



ARGOS-3: Just Do It

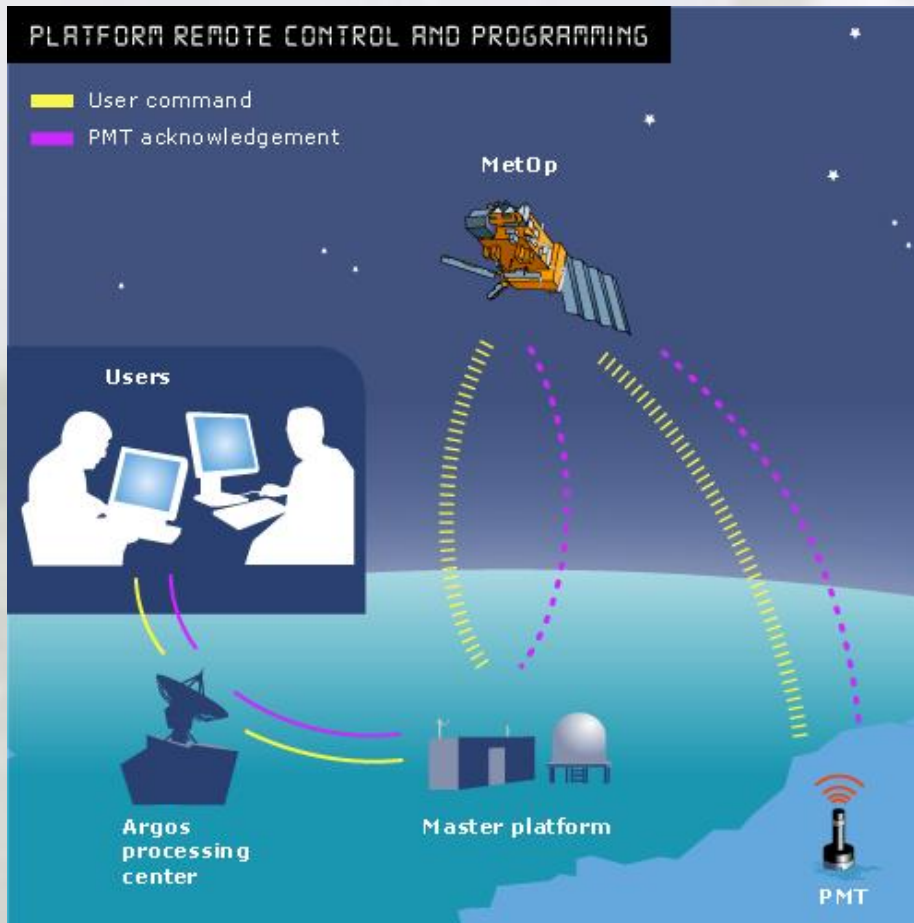
Bill Woodward, CLS America
Michel Guigue, CLS Toulouse
Christian Ortega, CLS Toulouse

