

The background features a stylized globe showing clouds, a blue sky, and a green landmass. Overlaid on the globe are several text elements: 'WMO' and 'ICSU' in blue at the top; 'IOC' in blue on the left; 'UNEP' in blue on the right; 'GCOS' in red in the center; and 'GLOBAL CLIMATE OBSERVING SYSTEM' in red along the bottom arc.

# **Reference U/A for GCOS**

## **Seattle 2006**

***Richard K. Thigpen***

***GCOS Secretariat***

***Geneva***



# **The GCOS Upper Air Network**

**Considered Baseline Calibration Network**

**Permits calibration of other data i.e.  
satellite, AMDAR**

**Should be the best stations**

**Long History, good operation**

**Climate Monitoring Principles**

**PR has Agreed**

# **GCOS Upper Air Network**

**About 150 Stations**

**Uniform Global Distribution (5-10 Deg)**

**Minimum Requirement (Draft)**

**At least 25 soundings/month to 30HPa**

**Temp, Humidity, Wind Speed and Direction**

**Target requirement (Draft)**

**Temp, Wind, Humidity as High as Possible**

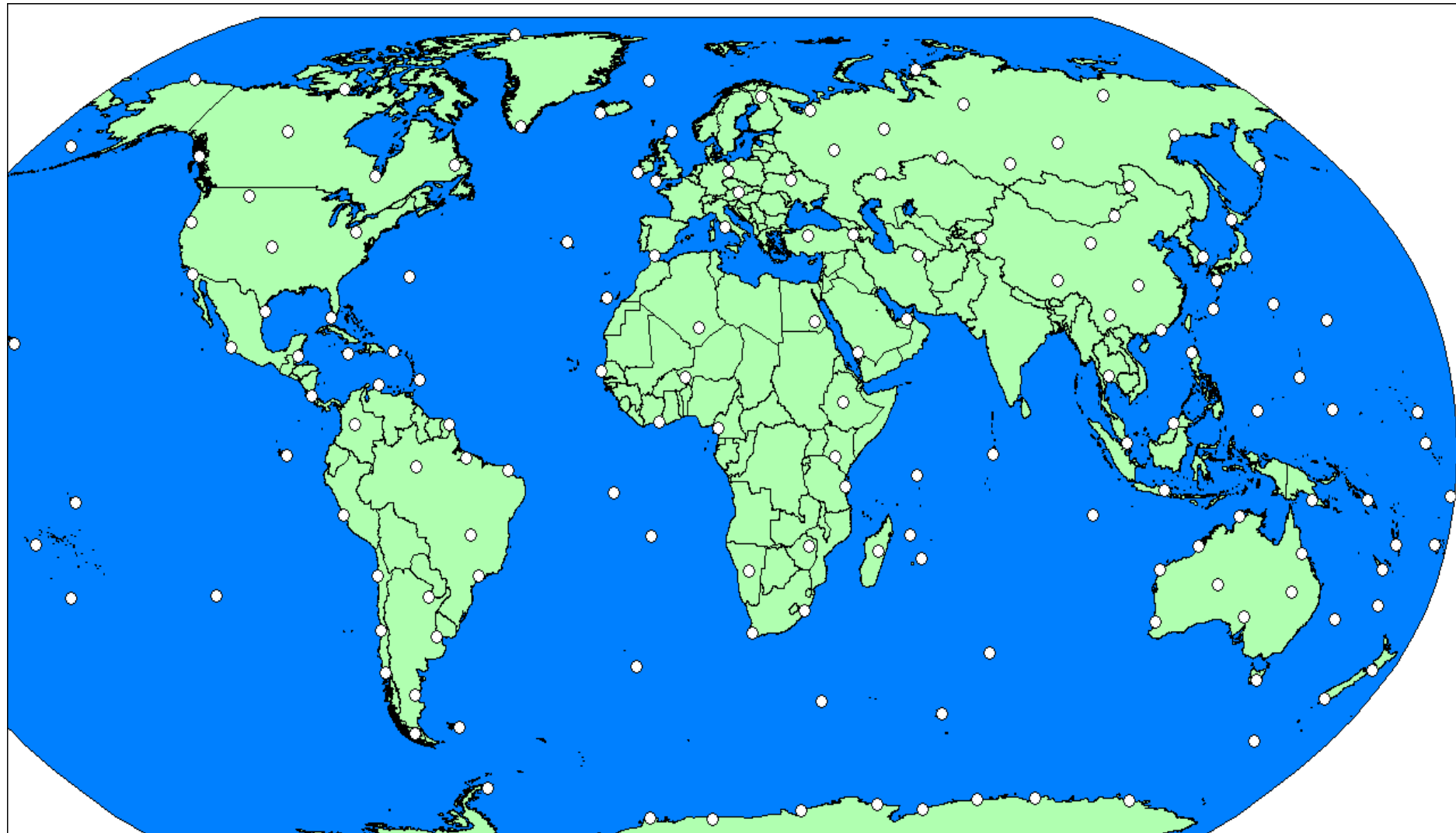
**CLIMAT TEMP**

**Biggest problems:**

**Operating Costs**

**Old Equipment**

# GUAN



# **Things We Have Done to Improve GUAN**

**Direct Renovations**

**CBS Lead Centers for GCOS**

**Technical Support projects**





# **Early Initiatives**

**Corrected Errors in Station Lists**

**Some Stations Closed, misidentified, GTS  
Routing Problems**

**Revised Reports:**

**Additional Reports established**

**Reporting Centers Using same Lists**

**Improved Distribution of network Stations:**

**Additional Stations Added in Sparse Areas**

# **Revitalization Activities**

## **Equipment Replacement**

### **Hydrogen