ARGOS REAL-TIME ANTENNA UPGRADE PROJECT

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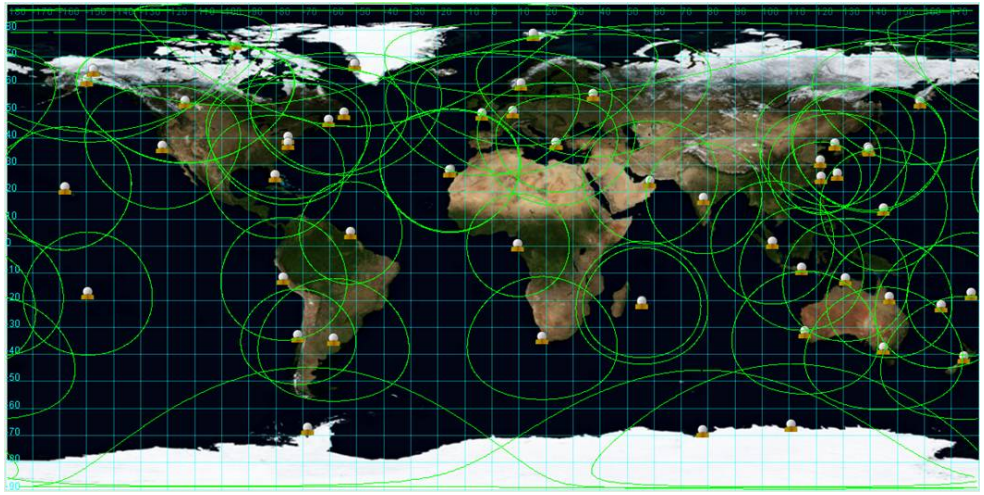
DBCP SCIENTIFIC AND TECHNICAL WORKSHOP
OBAN, SCOTLAND
SEPTEMBER 27, 2010

OBJECTIVE

ESTABLISH AN OPTIMIZED AND RELIABLE GLOBAL NETWORK OF REAL-TIME ANTENNAS WHICH MINIMIZES THE DELIVERY TIME OF ARGOS PTT/PMT DATA



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TODAY'S PRESENTATION

- PRINCIPLES
- IMPORTANT FEATURES OF A R/T ANTENNA
- THE CURRENT NETWORK – WHY UPGRADE IT ?
- THE UPGRADE APPROACH
- THE CURRENT PLAN
- IMPACT TO DBCP/SIMULATION RESULTS

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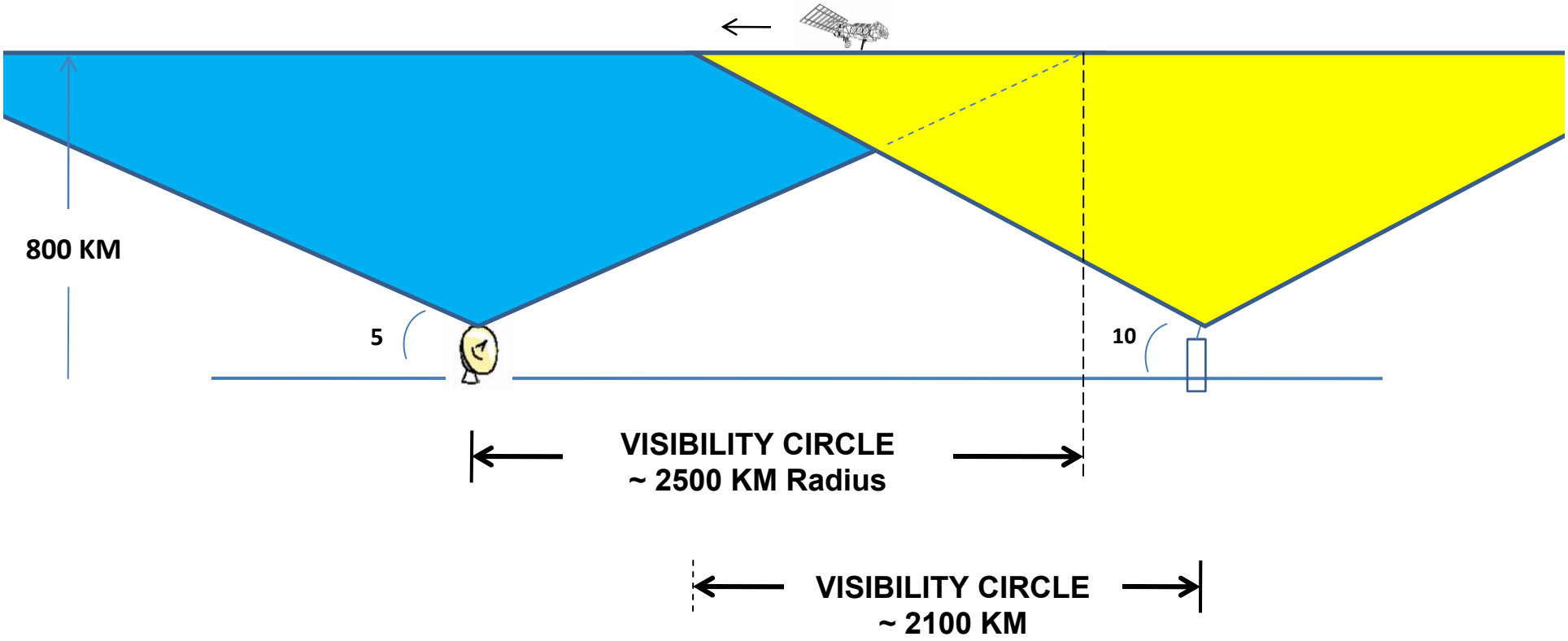
PRINCIPLES

- R/T = “BENT PIPE” TRANSMISSION
- GEOMETRY: THE SATELLITE MUST SEE ARGOS XMTR AT THE SAME TIME THE ANTENNA SEES THE SATELLITE
- VISIBILITY CIRCLE / ACCESSIBILITY CIRCLE

