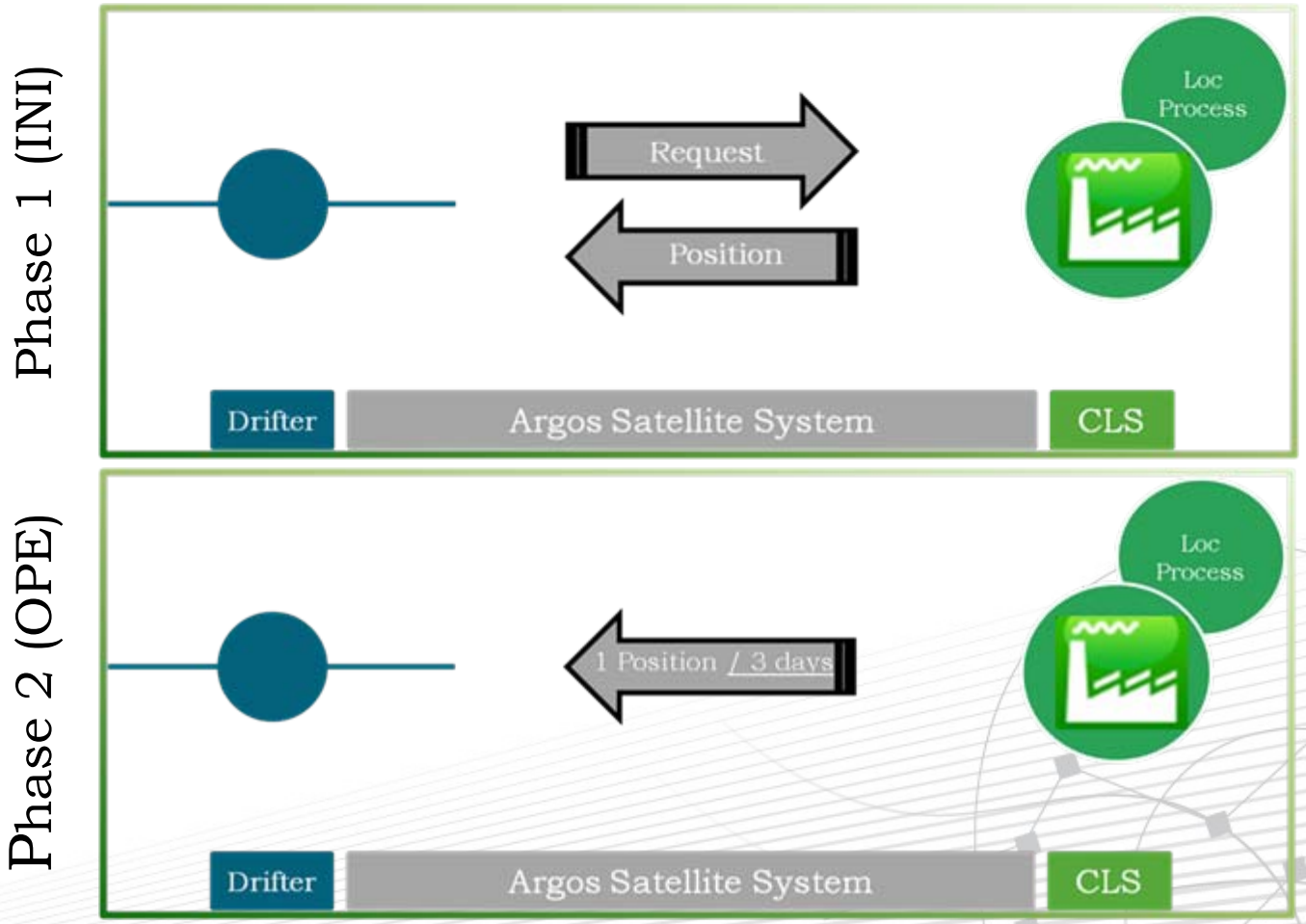
Optimizing Argos PMT settings fro drifting buoys

DBCP 29 Meeting - Paris
September 2013

How do argos-3 drifters work?

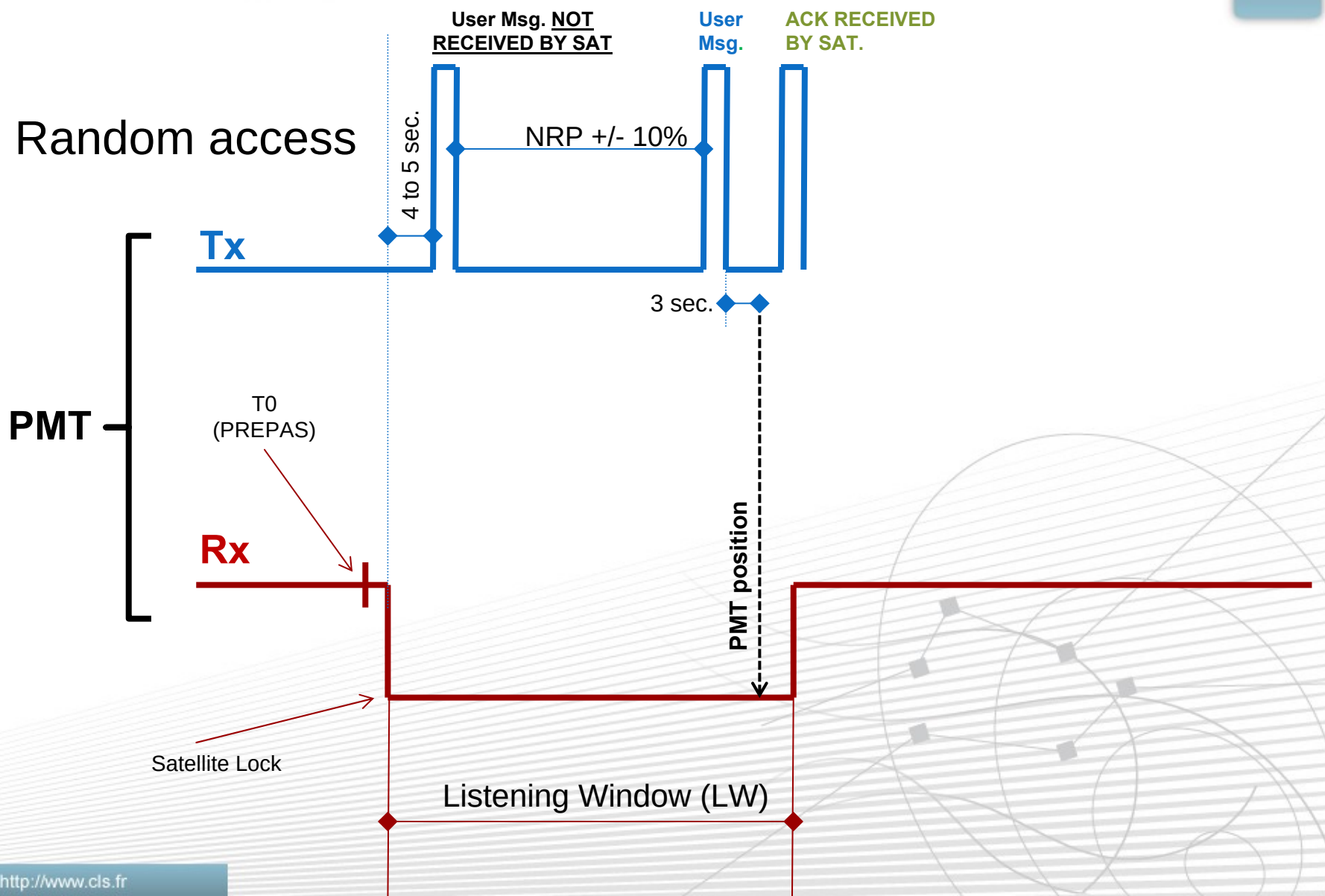
- Benefits of the Argos-3 :
  - Transmissions limited to sat. passes thanks to pass predictions,
  - Optimization of current consumption,
  - GPS free system (lower cost, lower current consumption) – Every 3 days a new position is sent towards the drifter.