REMINDER

ARGOS-3 FEATURES

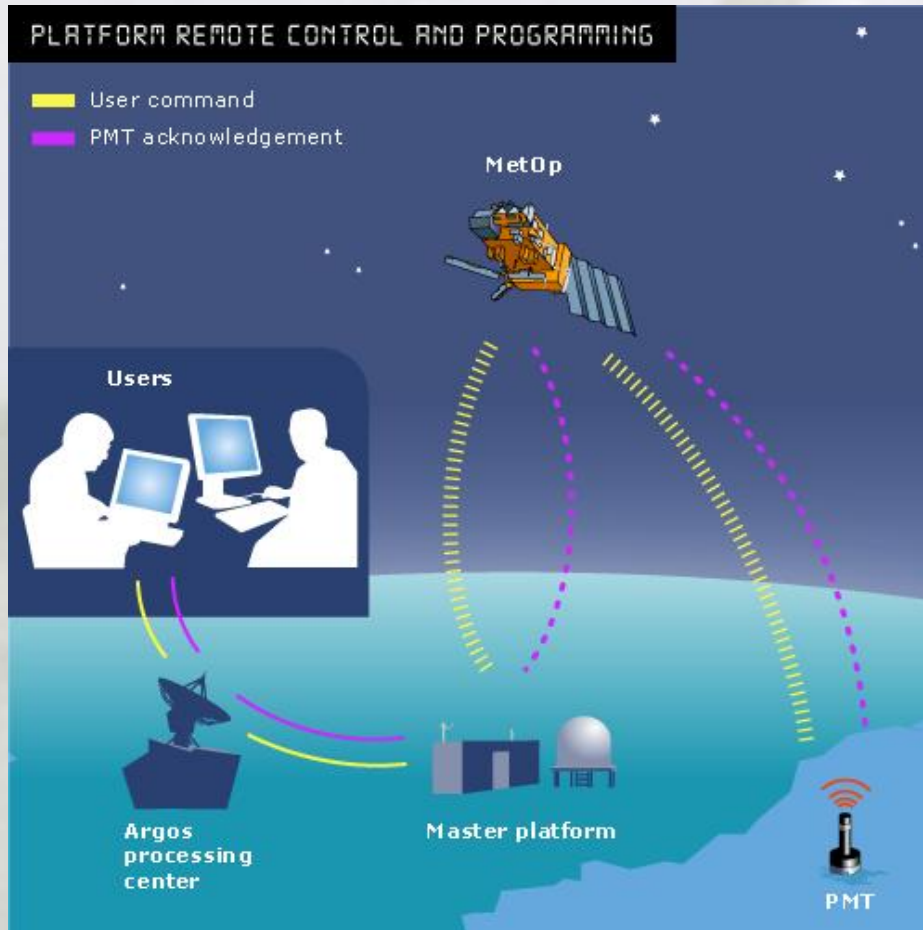
- **Sat Pass Prediction**
- **Two-Way Communication**
- **High Data Rate**

Managing Transmission, Sending more data



- ✓ **Rendez-vous** with satellites
- ✓ **Efficient** transmissions: power saving
- ✓ **Sending more Data**
 - with the Interactive data Collection (reception ack)

Sending Commands to PMTs



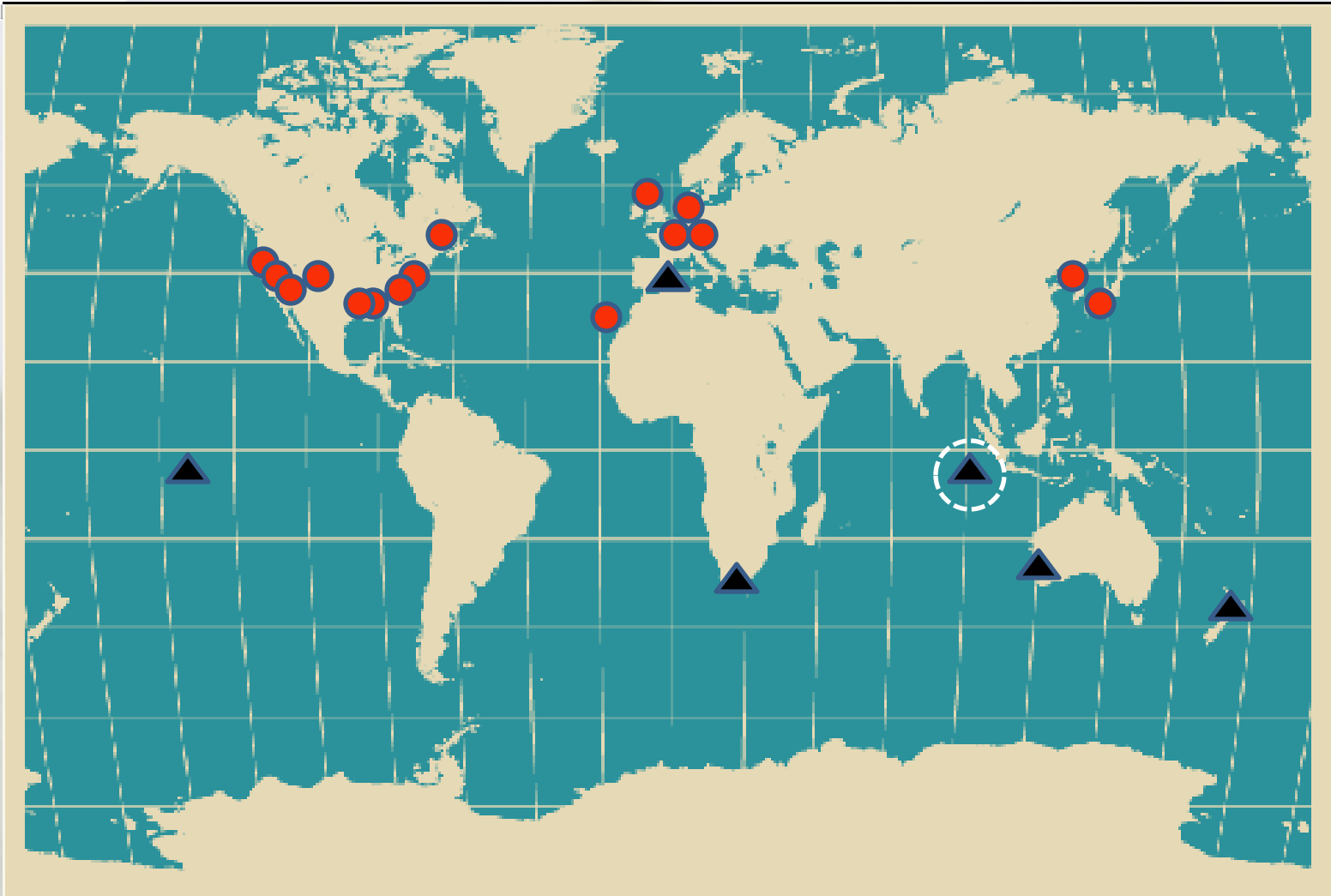
- Posting commands via ArgosWeb
- Loading on Sat.
- Sat Relay to the PMT
- PMT Ack to Sat.
- PMT Ack on ArgosWeb