VISIBILITY/ACCESSIBILITY CIRCLE



ACCESSIBILITY CIRCLE RADIUS = ~ (2500 + 2100) = 4600KM

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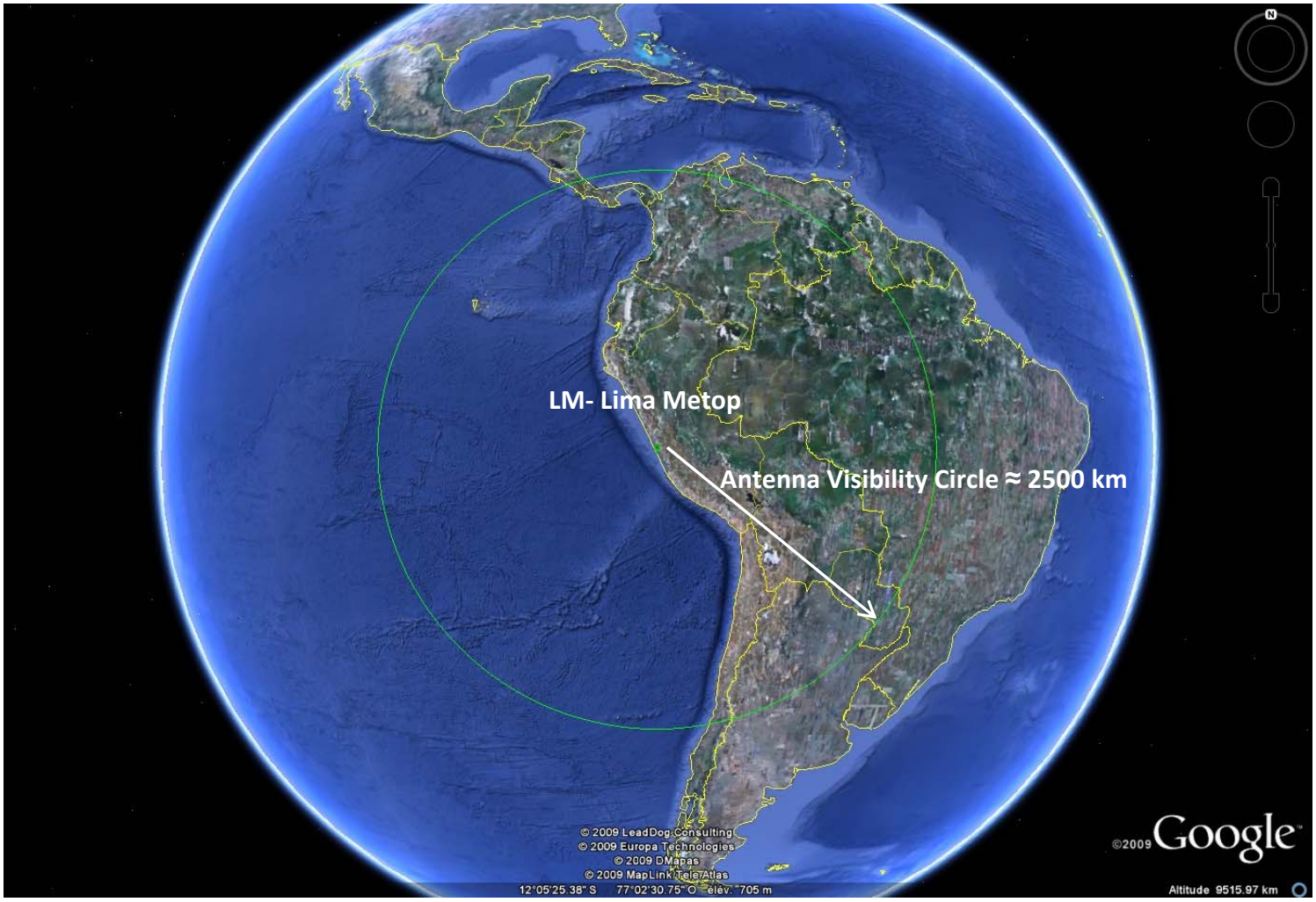
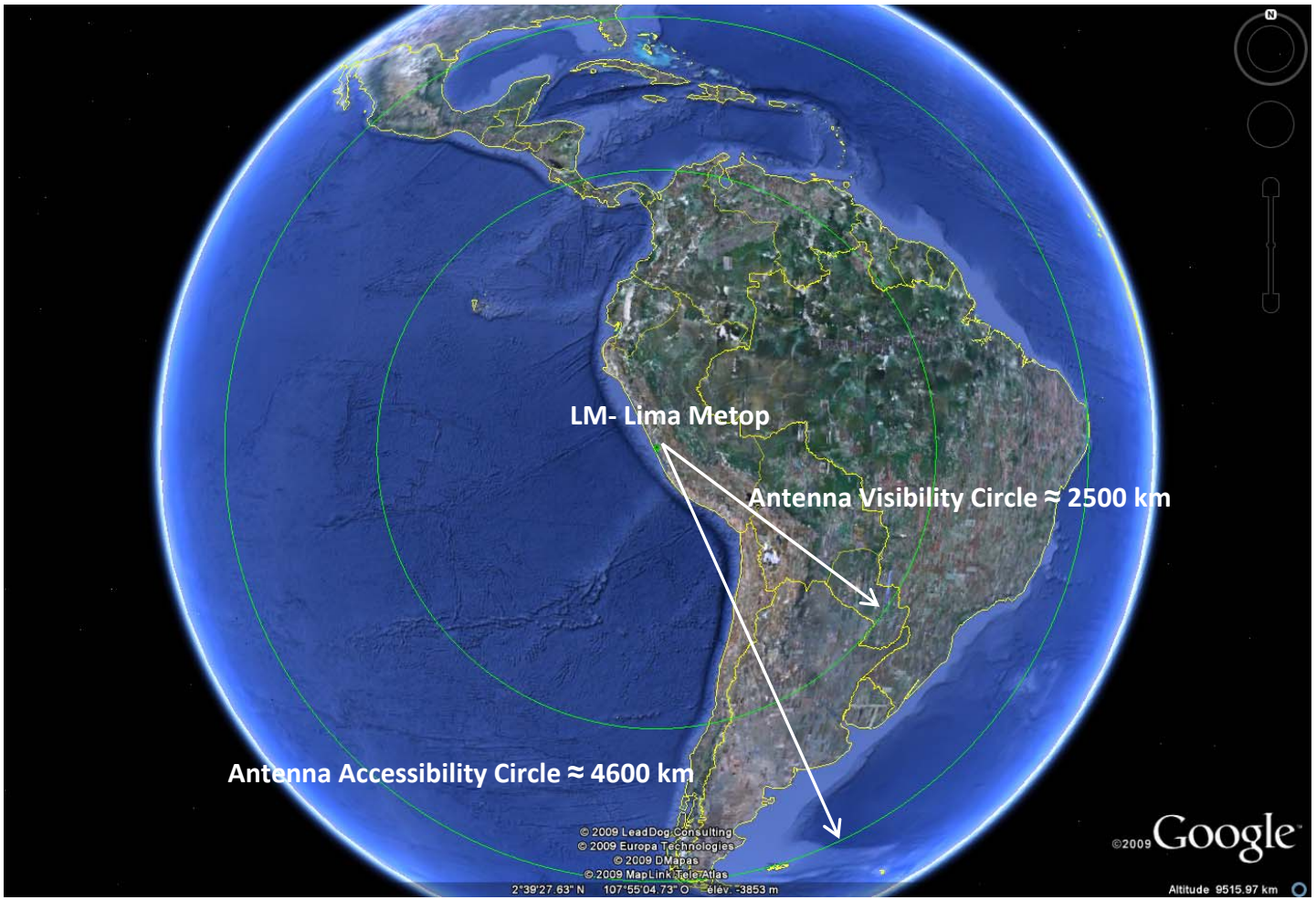
VISIBILITY AND ACCESSIBILITY CIRCLES

