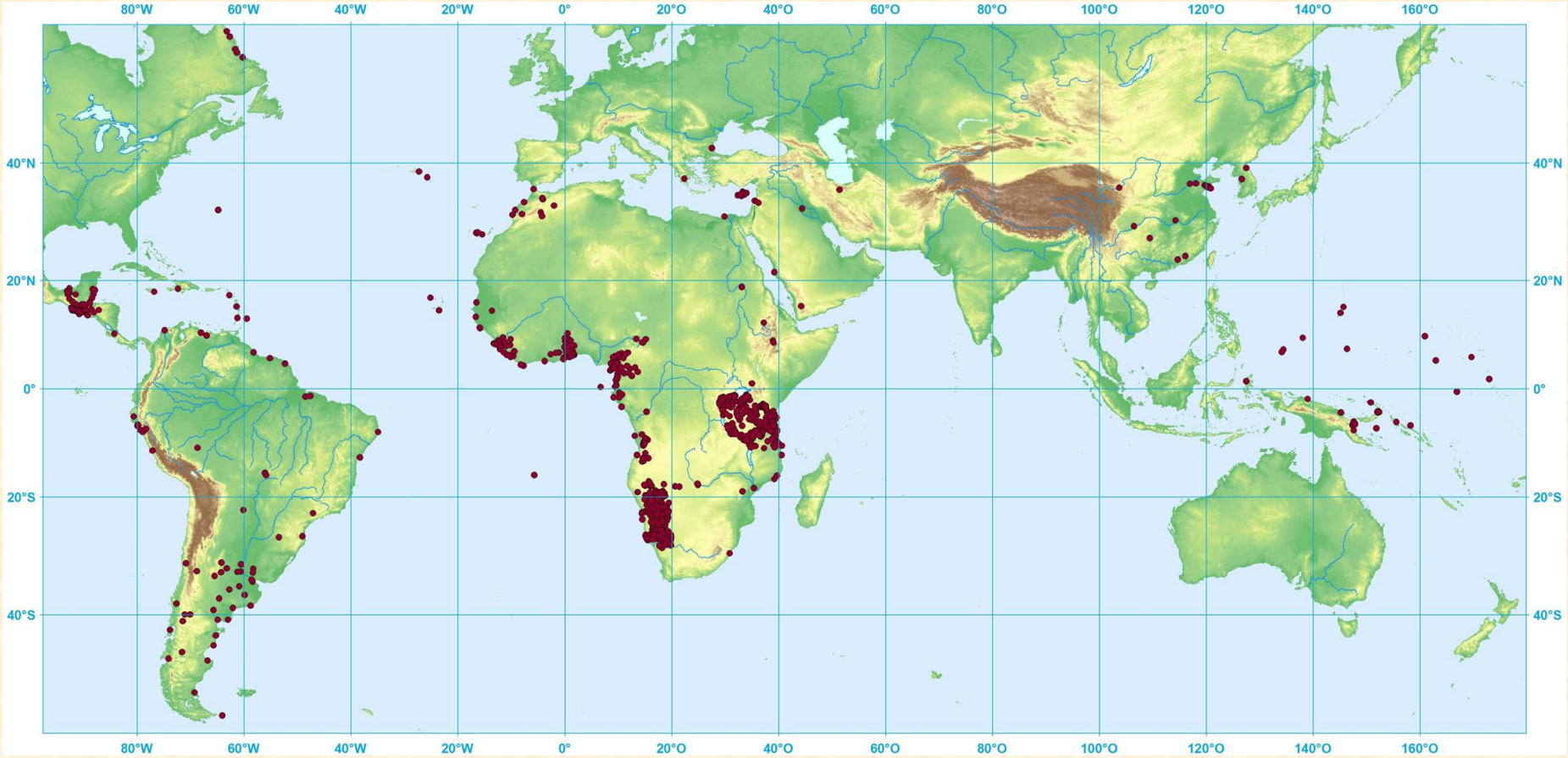
MedCLIVAR



University of Giessen, Germany
Alexandria, Egypt: WMO 62319
1876-1896: Austrian Year Books

ERA-CLIM data recovery & digitization

Position of overseas historical stations being digitised by Deutsche Seewarte (DWD)



DWD old German colonial data scanning, digitization and quality control working plan for the next years

Nr.	Country	Number of stations	Scanned	Digitized	Quality controlled	Data bank of DWD	doi number	Handed over
1	South Korea	**1**	2016	2013	2013	2018	2018	2013
2	China	**13**	2015	2008-2012	2015	2018	2018	2009, 2015
3	Tropical Pacific	**40**	2016	2010-2015	2017	2018	2018	2017
4	Togo	**9**	2016	2012-2016	2017	2018	2018	2017
5	Canada	**5**	2016	2016-2017	2017	2018	2018	2017
6	Ghana	**16**	2017	2012-2016	2017	2018	2018	2018
7	Cameroon	**101**	2017	2010-2017	2017	2018	2018	2018
8	Namibia	**380**	2018-2020	2016-2023	2023	2024	2024	2024
9	Tanzania	**507**	2021-2022	2015-2025	2025	2026	2026	2026

Status: future plan / in progress / ready

As of: 02.06.2017

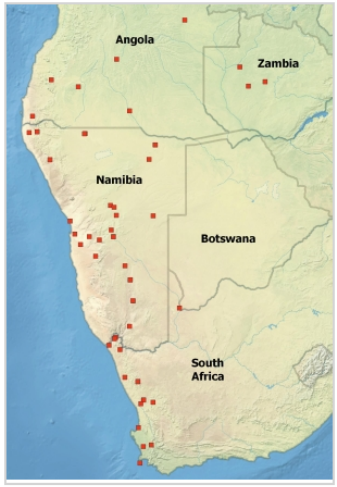
The Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL)

SASSCAL
Southern African Science Service Centre for Climate Change and Adaptive Land Management

The Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) is a joint initiative of Angola, Botswana, Namibia, South Africa, Zambia, and Germany in response to the challenges of global change.

SPONSORED BY THE
Federal Ministry of Education and Research

SASSCAL ObservationNet



The **SASSCAL ObservationNet** offers data and user friendly information regarding the temporal changes within ecosystems and their biological diversity. The data have been collected by a variety of different scientific disciplines jointly using standardized research infrastructures for long-term observation, called Biodiversity Observatories.

In the frame of the "Global observation system of systems" (GEOSS) and its "Global Biodiversity Observation network" (GEO BON) such plot-based observation sites are important research infrastructures. They provide information on the health of ecosystems and on the intactness of biodiversity.

The **SASSCAL ObservationNet** with its **54 Biodiversity Observatories** forms one of the largest contributions to the global network of plot based observatories. Other large networks are listed here. SASSCAL also supports the use of Essential Biodiversity Variables (EBVs).

Similarly, SASSCAL also aims at collecting the essential parameters for the functional assessment of organisms, as defined by TRY (a global database of plant traits).

Each "Biodiversity Observatory" forms an exactly surveyed square kilometer representative for a ecological zone. All "Biodiversity Observatories" serve for long-term observation of the change of diversity and composition of organisms and essential environmental key variables (regarding e.g. soil, climate, land use). Information, gained at these observatories can be extrapolated to a larger space.

SASSCAL WeatherNet (http://www.sasscalweathernet.org/)

A large number of automatic weather stations has been implemented in the frame of the BIOTA AFRICA project by the Namibian National Botanical Research Institute (NBRI) and the Group "Biodiversity, Evolution and Ecology (BEE) of the University of Hamburg. The website offers hourly updates of data and graphs of a large number of weather parameters. The number of weather stations will be further augmented in the frame of SASSCAL and in all SASSCAL countries:

Automatic Weather Stations in Angola, Botswana, Namibia, South Africa and Zambia from 2010 at the earliest.

Rainfall App

DESCRIPTION:

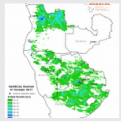
The SASSCAL Rainfall App was designed as an easy on-line repository for rainfall records for farmers and other citizens. The collection of rainfall data is also used for valuable scientific research.

