Proposed GCOS/AOPC task team on the GCOS Upper Air Network (GUAN)

16th June 2017 Tim Oakley, GCOS Network Manager

GUAN scope and purpose (GCOS Document 144)

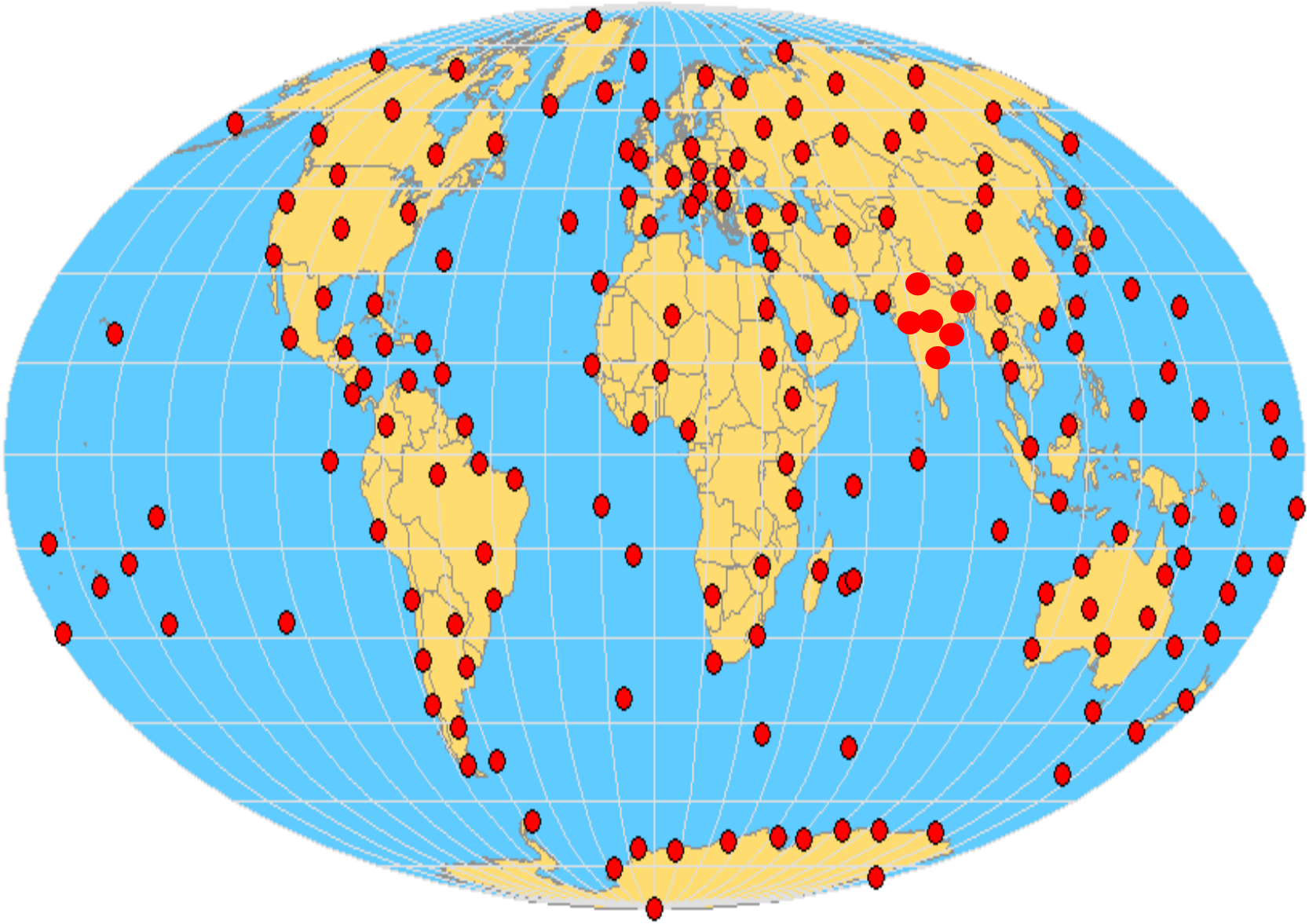
The scope of the GUAN is for a spacing of between 5 to 10 degrees latitude, sufficient to resolve synoptic-scale waves. The desired parameters are temperature, pressure/geopotential height, wind, and humidity (at least in the troposphere). The inclusion criteria are:

- Commitment by NMHSs with regard to continuity;
- Length and quality of historical time series;
- Current measurement quality.

