RBR

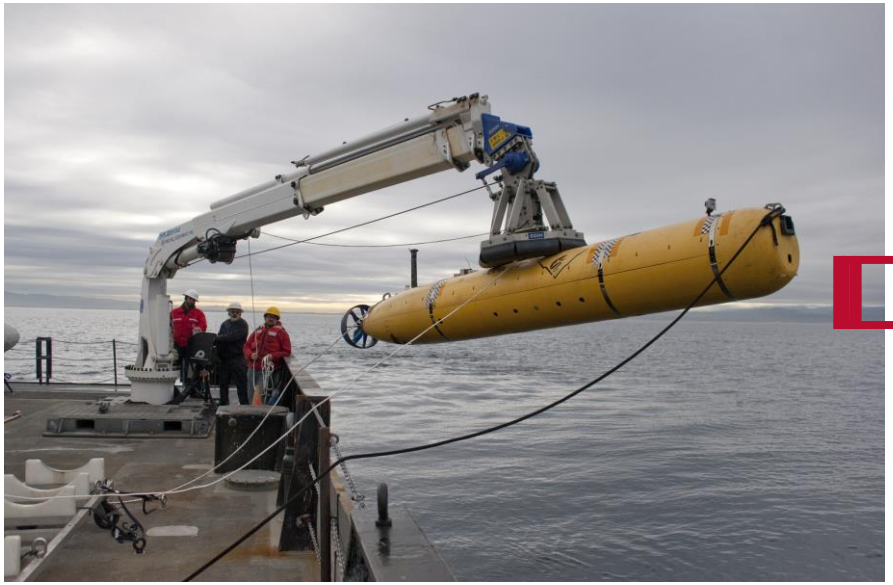
rbr-global.com

改进传感器技术和平台集成以实现更多功能
Improving sensor technology to enable more capabilities

Eric Siegel

Evolution: Large to Small

海洋观测发展历程: 大型设备 → 小型仪器



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Evolution: Short-term to Long-term

海洋观测发展历程: 短期观测 → 长期监测

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Evolution: Few to Many

海洋观测发展历程: 单个浮标 → 海量布放

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Smaller
体积更小

Longer
周期更长

Many
数量更多

Sensor Evolution

- More accurate 更高精度
- Lower power 更低能耗
- Very strong 坚固耐用
- Quiet operation 低噪音运行
- Easy calibration 方便校准
- Sensor integration 集成运行

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Our focus

- 高精度传感器Highest accuracy sensors
- 全球海洋科学研究Global ocean science research
- 超低功耗电子产品Ultra-low power electronics
- 迅速响应客户需求Responsive partnerships
- 周到的技术支持Attentive technical support
- 总部位于加拿大Located in Canada
- 销售市场及技术支持遍布全球Global sales & support network
- 中文网站RBR中国rbr.cn

Products

Loggers
记录仪

OEM
OEM生产

Sensors
传感器

Systems
观测系统

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传感器 **Sensors**

- 温度 Temperature
- 深度(压力) Depth
- 光学溶解氧 ODO
- 光合有效辐射 PAR

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观测记录仪 **Loggers**

- 微型观测仪 Compact loggers
- 温盐深记录仪 CTDs
- 水质仪 Water quality
- 波潮仪 Tide & Wave
- 海啸预警 Tsunami warning

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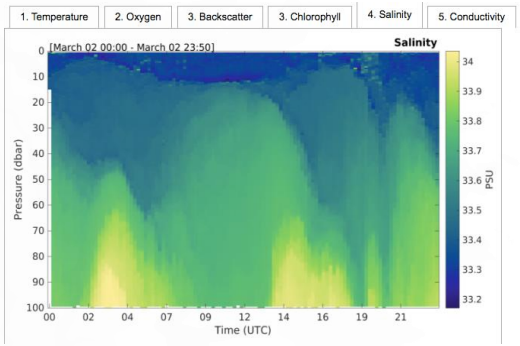
观测系统 **Systems**