Generators and Upper Air Systems**

**Gan, Maldives**

**Dar es Salaam, Tanzania**

**Windhoek, Namibia**

**Harare, Zimbabwe**

**Yerevan, Armenia**

**Penrhyn, Cook Islands**

**Douala, Cameroon**

**Antananarivo, Madagascar**

**Dakar, Senegal**

**Addis Ababa, Ethiopia**

**Nairobi, Kenya**

**Bauerfield, Vanuatu**

**Honiara, Solomon Islands**

**Laoag, Philippines**

**Galapagos, Ecuador**

**Radiosondes and Balloons To Many**



# New GUAN Station at Gan, Maldives





# New GUAN Station at Dar es Salaam





# Yerevan, Armenia



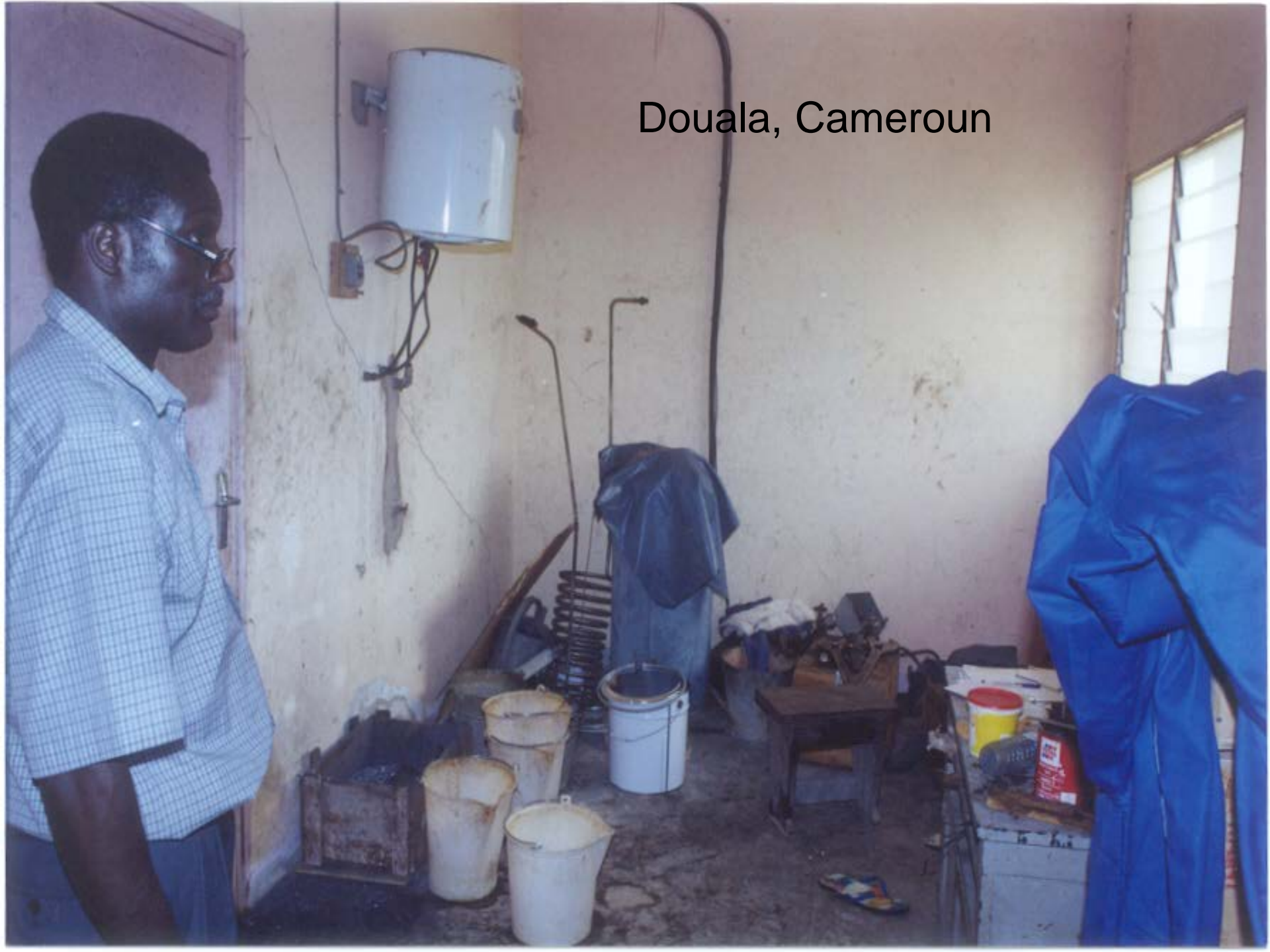


# Windhoek





Douala, Cameroun



Antananarivo, Madagascar





# **How Did We Do Them?**

**Bi lateral Agreements**

**UKMO, New Zealand, South Africa**

**Works Good But.....**

**GCOS Managed, WMO Procurement**

**Works Good But.....**

**Employed many Different Systems**



# **CBS Lead Centers for GCOS**

**Have Authority to Contact Country Directly**

**WMO Very Formal About Contact with Members**

**Japanese Met Service First for GSN**

**Then NCDC for GSN and GUAN**

**Recently IRAN for GSN and GUAN**

**Now Australia and Morocco for GSN and GUAN**



## **Lead Center Representatives**

**Hiroshi Nakamigawa**

**JMA**

**Larry Nicodemus**

**US**

**Mina Jabbari**

**Iran**

**Phil Alford**

**Australia**

**Rachid Sebbari**

**Morocco**

# **CBS Lead Centers**

**Training Session Last month**

**Good Progress Already**

**Iran has contacted >12 Countries**

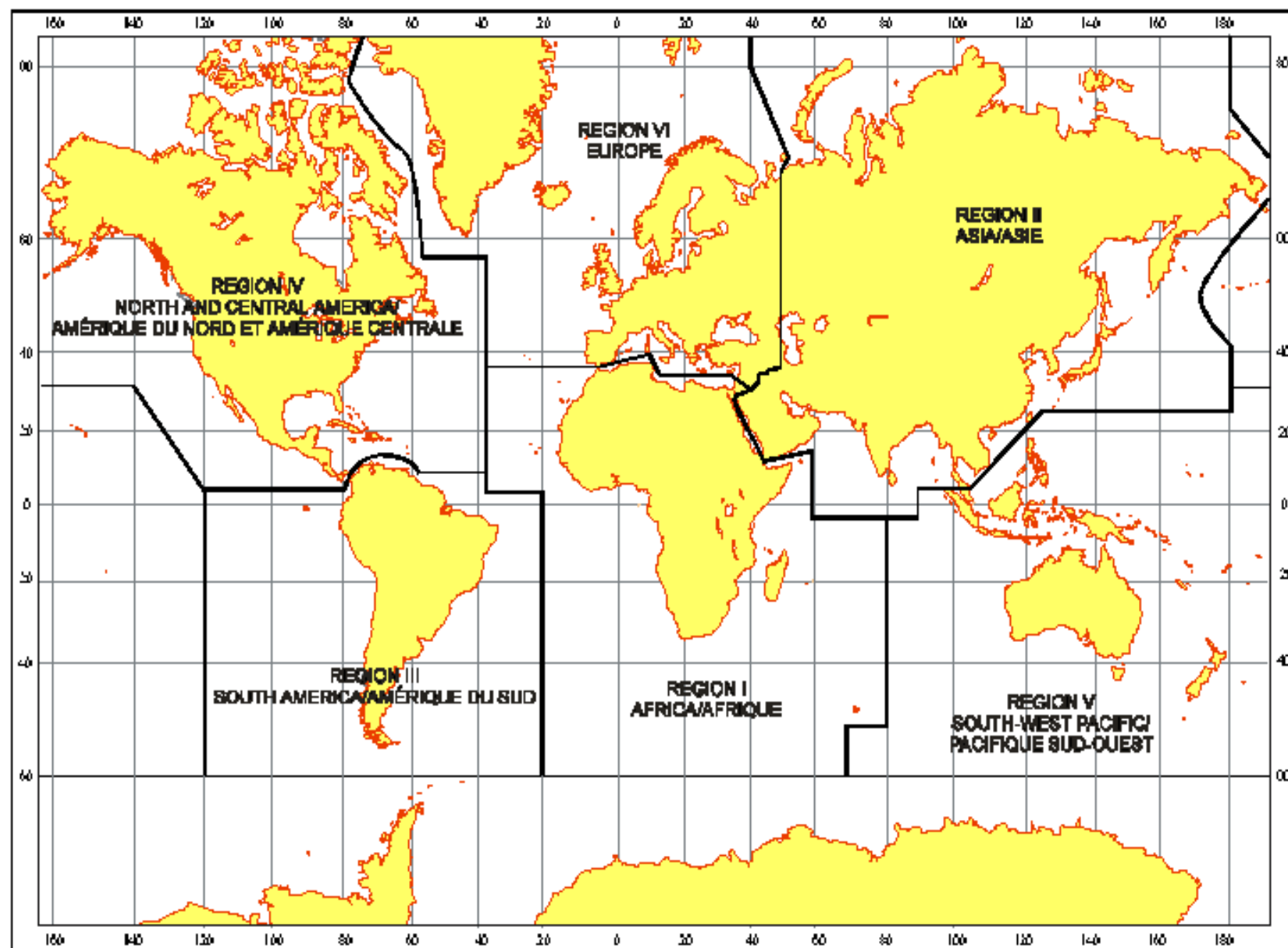
**Retrieved Historic Data**

**See Results Already**

**Language, Cultural, & Regional Differences**



# WORLD MAP OF WMO REGIONS / CARTE MONDIALE DES RÉGIONS



# **GCOS Technical Support Projects**

**Three One Year Projects Established**

**Pacific Islands (New Zealand Met  
Service)**