The purposes of the GUAN are the following:

- To establish national commitments for the preservation of a minimum set of upper-air stations for the foreseeable future;
- To build a collection of validated data from these stations in standardized formats;
- To provide this information to the global climate community with no formal restrictions.

GUAN Network 2017 (178 Stations)



Why do we need to review the GUAN?

- Network now 20+ years old
- Significant changes in both technology and data users
- GUAN often cited as being of little difference from the comprehensive network
- Requirements more explicit on the needs and benefit of high quality data, demanding a stronger governance on data availability, timeliness, accuracy
- Operators (Mainly WMO Members) have forgotten their commitment
- Increasing pressure on resources
- 2014 GCOS network review meeting recommended an updated, more proactively managed network
- Operational monitoring, Tiered networks and programmes such as GAIA-CLIM have highlighted the weaknesses in the current system

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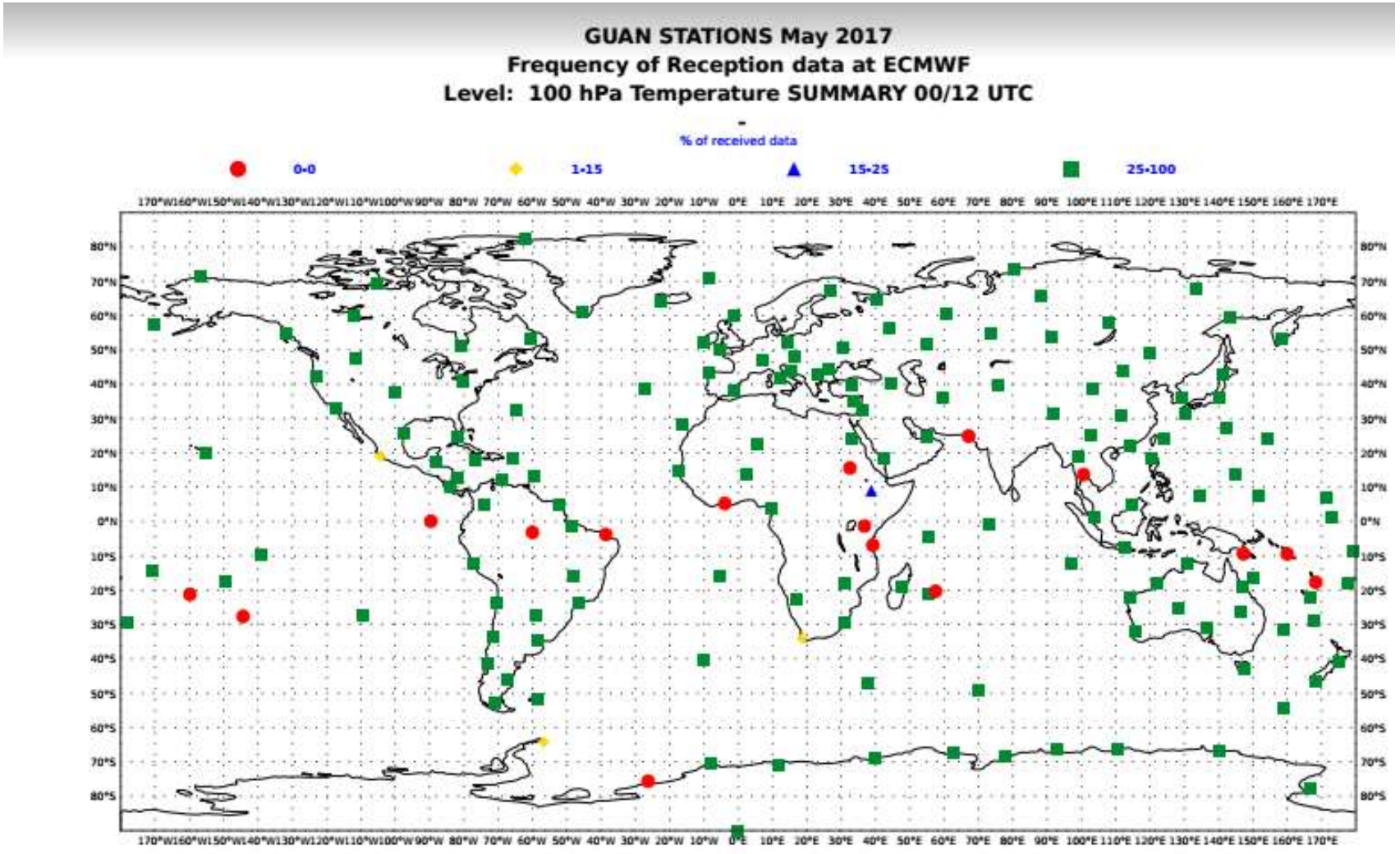
GUAN Availability Monitoring – ECWMF