App Location
http://rain.sasscal.org

Daily Rainfall

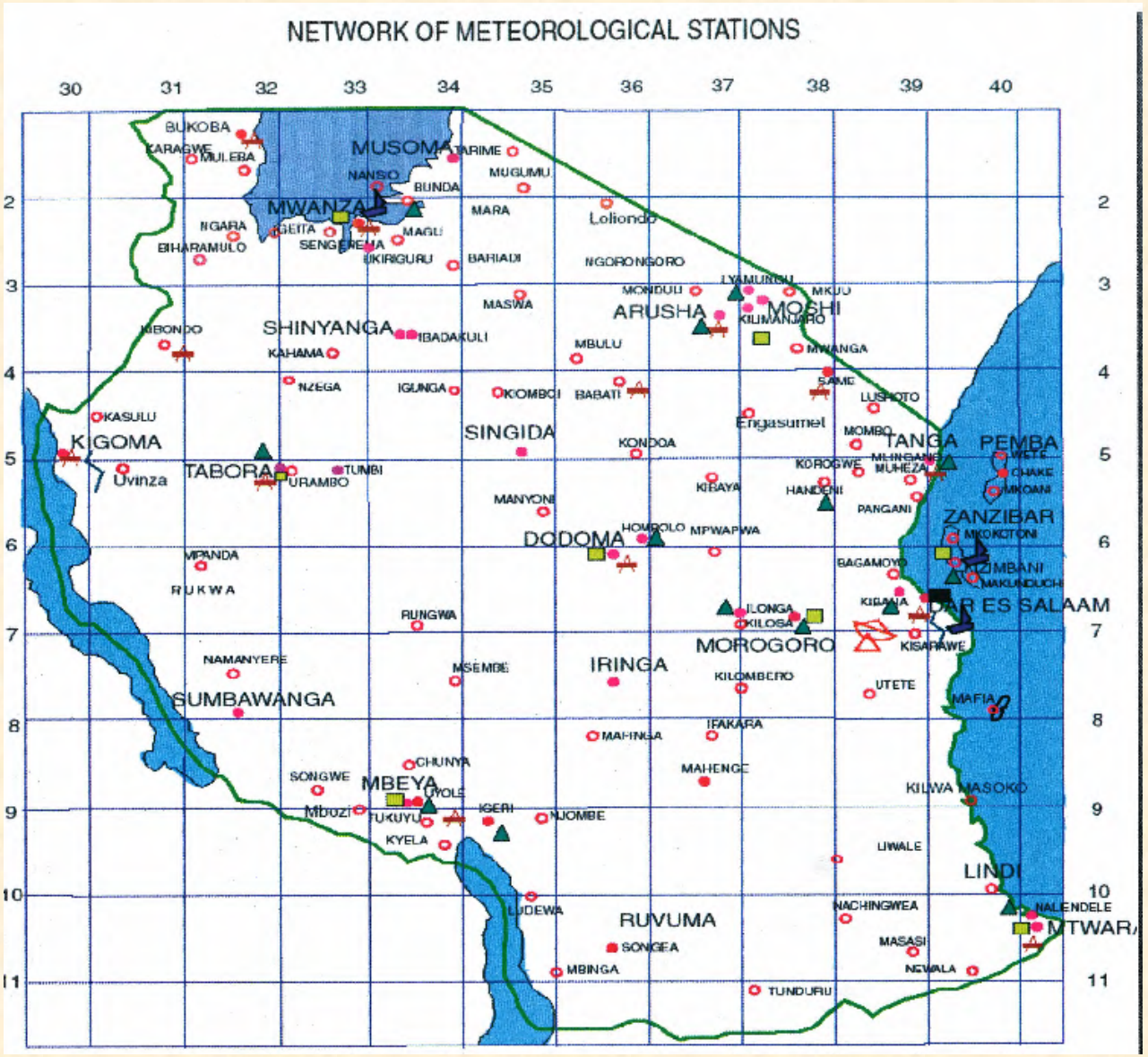
DESCRIPTION:

The SASSCAL Daily rainfall map represents the rainfallrecorded by the SASSCAL Weathernet for its Automated Weather Stations, for the previous day, complemented by the G-Wadi satellite rainfall.

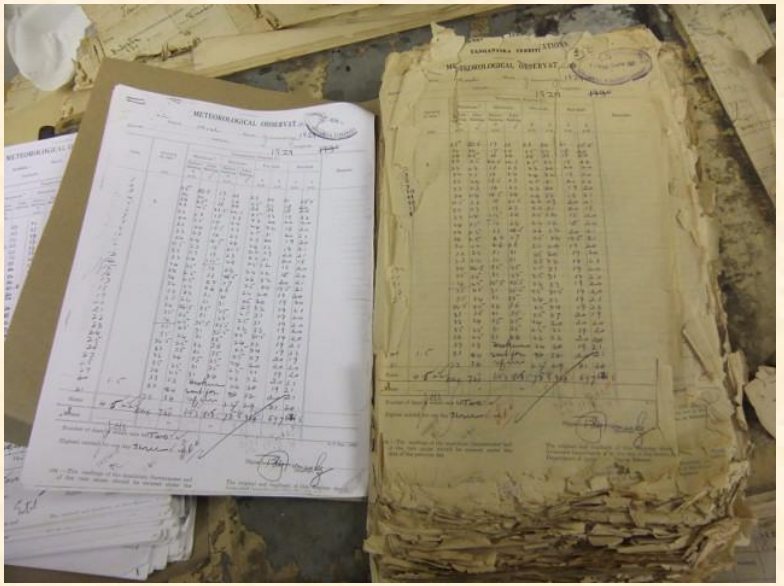


Weathernet Home:
http://www.sasscalweathernet.org/

Tanzania Meteorological Agency (TMA) Data Rescue Engagement with the Met Office & UK DfiD



Old weather data records held by the Tanzanian Meteorological Agency (TMA)



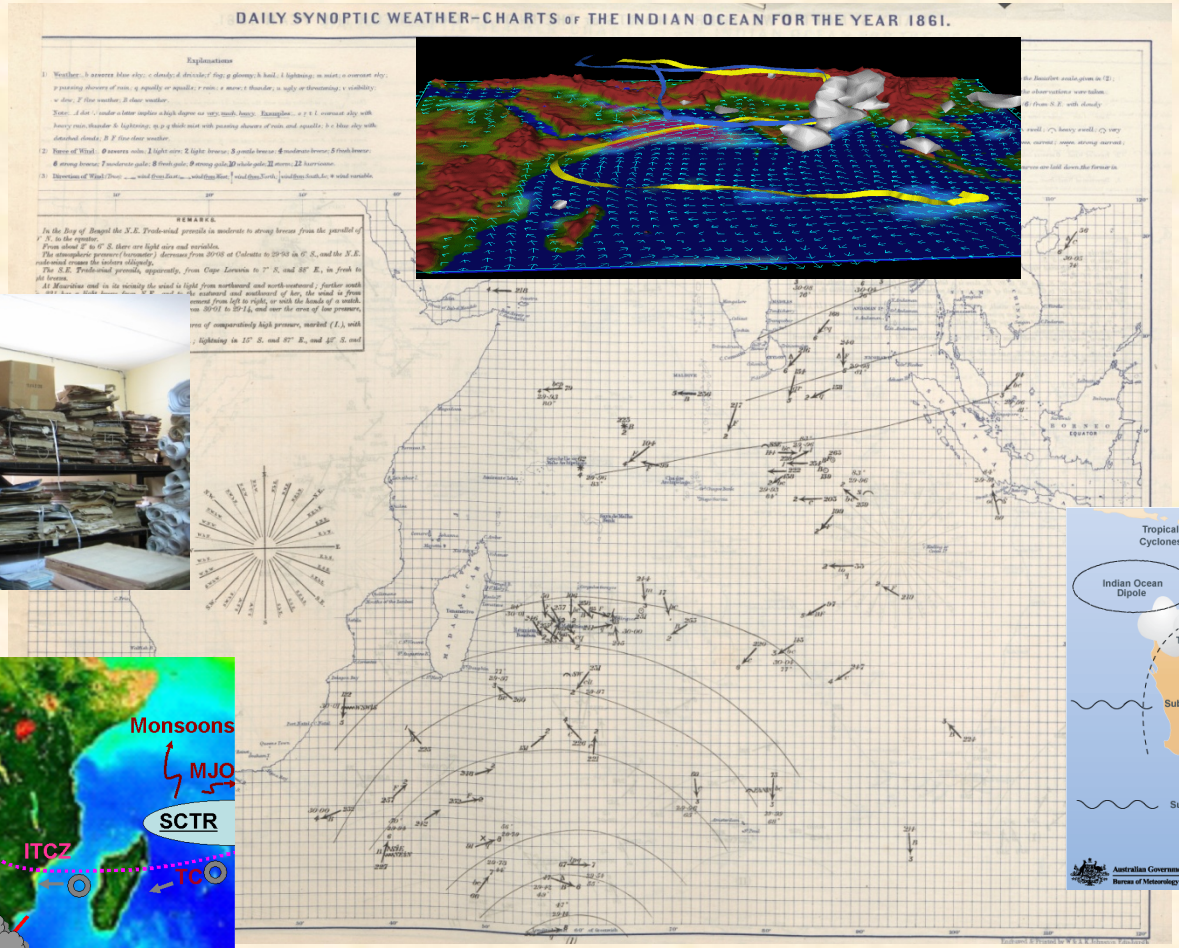
ACRE/WMO/GFCS
Indian Ocean Data Rescue Initiative (INDARE)

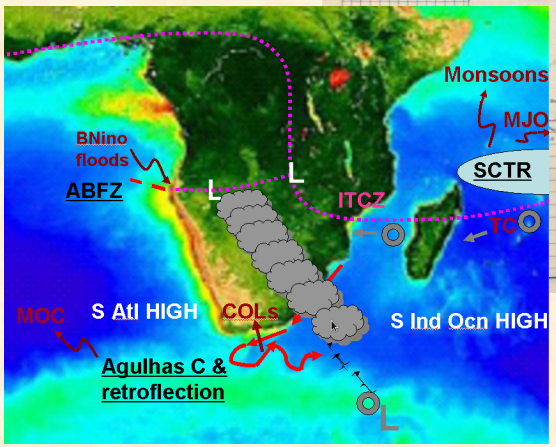
International Workshop on Rescuing Climate Heritage of Indian Ocean Countries

