Pilot Project for the evaluation of Argos-3 technology: ’08-’09 report

By
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Presented
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Purpose

The purpose of creating an Argos-3 DBCP Data Buoy Evaluation Pilot Project is to

- i) independently and objectively evaluate Argos-3 for use by the global data buoy community,
- ii) foster Argos-3 integration by buoy manufacturers, and
- iii) provide Argos-3 equipped drifting buoys to the community for evaluation (CLS provides 50 SVP drifters+25 barometer upgrades, DBCP 25 more barometer upgrades).

ARGOS 3 SYSTEM MAIN FEATURES

- Transmission only when satellites are in view (uses 10% of power compared to Argos 2);
- Message reception acknowledgement (more efficient data transfer);
- Pseudo-ack (for Argos 2 satellites);
- Data integrity through check-sum control;
- Remote mission control built into PMT.

Definition of Argos III data format for drifting buoys (completed January '09)

1. **Transmission formats**

Structure of Argos messages:

	Argos parameters (48 bits)			Data (by blocks of 32 bits)		
	FFFE2F	Msg length	Argos ID	Argos ID	FCS	Data Field
Nb of Bits	24	4	20	8	16	…

Generic Data Field (minimum acquisition period = 15 min):

Parameter	Bits	Min	Max	Formula
Header	2	0	3	Header = n
Observation time since 1st of January at 00:00	16	0	16382	Hour (UTC) = n * 0.25
SST	10	-5	35.8	SST (°C) = n*0.08 - 5
Submergence count	6	0	100	Subm. (%) = n * 1.6129
Battery voltage	6	10.75	16.95	Vbat (V) = n*0.1 + xx[1]
Air pressure	11	850	1054.6	AP (hPa) = n*0.1 + 850
Pressure tendency	9	-25.5	25.5	dP (hPa) = n*0.1 - 25.5[2]
GPS latitude sign bit	1	-1	1	Lat sign = n*-2 + 1
GPS latitude	23	0	90	Lat (deg) = n*0.0000128
GPS longitude sign bit	1	-1	1	Long sign = n*-2 + 1
GPS longitude	24	0	180	Long (deg) = n*0.0000128
Observation time adjustment	10	0	1024	Adjustment added to obs. Time. Hour = n/3600

Definition of Argos III data format for drifting buoys (completed January '09)

Transmission Data Formats:

SVP Data Format (2 Argos blocks): SVP

	Header	Time	SST	Submer	Battery						Bits in Data Format field	Bytes	Nb of Transmitted data blocks
Nb of Bits	2	16	10	6	6						40	5	2
	Header=0												

SVP-B Data Format (3 Argos blocks): SVP-B

	Header	Time	SST	Submer	Battery	Air Pressure	Pressure Tendency						
Nb of Bits	2	16	10	6	6	11	9				60	7 1/2	3
	Header=2												

SVP + GPS Data Format (4 Argos blocks): SVP-G - GPS Accurate Time

	Header	Time	SST	Submer	Battery	GPS Latitude	GPS Longitude	Time Adjustment					
Nb of Bits	2	16	10	6	6	24	25	10			99	12 3/8	4
	Header=1												