How do argos-3 drifters work?

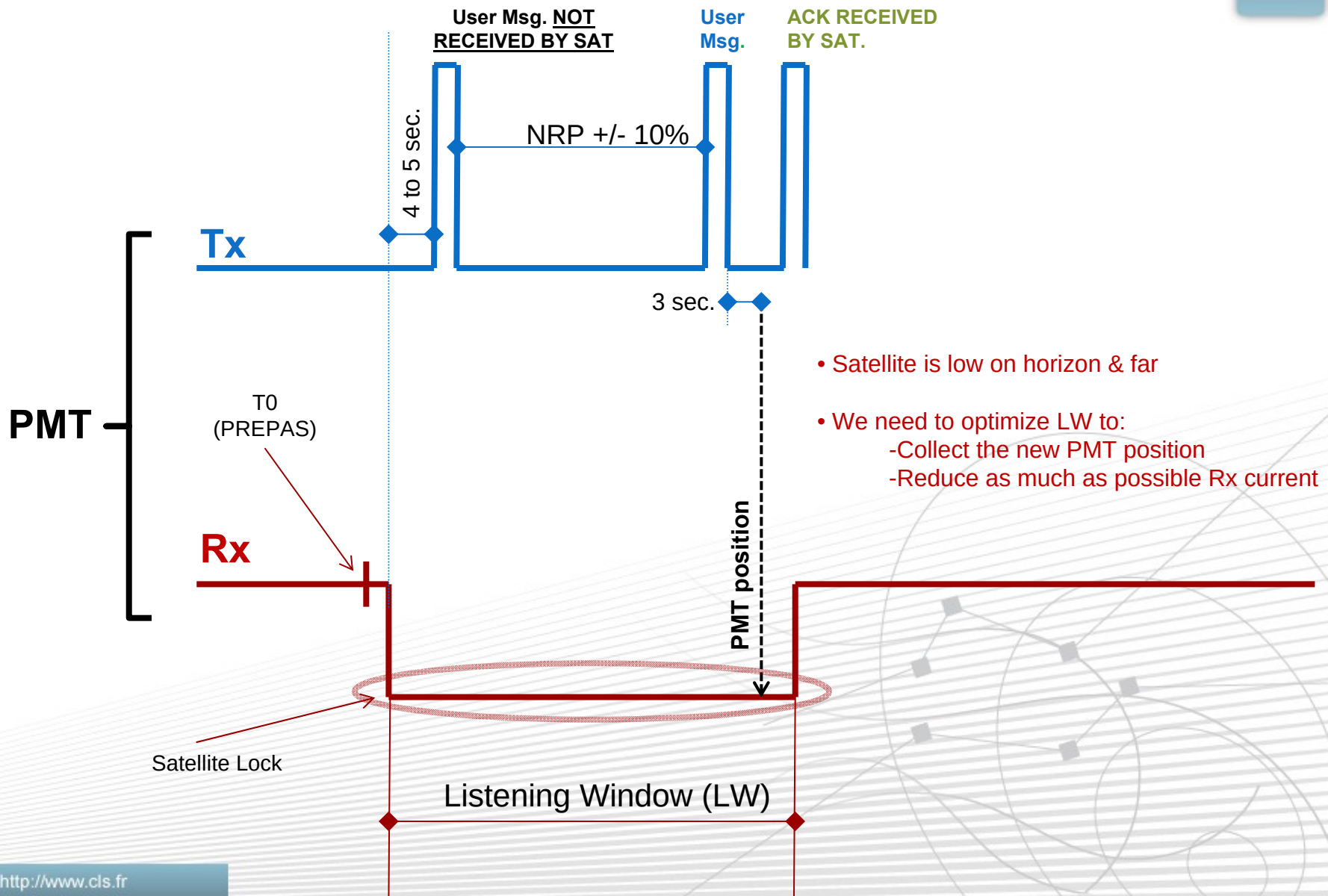


Transmission and Reception process

How do argos-3 drifters work?