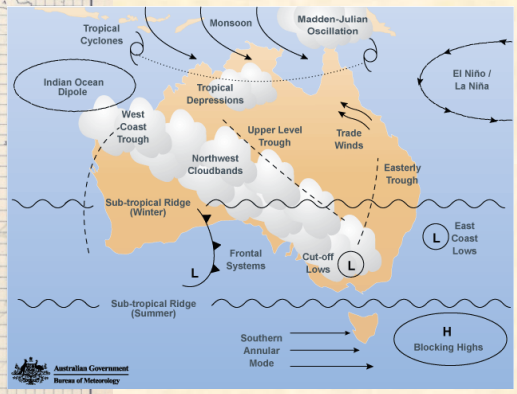
A necessary step for Improved Data foundations for Climate Services

Maputo, Mozambique, April 1st-4th 2014

(ACRE, WMO, IEDRO, ETCCDI, ICA&D, ISTI, ICOADS, MeteoFrance, SASSCAL)







ACRE (Atmospheric Circulation Reconstructions over the Earth), **WMO** (World Meteorological Organisation),
IEDRO (International Environmental Data Rescue Organisation), **ETCCDI** (Expert Team on Climate Change Detection and Indices),
ICA&D (International Climate Assessment & Data Set and Data Rescue), **ISTI** (International Surface Temperature Initiative),
ICOADS (International Comprehensive Ocean-Atmosphere Data Set), **SASSCAL** (Southern African Science Service Centre for Climate Change and Adaptive Land Use)

Republic of Mauritius

National Archives of Mauritius

Mauritius Meteorological Services

THE MAURITIUS PROJECT

Recovering, imaging, digitising, archiving and preserving of old weather observations extracted from ship logbooks in 188 volumes of Charles Meldrum's 'anemological' journals from 1853 to 1914 and terrestrial weather observations for Mauritius (including data from Colonel Lloyd's Colonial Observatory at Port Louis) from the late 18th to the early years of the 20th century held by the National Archives of Mauritius and the Mauritius Meteorological Services (MMS).

University of Brighton

ACRE

Atmospheric Circulation Reconstructions over the Earth

IEDRO

INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION

Met Office Hadley Centre

Old weather data records in the Archives of the Mauritius Meteorological Service – 2011

Old weather data records in in the Archives of the Mauritius Meteorological Service – 2014

Republic of Mauritius

National Archives, Mauritius

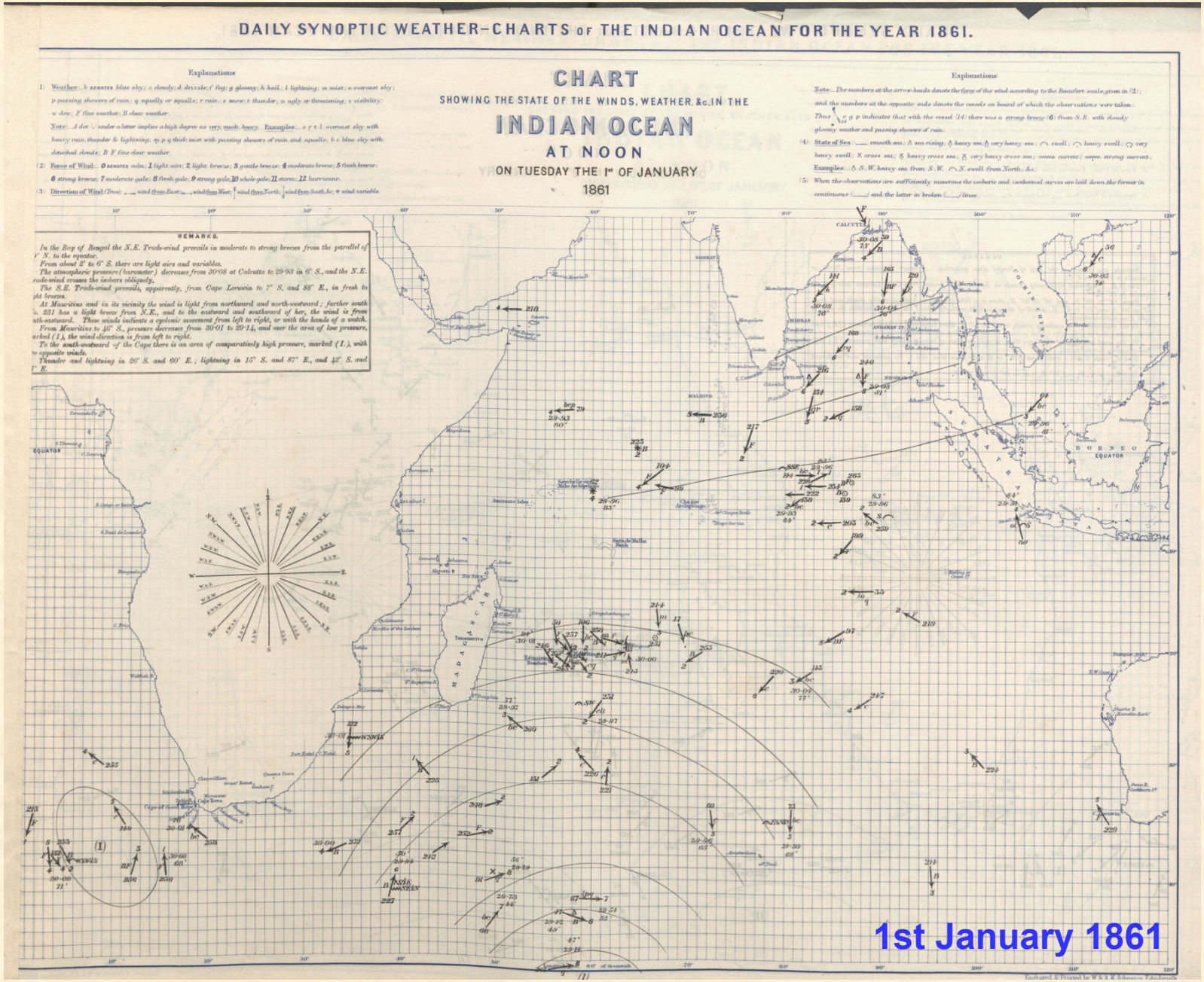
Z 6 Meteorological Department

A: Anemological Journal 1853-1914

B: Copies of ships' log books 1848-1874

Source: Prof. David Nash, School of Environment and Technology, University of Brighton, UK

MELDRUM's HISTORICAL DAILY INDIAN OCEAN CHARTS



Tabulation of weather observations for a storm in January 1901 in Charles Meldrum's 'anemological' volumes and published in the *Proceedings and Transactions of the Meteorological Society of Mauritius*

Various Ship Log Book Extracts

YEAR	MONTH	DAY	HOUR	NO. ON CHART	LAT (S)	LONG (E)	WIND DIRECTION	FORCE	STATE OF SEA	BAROMETER	AIR TEMP
1901	1	4	1200	1	19.50	57.50	E by N	2	Calm	30.02	
1901	1	4	1200	4	20.44	55.53	E by N	1	Calm	30.06	
1901	1	4	1200	6	3.18	67.29	WSW	6	High	29.92	82.0
1901	1	4	1200	7	25.06	67.31	Calm	0		29.95	82.0
1901	1	4	1200	10	8.55	71.28	SE	6	High	29.68	
1901	1	4	1200	11	16.55	61.27	SE	4	Moderate	29.94	81.0
1901	1	4	1200	13	38.48	54.17	W	6	High	30.08	
1901	1	4	1200	14	23.09	90.16	E	5	Moderate	30.11	
1901	1	4	1200	16	8.33	55.24	Var	4	Moderate	29.90	
1901	1	4	1200	17	26.15	45.04	ESE	2	Heavy	29.90	
1901	1	4	1200	19	32.15	86.00	N by W	2		30.12	
1901	1	5	1200	4	20.52	55.30	SE by E	2	Calm	30.06	
1901	1	5	1200	6	5.30	67.57	Var	5	Rough	29.86	83.0
1901	1	5	1200	7	25.16	67.27	NW	1	Calm	29.98	81.0
1901	1	5	1200	10	8.52	71.15	WNW	10	Dangerous	29.70	
1901	1	5	1200	11	20.13	57.28	SE by E	4	Moderate	29.84	83.0
1901	1	5	1200	13	38.11	57.46	WSW	4	Calm	30.18	
1901	1	5	1200	14	23.03	88.38	E by N	5	Calm	30.08	
1901	1	5	1200	16	7.03	55.45	WNW	8	High		
1901	1	5	1200	17	26.15	45.38	WSW	1	Heavy	29.86	
1901	1	5	1200	18	32.05	82.30	NW by W	5		29.95	
1901	1	6	1200	4	20.14	57.00	SE by E	2	Calm	30.06	
1901	1	6	1200	5	30.13	33.45	ENE	1	Calm	29.79	
1901	1	6	1200	6	6.31	68.20	Var	5	Rough	29.85	81.0
1901	1	6	1200	7	25.12	67.33	Calm	0	Calm		
1901	1	6	1200	10	9.11	72.45	NW	9	High	29.70	
1901	1	6	1200	13	36.57	59.26	ESE	2		30.18	