TYPICAL DRIFTER TRANSMISSION SCENARIO

- **USE PASS PREDICTION – XMIT ONLY WHEN OVERHEAD**
- **LOW DATA RATE TRANSMISSION**
- **COLLECT HOURLY OBS – NEW ARGOS 3 SVP FORMAT (48 BYTES)**
- **CORRECT DRIFTER TIME WITH ARGOS 3 TIME**


BENEFITS

- COST REDUCTIONS DUE TO LONGER LIFETIME**
- MISSION ADJUSTMENT POSSIBILITY**
- CAN XFER LARGE AMOUNTS OF DATA**



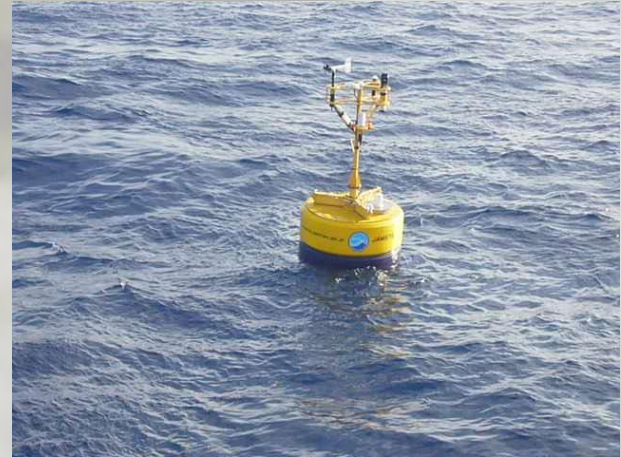
DBCP Scientific & Technical Workshop
Paris, France
September 28, 2009

PMT m-TRITON

 **First ARGOS-3 platform in the world deployed!!**

March 19, 2009 in the Indian Ocean

- ✓ High Data Rate Transmission Only
- ✓ 27.6 k bytes / day, no data loss
- ✓ 1/6 power consumption of A2 TRITON