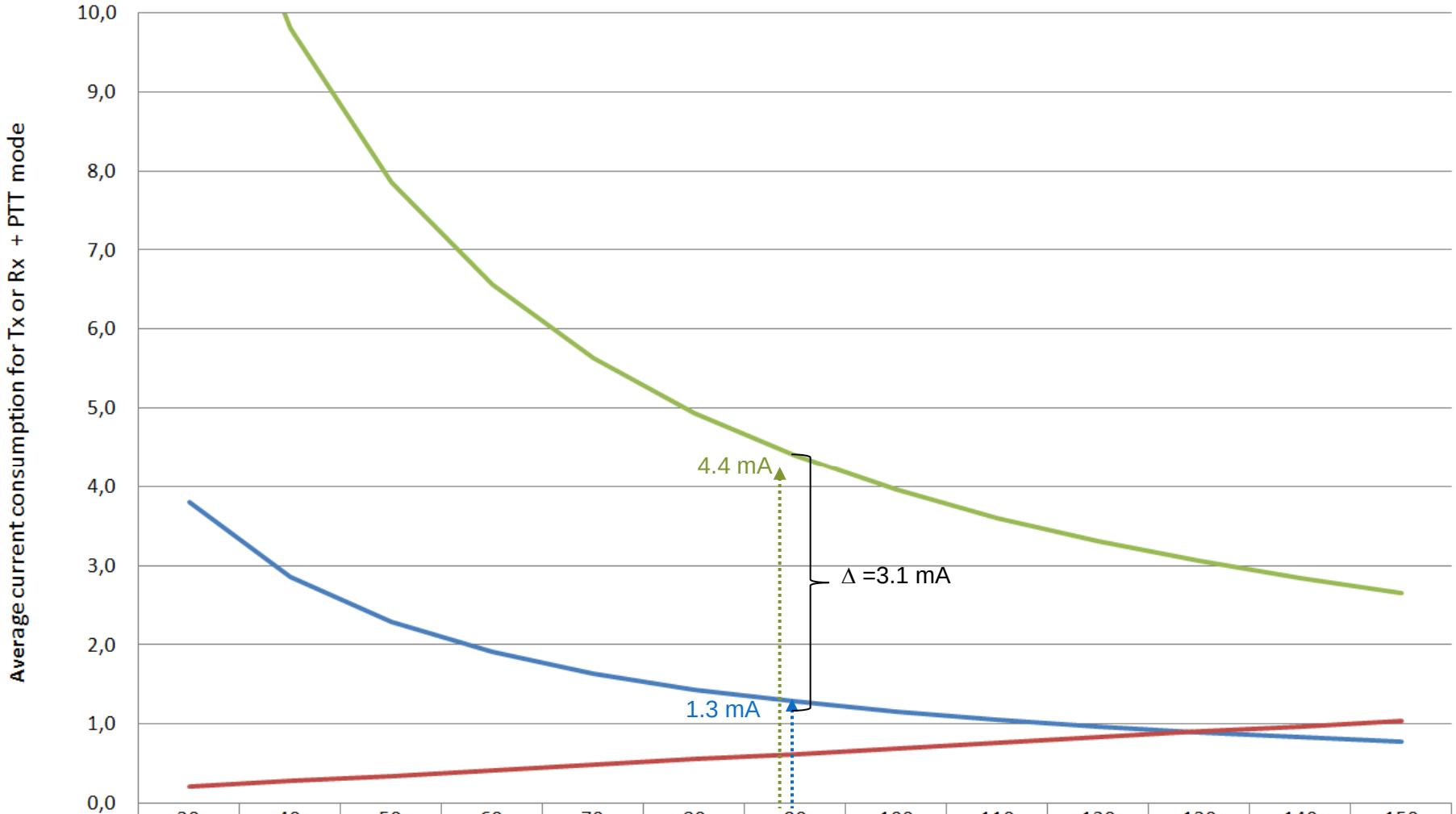


How do argos-3 drifters work?



- Satellite is low on horizon & far
- We need to optimize LW to:
  - -Collect the new PMT position
  - -Reduce as much as possible Rx current

A3 Tx & Rx av. current consumption vs PTT



	30	40	50	60	70	80	90	100	110	120	130	140	150
TX Contribution	3,8	2,9	2,3	1,9	1,6	1,4	1,3	1,2	1,1	1,0	0,9	0,8	0,8
Rx Contrinution	0,2	0,3	0,3	0,4	0,5	0,6	0,6	0,7	0,8	0,8	0,9	1,0	1,0
PTT mode	13,1	9,8	7,9	6,6	5,6	4,9	4,4	4,0	3,6	3,3	3,1	2,8	2,7

Tx rep. rate (sec.) or Listening Window (LW) (sec.) or PTT rep. rate

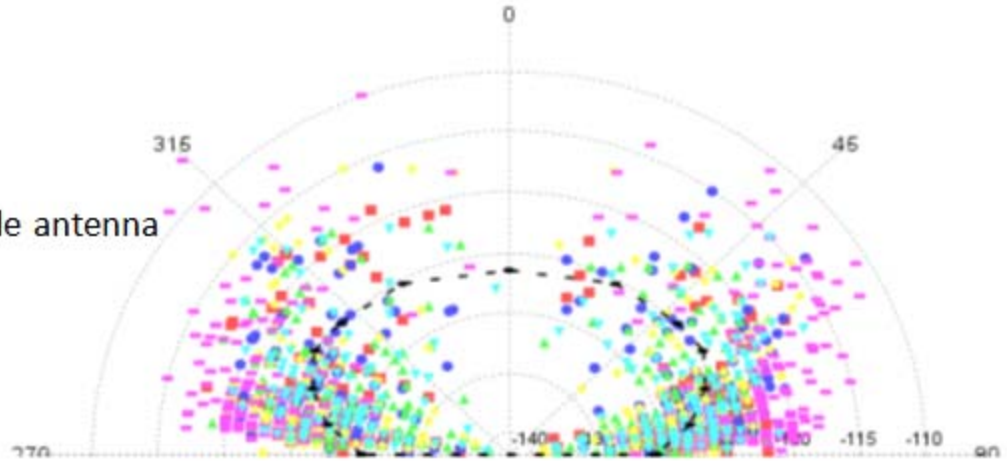
PMT position LW using a dipole antenna

Tests done in Toulouse demonstrated that 2 transmissions were required to receive PMT position:

LW=(NRP+10%)+8 sec

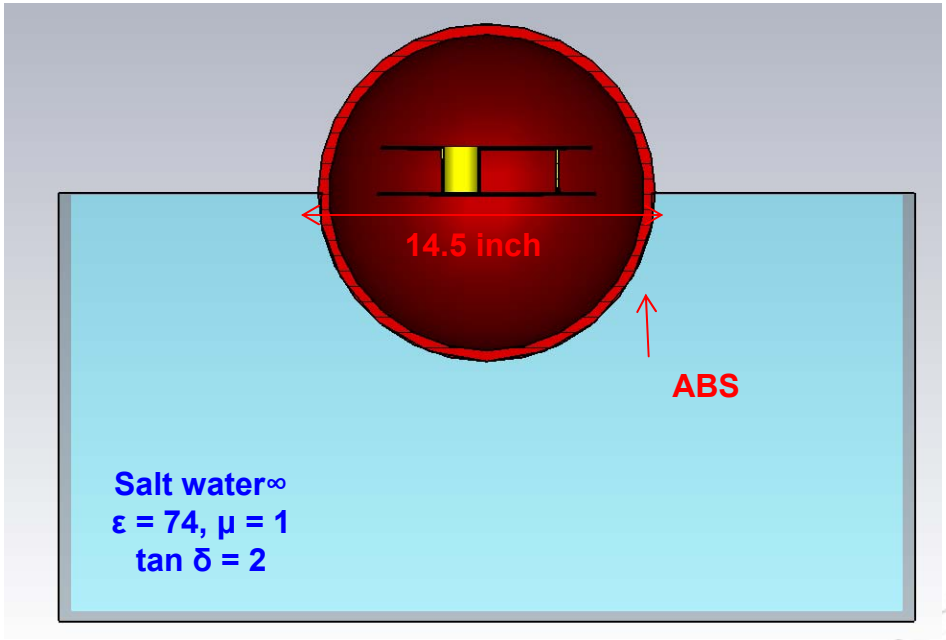
Ex: NRP: 90 sec, LW shall be set to a minimum of 107 sec. when working with a low-elevation dipole.