SVP-B + GPS Data Format (5 Argos blocks): SVP-BG - GPS Accurate Time

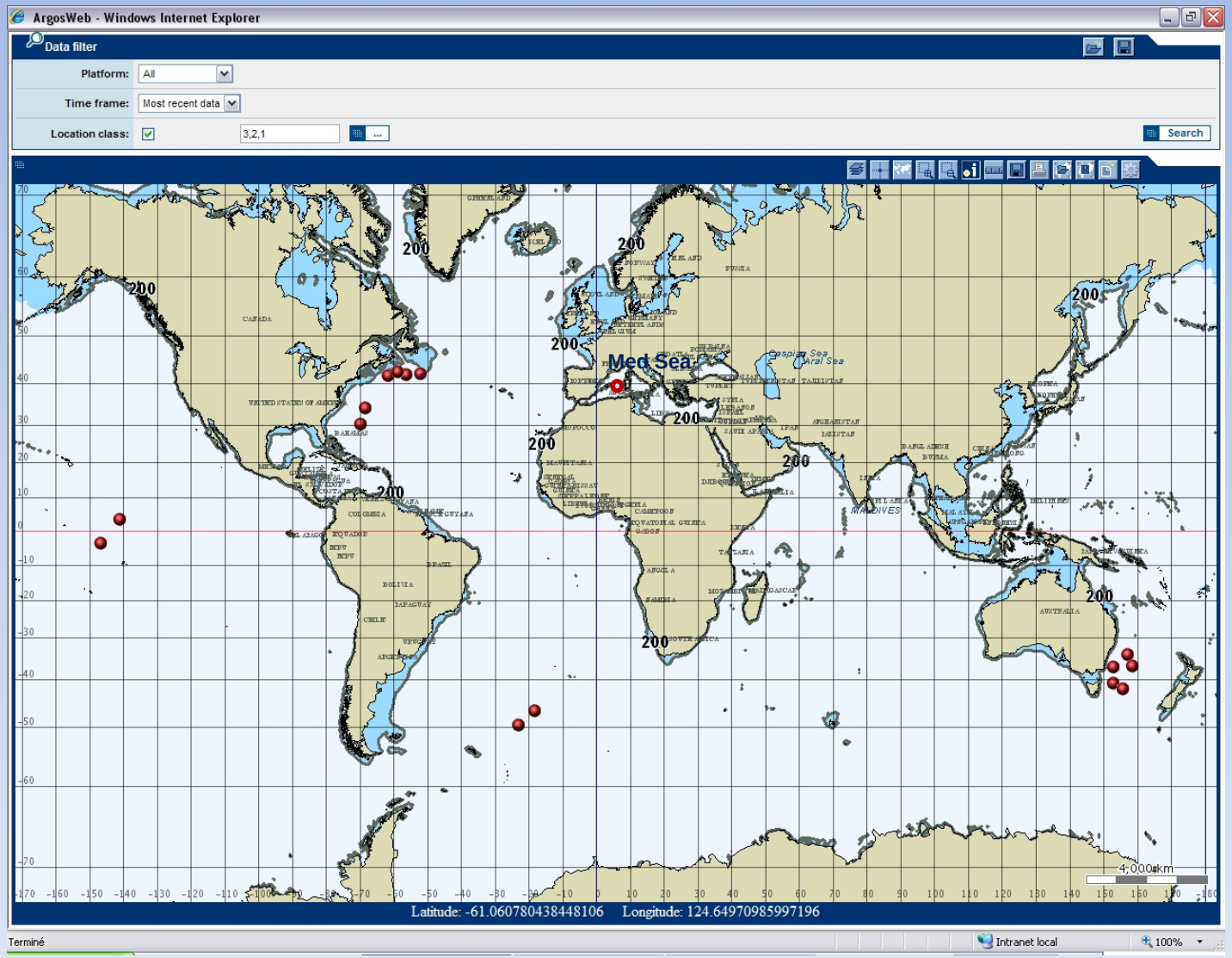
	Header	Time	SST	Submer	Battery	Air Pressure	Pressure Tendency	GPS Latitude	GPS Longitude	Time Adjustment			
Nb of Bits	2	16	10	6	6	11	9	24	25	10	119	14 7/8	5
	Header=3												

Buoys delivered by manufacturers

- 5 SVP-BG and 5 SVP-B, Clearwater;
- 10 SVP, Pacific Gyre;
- 5 SVP-B and 5 SVP from Metocean;
- 1 SVP-B and 1 SVP were dry tested and are ready for shipment from Marlin-Yug.