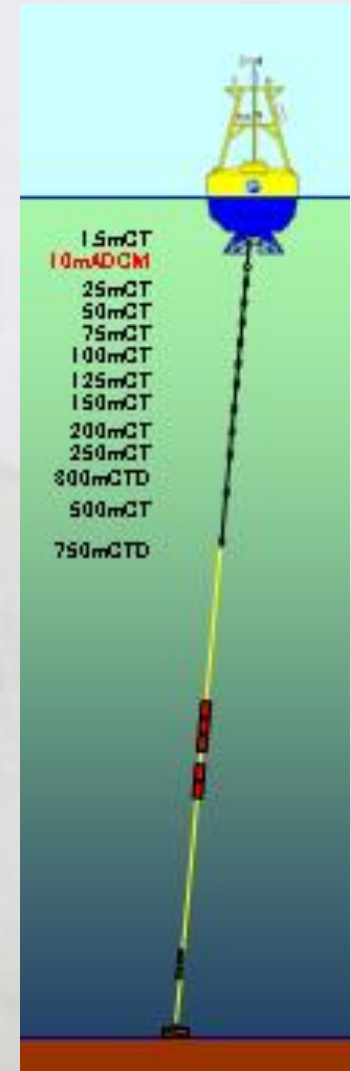
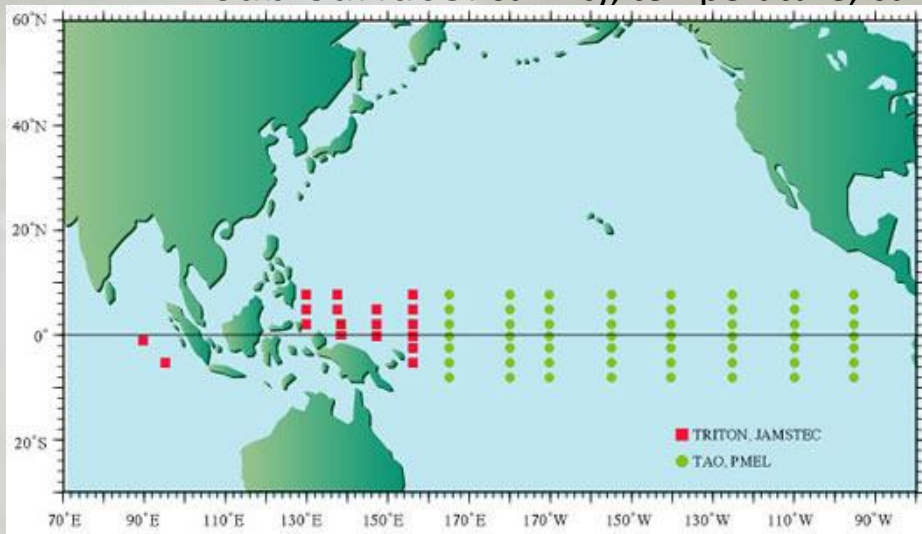
What is TRITON?

Ocean Moored Buoy Network

- West Pacific: TRITON by Jamstec, Japan
- East Pacific: TAO by NOAA PMEL, USA

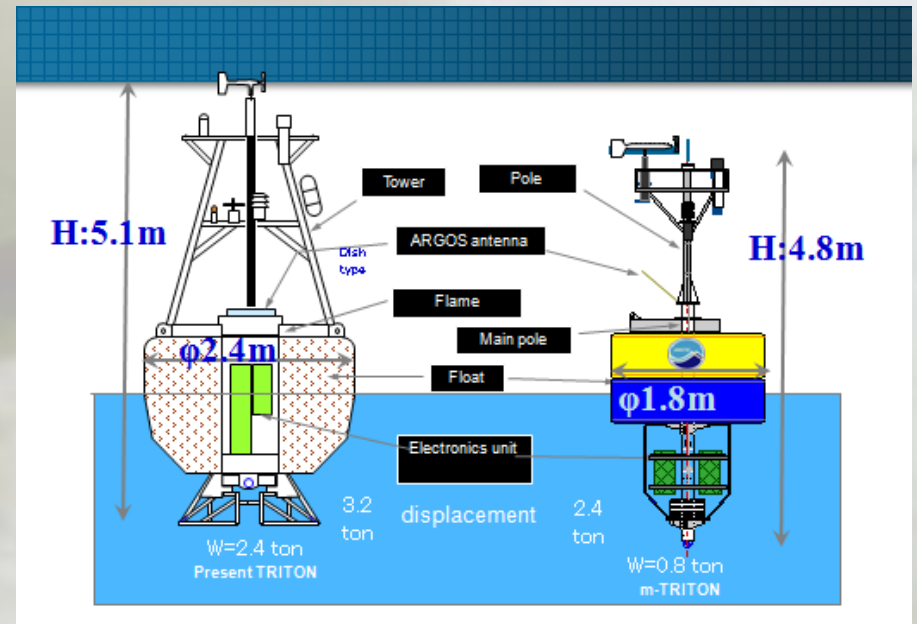
Sensors

- Surface float: temperature, air pressure, humidity, wind sp and direction, precipitation, sun shine
- sub-surface: salinity, temperature, current



m-TRITON

- m-TRITON was developed to enhance observation in the Indian Ocean
- “m” is for “mini”
 - For easier deployment and recovery
 - slack mooring (loose line): buoy moving around → GPS added
 - ARGOS-3 PMT