- **Example: HRPT Station LM (Lima-METOP)**



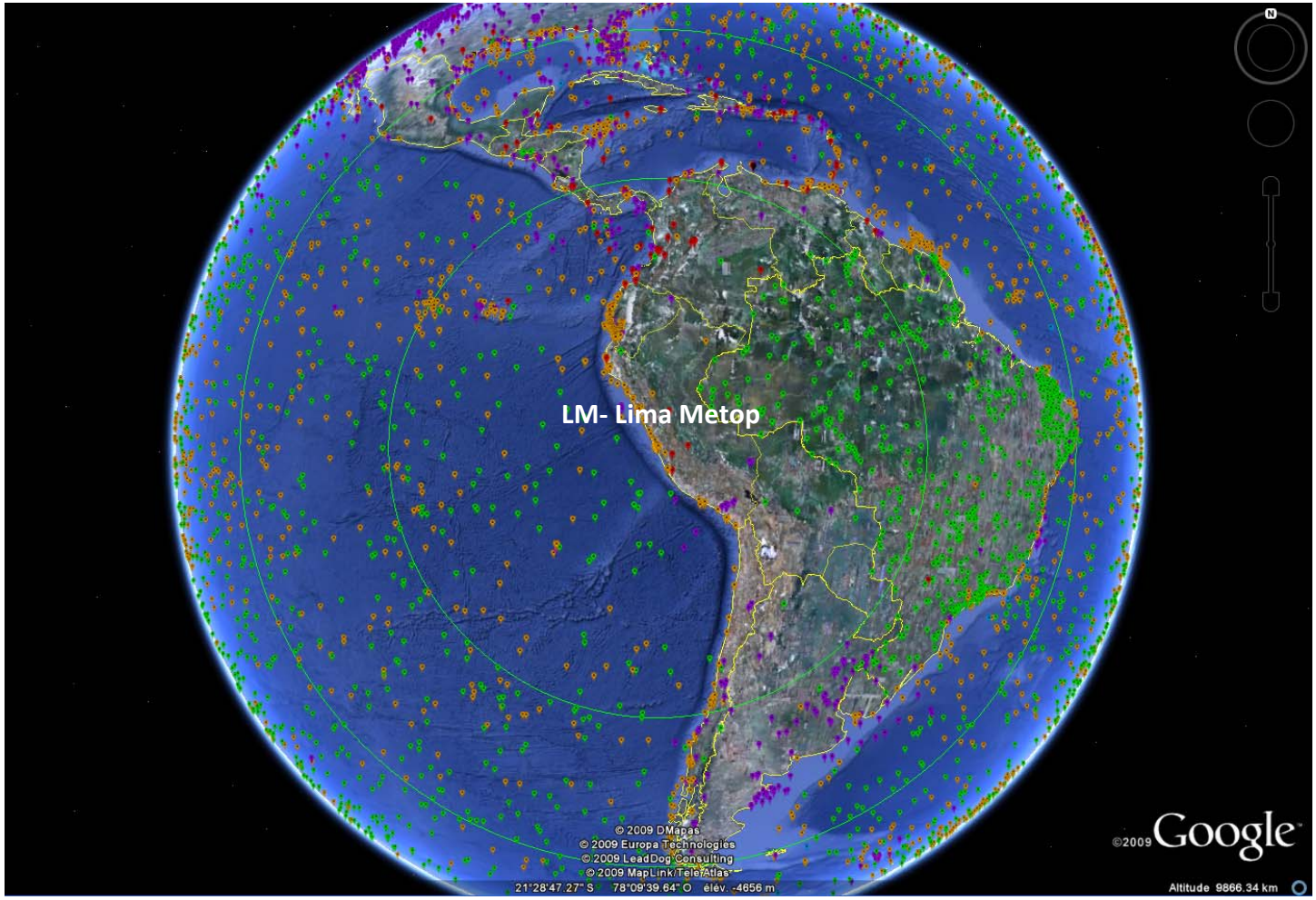
VISIBILITY AND ACCESSIBILITY CIRCLES

- **Example: HRPT Station LM (Lima-METOP)**



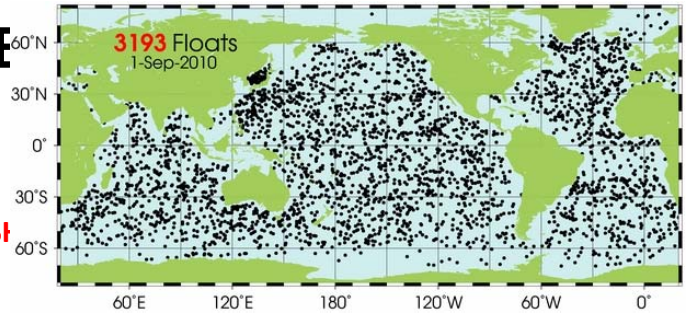
VISIBILITY AND ACCESSIBILITY CIRCLES

- **Example: HRPT Station LM (Lima-METOP) with Argos Platforms**



IMPORTANT FEATURES OF AN ARGOS R/T ANTENNA

- **LOCATION**: GEOPOSITIONED SO A HIGH PERCENTAGE OF PLATFORMS ARE IN ACCESSIBILITY CIRCLE
- **DISH + RCVR**: MAXIMIZE NUMBER OF SATELLITES CARRYING ARGOS FROM WHICH IT CAN CAPTURE THE "BENT PIPE" TRANSMISSIONS
- **NETWORK READY**: CAPABLE OF AUTOMATED ARGOS DATA EXTRACTION AND QUICK DELIVERY TO PROCESSING CENTE
- **OPERATIONAL** : 24/7



TODAY'S NETWORK – 60 STATIONS

SOUNDS LIKE A LOT – WHY UPGRADE IT ?

- NON-UNIFORM & LIMITED MIX OF SATS THAT ARE RECEIVED – METOP/SARAL ARE NEEDED
- LOCATION/OPERATORS ARE NOT OPTIMUM
- DAYS IN OPERATION ARE NOT CONSISTENT
- % OF DATASETS RECEIVED vs. EXPECTED IS LOW
- DATA DELIVERY TIMES ARE VARIABLE AND NOT RELIABLE

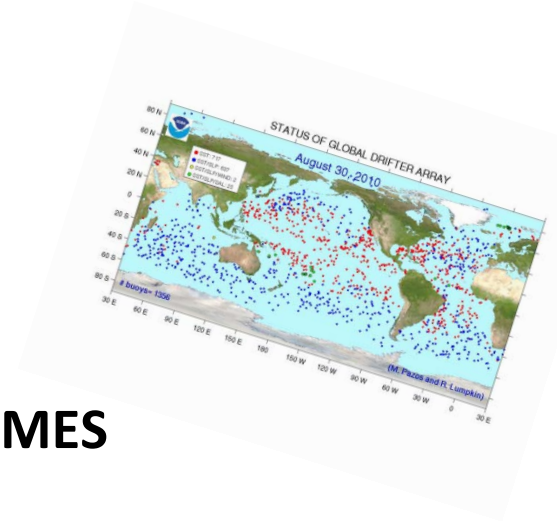
"CREATE THE NETWORK WE NEED NOT JUST USE WHAT MIGHT BE AVAILABLE"

UPGRADE APPROACH

- UPGRADE A SUBSET OF EXISTING L-BAND ANTENNAS TO RECEIVE DATA FROM ALL SATELLITES (NOAA, METOP, SARAL)
- INSTALL NEW ANTENNAS AND/OR CONNECT TO OTHERS WHERE NEEDED
- CONDUCT SYSTEM STUDIES TO DEFINE CANDIDATE ANTENNAS – BUDGET LIMITED TO ~ 20
- IMPLEMENT OPERATIONAL AGREEMENTS WITH OPERATORS

SYSTEM STUDIES

WHAT WAS CONSIDERED:



- LOCATION/AVAILABILITY OF EXISTING STATIONS
- EXISTING SATELLITES (6) + SARAL & METOP-B
- APPLICATIONS WITH SENSITIVE DATA DELIVERY TIMES
- GEOGRAPHIC DISTRIBUTION OF MAIN APPLICATIONS & AREAS REQUIRING PRIORITY COVERAGE
- EXISTING STATIONS WHICH QUALIFY FOR UPGRADING TO ADEQUATE DISH SIZE TO ENSURE LINK BUDGETS
- NEW SARAL REAL-TIME STRATEGY (last 100 minutes)