- 感应式数据通信
  Inductive modems
- 遥测服务
  Telemetry services
- 安全数据托管
  Secure data hosting
- Wi-Fi数据传输和移动应用
  Wi-Fi & Mobile apps



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OEM 生产

- 低功耗
  Low power electronics
- WOCE精度标准
  WOCE accuracy
- 传感器集成
  Sensor integration
- 定制化解决方案
  Customized solutions

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Global Oceanographic Acceptance

- WOCE精度要求

WOCE accuracy

- 广泛应用于全球主要海洋机构

Used at every major oceanographic research centre

- 布放于每个海域

Deployed in every ocean

精度 Accuracy	RBR CTD	Pumped CTD
电导率 Conductivity	±0.003 mS/cm	±0.003 mS/cm
温度 Temperature	±0.002°C	±0.002°C
深度（压力） Depth	±0.05% FS	±0.1% FS
功耗 Power Req	18mJ	175mJ

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核心温盐深传感器技术Core CTD Technology

- 感应式电导率传感器
Inductive Conductivity
- 温度传感器
Temperature
- 深度传感器
Depth
- 电子电路
Electronics

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感应式电导率传感器

Inductive Conductivity

- 高精度　High accuracy
- 低功耗　Very low power
- 自然冲刷 Natural flushing
- 无泵　　No pump
- 低噪运行 Quite operation
- 结实耐用 Strong

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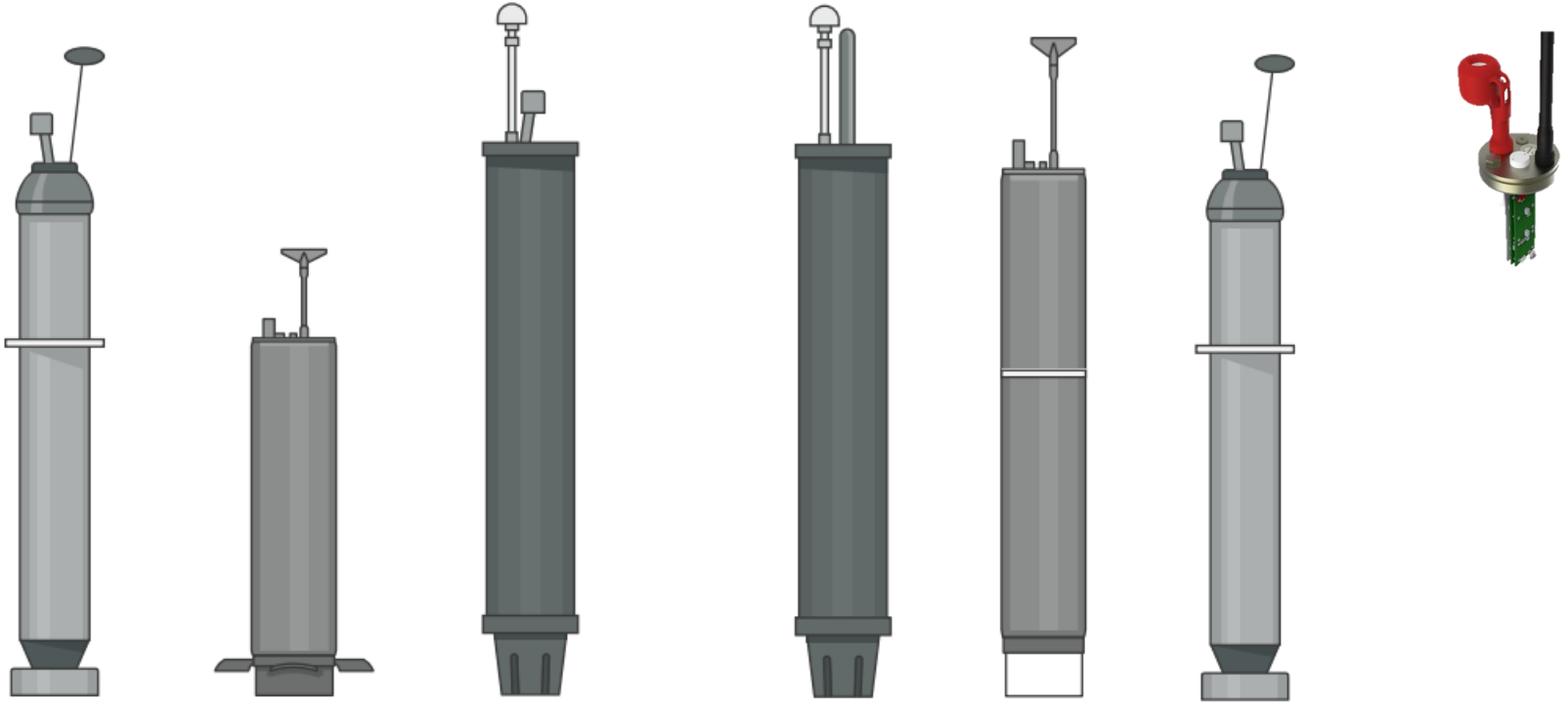
RBR应用于剖面浮标
RBR on profiling floats