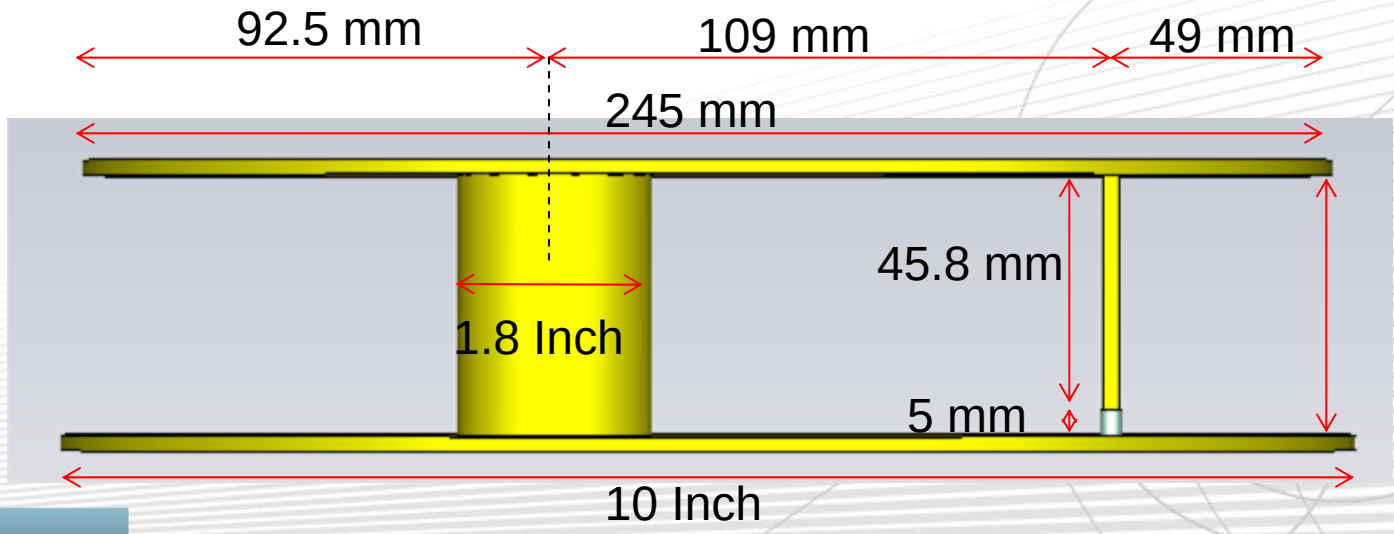
Dipole antenna



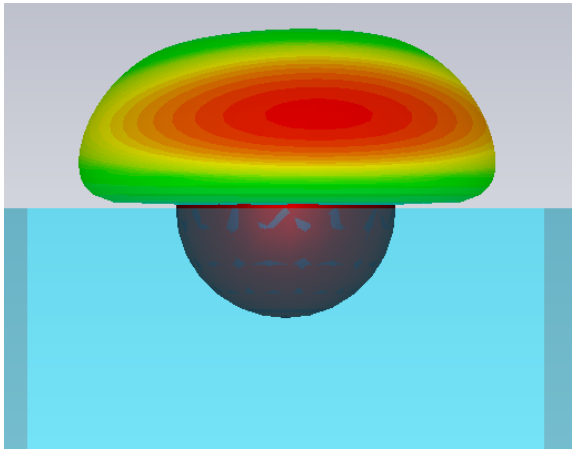
Regular dipole antenna

A3 antenna design is available upon request





A3 antenna design is available upon request



S11 better than -8.2 dB over the A3 band

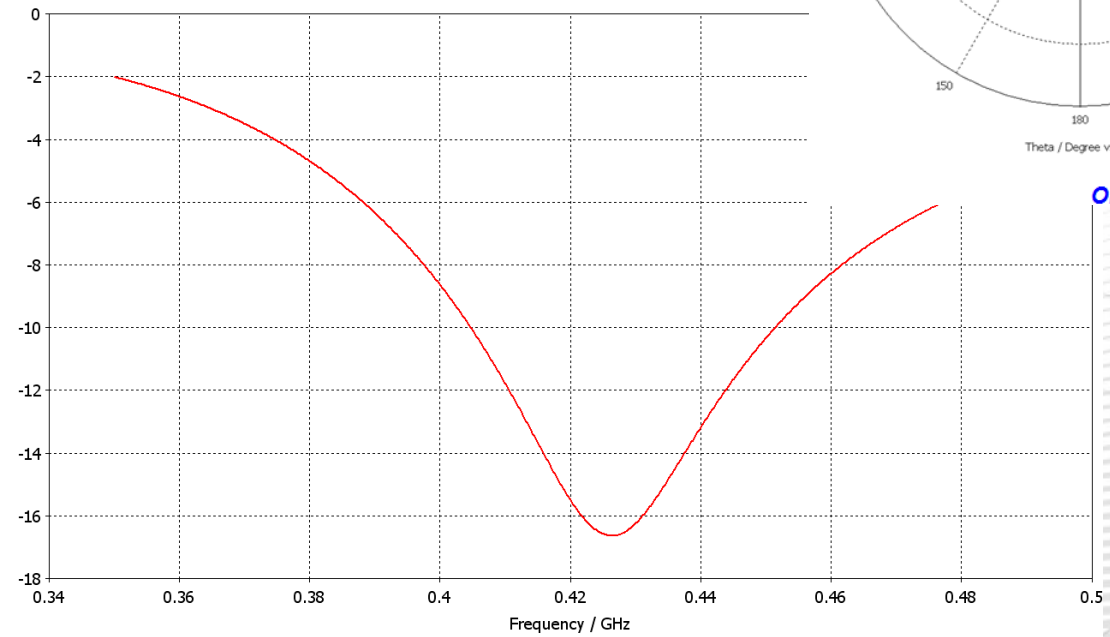


Diagramme de rayonnement 2D à 0.4 GHz dans 2 plans d'élévations

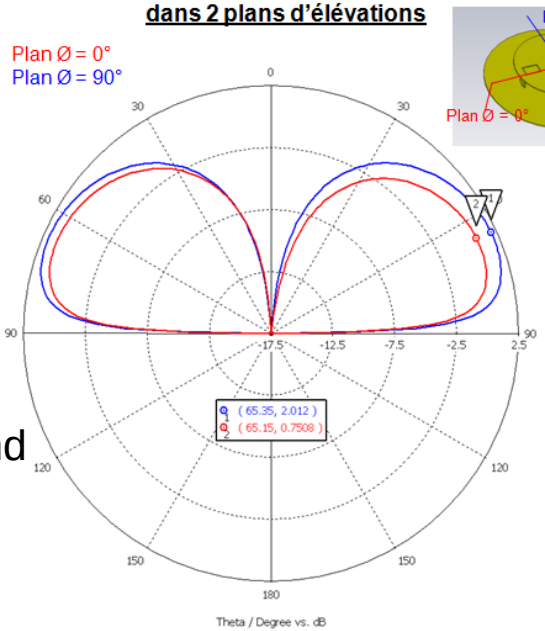
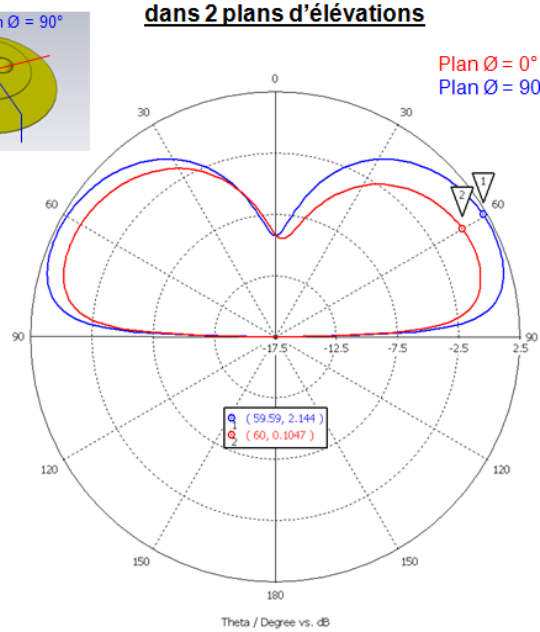