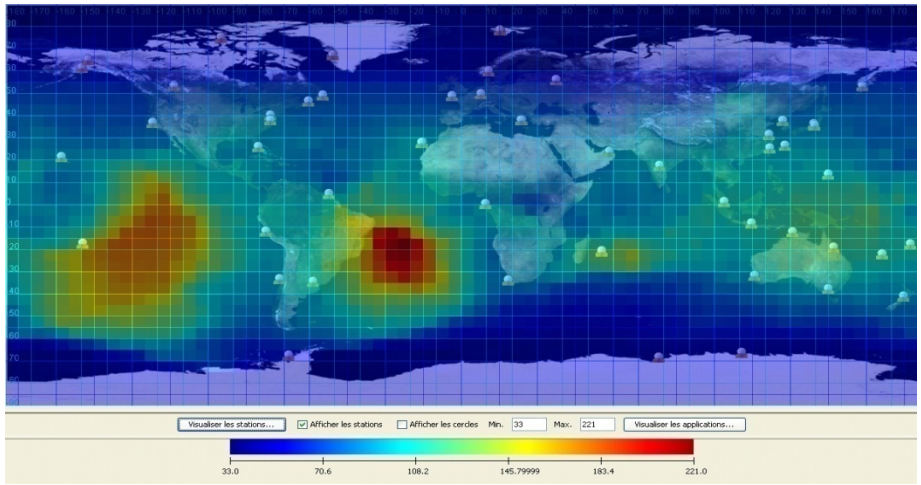
ANTENNA SELECTION

- **REFINE ANTENNA CHOICES BY ANALYZING DELIVERY TIME PERFORMANCE OF UPGRADE SCENARIOS WITH SIMULATION TOOL**

- **TOOL CALCULATES THE AVERAGE TIME FOR A PLATFORM TO DELIVER ITS DATA AS A FUNCTION OF:**
  - **THE ARGOS SATELLITE CONSTELLATION (real parameters, simulated SARAL)**
  - **THE REAL ANTENNAS OF THE NETWORK AND THEIR CHARACTERISTICS (locations, satellites tracked, elevation mask, average data delivery time, etc….)**

ANTENNA SELECTION, cont'd

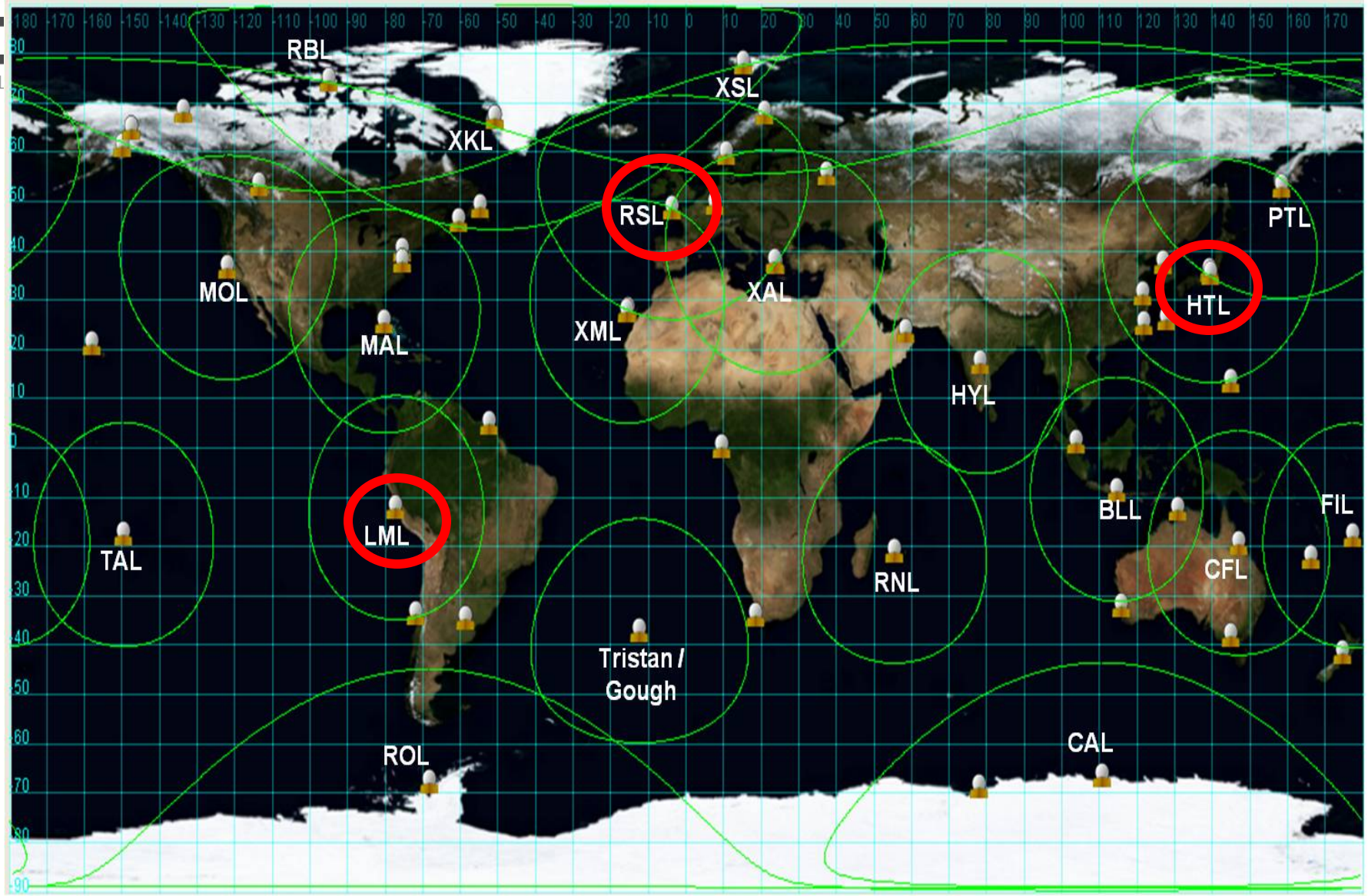
- **SCENARIOS (typically 10 days) ARE RUN; DELIVERY TIMES ARE OBTAINED BY STEP-WISE ANALYSIS OF THE TIME EVOLVING CONFIGURATION :** ***"Platform/Satellites Above/Stations Around"***
- **RESULTS DISPLAYED ON A 5° X 5° GRID**



UPGRADE ACTIONS

- **RCVR DEVELOPMENT – NOAA/METOP/SARAL: Acceptance, Sept. 2010**
- **UPGRADE 3 CLS STATIONS WITH NEW RCVR: End of 2010**
- **UPGRADE 10 'NON-CLS' STATIONS: Planned for 2011**
- **PROCURE AND INSTALL NEW STATIONS(2): Planned for 2011**
- **UPGRADE 3/5 EXISTING AUSTRALIAN STATIONS: Ongoing**