Teledyne APEX

MRV ALAMO

MetOcean NAMI

MetOcean PABLO

MRV S2-A

NOTC COPEX

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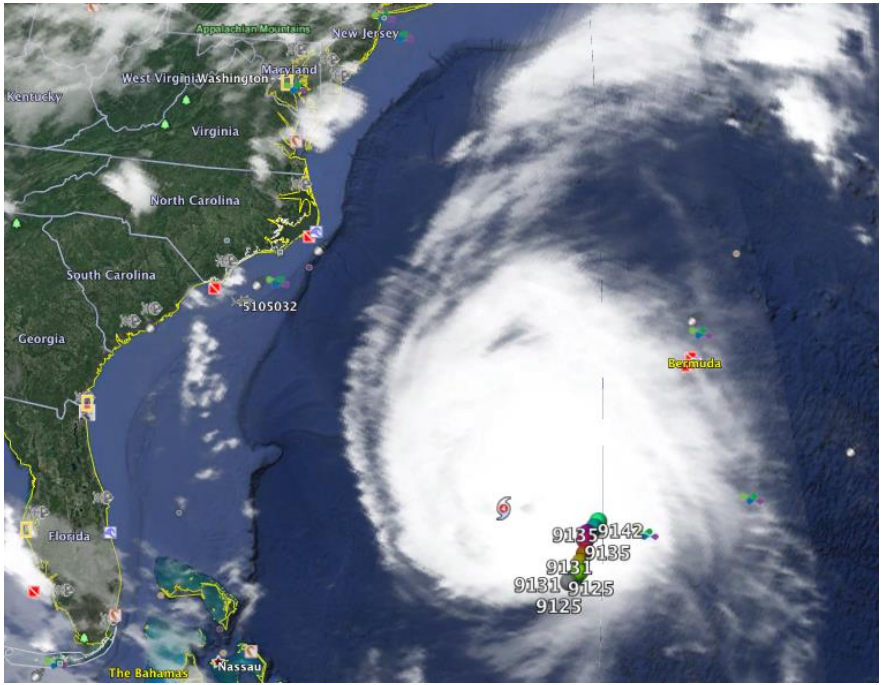