Island Stations

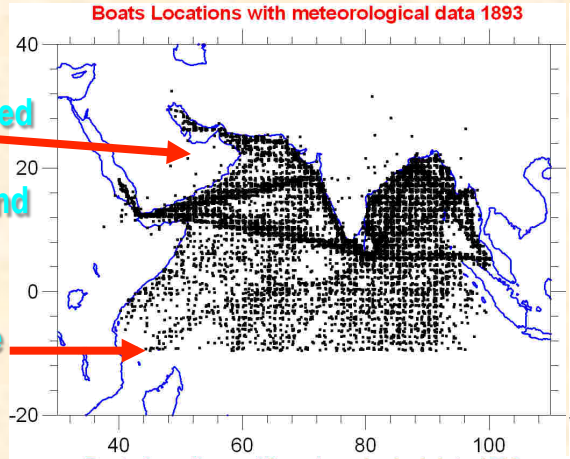
YEAR	MONTH	DAY	HOUR	LAND SITES	WIND DIRECTION	FORCE	STATE OF SEA	BAROMETER	AIR TEMP
1901	1	4	1200	Mauritius	E by N	2		29.98	81.0
1901	1	4	1200	Rodriques	ENE	2	Smooth	30.17	85.0
1901	1	4	1200	Seychelles	NW	3	NWly swell	29.91	82.0
1901	1	4	1200	Bourbon	E	3	Calm	29.94	83.0
1901	1	5	1200	Mauritius	E	2		29.99	82.0
1901	1	5	1200	Rodriques	ESE	2	Smooth	30.14	84.0
1901	1	5	1200	Seychelles	NW	3	NWly swell	29.88	82.0
1901	1	5	1200	Bourbon	SE	3	Calm	29.96	82.0
1901	1	6	1200	Mauritius	ESE	3		29.96	81.0
1901	1	6	1200	Rodriques	ENE	1	Smooth	30.13	85.0
1901	1	6	1200	Seychelles	NW	3	Moderate swell	29.87	83.0
1901	1	6	1200	Bourbon	Var		High	30.00	82.0
1901	1	6	1200	Diego Garcia	NW	9	High	29.71	

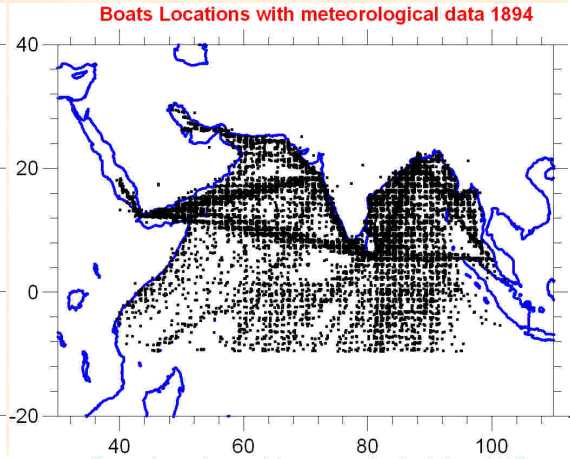
Terrestrial & marine once daily weather observations in IMD 1893-1899 monsoon charts

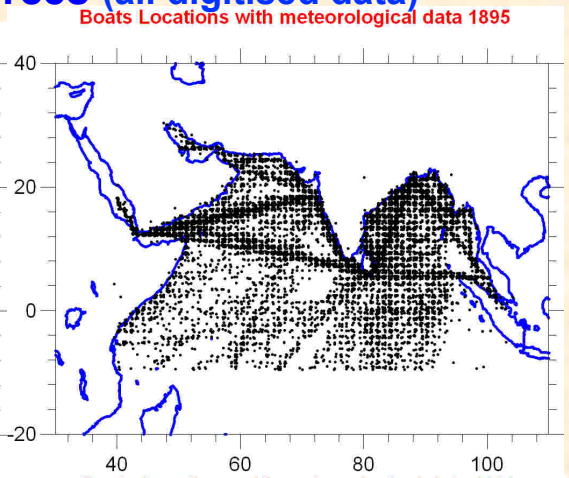
IMD 1893-1899 ship's logbooks: Indian Ocean sources (all digitised data)