3 CLS STATIONS TO BE UPGRADED BY END 2010



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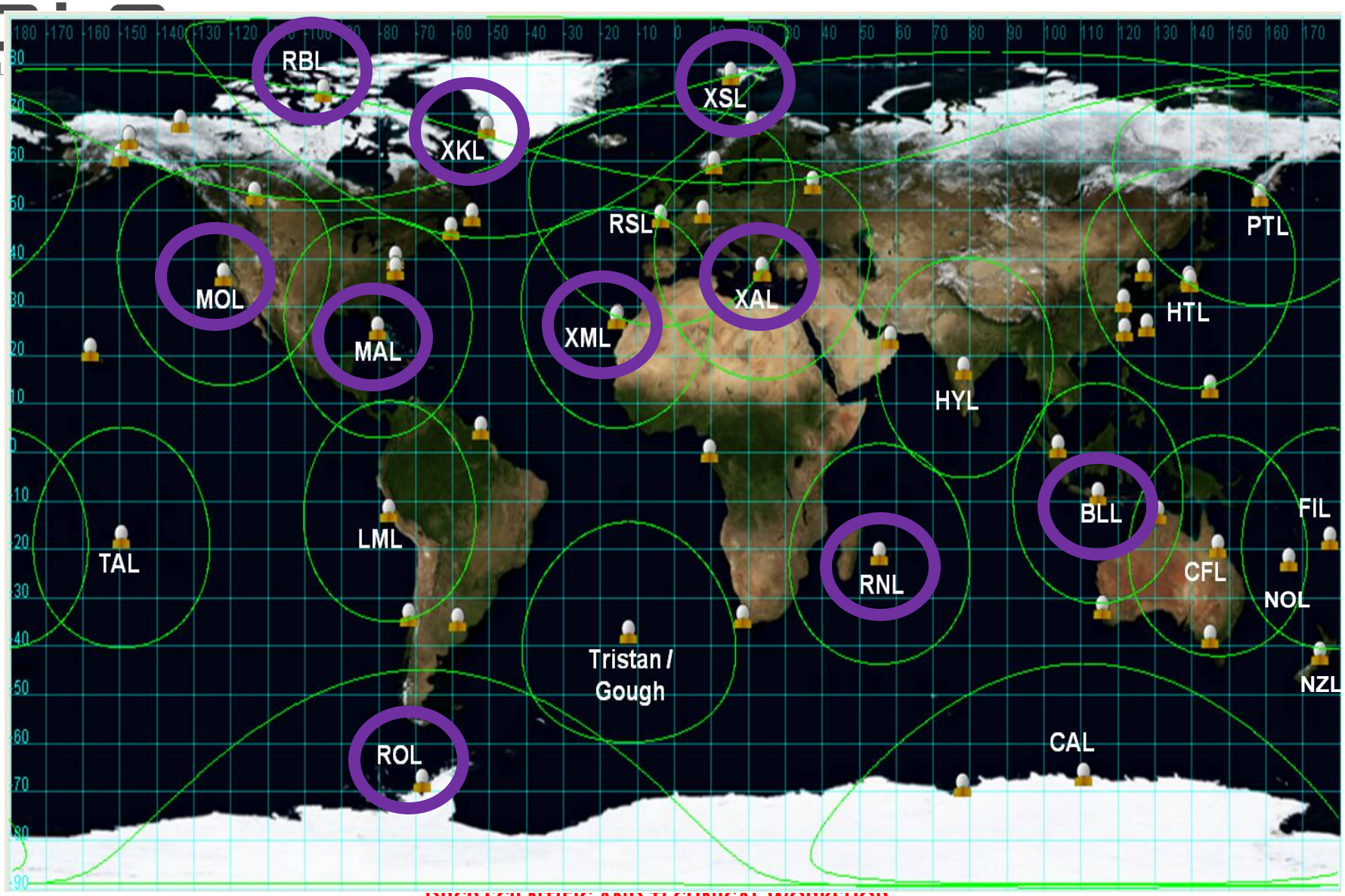