**Caribbean (Private Company)**

**SADC Africa (Botswana Met Service)**

**Visit Each GUAN Station 2 Times per Year**

**Visit as Many GSN as Possible**

**Monitor reports from all Stations**

# **Technical Support Projects**

## **Site Visits:**

### **Better Meta Data**

**Including Photos Around  
Sensor Suite**

**Actual Location of Many are Wrong**

**Many are no Longer Good Sites**

### **Calibration and Training**





The background features a stylized globe showing the Americas. Overlaid on the globe are several text elements: 'WMO' and 'ICSU' in blue at the top; 'LOCAL' in blue on the left; 'GLOBAL CLIMATE OBSERVING SYSTEM' in red along the bottom; and 'GCOS' in red in the center. The main text is in bold black.

## **Reference Network Assumptions**

**Global Coverage is needed**

**So Some will be in Poor Areas**

**Will be operated by Met Services**



# **Reference Network Considerations**

## **Developing Areas**

**Operational Cost**

**Cost will be Higher**

**Coordination**

**Flight Times Not Fixed**

**Communication**

**Need Near Real Time Management**



## **Higher Cost**

**Radiosondes will Cost More**

**Balloons Will cost More**

**More of Both will be Needed**

**Staffing Needs will be Higher**

**Need a Long Term Commitment**

The background of the slide is a satellite image of Earth, showing a mix of blue oceans and brownish-yellow landmasses. Overlaid on this image are several semi-transparent logos and text elements. At the top, the text 'WMO ICSU' is visible in blue. On the right side, 'UNEP' is written in blue. A large red circular logo for 'GLOBAL CLIMATE OBSERVING SYSTEM' (GCOS) is centered, with 'GCOS' in the middle and the full name around the perimeter. The word 'IOCC' is also visible in blue on the left side.