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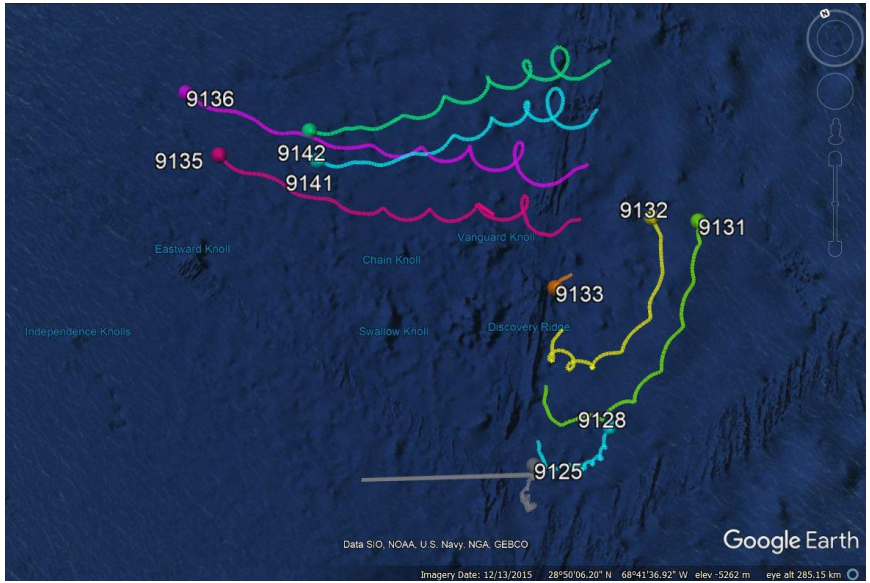