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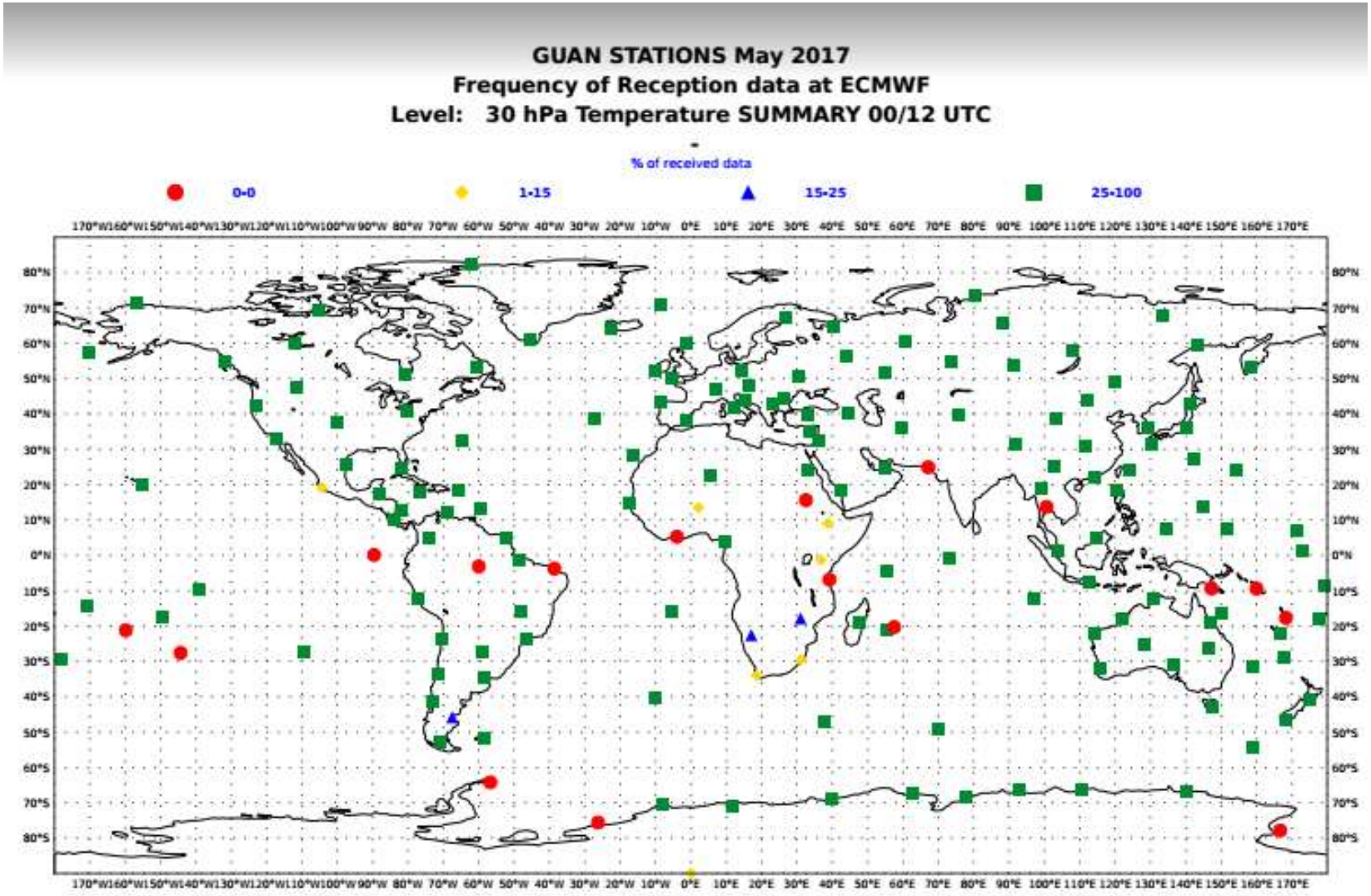

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Task Team on the GCOS Upper Air Network (GUAN)

Background

AOPC-22 (Exeter, UK, March 2017) agreed on the creation of a dedicated task-team to deliver progress upon a number of actions in the GCOS Implementation Plan (GCOS 200) related to the operation and monitoring of the GCOS Upper Air Network:

- Reviewing the network requirements;
- Assessing and documenting the benefits of meeting stated requirements;
- How it contributes as a baseline network in the tiered network framework with GRUAN and the comprehensive network.