A typical Argos-3 buoy integration

Argos III array status



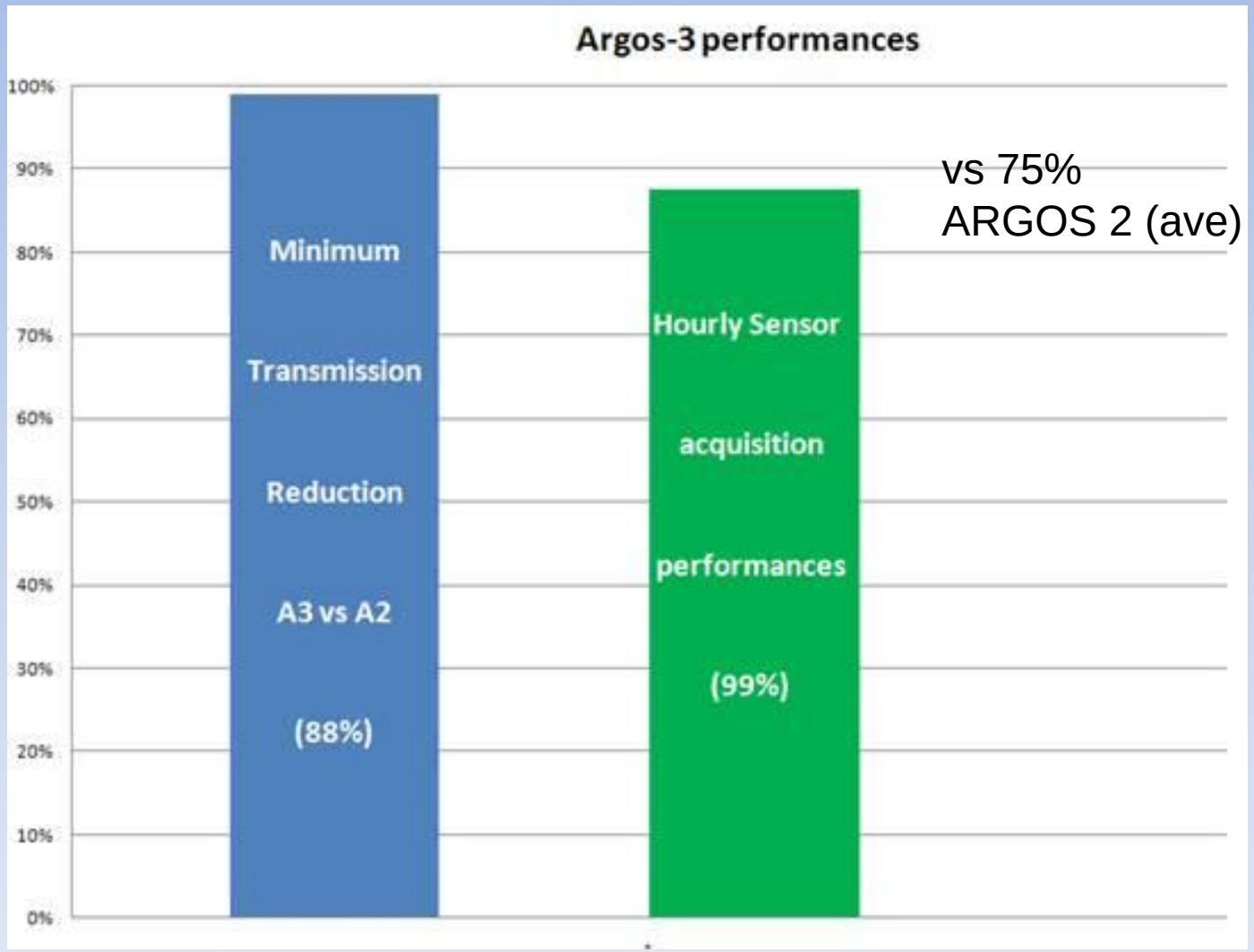
18 Argos-3 already deployed buoys

	Manufacturers	Buoy type	Agency
7	Metocean	5 SVP B	NZ Met. Office
		2 SVP	SAWS
4	Clearwater	1 + 1 SVP B G	IMEDEA / NOAA
		1 + 1 SVP	IMEDEA / NOAA
7	Pacific Gyre	5 SVP 2 SVP ?	NOAA
	Marlin Yug		