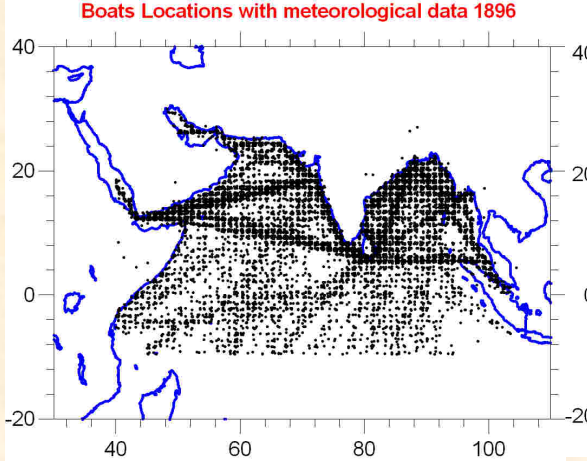
Misplaced data over land

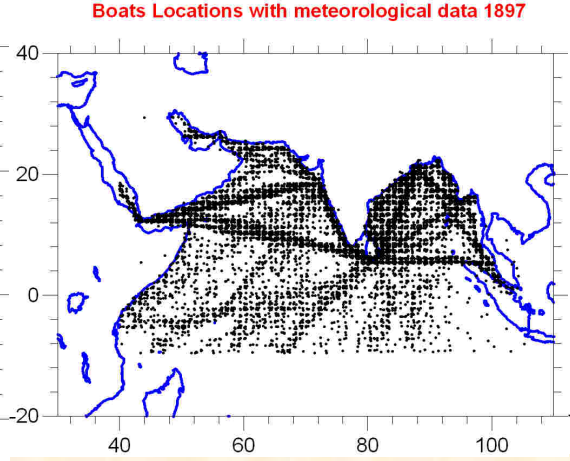
Cut off latitude 10°S

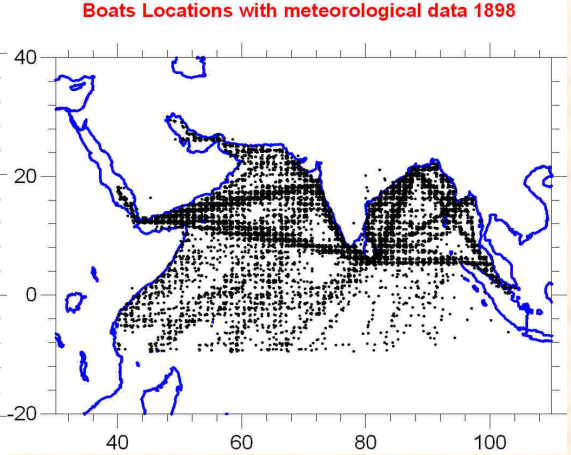


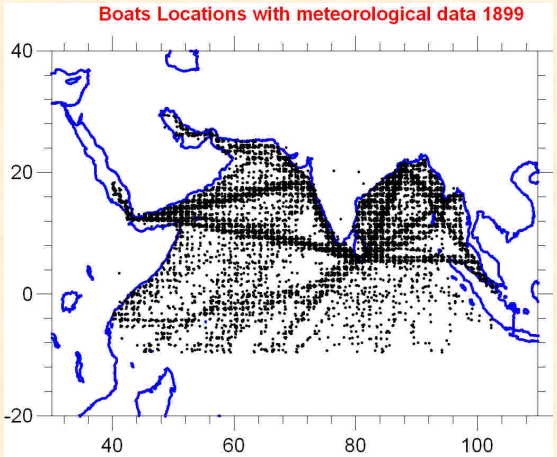




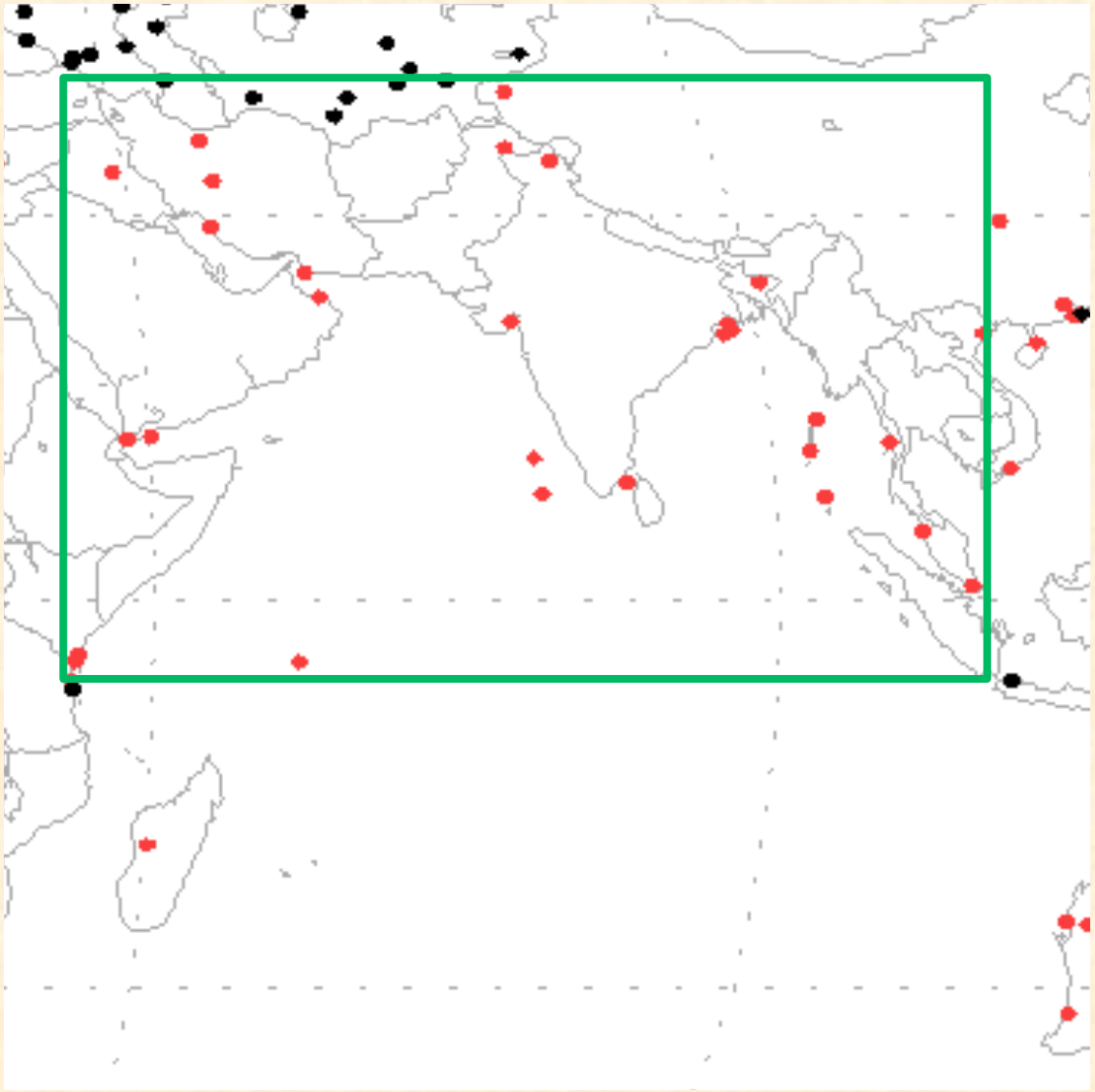




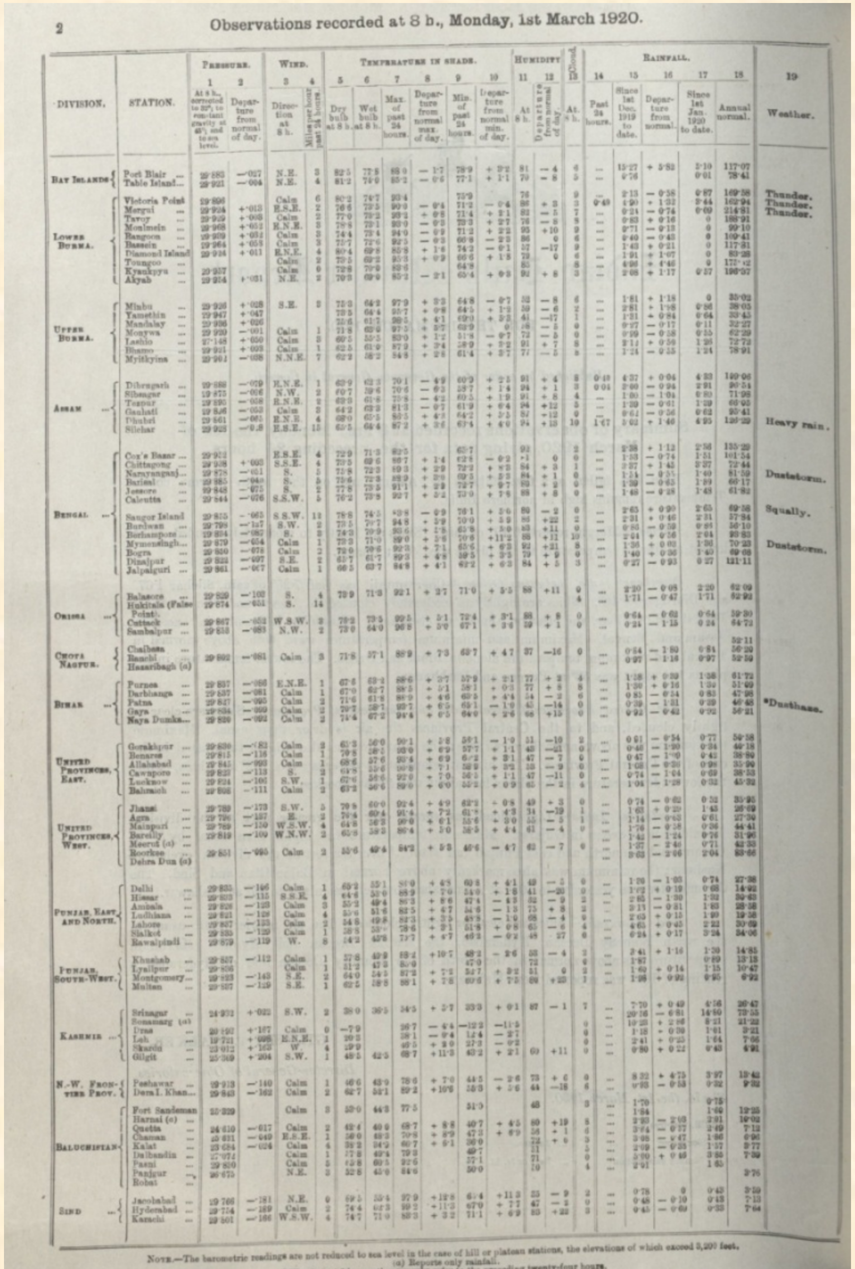




Distribution (in red) of terrestrial stations with weather observations in the IMD 1893-1899 monsoon chart publications (all digitised)



Indian Daily Weather Reports (IDWRs) 1878-1980s



2 Observations recorded at 8 h., Monday, 1st March 1920.

NOTE.—The barometric readings are not reduced to sea level in the case of hill or plateau stations, the elevations of which exceed 3,500 feet.
(a) Reports only rainfall.
* Weather at 8 hrs.; other remarks refer to the preceding twenty-four hours.

Imaging of Indian Daily Weather Reports (IDWRs)

Contract placed for imaging of IDWRs from periods missing in Met Office Archive holdings - June 1887-Dec 1888; Jul 1889-Dec 1919; Jul-Dec 1920; Jan-Dec 1921; Jul-Dec 1922; Jan-Jun 1923; Jul-Dec 1924; Dec 1925; 1931 and 1932. First volume shipped from NOAA to National Archives A1 for imaging (150-200 stations/day).

The photography of 80 volumes of the IDWRs at NARA plus those at the National Meteorological Archive of the Met Office [covering 1878-1980s] completed in August 2016

(Kevin Wood , University of Washington & US National Archives and Records Administration [NARA])

Proposed digitisation project to INDARE

Recovery of Historical Weather Observations for the Indian sub-continental region and 'Extra' India: the Indo-South East Asian Data Recovery Project

The collaborating agencies and institutions will work together in accelerating the rescue and digitization of old climate records which are under risk of deterioration or threat of disappearance. It will build on recent successful Data Rescue described above to complement the digitization and quality control of already scanned records, through collaboration with the National Meteorological and Hydrological Services of the Indian/South East Asian region including India, Afghanistan, Pakistan, Myanmar, Bangladesh, Sri Lanka, Nepal, Bhutan, the Seychelles and the Maldives.

Activities:

- Engage the NMHS of Pakistan, Afghanistan, India, Nepal, Bhutan, Bangladesh, Myanmar, Sri Lanka, Seychelles, and the Maldives in the digitization and quality control of terrestrial and marine surface daily weather observations in the Indian Daily Weather Reports (IDWR). With the Maldives, this will include a special focus on recovering and digitizing the weather observations not in the IDWRs but in Climatological Returns and Registers amongst the holdings of the UK Met Office for the period 1943-1976.

