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# WEBB RESEARCH CORPORATION

Falmouth, MA



**APEX Profiler**



**SLOCUM Glider**

Rev: 06/22/08

# WEBB RESEARCH CORPORATION



Specialists in neutrally buoyant drifters and profilers, and moored acoustic sources since 1982.

[www.webbresearch.com](http://www.webbresearch.com)

# Corporate Overview

- WRC founded in 1982
- 30 Employees
- Located in Falmouth, MA, USA
- 1580 m<sup>2</sup> facility

# Important Announcement

- On Thursday 19 June 2008, WRC announced intention to be acquired by Teledyne Technologies
- This transaction is expected to close in July 2008
- New name will be Teledyne Webb Research

# Acquisition Details

- Business will continue at present location with same staff (including Douglas and Daniel Webb) and same product line.
- Will be part of Teledyne Marine group
- We anticipate commencing use of lithium primary batteries
- See announcement at:  
[http://www.teledyne.com/news/tdy\\_06192008.asp](http://www.teledyne.com/news/tdy_06192008.asp)

# APEX

## Autonomous Profiling Explorer

- Neutrally buoyant drifter
- Descended from earlier ALACE, PALACE designs
- Variable buoyancy engine controls depth, and surfaces float for data telemetry and geolocation by satellite
- Provides profile data, and Lagrangian tracking of average current at drift depth

# APEX

- Maximum depth: 2000db
- Life (nominal): 150 ascents, 4 yrs.
- Telemetry: ARGOS or Iridium
- Ascent rate: 0.08 m/s
- Mass: 26 kg typical
- Batteries: Alkaline

Usually not recovered – expendable



# Sensor Options

Temperature  
Salinity  
Pressure



SeaBird  
Model 41  
CTD

Oxygen



Aanderaa  
Oxygen  
Optode

Oxygen

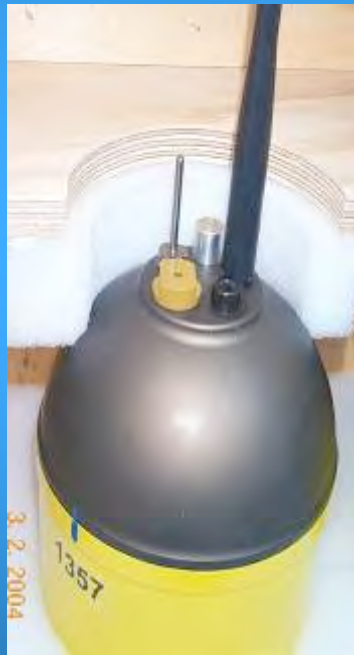


SeaBird IDO  
Oxygen Sensor



# Sensor Options

Temperature  
Depth



Seascan

Acoustic  
Receiver



RAFOS  
Seascan

FLNTU



Wet Labs

Transmissometer



Wet Labs Sea Rover

# APEX is field-proven

- Over 4000 units delivered to 20 nations:  
Australia, Canada, Chile, China, Denmark,  
France, Germany, India, Ireland, Italy, Japan,  
Korea, Norway, Netherlands, Russia, Spain,  
Taiwan, Turkey, US, UK.
- Production capacity ~ 60 units/month
- Including ALACE and PALACE, WRC has  
delivered over 5000 floats

# April 2008 - Shipment of 5000<sup>th</sup> Float





ARGO nations using APEX include:  
Australia, Canada, Chile, China, Denmark,  
France, Germany, India, Norway,  
Netherlands, Japan, S. Korea, Russia,  
Spain, United Kingdom and U.S.A.

