



Photograph courtesy of the National Oceanic and Atmospheric Administration (NOAA) Central Library.

About Battelle

Battelle is the world's largest nonprofit independent research and development organization, providing innovative solutions to the world's most pressing needs through its four global businesses: Laboratory Management, National Security, Energy Technology, and Health and Life Sciences. It advances scientific discovery and application by conducting \$4 billion in global R&D annually through contract research, laboratory management, and technology commercialization.

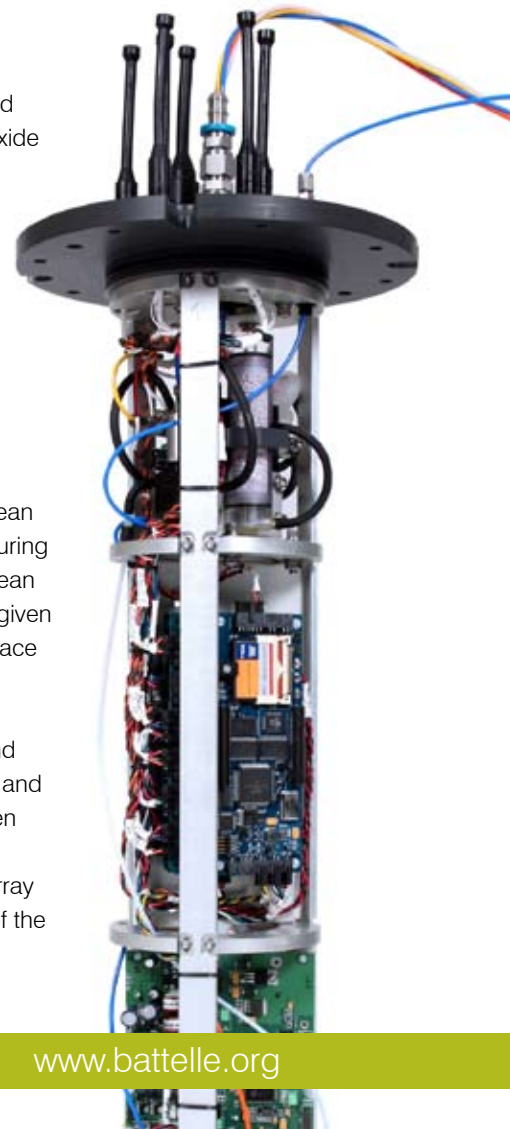
Autonomous pCO₂ Monitoring System
*Designed by MBARI—Enhanced by NOAA—
Manufactured by Battelle*

Ocean acidification and global climate change are very real issues affecting multiple industries today. From the oil and gas industry and academia to industrial fisheries and wildlife sanctuaries, scientists and technical experts are charged with monitoring the level of carbon dioxide (CO₂) in the ocean to understand the impact of changing chemistry on aquatic life.

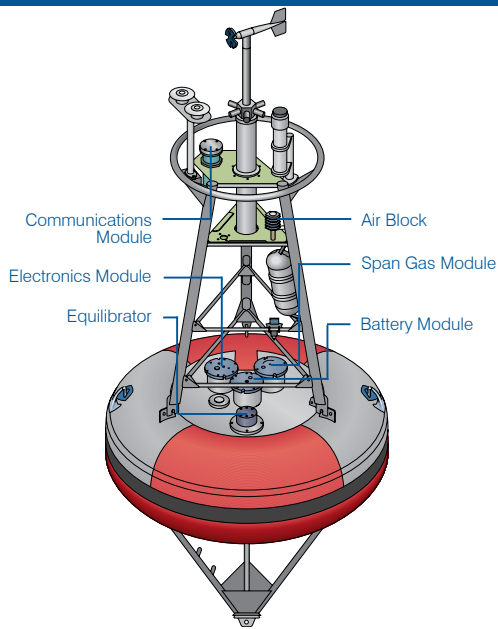
In response to this need, Battelle is launching a cooperative effort with the Monterey Bay Aquarium Research Institute (MBARI) and National Oceanic and Atmospheric Association (NOAA) to manufacture and commercialize an analytical instrument that will help scientists understand and predict climate change.

This autonomous CO₂ monitoring system provides air and aqueous partial pressure carbon dioxide (pCO₂) measurements for remote ocean environments. Originally designed by MBARI, this approach of measuring the partial pressure of CO₂ gives scientists an idea of whether the ocean is acting as a source or sink of CO₂ (relative to the atmosphere) at a given place and time. Such fluxes of CO₂ vary dramatically from place to place and over time.

NOAA enhanced the device by adding a reference calibration gas and two-way satellite data transmission capabilities to control the system and receive data in near real-time. Currently, NOAA has more than a dozen pCO₂ monitoring systems deployed on a variety of buoys around the world. NOAA is using this analytical instrument to develop a global array of moored observation systems to determine air-sea flux in support of the Global Ocean Observing System (GOOS).



Specifications and Features



- Monitors surface air and aqueous pCO₂ concentrations
- 100–600 ppm measurement range (extended range on request)
- ~1 ppm precision
- 0–40°C operating temperature
- Capable of more than 12 months of autonomous operation
- Contains compact flash memory storage
- Self-powered (i.e., batteries)
- Equipped with precision CO₂ reference gas
- Includes Iridium satellite communications link
- Modular design for interchangeability
- Rugged design for ocean deployment

Autonomous pCO₂ Monitoring System

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MBARI designs pCO₂ shipboard sensor version – validates sensor and begins collecting data

MBARI redesigns pCO₂ for deployment in drifters/mooring applications, incorporating communications and automated reporting

NOAA continues development of pCO₂ sensor, designing a 2 point calibration process and incorporating additional manufacturing improvements

Battelle collaborates with MBARI and NOAA, and begins production readiness effort for pCO₂ sensor

Battelle implements build-to-order production for pCO₂ sensor

1st orders delivered

1992 • 1997

1997 • 2002

2003 • 2007

2008

NOW

2009