Membership

Chair ??
GCOS Network Manager (Secretariat support) – Tim Oakley
AOPC Representative – Peter Thorne?
GRUAN Representative - ??
WIGOS Representative - ??
NWP Representative - ??
CBS expert team in surface observations representative - ??
CIMO expert team on upper air systems representative - ??
(HMEI Observer - ??)

Terms of Reference (1)

Complete actions A13 and A14 in the GCOS IP on the GUAN vision, and start the implementation of any resulting changes to GUAN. As part of this process document the benefits of GUAN.

Action A13:	Implement vision for future of GCOS Upper-Air Network operation
Action	Show demonstrable steps towards implementing the vision articulated in the GCOS Networks Meeting in 2014[54] relating to the future of GUAN operation
Benefit	Improved data quality, better integrated with GRUAN and more closely aligned with WIGOS framework
Who	Task team of AOPC with GCOS Secretariat in collaboration with relevant WMO commissions and WIGOS
Time frame	2019 for adoption at Nineteenth World Meteorological Congress
Performance indicator	Annual reporting in progress at AOPC of task team
Annual cost	US$ 100 000–1 million

Action A14:	Evaluation of benefits for the GCOS Upper-Air Network
Action	Quantify the benefits of aspects of GUAN operation including attaining 30 hPa or 10 hPa, twice-daily as opposed to daily ascents and the value of remote island GUAN sites
Benefit	Better guidance to GUAN management, improved scientific rationale for decision-making
Who	NWP and reanalysis centres
Time frame	Completed by 2018
Performance indicator	Published analysis (in peer reviewed literature plus longer report)
Annual cost	US$ 10 000–100 000

Terms of Reference (2)

Specifically, review and update the requirements of the GUAN, in terms of:

Availability

Currently the GUAN membership is primarily a result of location, historical records and a commitment by WMO Members. Management is primarily passive, informing and encouraging, which means that underperforming stations are rarely censured. The task team should consider whether an alternative metric or set of metrics should be used in future. This consideration should extend to timeliness and vertical resolution considerations.

Scheduling

GUAN radiosondes are currently launched at 00 and / or 12Z for historical reasons. The task team should assess from the range of climate application areas (trend detection, satellite cal / val, process understanding etc.) whether a change to this guidance is required. This should be done in collaboration with CBS Expert-Team in Surface Based Observations.

Balloon burst height

GUAN radosondes at many of the stations do not meet the stated heights required in GCOS-144. Analysis is required to assess the cost-benefit basis of making regular ascents to the height currently stipulated.

Required quality

Should GUAN sites launch radiosondes that meet certain quality criteria? If so, how should these criteria be assigned and assessed to ensure a robust and fair system?.

Terms of Reference (3)

Monitor the use of BUFR reporting and the associated metadata for GUAN GCOS IP A5.

Action A5:	Transition to BUFR
Action	Encourage dual transmission of TAC and BUFR for at least 6 months and longer if inconsistencies are seen (to compare the two data streams for accuracy).
Benefit	Transition to BUFR does not introduce discontinuities in the datasets. BUFR allows metadata to be stored with data.
Who	Parties operating GSN stations for implementation
Time frame	Ongoing for implementation; review by 2018
Performance indicator	Proven capability to store BUFR messages giving same quality or better as TAC data
Annual cost	US$ 100 000–1 million

Terms of Reference (4)

Document requirements and propose a process for retaining original radiosonde measurements (raw data) as detailed in GCOS IP A17.

Action A17:	Retain original measured values for radiosonde data
Action	For radiosonde data and any other data that require substantive processing from the original measurement (e.g. digital counts) to the final estimate of the measurand (e.g. T and q profiles through the lower stratosphere); the original measured values should be retained to allow subsequent reprocessing.
Benefit	Possibility to reprocess data as required, improved data provenance
Who	HMEI (manufacturers), NMHSs, archival centres.
Time frame	Ongoing.
Performance indicator	Original measurement raw data and metadata available at recognized repositories
Annual cost	US$ 100 000–1million

Task Team Logistics

1. The task team shall exist for an initial period of two years.

2. The task team shall work primarily remotely, facilitated by GCOS secretariat. It is expected that an initial 'in person' meeting will be organized to discuss and agree the work-plan and deliverables, further meetings will be decided as required.

3. Within 3 months of the initiation of the task-team a detailed work plan and deliverable will be agreed.

4. The task team chair shall be expected to report annually on progress to AOPC by means of a brief written report and, if support available, verbal reporting in person.

5. The task team shall be expected to lead the production of a final report which may form the basis for any modifications recommended by AOPC to GUAN's future operation.

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