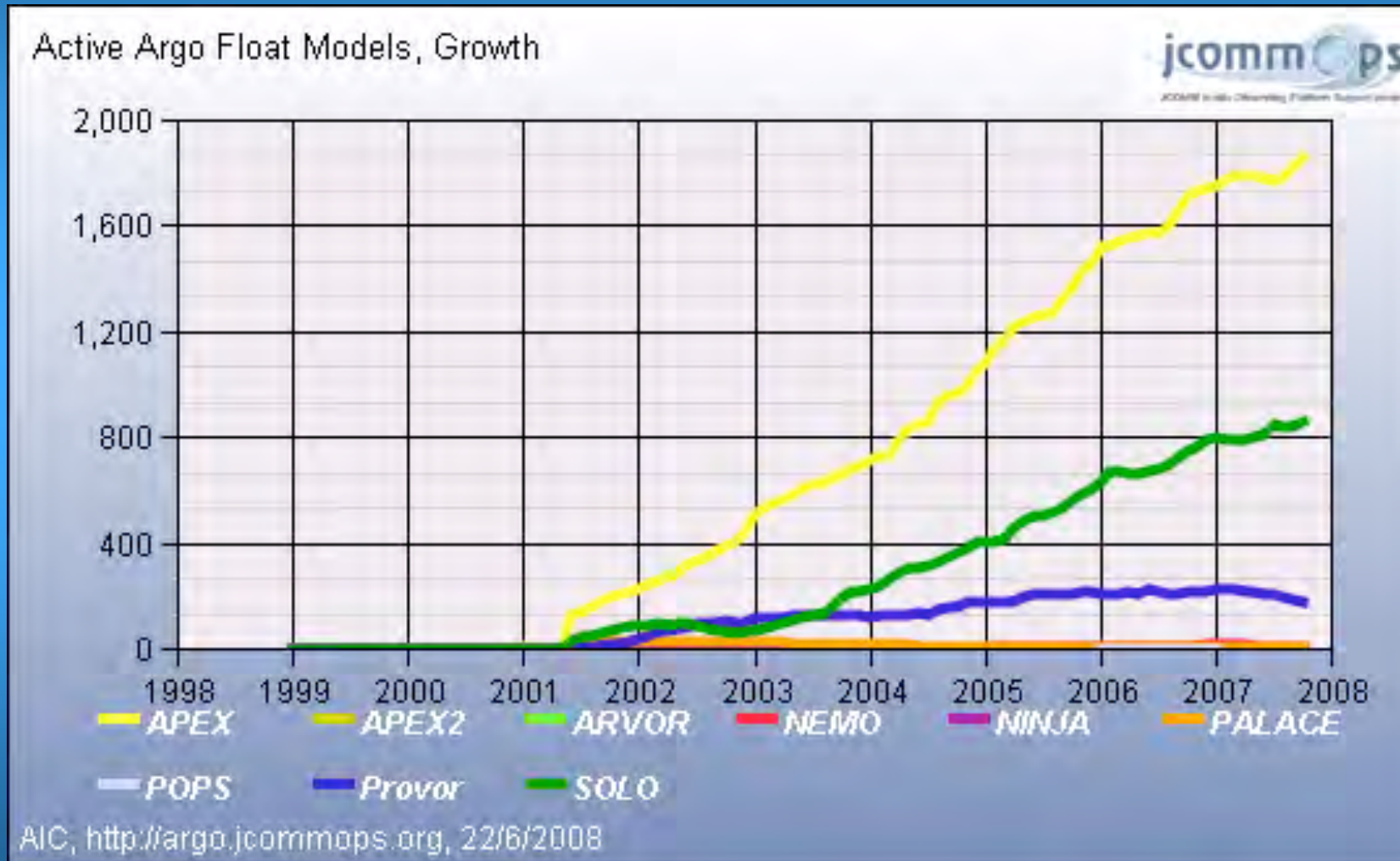
65% of the global ARGO fleet are  
APEX floats (as of February '08).

# Proven Production Capacity



Shipping over 600 floats per year  
Proven ability to meet customer's delivery schedules.