A2 Data Transmission

● A2 Version of TRITON / m-TRITON

- Measurement every 10 minutes
- Only one hour average transmitted. 10 minutes measurements are available when recovered (once a year)
- An hourly data consists of ;
 - 2 messages for subsurface sensors: 32 bytes and 28 bytes
 - 0.5 message for surface sensors (2 hourly data are packed into one message): 28 / 2 bytes
- 2.5 messages / hour ($32 + 28 + 14 = 74$ bytes / hour)
- $2.5 * 24 = 60$ messages / day ($74 * 24 = 1776$ bytes / day)

A3 High Data Rate Transmission

- **TRITON PMT transmits only High Data Rate messages**
- **Transmissions only to ARGOS-3 satellites (METOP only today)**
- **No transmission to A2 satellites**
- **PMT knows when satellites fly over. PMT can compute satellite passes based on the orbit parameters of Allcast downlink messages.**
- **PMT transmits HD messages by Interactive mode.**
 - **The satellite sends back an ACK message when it receives an error free message. If PMT receives this ACK, the next message is transmitted. If not, PMT repeats the same message.**

A3 Data Transmission

● A3 m-TRITON

- Measurement every 10 minutes
- All measurements are transmitted with full precision of sensor output
- GPS fix every 10 minutes
- 1 High Data Rate message 576 bytes generated every 30 minutes. It contains 3 sets of 10 minutes measurements
- 2 HD messages / hour ($576 * 2 = 1152$ bytes / hour)
- 48 HD messages / day ($1152 * 24 = 27,648$ bytes / day)
- A3 : A2 = 27.6 : 1.78 (kbytes) = 15.6 : 1

PMT operation results

- **Operating since March 19. Until today, no data has been lost. 100% data recovery rate**
- **Very High Efficiency of data transfer: Low rate of repeating transmissions.**
- **Low power consumption**

Transmission Efficiency

- **A3 PMT transmitted 2062 times to transfer 1436 HD messages.**

Nb transmission of one message in average:

$$2062 / 1436 = 1.4 \text{ times}$$

- **A2 PTT transmits 24 hours with 20 sec interval to transfer 60 messages**

Nb transmission of one message in average:

$$(3 * 60 * 24) / 60 = 72 \text{ times}$$

HIGH DATA RATE- *FLOAT EXAMPLE*

✓ ARGOS-3 FEATURES ALLOW LARGER DATA VOLUME XFER IN SHORTER TIME

✓ FLOAT EXAMPLE:

A-2

A-3

Low Bit Rate
(400 bps)

70 Levels-15 msgs
10-15 Hrs

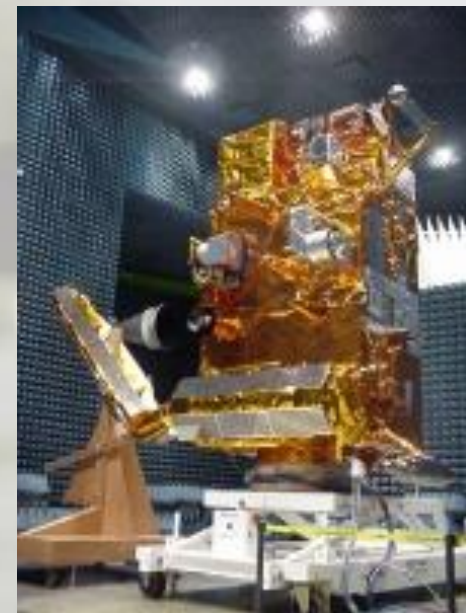
70 Levels-15 msgs
10 mins (1 pass)

High Bit Rate
(4,800 bps)