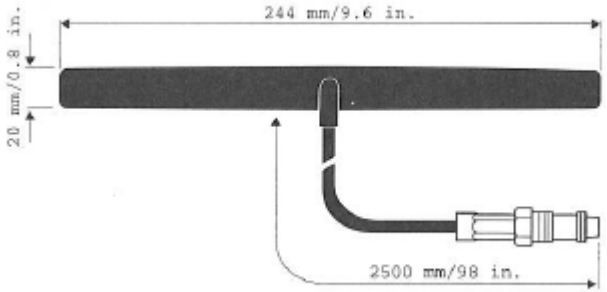
Diagramme de rayonnement 2D à 0.46 GHz dans 2 plans d'élévations



Gain maximum *: 2 dB à 0.4 GHz , 2.1 dB à 0.46 GHz*

Ondulation azimuthal: *1.25 dB à 0.4 GHz et 1.9 dB à 0.46 GHz*

The “Hirschmann” case

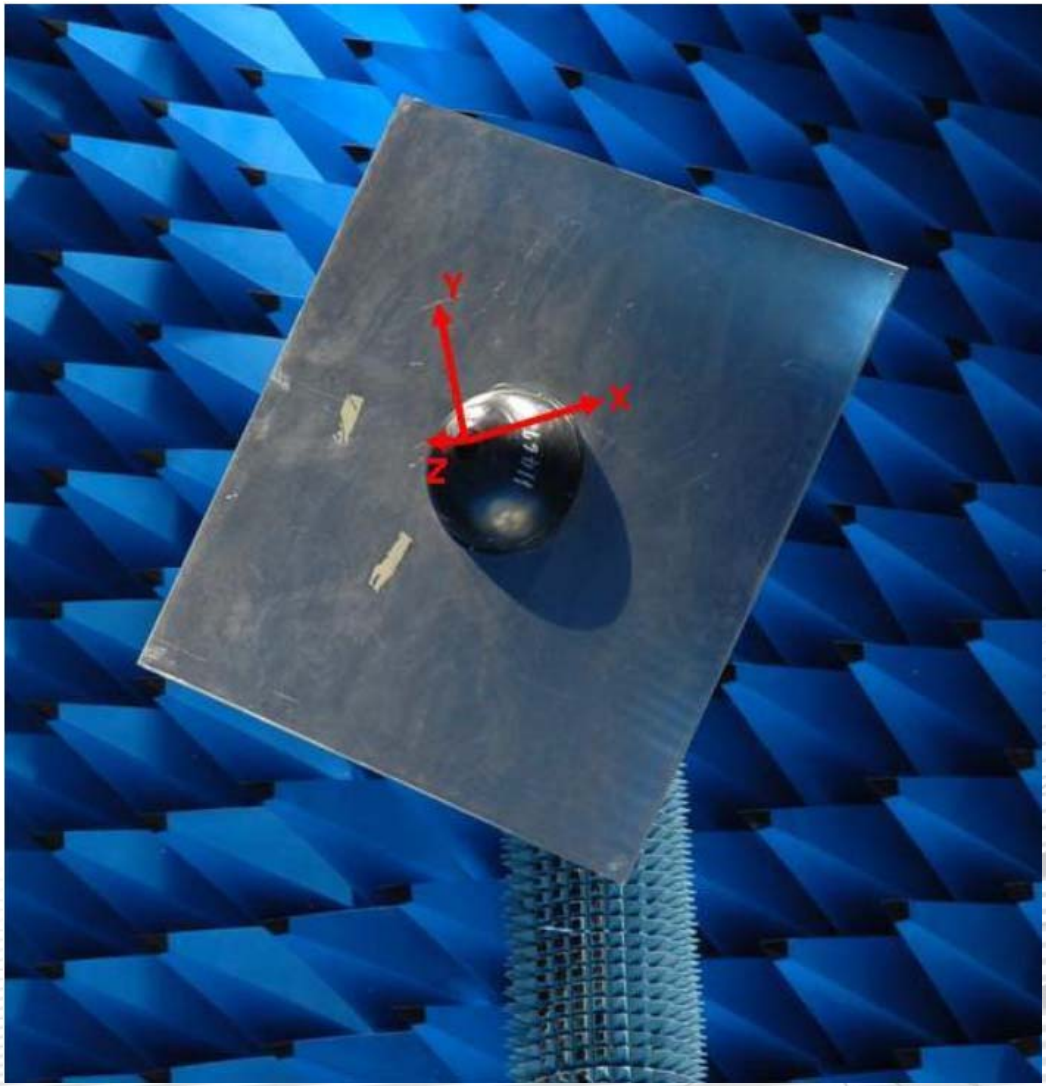


Technische Daten / Technical data / Dates techniques

Abmessungen / Dimensions		20 x 244 x 5 mm / 0.8 x 9.6 x 0.2 in.
Gehäusematerial / Housing Materials / Matériau de boîtier		PA
Gewicht / Weight / Poids		41 g / 1.4 oz
Temperaturbereich / Temperature range / Classe de température		-40 - +80°C / -40 - +176 °F
Schutzklasse / Protection class / Classe de protection		IP55 (acc. IEC 60529)
TETRA		
Frequenzbereich / Frequency range / Gamme de fréquences		380 - 430 MHz 808 - 870 MHz
Impedanz / Impedance / Impédance		50 Ohm
Gewinn / Gain	typ.	2,1 dBi
Richtcharakteristik / Beamwidth / Charactéristiques de rayonnement		omnidirectional (horizontal)
Anpassung / Return loss / Adaptation (VSWR)		< 2,0