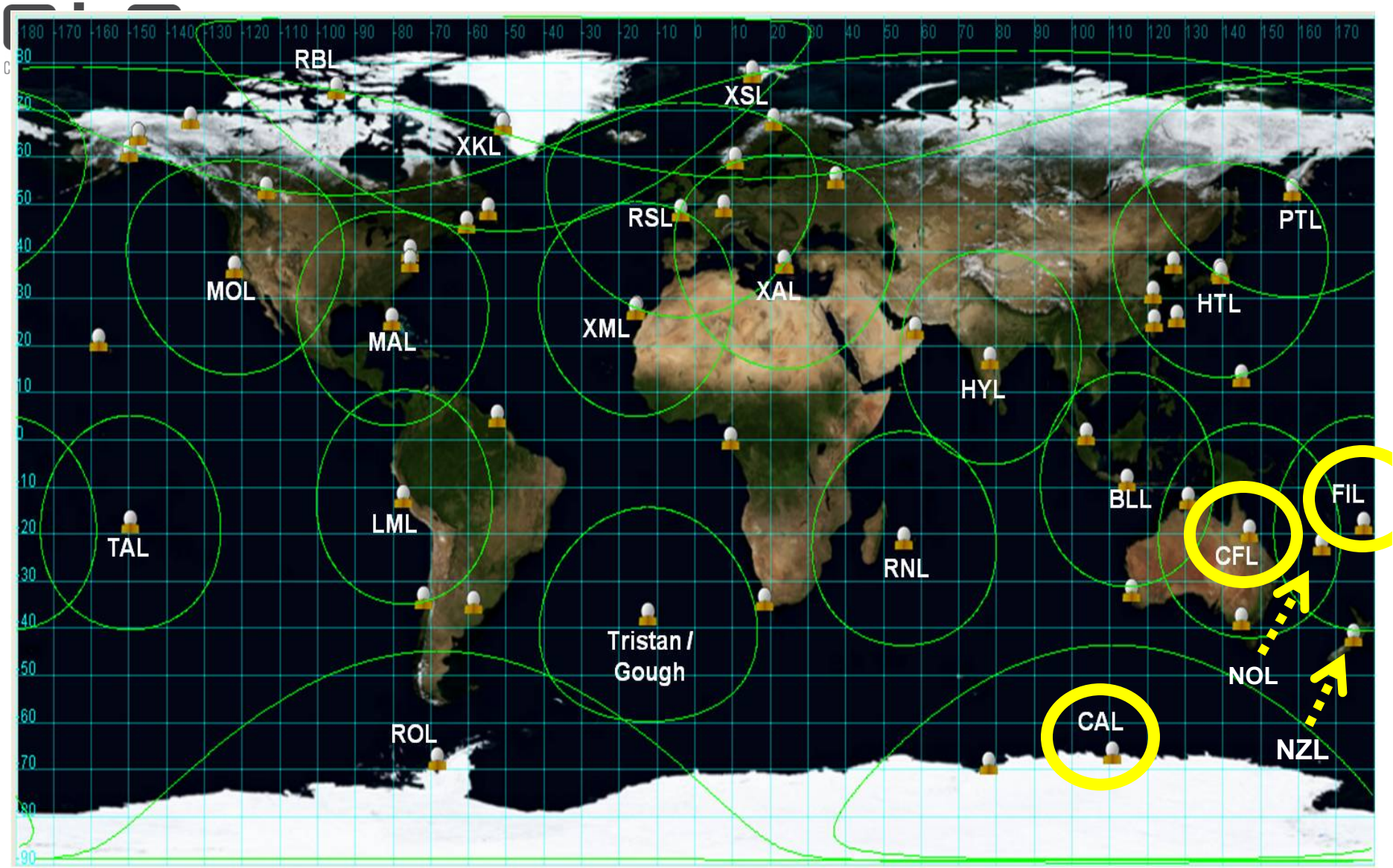
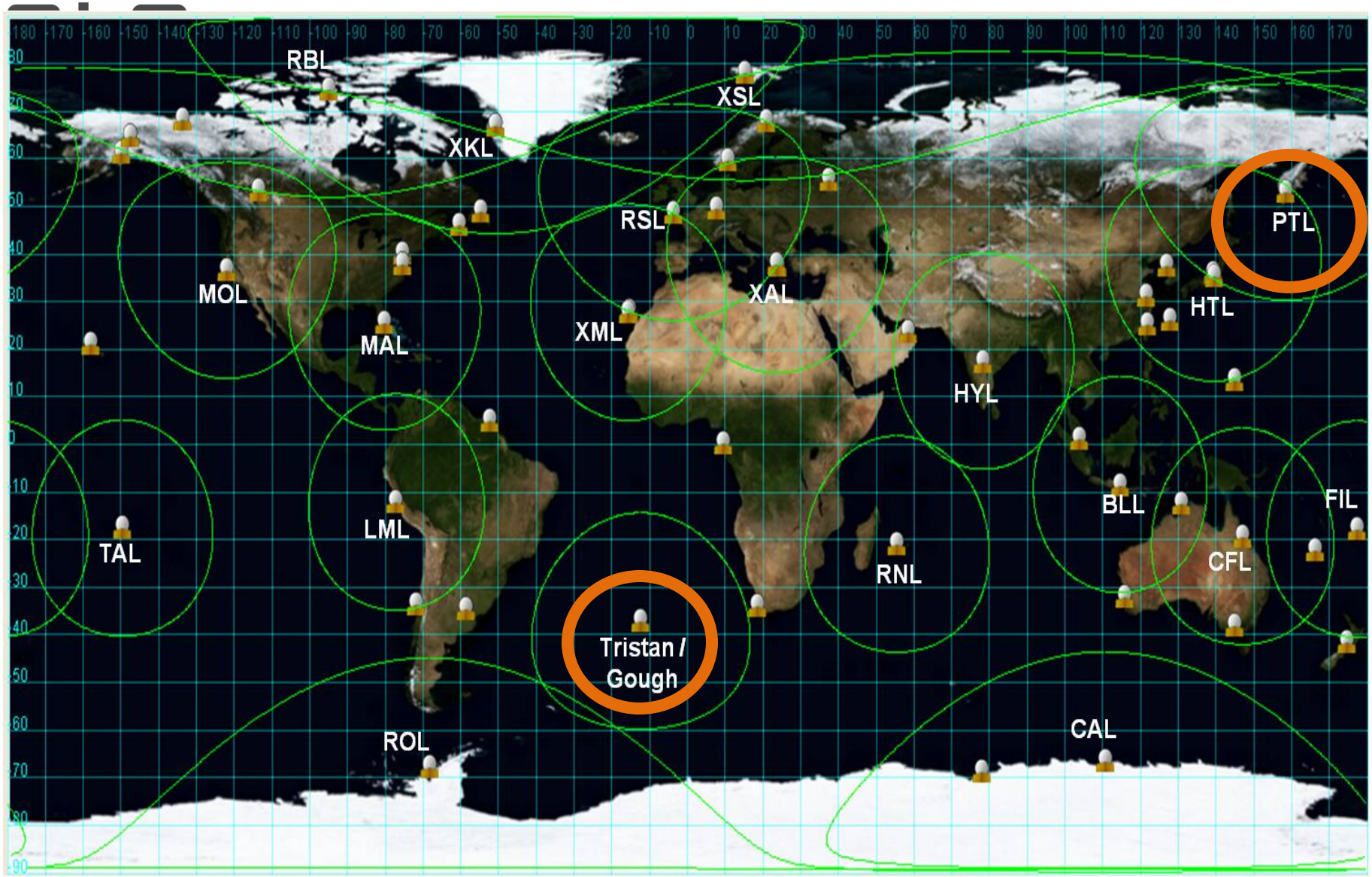
THE 10 'NON-CLS' STATIONS FOR 2011 UPGRADING