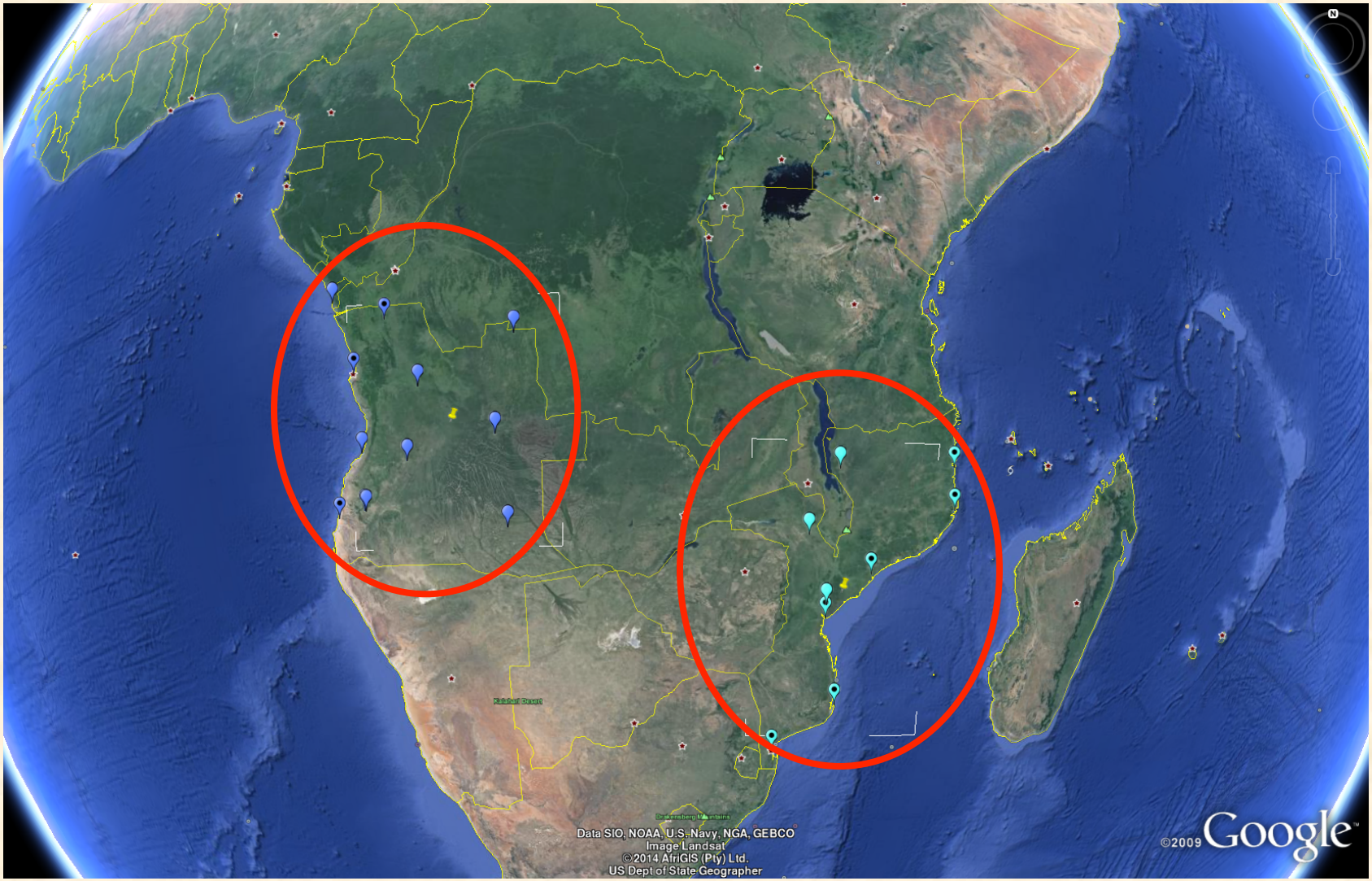
- Digitize the scans of the IDWR volumes from 1878-1947 (prior to Indian Independence) in collaboration with University of Giessen over the next 3 years under ACRE China with funding from CSSP China.

- Make available the remaining 1948-1992 IDWR scans to NMHS in the Indo-South East Asian region from a central repository for them to aid the digitization and quality control of the data tabulated in them. There are about 185 scanned books containing 150-210 stations once per day. Standard surface parameters: pressure, wind, temperature (dry, wet, max, min), humidity, cloud and precipitation.

- Implementation meeting as part of an ACRE/INDARE Indian Ocean regional data rescue workshop in the Maldives?????

Historical Portuguese Colonial Data for the Indian Ocean region

Historical Portuguese Colonial Stations in Angola and Mozambique: Data being recovered and digitised by FFCUL/IDL, University of Lisbon, Portugal



Stations with a black dot in a light blue circle have data from 1915 (daily) to 1956 (Mozambique) or 1974 (Angola). Those with just a light blue dot start in 1953.

Recovered IDL archive in Portugal from 1853 to 1978:

In an attic at Politécnica – Needs to be inventorised

Around 200 m of packets with registers of meteorology, magnetism and seismology data

Recovered IDL archive from 1853 to 1978:

Saved from the Politécnica fire of 1978

Probably contains several Portuguese ship's logbooks (1860's to 1940's)

Proposed to INDARE

Data Rescue of historical weather observations from the former African and Asian Portuguese colonies for 1870-1946

East Africa and Indian Ocean (Mozambique, Goa-India, Macau-China and East Timor)

Objectives:

- **secure the physical integrity of the partly damaged documents, by using paper preservation and repair techniques**
- **catalogue the whole collection and to image the handwritten data**
- **digitize new datasets for the former colonies and to correct published errors due to misinterpretation of handwritten characters**
- **obtain metadata information that has been missing until recently and that will be contained in the original handwritten records**
- **more complete and accurate records will lead to more reliable climatic studies of the Portuguese and former colonies**
- **to make available to the original countries (former colonies) and scientific community at large the most complete data collections that IDL has gathered during the 1853-1946 period.**

OTHER ACRE ACTIVITIES

Australian Broadcasting Corporation (ABC) Science: Weather Detective Citizen Science Project 2014

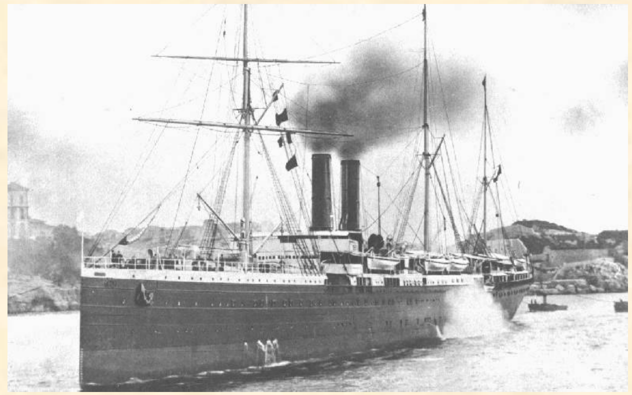
Clement Wragge's abstracts from ship logbooks

http://www.weatherdetective.net.au/

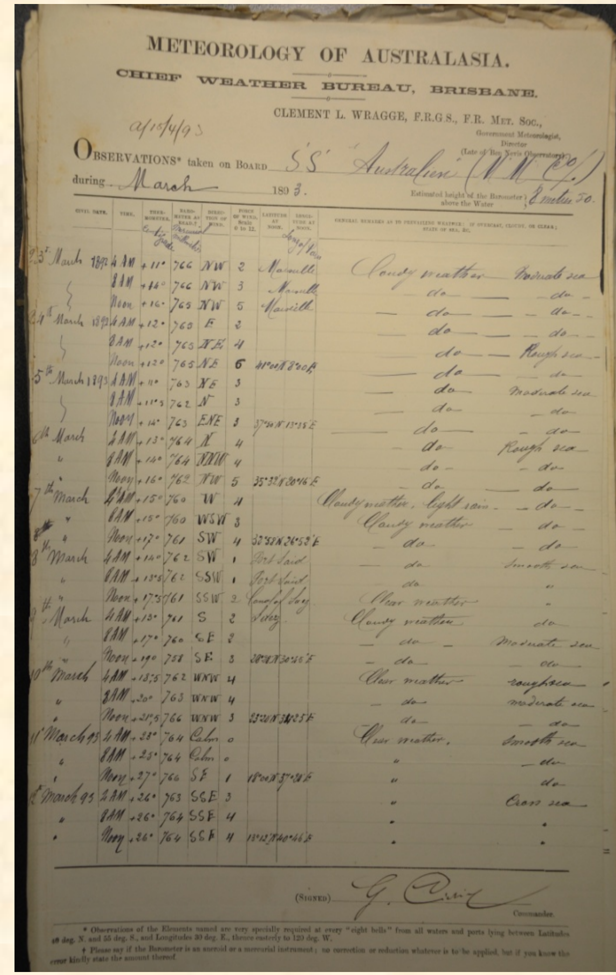
Clement Wragge's abstracts from ship logbooks: 1889-1903

Clement Lindley Wragge
1852-1922

Was appointed meteorological observer in the Queensland post and telegraph department in 1887. Within a short time he had established his bureau as 'The Chief Weather Bureau, Brisbane'. One of Wragge's chief claims to fame is that he is the first person to introduce the systematic naming of storms and cyclones, choosing feminine names for tropical storms and for unpleasant southern storms often using the names of politicians who thwarted his ambitions or denied him funding.



The French liner ***S.S. Australien*** was one of a quartet of vessels with which the Messageries Maritimes developed its Australian trade in 1889-1891. For 25 years the ship was a regular caller at Australian ports and despite the rivalry of newer vessels kept up her popularity over this long stretch of time.

