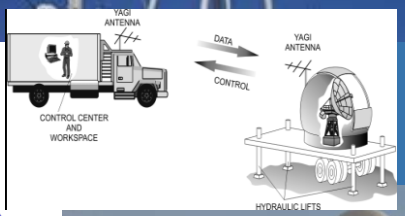
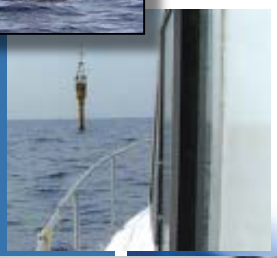
HORST

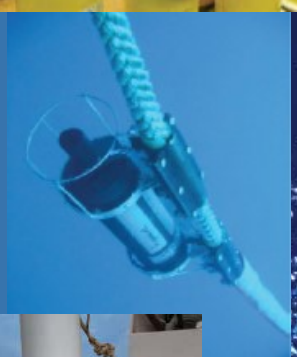
HYDROMETEOROLOGICAL & OCEANOGRAPHIC
REMOTE SENSING TECHNOLOGIES



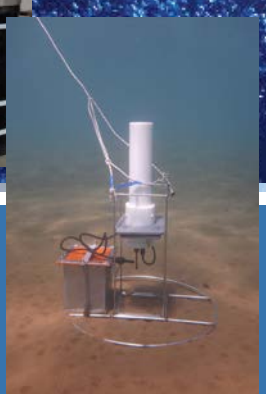


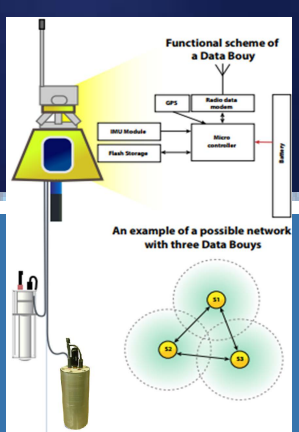
H.O.R.S.T. "Environmental Remote Sensing Technologies" S.P. P.C. is a company, aiming on providing **integrated solutions** with the development of**, innovative technologies and modelling applications**, focusing on **remote sensing and prediction of environmental parameters at sea and overland**

Underwater passive acoustic & radioactive detectors, buoy applications, etc. for
(i) Meteorological
(ii) Biological
(iii) Geological
(iv) Environmental Analysis
(v) Offshore Operations



Satellite & radar hydrometeorology and hydrology modeling for flash flooding and sever weather





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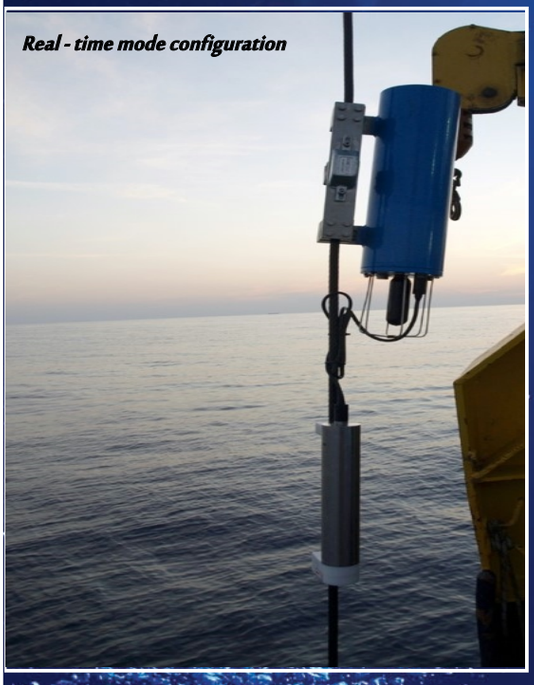
Hydrometrological and Oceanographic Remote Sensing Technologies Ltd. (HORST Ltd.) is a company dealing with the implementation, design and customization of underwater Passive Acoustic systems called PAL (Passive Aquatic Listeners).
This state-of-the-art technology seeks to address the emerging need for frequent sampling and prediction of spatio-temporal variations of environmental physical-biological parameters, man-made activities and the continuous, increasing noise trends in the Oceans.



Real - time mode configuration

Autonomous mode configuration

Bristelmouth mode configuration

HORST

HYDROMETEOROLOGICAL & OCEANOGRAPHIC
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PRODUCT

– PAL unit with state-of-the-art hardware and software, customized for different applications, according to customers' needs.

• monitoring of different physical processes:

1. **Environmental:** wind speed, precipitation (i.e., convective/stratiform, drop size distribution)
2. **Biological:** marine mammal calls (i.e., whales, dolphins), shrimps, etc.
3. **Man-made activities:** ships and sonars, impulsive from seismic surveys, pilling from wind farms and oil platforms, etc.
4. **Geological:** earthquakes, landslides, cold and/or warm seepage, etc.