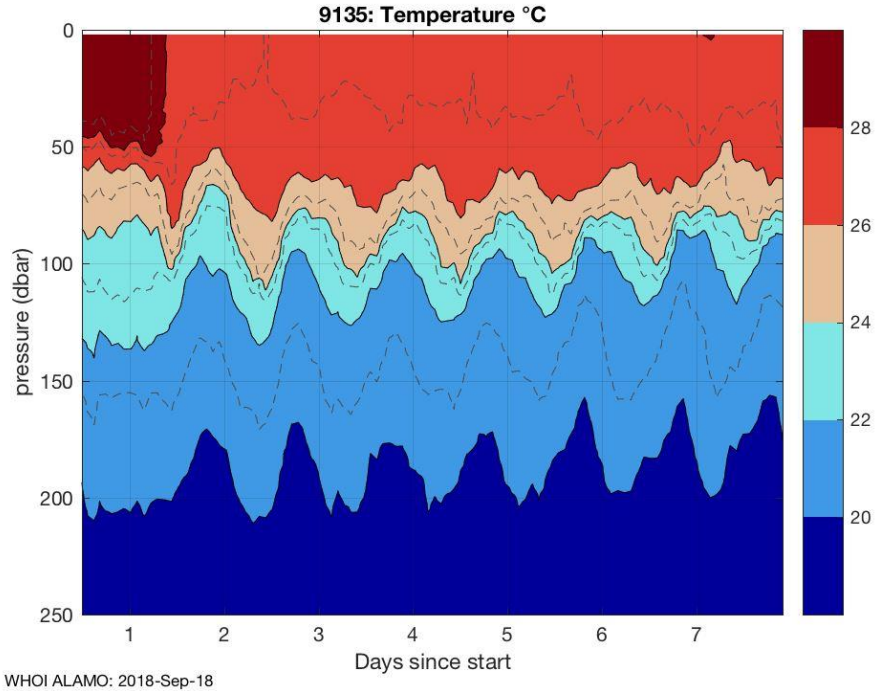

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应用于剖面浮标的优势

Value to Profiling Floats

- 低功耗

Low power electronics

- 无需泵

No pump needed

- 高稳定性

High sensor stability

低功耗 Low Power Electronics

- **提高垂向**观测分辨率

Increases vertical resolution

- **延**长布放周期

Increases deployment duration

- **减少每条剖面的功耗**

Reduces cost/profile

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应用于剖面浮标的优势

Value to Profiling Floats

- 低功耗

Low power electronics