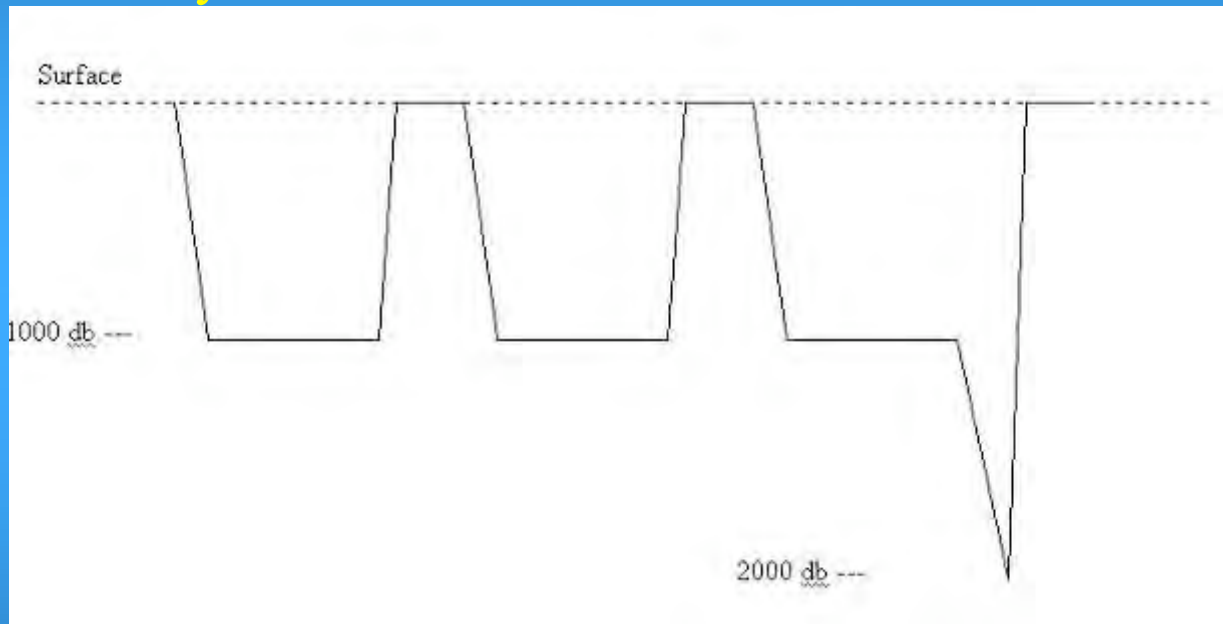
# Growth of APEX Usage



# “Park and Profile” Feature

Allows drifting depth to be less than profile depth.

Deep profile can be done every cycle, OR every Nth cycle, as shown schematically:



In this example, every 3<sup>rd</sup> profile is 2000db.

Other profiles are from shallower “park” depth.

This option offers substantial savings of battery energy.

# Typical APEX Application: CTD Profiles

- Salinity and Temperature recorded at predetermined Pressure levels
- Typical 2000db ARGO profile:  
70 T,S,P points, every 10 days
- High resolution profiles are possible using IRIDIUM telemetry
- Can be used for shallower & more frequent profiling  
Example: NOAA-NMFS 100db daily