• detection and quantification of sound sources;

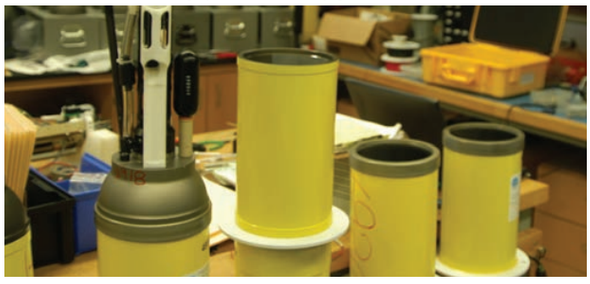
– Training for system deployment in buoys and subsurface moorings.

– Manual and open source software for client adjustment.

– Experts support and upgrades for specialized customer needs.

– 2-year warranty and maintenance support.

Argo float mode configuration



BENEFITS & REWARDS TO CUSTOMERS

Functional: A single sensor can measure accurately multiple environmental and biological parameters (frequency acoustic range 2 Hz – 80 kHz with sensitivity of –173 dB rel. 1V/μPa @ 1 kHz).

Underwater: Less susceptible to vandalism and weather conditions also in high operational depths up to 4000m depending on housing materials. Bearing the greatest advantage of large sea-surface acoustical operational coverage (e.g. > 4 km^2).

Flexible, Small and Autonomous Easy to deploy with high data capacity storage (>64GB) can operate for long period (more than a year) with no interruptions, standardization communication protocol for existing observing systems (i.e. plug'n'play). Its portability will also provide the capability for operation on various measuring platforms (e.g. Autonomous and/or remotely underwater vehicles, ARGO floats, drifters, etc.)

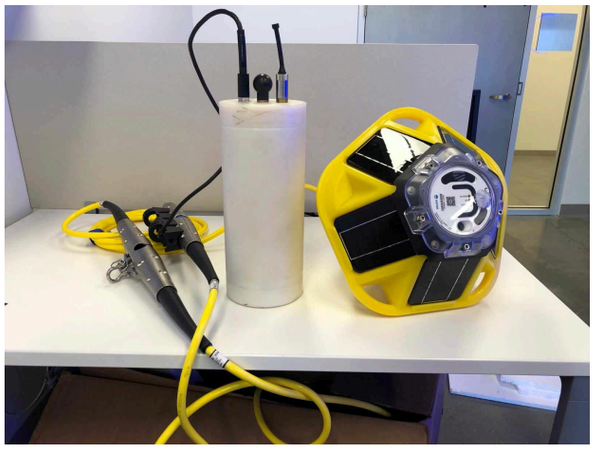
Low production Cost: Low cost system components.

Smart: Real-time processing algorithm for detection, quantification, temporal sampling strategy selection and optimized storage of data.

SPECIFIGATIONS

Power Consumption	0.8W total power consumption
Operating Depth	500 - 4000 meters
Number of Channels	1
Max Sample Rate	192 kHz
Max Dynamic Rate	105dB
Frequency Range	5Hz to 95kHz
Sensitivity	(-160dBV re 1uPa)
Gain Selection	0 to 40dB
Interface	Micro USB
Bristlemouth Compliant	No
Self Noise	< 20 dB
Operating temperature Range	(-2C to +55C)
Processor	Dual-core Tensilica LX6 microprocessor
Memory	4MB SRAM
Storage	128GB

Low cost real-time configuration mode integrated with Sofar's Spotter



Hydrophone to Buoy comms overview

Ambient noise budget of PAL from different deployment sites*

Sound Budgets

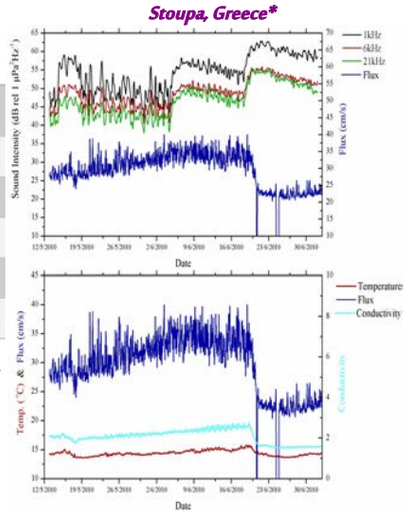
Percentage of time present

	20 S 85 W	10 N 95 W	Bering Sea	Ionian Sea	Carr Inlet	Haro Strait
Wind	93%	86%	90%	74%	80 %	21 %
Rain	-	8 %	3 %	3 %	8 %	5 %
Ships	0.5 %	1.5 %	1 %	20 %	2 %	59 %
Whale*	1.8 %	0.6 %	-	0.5 %	-	-
Other	5 %	4 %	6 %	2 %	10 %	15 %

*30 kHz click detected – no visual confirmation

****These data are optional avaiable in real-time mode via inductive or acoustic modem***

PAL measurements from an underwater SGD in Stoupa, Greece*



HORST S.P.P.C., Alepou, Mamaloi, Corfu 49100, Greece

tel/fax: +30-26610-52704, cell: +30-6974113259

site: www.horst.gr

email: info@horst.gr