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No pump needed

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High sensor stability

无需泵 No Pump Needed

- 海水自然流动冲刷

Natural flushing

- 能够观测表层盐度

Salinity to the surface

- 弱化噪声影响
- Enables passive acoustics

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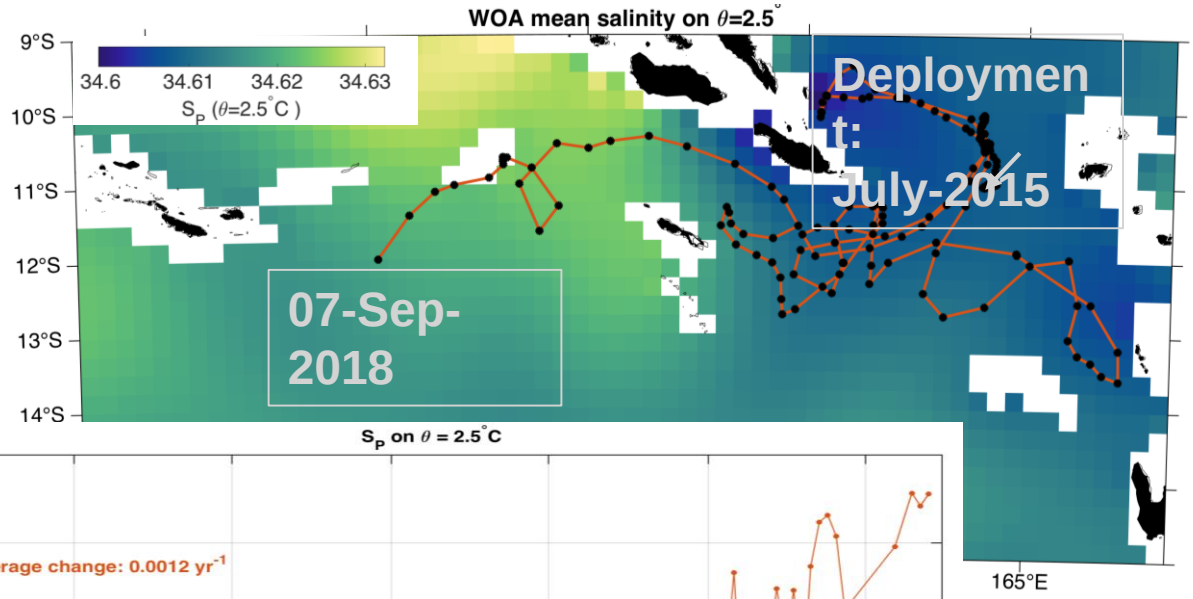
传感器稳定性
Sensor Stability

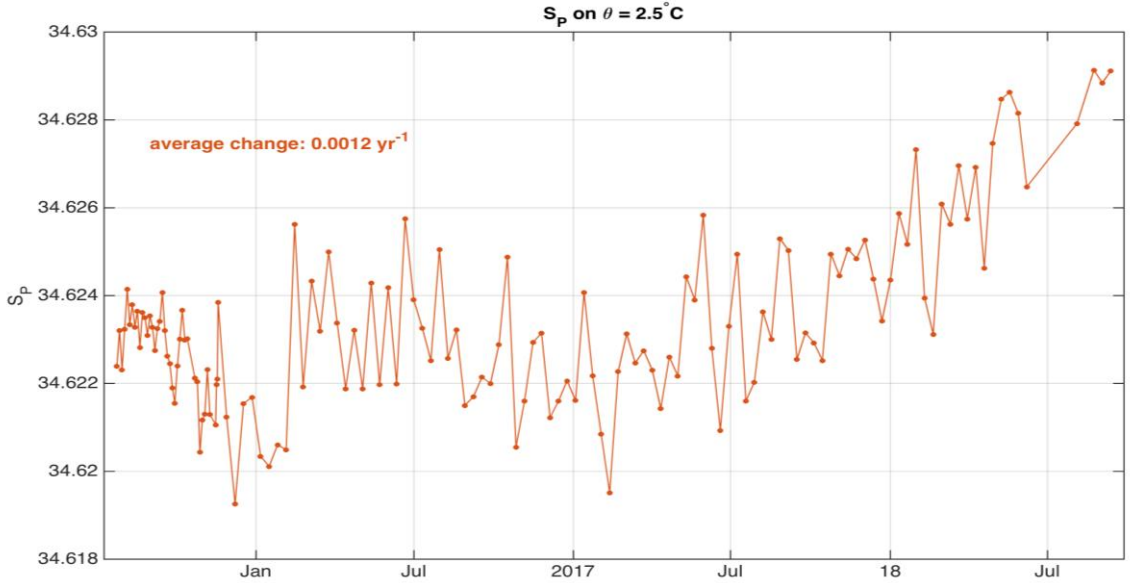
Over 3.5 years

- Average change is 0.0012 yr $^{-1}$
- RBR hasn't drifted much
- Coral Sea deployment