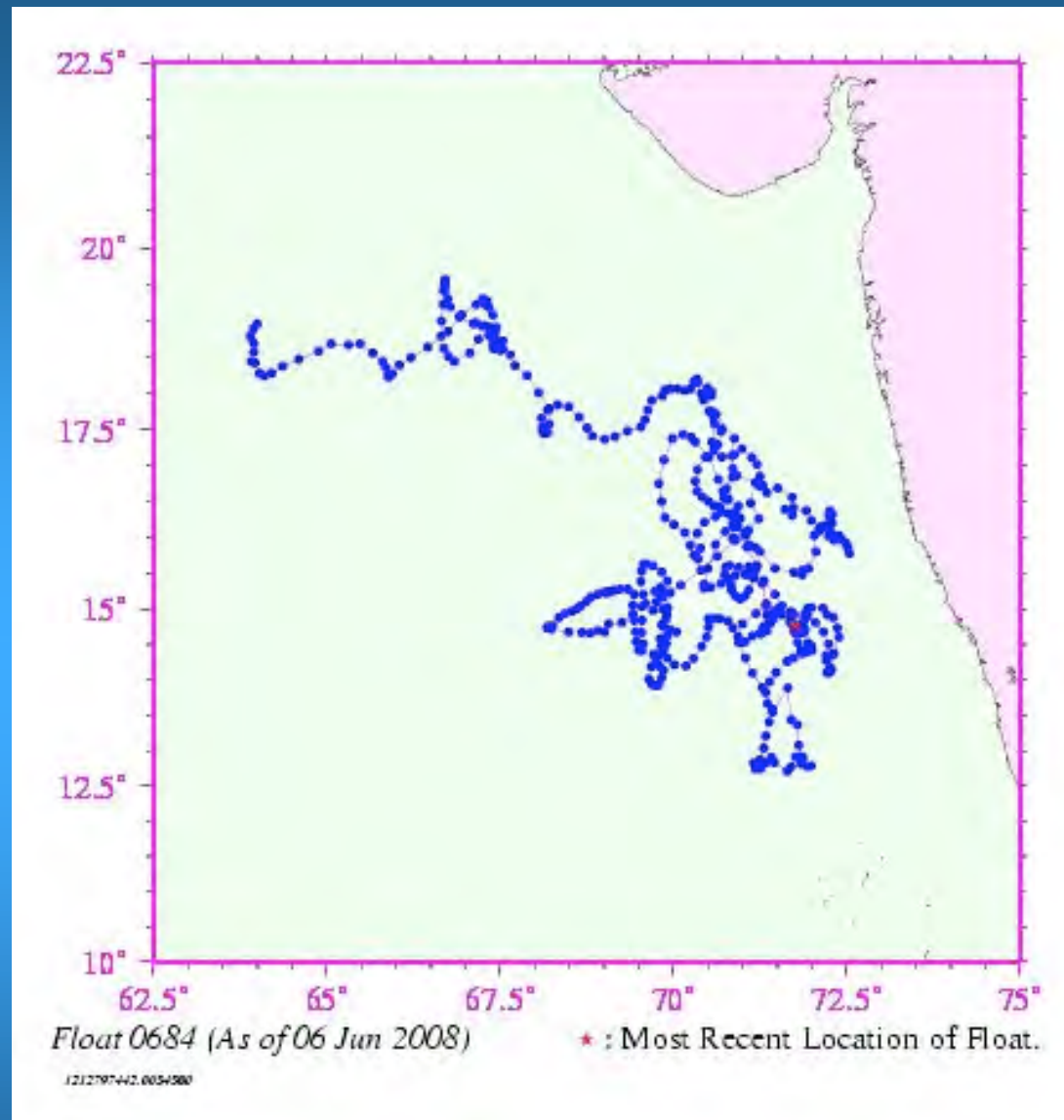


## APEX LONGEVITY

449 profiles to  
1050 meters  
over 4 years.

NAVO Float  
0684

Alkaline  
Batteries



Data Provided by US Naval Oceanographic Office

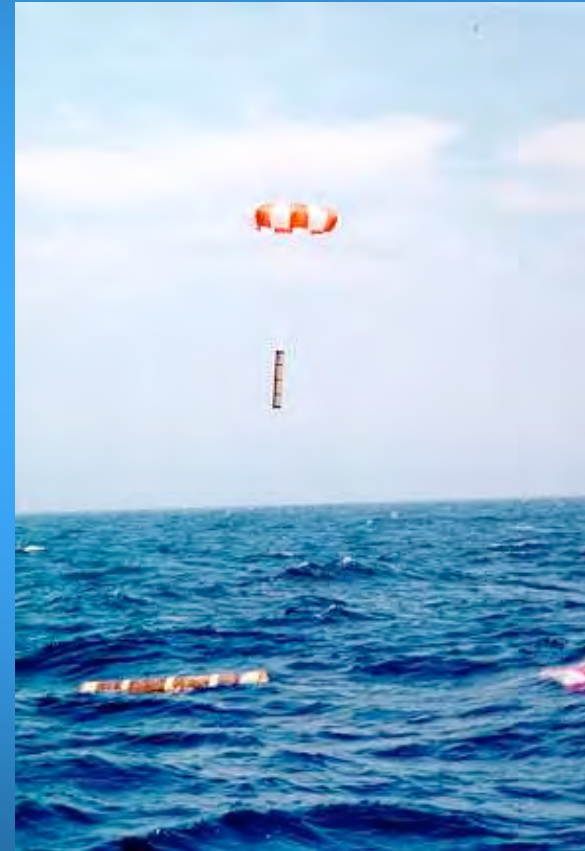
<http://runt.ocean.washington.edu/navo/homographs/XY/0684.html>

# Deployment from C130 Aircraft



**Certified by US DOD June '99.**

**Routinely deployed by US Naval  
Oceanographic Office, Dr. C. Horton.**



# Deployment from Merchant Vessels (VOS)

Done routinely by several institutions:

- U.W. Seattle
- UK MET Office
- US NOAA National Data Buoy Center
- Korea KMA-METRI

Requires packaging to protect float during launch.

- Unlike research ships, merchant vessels do not stop for float deployments.
- Ship speed is over 20 knots
- Decks are 6 to 24 m. above water

# Field-Proven APEX Options

- ARGOS or bidirectional Iridium Telemetry
- With Iridium, optional high resolution continuous CTD sampling during ascent
- Surface ice detection / avoidance
- Isobaric, Isopycnal or Isothermal tracking
- Seasonally variable sampling modes
- Automatic Pressure Activation (optional)
- First profile returned within 24 hours of launch
- Rapid upper-ocean profiles

# Simple Pre-Launch Testing

An interface cable and procedure are provided with each shipment, enabling users to easily test floats, or alter menu parameters.

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