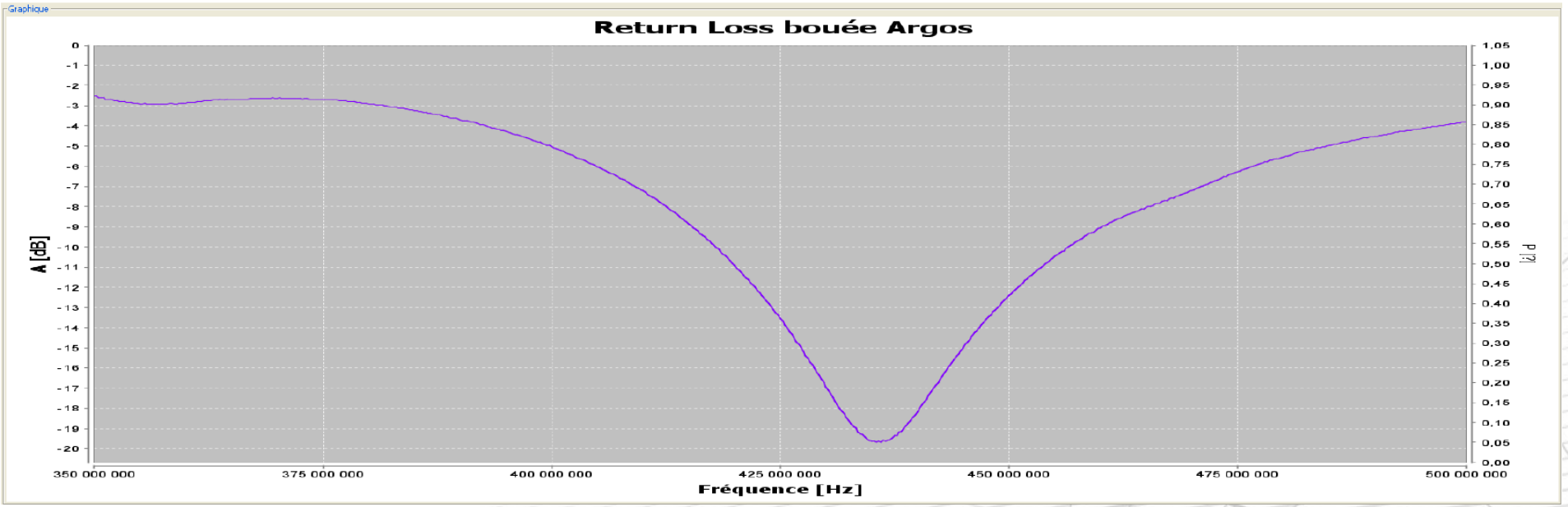
The “Hirschmann” case

Antenna
is installed
horizontally
inside the dome



CNES Labs

The “Hirschmann” case

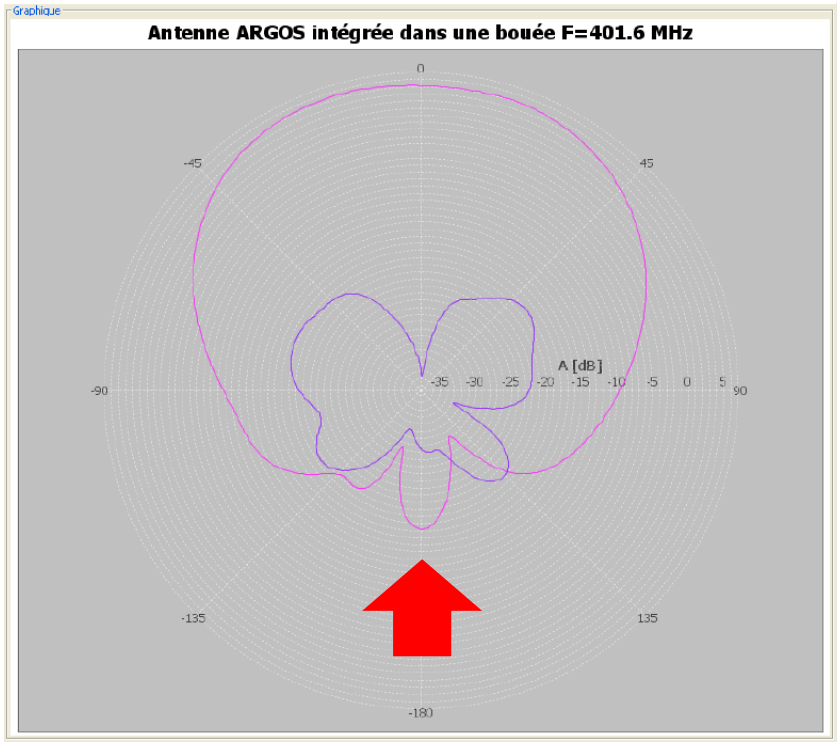


S11

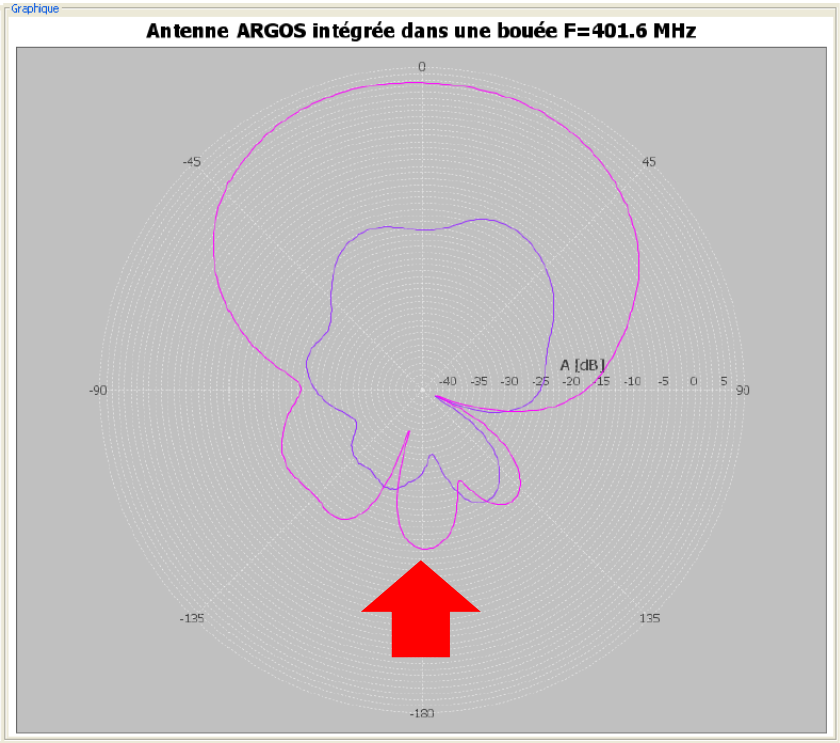
-5.34 dB @ F=401.6 MHz

-7.86 dB @ F=466 MHz.