成功运行3.5 年

- 平均变化率仅 0.0012 yr $^{-1}$
- RBR 数据几乎没有数据漂移
- 布放于珊瑚海（即所罗门海，大堡礁所在地）





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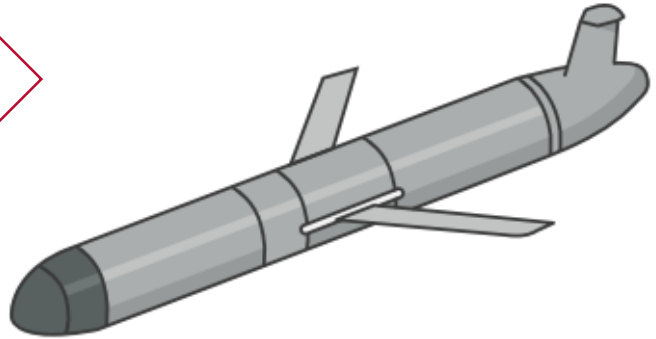
应用于剖面浮标的优势

Value to Profiling floats

同样适用于水下滑翔机、无缆机器人

Value to Gliders & AUVs



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演化版RBR CTD
Evolution of RBR CTD

RBR*legato* CTD

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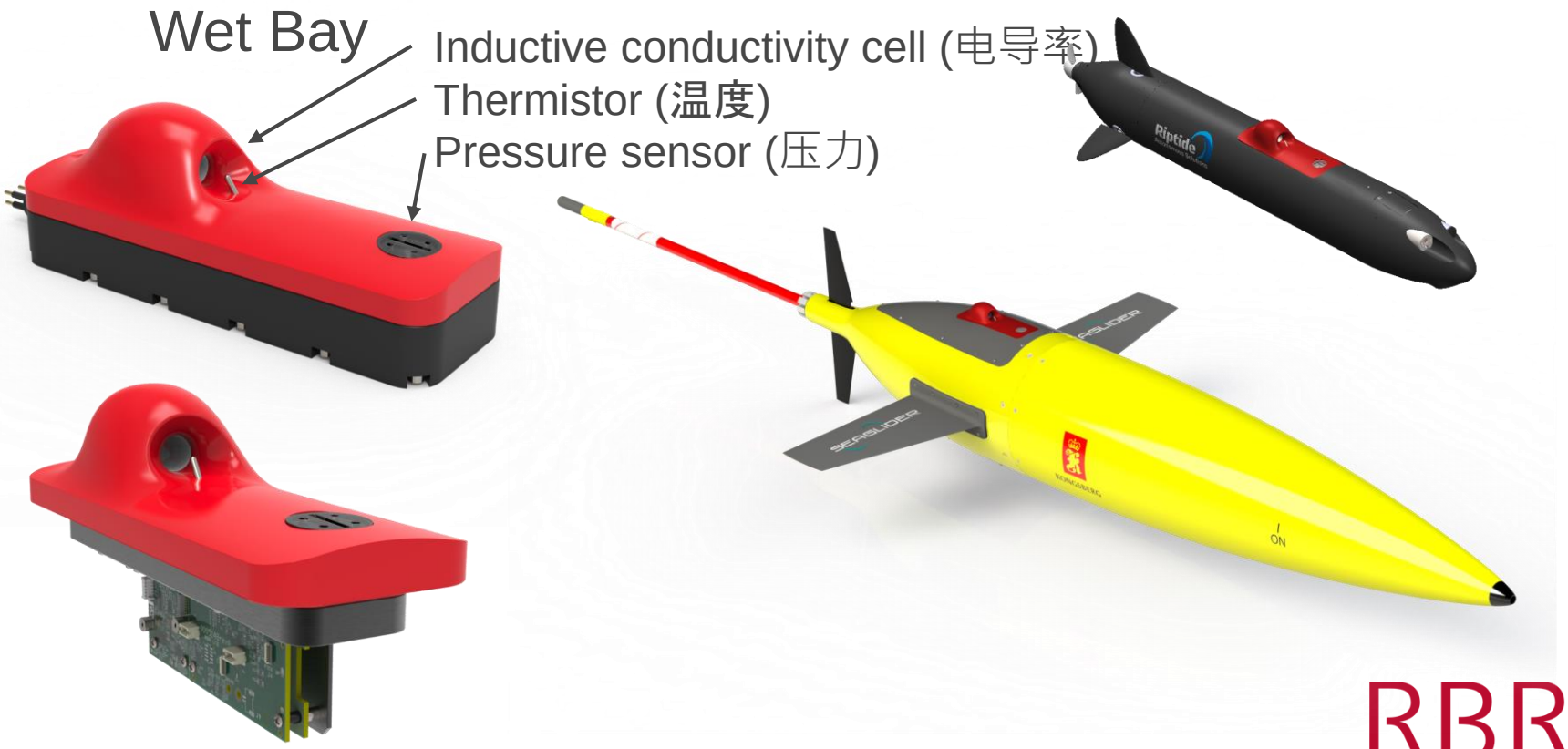
RBR*legato* CTD