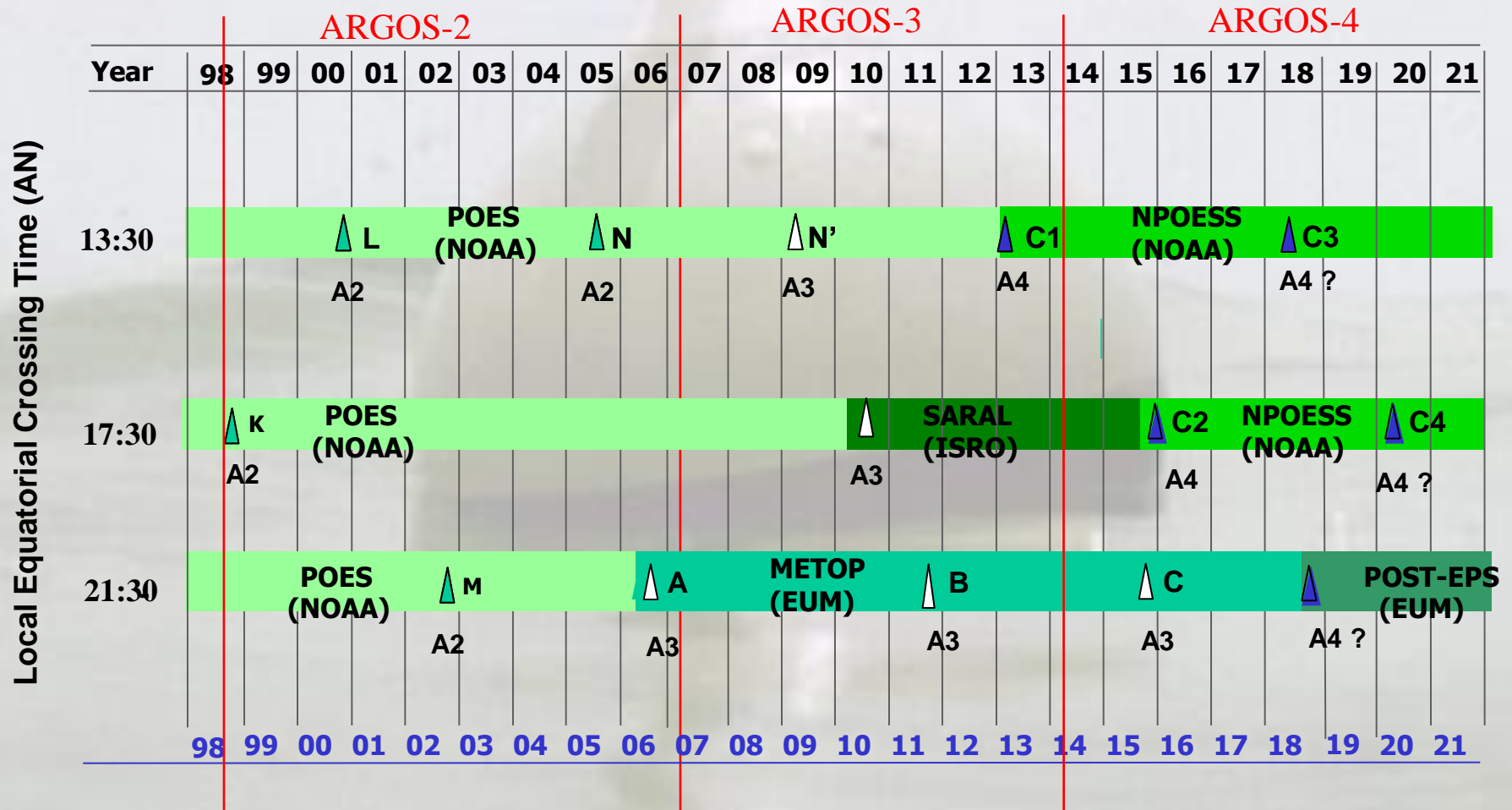
N/A

70 Levels – 1 msg
700 Levels – 8 msgs
10 mins (1 pass)

ARGOS NOW HAS CONFIRMED SEATING ON SATELLITES SCHEDULED FOR LAUNCH AT LEAST UNTIL 2016 AND MOST PROBABLY BEYOND



Argos System: the 3 Generations



ARGOS-4 – MAIN OBJECTIVES

- **ENSURE LOC & DC MISSION CONTINUITY ON METEOROLOGICAL SATS DURING PERIOD 2014 – 2022**
- **IMPROVE THE SERVICE/FULFILL THE NEEDS OF ARGOS USERS UNTIL AT LEAST 2022**

ARGOS- 4 MISSION: REQUIREMENTS

- **BACKWARD COMPATIBILITY**
- **INCREASED SYSTEM CAPACITY**
- **TRANSMIT LARGER DATA VOLUME**
- **WIDER FREQUENCY SPECTRUM**
- **HIGHER SENSITIVITY OF ON-BOARD RCVR**
- **DECREASED TERMINAL AND SERVICE COSTS**
- **IMPROVED LOCATION CALCULATION**