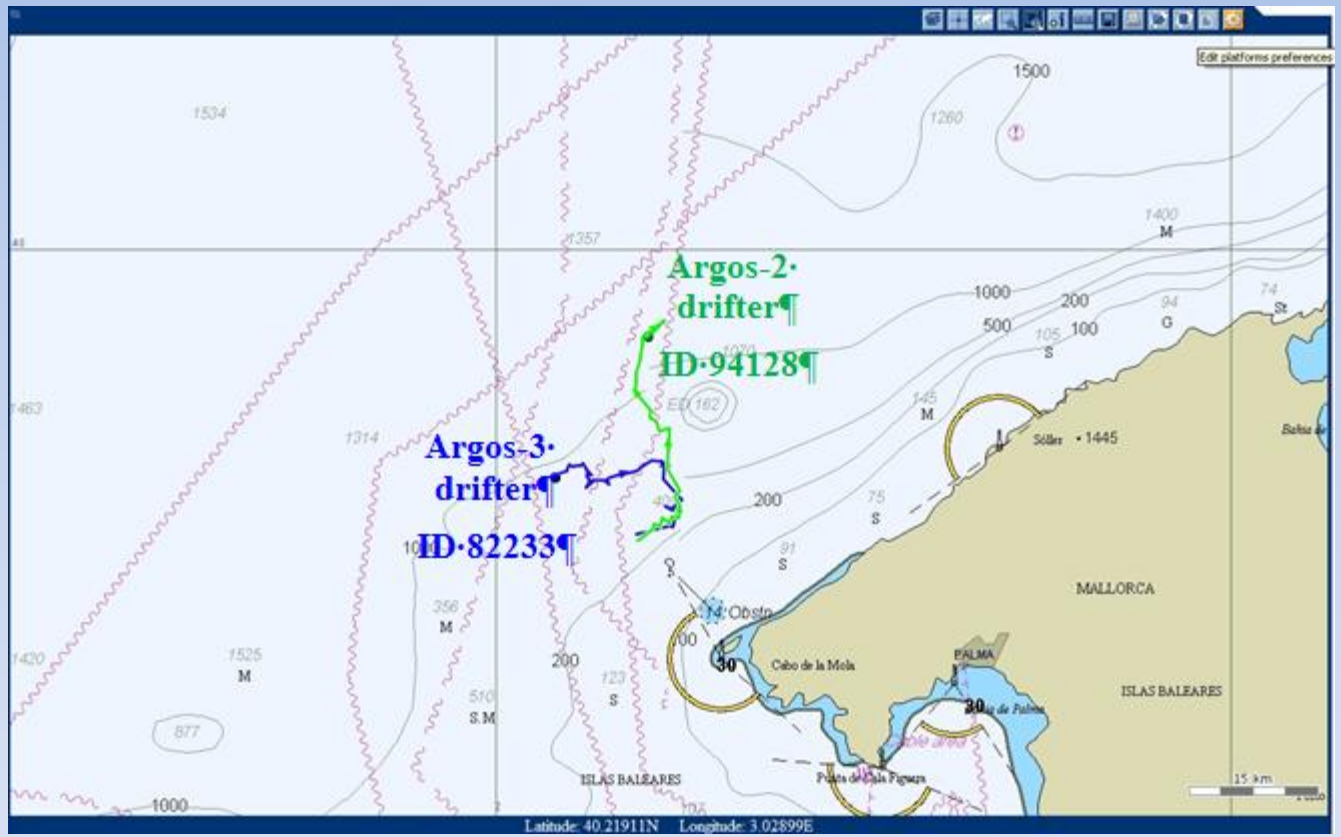
Evaluation Criteria

1. Check efficiency of initialization process and updates from satellites (position, time, ephemeris)
2. Dependability of sampling protocol (schedule of sampling)
3. Dependability of the controller/transmitter package (life expectancy) vs existing Argos 2 array
4. Quality of location, e.g. location class stats and compare to GPS fixes. How many msgs needed to have comparable locations vs argos 2
5. Data delivery (on schedule?) and latency of sensor(s) data.
6. Efficiency of transmission (how many attempts to get a full message –of course function of sea state but also maybe location, accuracy of location. Power management (look at # of argos 3 msgs received/attempted –max 3-4 attempts) and onboard analysis (also use ECMWF model predictions to evaluate environm. Pars)
7. Implement two way communication (CLS already has experience) and change sensor sampling scheme
8. Tuning the transmission strategy of the buoy to spare battery or improve the performance according to geographical/environmental conditions.
9. Cost implications (transmitter, antenna and transmission costs).