3+ STATIONS FOR UPGRADING BY ESS

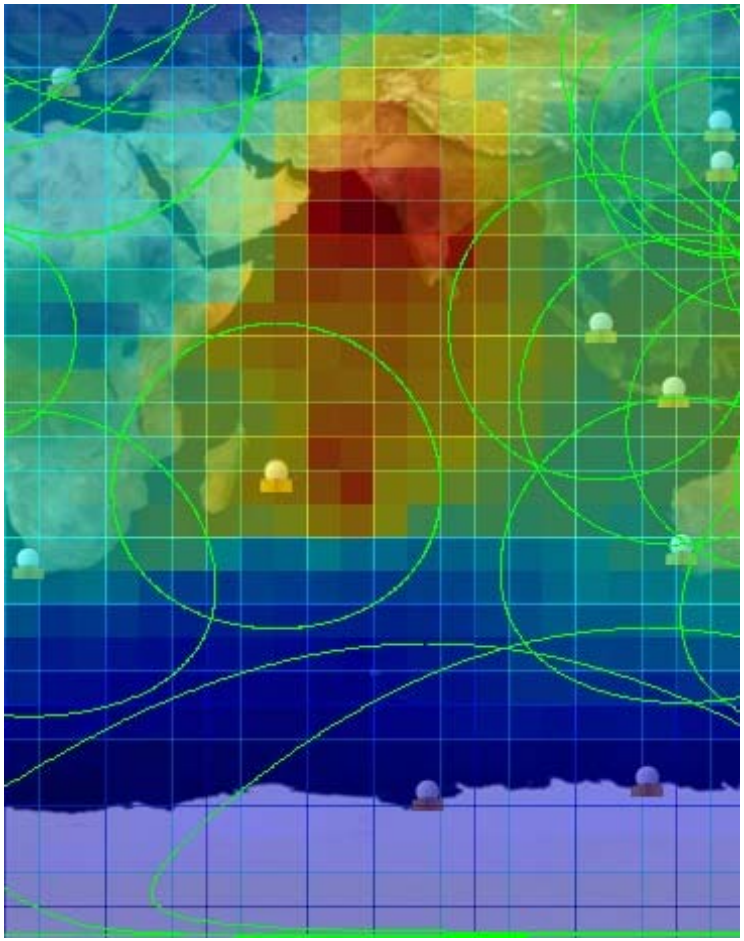


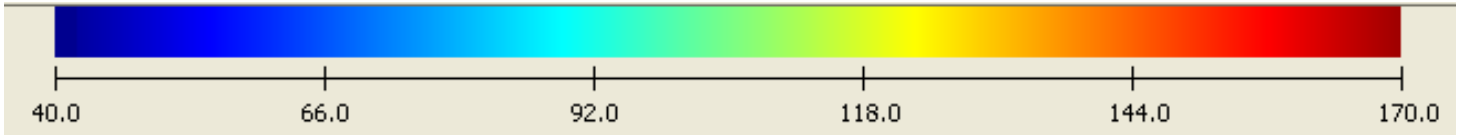
2 NEW STATIONS



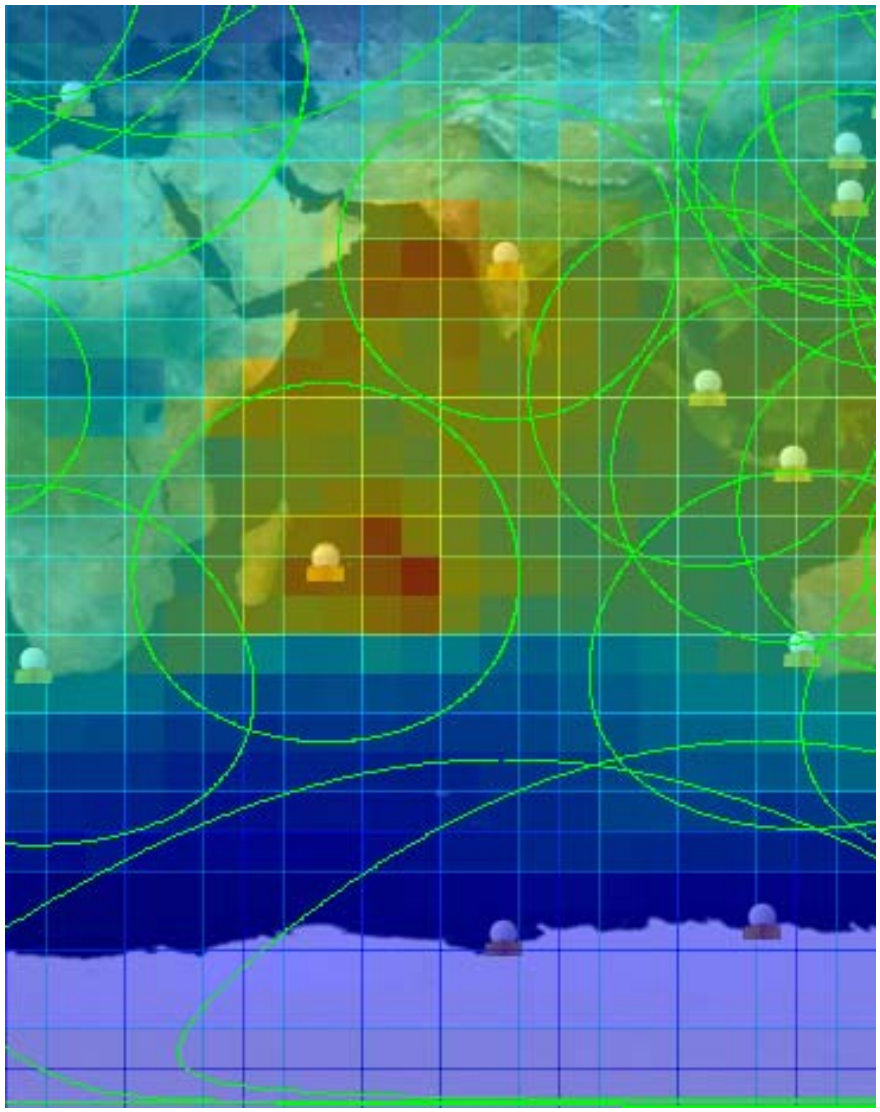
IMPACT TO DBCP

Average delivery times in minutes –Existing Network WITHOUT Hyderabad (India) and WITHOUT Muscat (Oman)