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RBR*legato* CTD

具体参数 Specifications

- 标准大小5x18 cm (红色部分)

Standard 2x7” bay

- 工作深度1000m

1000m depth rating

- 2Hz 采样频率 (可升级至16Hz)

2Hz sample rate (16Hz optional)

- 自然冲刷(无需泵)

Natural flushing (no pump)

- 单次采样能耗：18mJ at 1Hz

18mJ power at 1Hz

- 与有泵CTD精度相同

Same accuracy as pumped CTD

- 定制设计，以适用于各类水下机器人

Custom design to fit vehicle radius

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RBR*legato* CTD

New Opportunities

- 低功耗延长观测 Low power extends missions
- 易拆卸方便校准 User removable for calibration
- 无需泵自然冲刷 Natural flushing without pump
  - 弱化噪声影响Improves passive acoustics
  - 助力湍流研究 Improves turbulence studies
- 多参数传感器集成 Sensor integration
  - 易于增加其他传感器 Easily add new sensors
  - 控制采样及功耗Manages sampling and power
  - 集中于同一数据流One data stream

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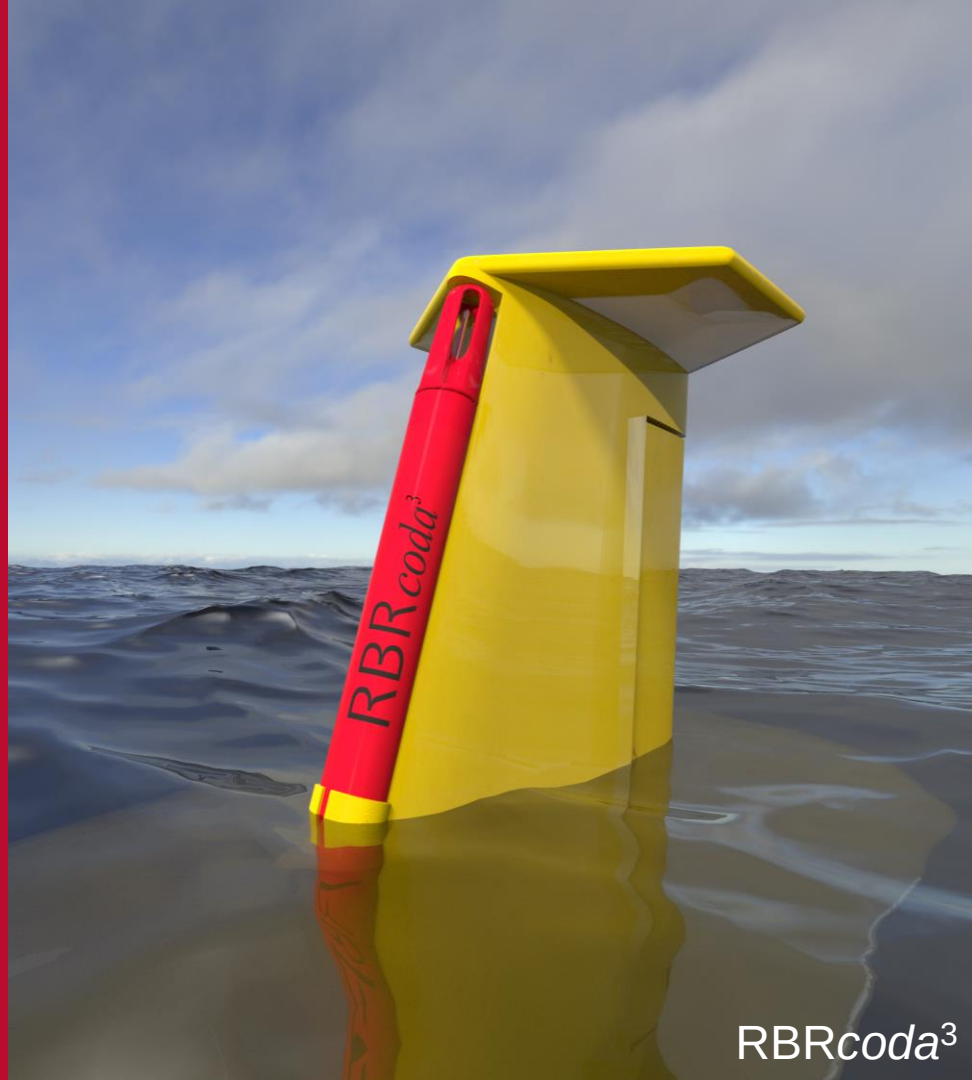
传感器集成
Sensor Integration



传感器集成
Sensor Integration

常用传感器集成
Common sensor integrations

- 气温 Atmospheric temperature
- 溶解氧 Dissolved Oxygen optode
- 叶绿素 Fluorescence
- 浊度 Turbidity
- 后向散射 Backscatter
- PAR
- pH
- pCO2

RBR*coda* ODO 微型实时传输 溶解氧

- 卓越精确度和稳定性堪比Aanderaa Optode
- 标准精度Standard accuracy of 8 µmol/l
- 能耗低Power consumption of only 36 mJ/sample
- 工作深度Depths up to 6000m
- 探头清洁刷可选Wiper available for |slow

• |fast	1s response (profiling)
• Standard	8s response
• |slow	30s response (moored)

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RBR China

Detail	Description
Official Name	Qingdao RBR Trading Co., Ltd
Website	rbr.cn
Email Address	info@rbr.cn
Address	Room 312, 3F, T3 Building 195#, Hong Kong East Road, Laoshan District, Qingdao, Shandong Province, China

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Welcome to RBR technical workshop:

优化海洋观测：RBR海洋仪器培训交流会
Optimizing Marine Measurements: An Instrumentation Workshop

时间：2018年10月26日（OI China展会翌日），9:00-12:00
地点：青岛蓝海大饭店会议室（崂山区苗岭路9-2号）

Friday, 26 October, 2018, 9:00-12:00
2 Miaoling Rd, LaoShan ShangQuan, Laoshan Qu, Qingdao Shi, Shandong Sheng, China, 266101

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展 望
Future

实现更多创新技术
Enable More Innovations

- 更多自主观测平台

More autonomous platforms

- 更优质数据

Better data

- 更长观测周期

Longer missions

- 更多传感器

More sensors

- 更多合作

More collaborations

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