# **Coordination**

**Satellite Over flight Times Must be Known**

**Burden on Operations Staff**

**Training Will be Needed**

**Different Sondes at Different Times**

The background features a stylized image of the Earth, showing continents and clouds. Overlaid on this image are several text elements and logos. At the top, 'WMO' and 'ICSU' are written in blue. A large, semi-circular blue arc on the right side contains the word 'UNEP'. A large, semi-circular red arc on the left side contains the words 'GLOBAL' and 'CLIMATE'. A large, semi-circular red arc at the bottom contains the words 'OBSERVING' and 'SYSTEM'. In the center, the words 'GCOS' are written in red. The main title 'Communications' is in bold black text at the top center. Below it, four lines of bold black text are centered: 'Must Communicate Flight Times', 'Telecommunications Changes Needed', 'An Operational Manager Will be Needed', and 'Could be TSP, Lead Centers, GCOS Secretariat????'.

# **Communications**

**Must Communicate Flight Times**

**Telecommunications Changes Needed**

**An Operational Manager Will be Needed**

**Could be TSP, Lead Centers, GCOS  
Secretariat????**



# **Keep Expectations Reasonable!**

**Upper Air Not Important to Developing Met Services**

**Even Then, They are Met Services not Climate Services**

**Need to Establish Importance of Climate Obs**

**Everything is Keyed to Met Operations**



***Thank You***

**GCOS**

***RKT***