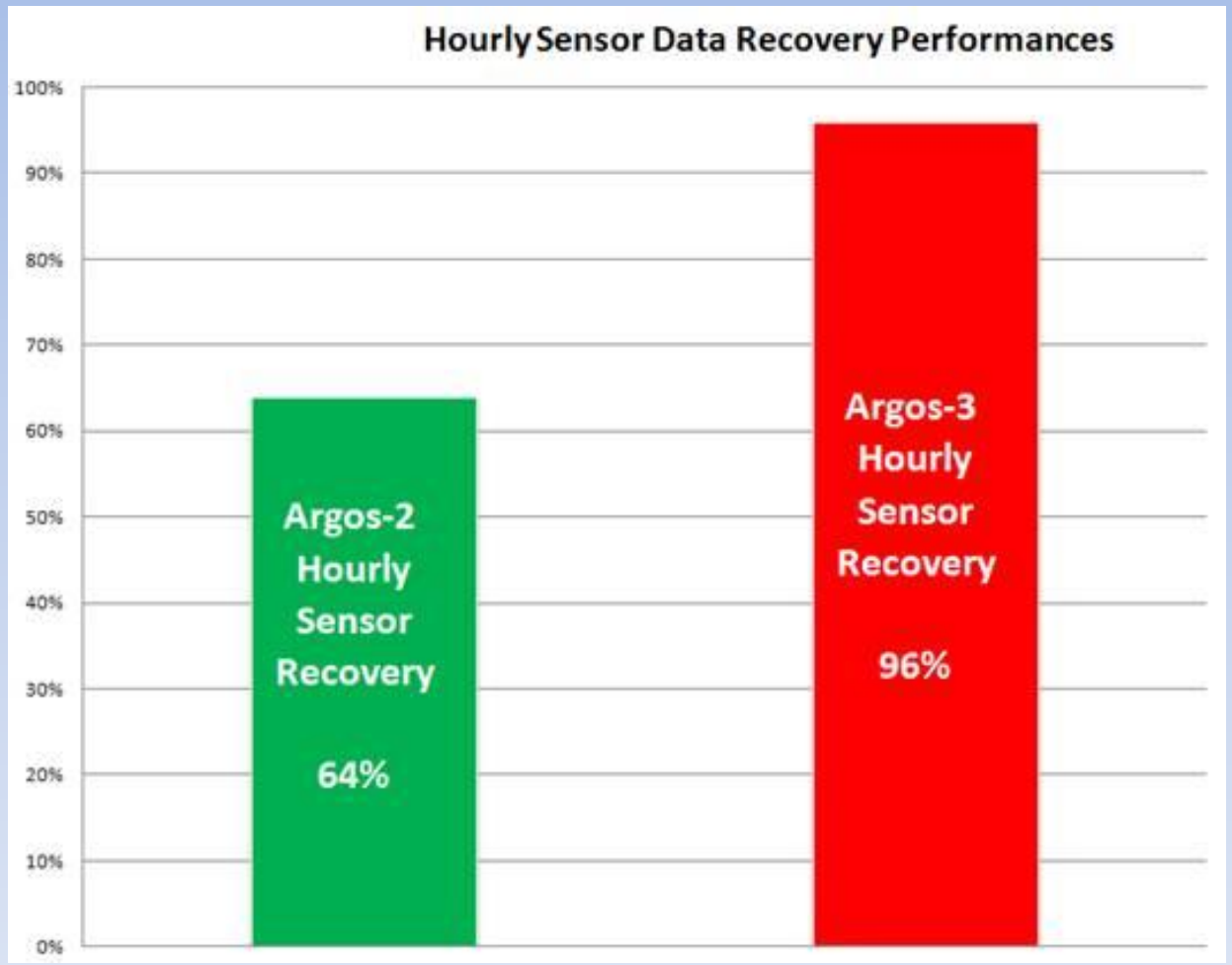
Argos-3 performances
MET – SVP B ID 82276



Argos-3 SVP BG - ID 82233
Argos-2 SVP - ID 94128
2nd try with an Argos-2 SVP drifter



Argos-3 improvements



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