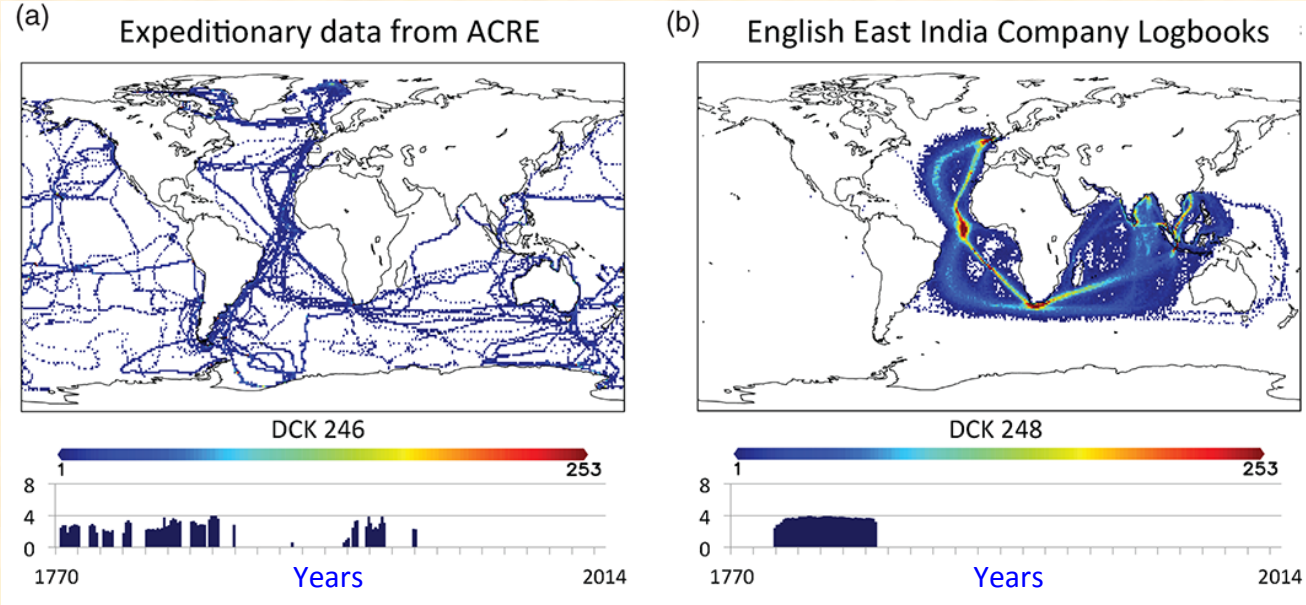


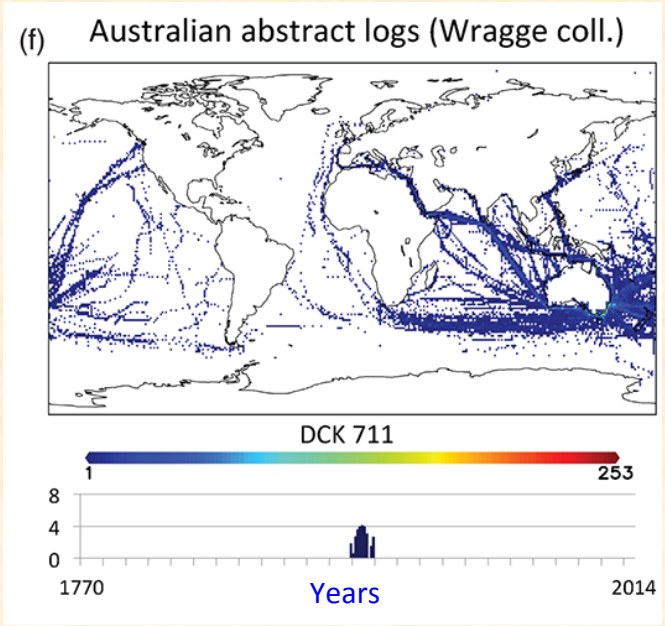
French Mail Ship *S.S. Australien*

(Mails for Australia, Mauritius, Mahe, Madagascar, Reunion, Seychelles, Aden, Suez, Port Said, France, Mediterranean ports, Continent of Europe and the United Kingdom, via Marseilles)

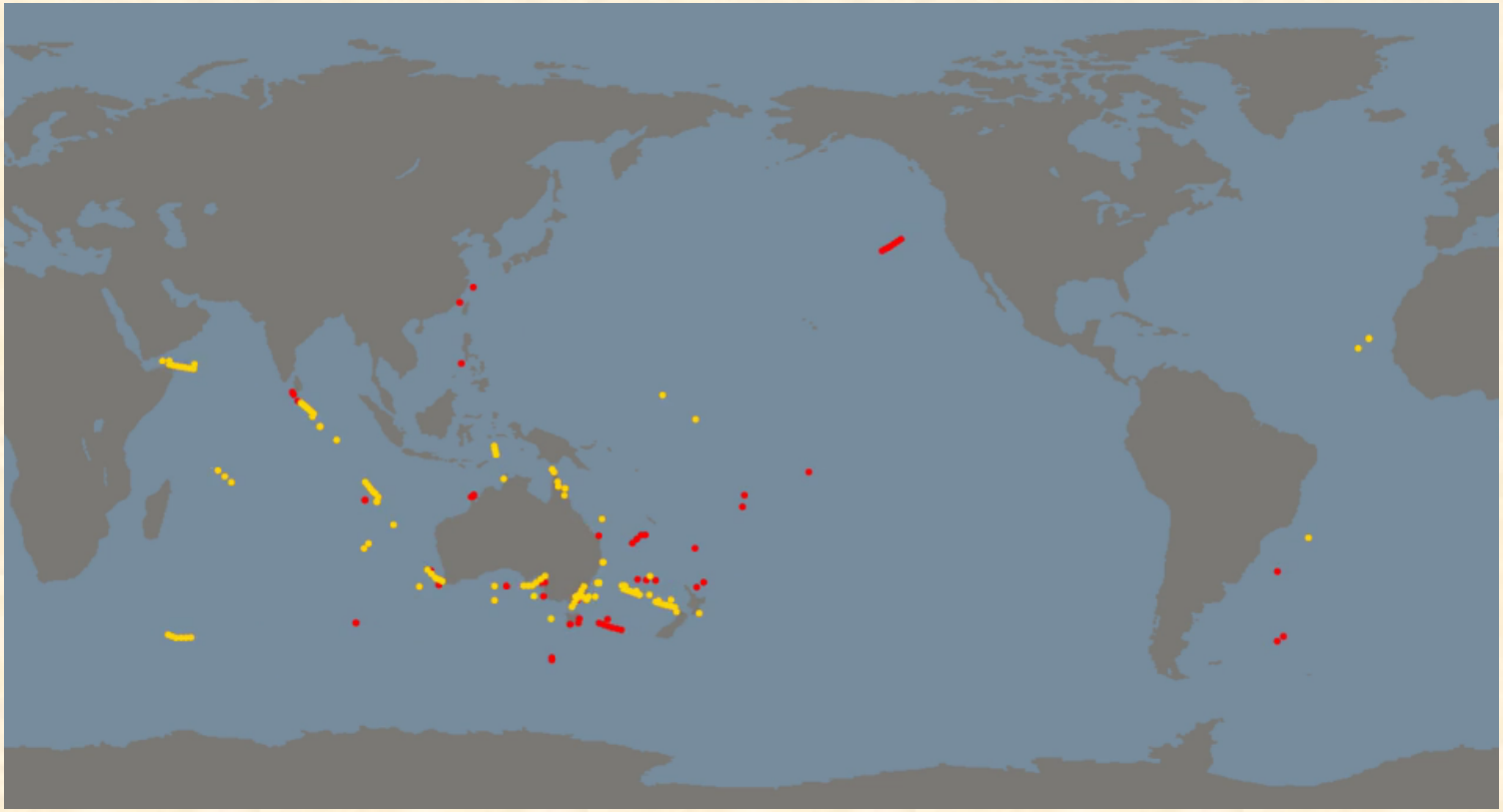
3/3/1893 – 17/4/1893

ICOADS Release 3.0: a major update to the historical marine climate record





International Journal of Climatology
27 JUN 2016 DOI: 10.1002/joc.4775
http://onlinelibrary.wiley.com/doi/10.1002/joc.4775/full#joc4775-fig-0001



Positions of all the new observations rescued by the Weather Detective citizen science project (weatherdetective.net.au/) - an update to 2017-09-20. Red dots are the observations rescued since the last update (2017-04-04). The observations cover a range of years in the late nineteenth Century, but here they are shown as if they had all been made in the same year. The project has completed 547,407 transcriptions - providing 78,845 new weather observations.

ACRE & C3S DRS

ACRE SOUTH AFRICA/C3S DRS – DATA RESCUE

Terrestrial stations and 'stationary ships' with instrumental weather observations in and around southern Africa from the second half of the 19th Century.

★ = stations that have had their daily to sub-daily data digitised by ACRE & partners over the periods shown in yellow text

= stations with daily to sub-daily data from 1875-1909 that have not been imaged or digitised

'stationary ships' located in harbours for many years or even decades making daily to sub-daily weather observations that have not been imaged or digitised

ACRE SOUTH AFRICA

Led by Prof. Stefan Grab, School of Geography, Archaeology and Environmental Studies, University of the Witwatersrand (UWits), Johannesburg, South Africa.

The longest and most promising continuous single station record in South Africa is that from the Royal Astronomical Observatory in Cape Town (today known as the South African Astronomical Observatory – SAAO). Original Meteorological records have been found and photographed by UWits scholars at the SAAO and Cambridge University Archives. The record includes the ECVs of daily rainfall, temperature, barometric pressure and wind. Currently two PhD students are working with this historic daily record, which begins in 1834 and continues to this day. This record requires calibration and quality checking; hence additional records from the former Cape Colony would be invaluable in this process.