Antenna pattern @ 401 MHz

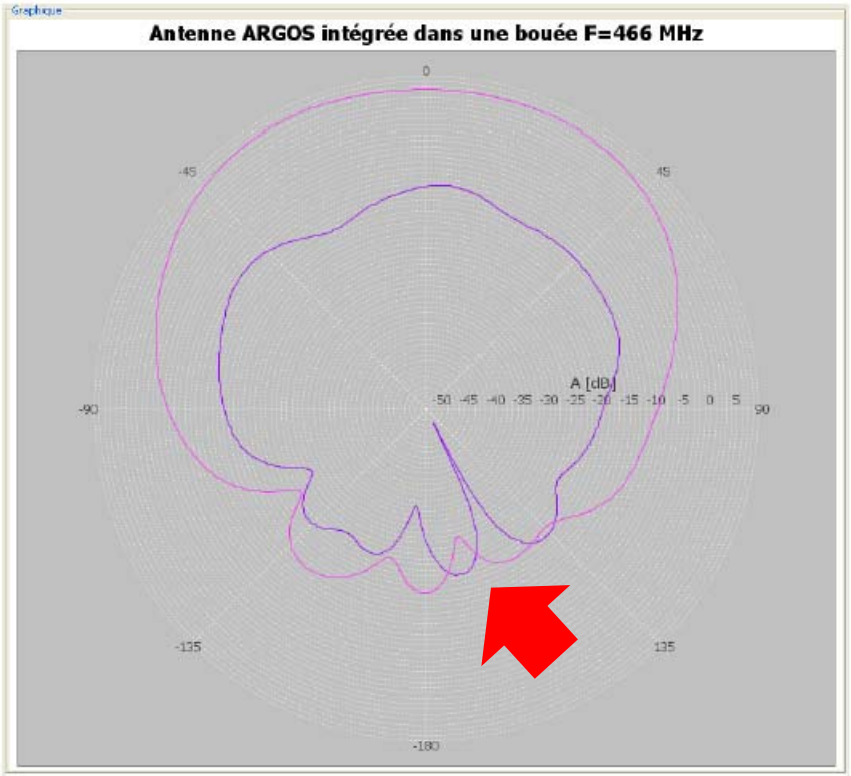


plan Ø=0°

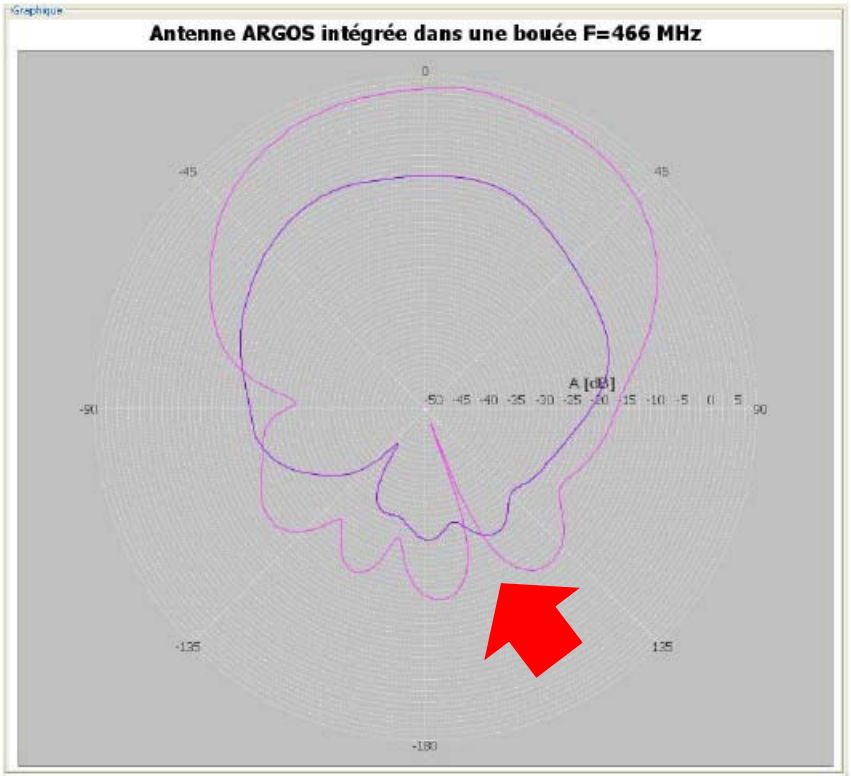


plan Ø=90°

Antenna pattern @ 466 MHz



plan Ø=0°



plan Ø=90°

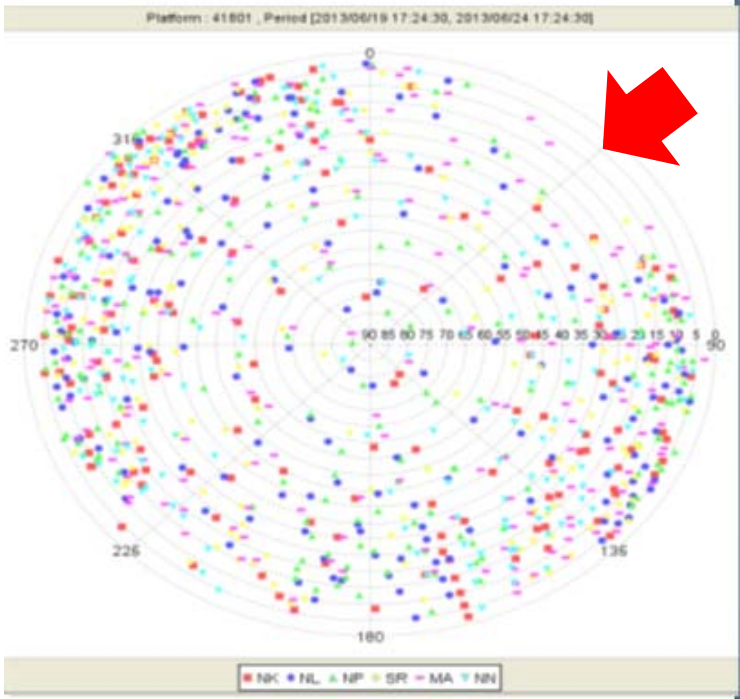
Satellite test results

Antenna pattern @ 466 MHz

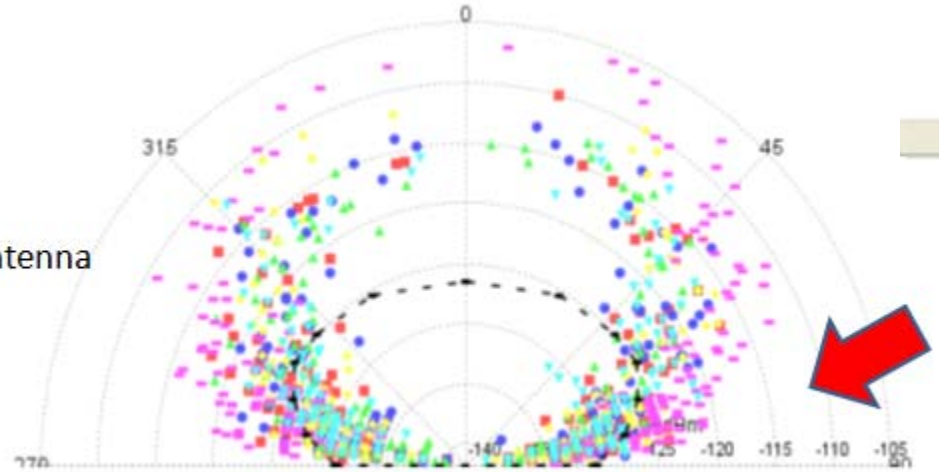
Tests done in Toulouse demonstrated that 2 transmissions were required to receive PMT position from a minimum elevation of 5°:

LW=(NRP+10%)+8 sec

ABOVE 5° of elevation

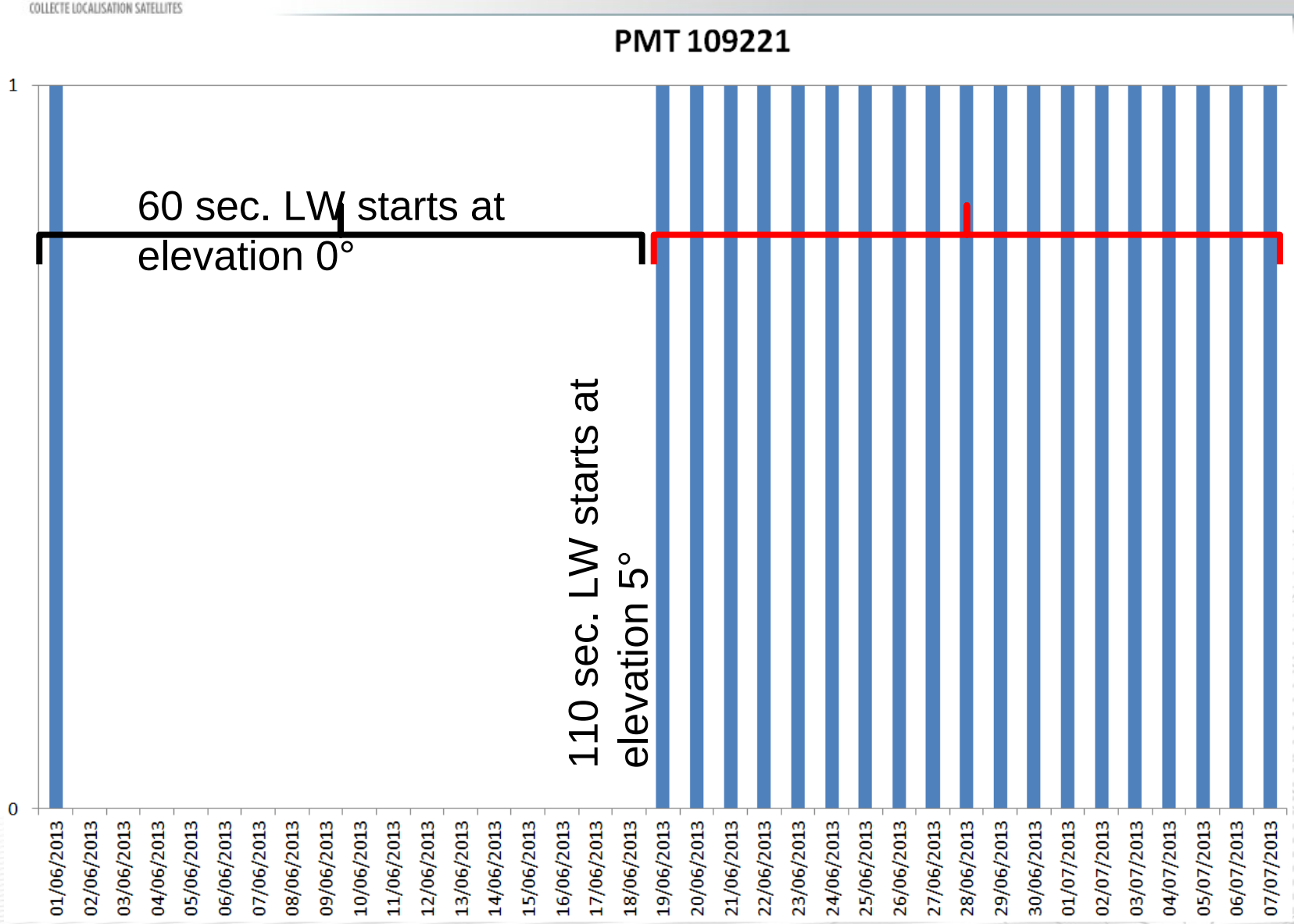


Hirschmann antenna

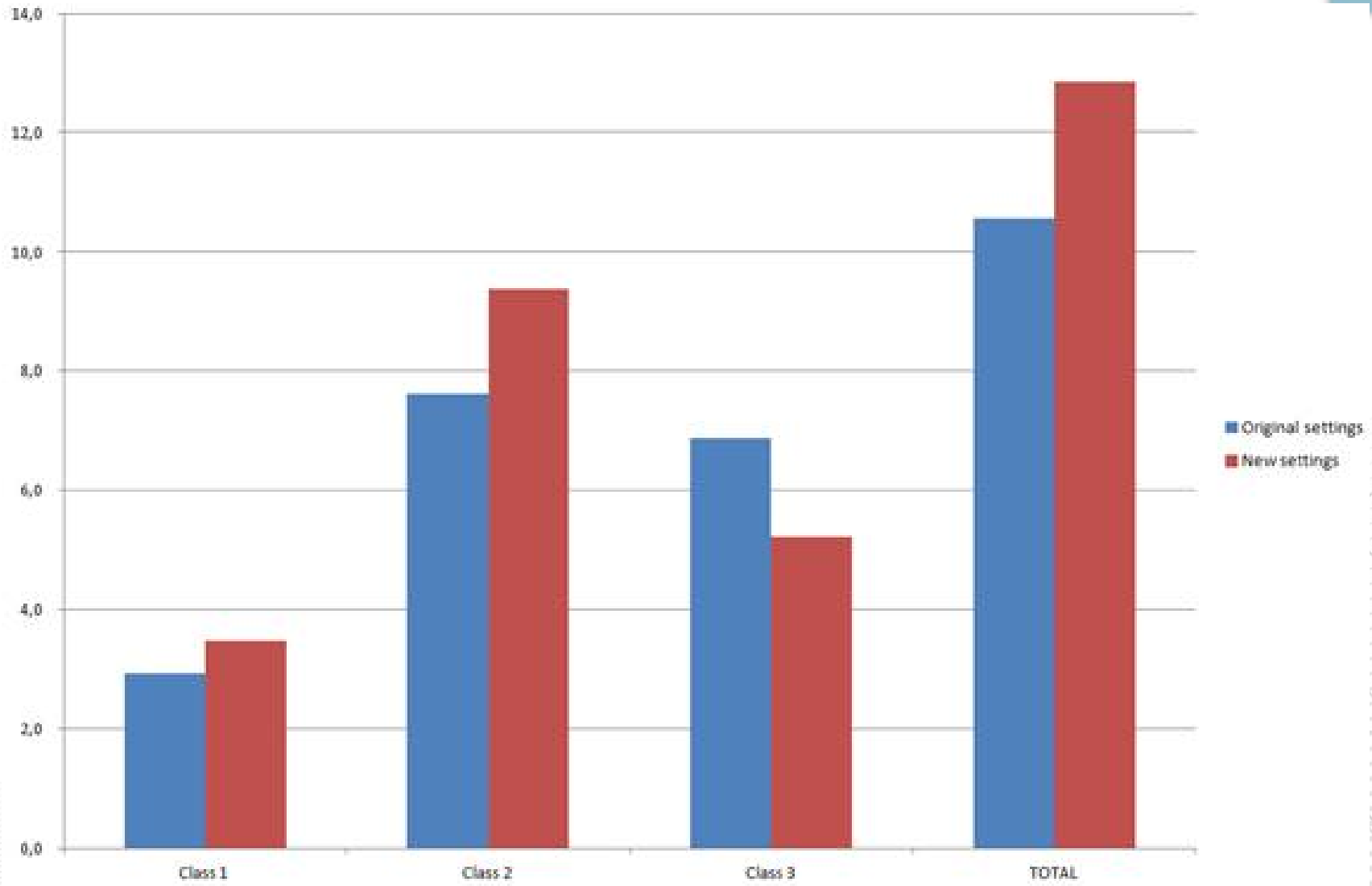


Hirschmann antenna

PMT position reception (ACK)



No significant effect on drifter locations



Conclusions

Every single drifter component shall be considered as a critical part of satellite communications.

CLS will be happy to support any integrators for drifter optimization.


Thank you!