



SeaKeeper 1000™ Underway Sampling System

Vessel-Mounted Monitoring for Environmental Data Collection



Standard SeaKeeper 1000 with computer controller (top), and flow-through sampling system (bottom). Data is displayed on a local computer and transmitted to National Weather Services worldwide.

The SeaKeeper 1000 is a long-term monitoring system mounted on ships of opportunity—ferries, cruise liners, freighters and research vessels. The SeaKeeper 1000 will autonomously collect water quality and atmospheric data and transmit to the members of the World Meteorological Organization for global forecasting as part of Volunteer Observing Ships (VOS). Additionally, data can be displayed locally for fast review and research applications using Palladium Technologies SeaKeepers Simon software.

Other applications for the monitoring system include climate research, carbon flux, survey, and other research.

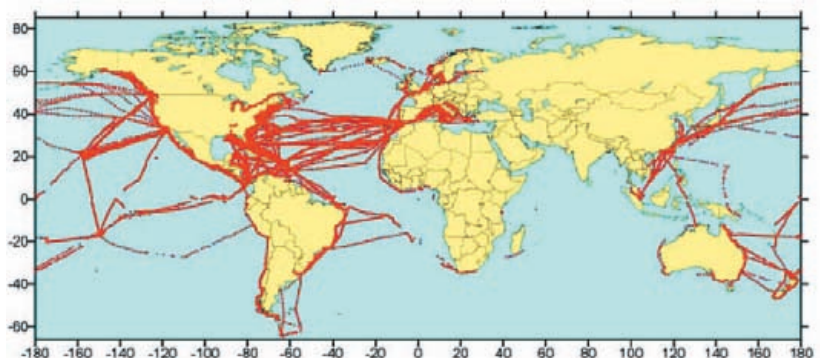
Why Collect Data with Ships?

By leveraging existing ships, operators can contribute meaningful data to the public and scientific community. Monitoring helps create public awareness of changing environmental conditions as well as generate data to quantify and empower change. The volume and special resolution covered in shipping and cruise passages is substantial—to collect comparable data utilizing typical survey methods is cost- and resource-prohibitive.

Configuration & Installation

A number of sensor packages are available. Depending on the sampling frequency, parameters, and accuracy required, a suite of 10 different instruments can be integrated into the system. With an annual service package, these systems can be swapped with calibrated replacements directly in the field.

The SeaKeeper 1000 has minimal impact to established ship operations. Once the system is installed by YSI, it will continue to autonomously run samples, collect and transmit data. Integral antifouling technology and containment vessels operate automatically.



SeaKeeper systems collect data points around the world. New data is combined with other data, resulting in a comprehensive data set. Partners such as Carnival Cruise Lines subscribe to annual maintenance program to maintain collection efforts.



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SeaKeeper 1000 Parameters				
	Parameter	Unit of Measure	Parameter	Unit of Measure
Date/Time/Location	Date	MM/DD/YYYY	Latitude	Degrees
	UTC Time	HH:MM:SS	Longitude	Degrees
Ocean Data	Cell Pressure	Decibars	Oxygen Saturation	%
	Cell Temperature (internal)	°C	Oxygen Concentration	ppm
	Conductivity	mmho/cm	pH	pH units
	Sea Surface Salinity (calculated)	psa	Eh	mV
			Sea Surface Temperature (external)	°C
Atmospheric Data	Wind Speed (apparent)	Knots	Relative Wind Direction	Degrees
	Magnetic Wind Direction (apparent)	Degrees	True Wind Speed (calc)	Degrees
	Air Temperature	°C	True Wind Direction (calc)	Degrees
	Relative Humidity	%	Course Over Ground (calc)	Degrees
	Barometric Pressure	hPa	Speed Over Ground (calc)	Knots
	Compass Heading	Degrees		

SeaKeeper Applications



American Presidential Lines: Three APL vessels currently carry a modified SeaKeeper 1000 on their trans-Pacific routes to supply better data, which assists marine forecasting South of the Aleutian Islands during winter.

Carnival Cruise Lines: Five Carnival Cruise Lines cruise ships carry systems on trans- Panama, Caribbean, Hawaiian, and Alaskan routes. Carnival participates in the annual service program for exchange of calibrated instrumentation on all its systems.

Royal Caribbean Cruise Lines: RCCL *Explorer of the Seas* carries a SeaKeeper 1000 system as part of a very sophisticated monitoring system, which is maintained in conjunction with the University of Miami (FL) Rosentiel School of Marine and Atmospheric Sciences.

SNCM Ferries of France: *Le Mediterranee*, a car ferry traveling between Marseilles and North Africa, carries a SeaKeeper 1000 system equipped with a Turner Cyclops fluorometer. This data is processed by IFREMER in Toulon as a part of the CIESM (Commission Internationale pour l'Exploration de la Mer) Mediterranean countries joint-research effort.



Meteorological Station

In addition to water quality data, atmospheric data like wind speed/direction, air temperature, relative humidity, and barometric data is collected for use in National Weather Services around the planet.

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