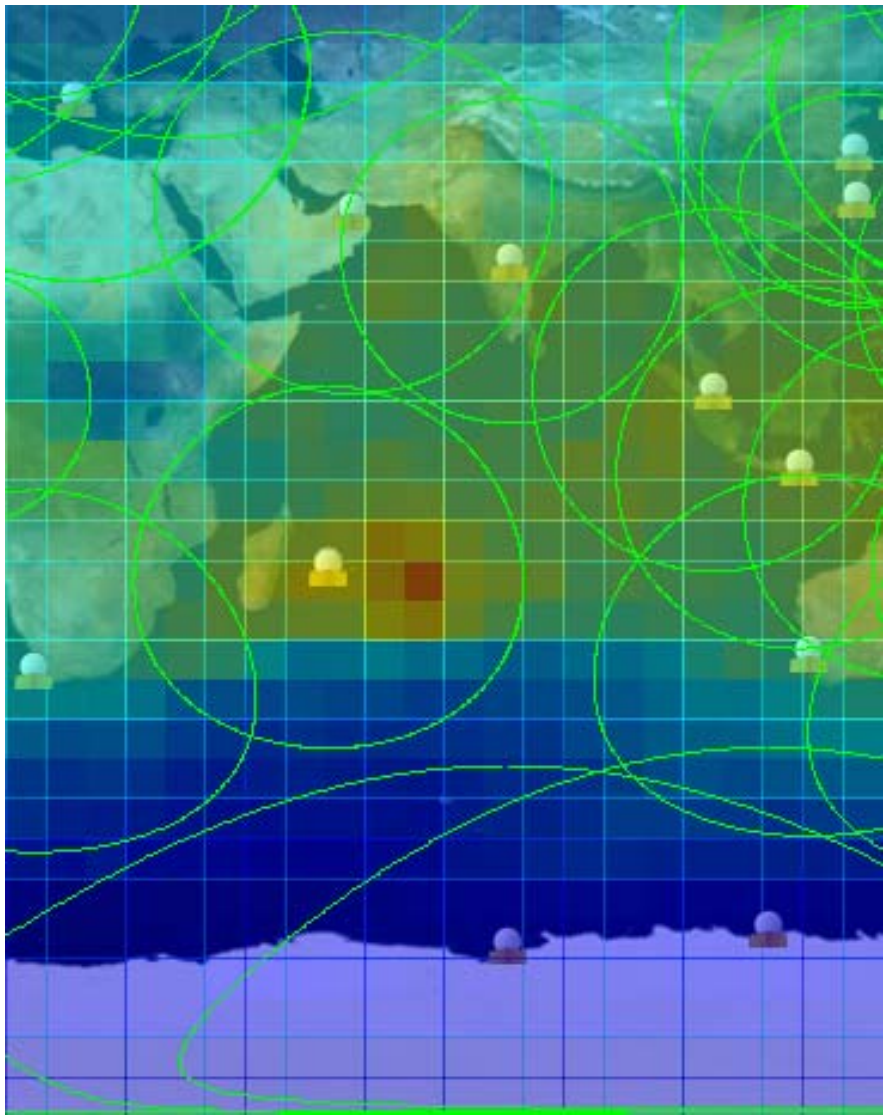




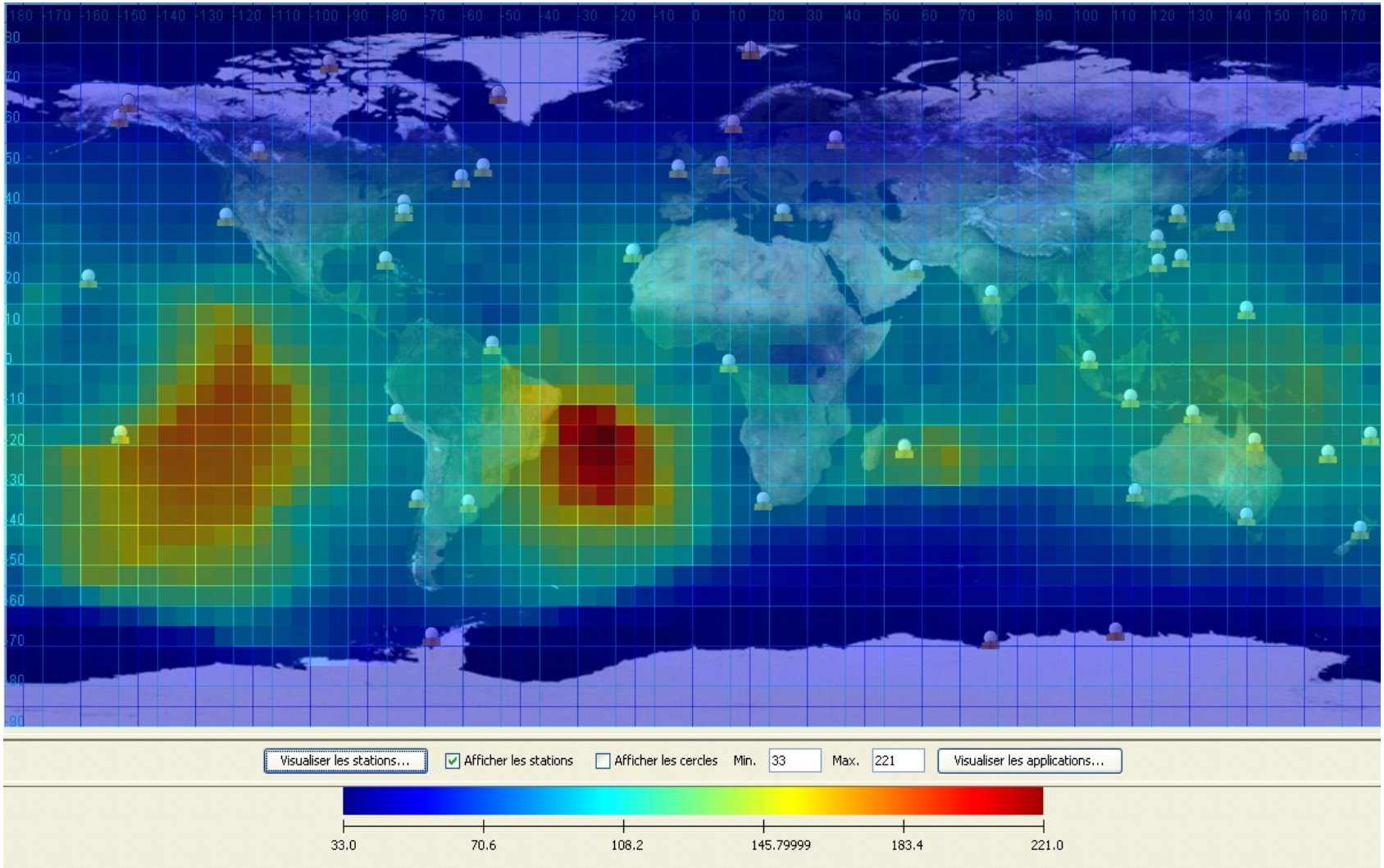
Average delivery times in minutes - Existing Network WITH Hyderabad (India) but WITHOUT Muscat (Oman)



Average delivery times in minutes – Existing Network WITH Hyderabad (India) and WITH Muscat (Oman)



GLOBAL DATA TIME AVAILABILITY (IN MINUTES) WITH THE CURRENT ARGOS REAL-TIME NETWORK



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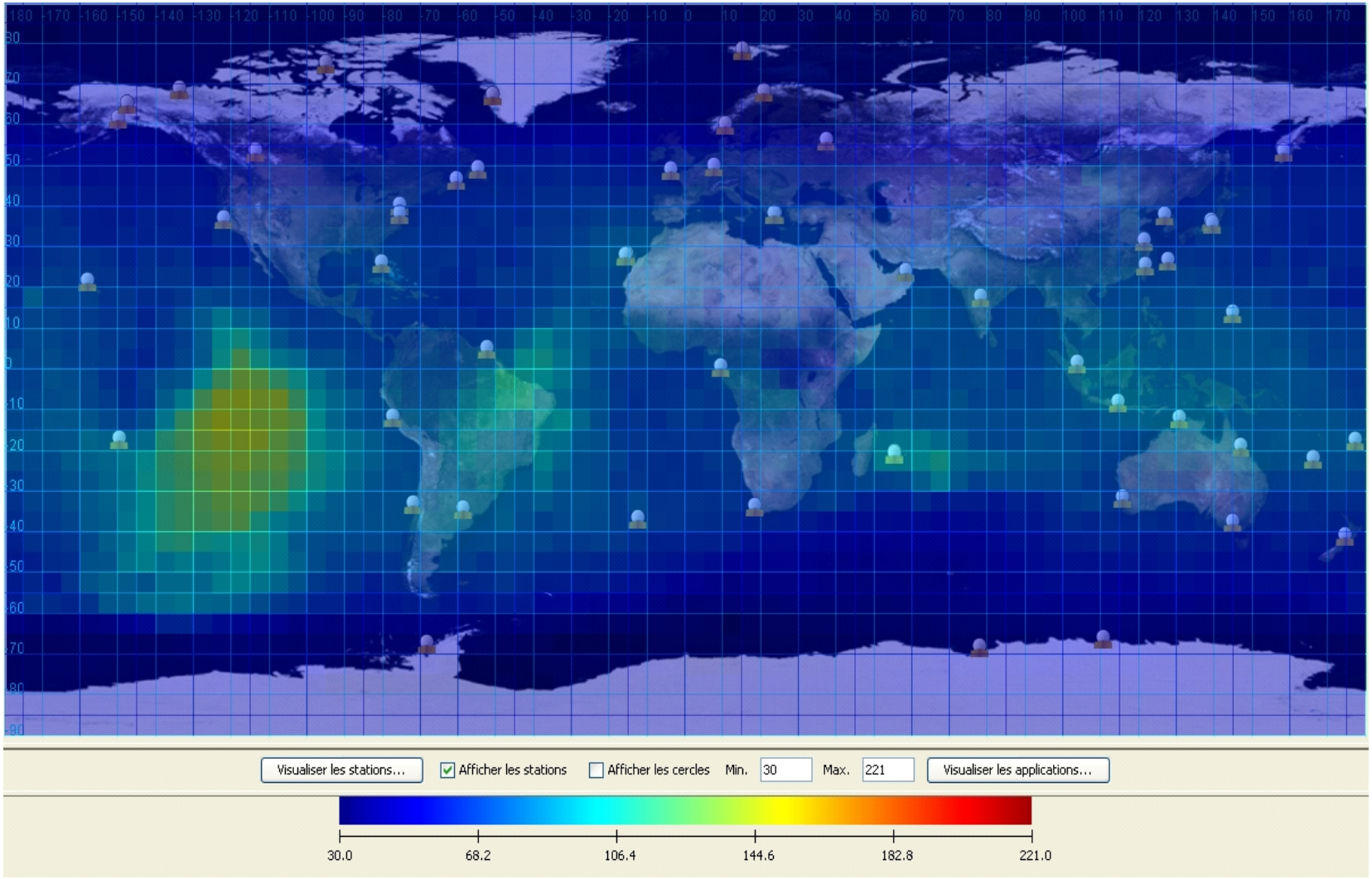
GLOBAL DATA TIME AVAILABILITY (IN MINUTES) WITH THE ARGOS REAL-TIME NETWORK UPGRADED



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