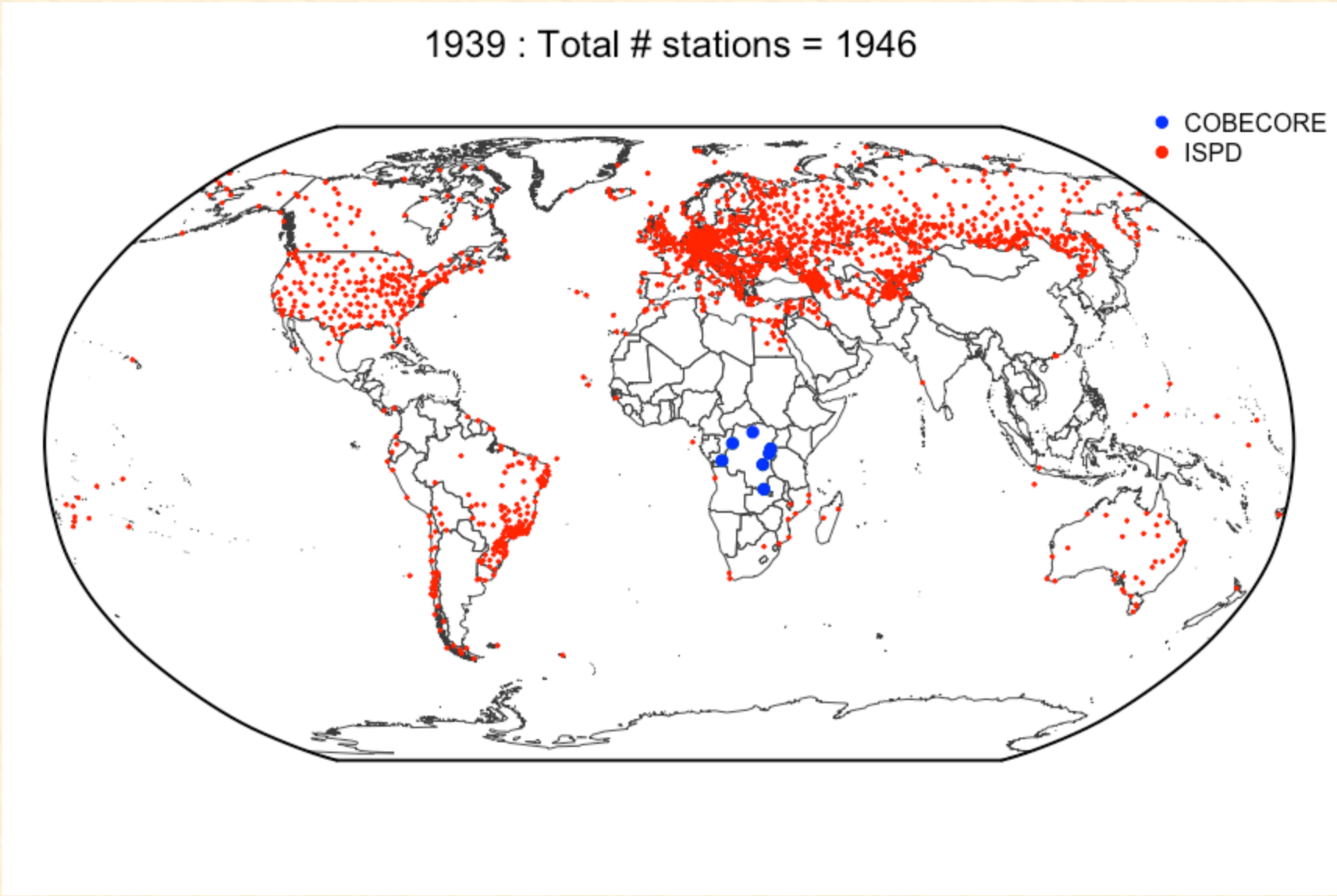
- Photograph and digitise Gordon's meteorological Journal of daily barometric and some temperature readings from 22 Sept 1789 to 21 June 1792 for Cape Town, *Meteorological Diaries kept at the Cape Town Port Office* (Harbour Masters records), archived in the Cape Town Archives (1829-1893), and the *Meteorological Diaries for the Cape Colony* (1821 onwards).

- Recovery and digitisation of daily to sub-daily data for the South African stations shown, covering the period 1875-1909 held at the South African Weather Service photographed and digitized. It should be noted that the only stations that have had, or are having, their daily to sub-daily data digitised by ACRE and partners, and that have been incorporated into ISPDv4 and used in reanalyses, are Cape Town, Kimberley and Durban. Digitisation by local students will provide them with both vital experience and provide vital income.

- Recovery, imaging and digitisation of historical weather observations taken by 'stationary' ships in ports around southern Africa and nearby islands

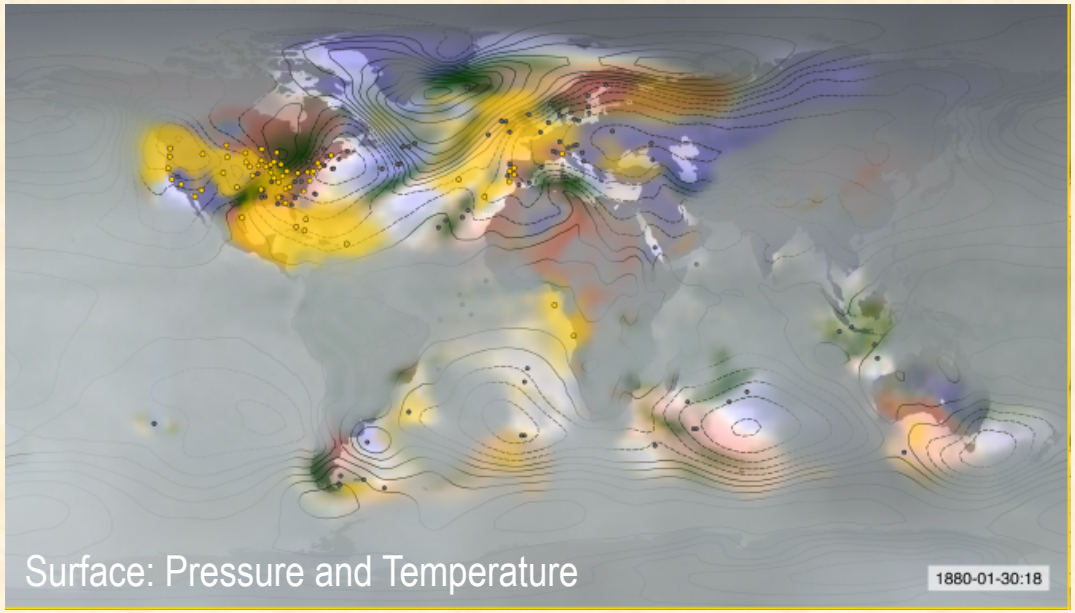
- Support digitisation for *The Mauritius Project* (ACRE & Indian Data Rescue initiative [INDARE])

ACRE, 20CR & COBECORE

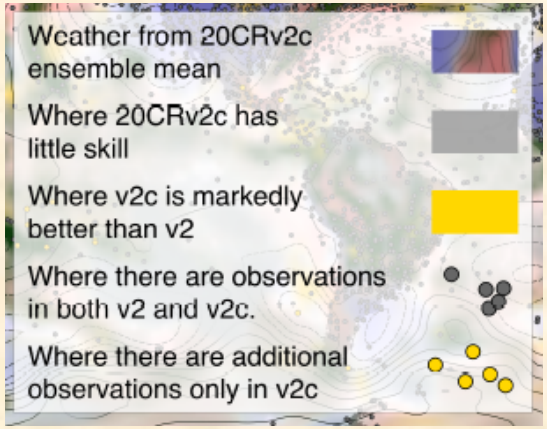

1939 : Total # stations = 1946
COBECORE
ISPD

20th Century Reanalysis Project (20CR): 20CRv2c 1851-2012

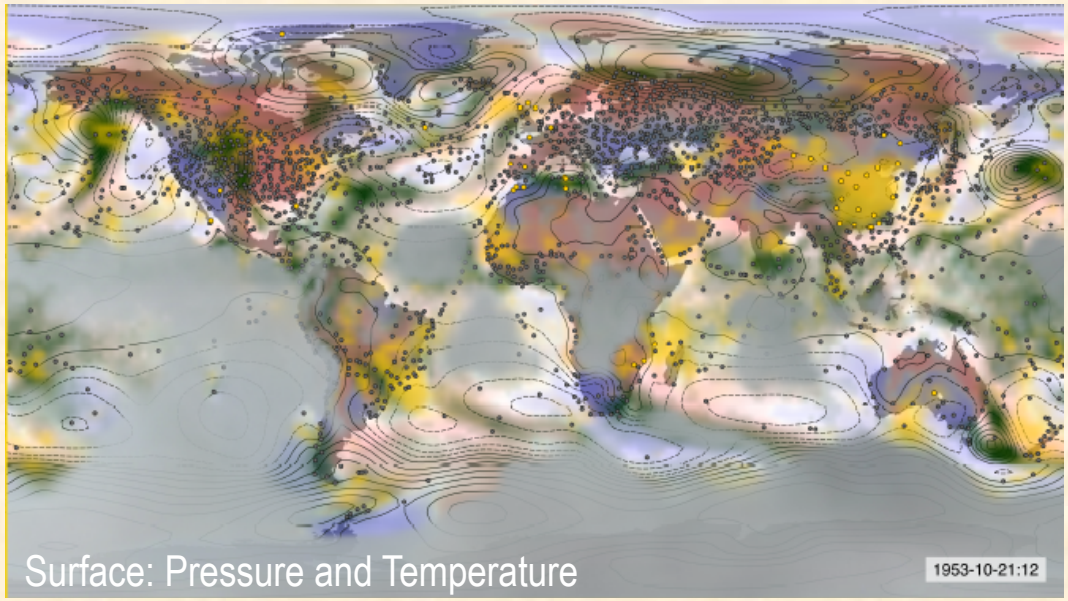
Global historical reanalysis 56 realizations every 6 hours 2^o x 2^o spatial resolution



30th Jan 1880 improving the "pre-industrial" baseline



21st October 1953 more certainty in key areas, BUT COBECORE historical surface pressure data from the Belgian Congo would vastly improve 20CR over Central Africa.



Atmospheric Circulation Reconstructions over the Earth

&

C3S Data Rescue Service (DRS)

Rob Allan,

ACRE & C3S DRS Manager,

Met Office Hadley Centre,

U.K.