Hermes buoys keep functioning through thick and thin

Since 1978, drifting buoys have been used to obtain reliable oceanographic and weather data, especially in remote, data-sparse seas and oceans. These free-floating, expendable data collection platforms (DCPs) have been used experimentally in many parts of the world for both meteorological and non-meteorological purposes.

In Canada drifting buoys are seen as a potentially valuable means of obtaining marine data, and this country is among the top three DCP nations, in manufacturing, research or operations. For example, one of the most successful and widely used drifters is made by Hermes Electronics of Dartmouth, N.S. Weighing 90 kilograms and with a battery life of about a year, these free-floating platforms reliably monitor water temperature and air pressure. (This is calculated at Edmonton). Since 1978 some 300 Hermes buoys have been produced and sold around the world.

The AES is involved, in one way or another, in weather observation programs using drifting buoys in the Atlantic, the Arctic, Hudson Bay and the Pacific in operational and/or experimental modes.

To give you a better idea of the AES work with drifting buoys, a brief round-up of existing programs in the Hudson Bay and Pacific regions follows.

The above two pictures show Hermes drifting buoys being deployed by Canadian ships in the Pacific region.

The Hudson Bay program

During 1981 AES Network, Planning and Standards Division (ACSN) set out to gather real-time weather data from two Hermes buoys deployed in Hudson Bay during the ice-free season. Air pressure, sea surface temperature were relayed to the Edmonton receiving station via polar orbiting satellite, then processed to extract the data and calculate the buoy location for input into the forecast system. Data obtained from the buoys were plentiful (1300 observations vs 89 obtained via ships), a definite improvement for a data-sparse area.

The project began when two Hermes buoys were shipped to Churchill, Man. Switched on July 9 by the Weather Office OIC, they were loaded aboard the MV Keewatin and the first buoy was deployed July 23 near the northwest tip of Hudson Bay. The other buoy was deployed a couple of hundred kilometers southwest of the first. Both started satisfactorily by relaying weather data via satellite to Edmonton where they proved sufficiently reliable to be retransmitted on AES circuits. However, a change in the prevailing wind in August and September swung the buoys round from northwest to southeast. The wind direction caused the "southern" buoy to drift down the bay for nearly six months until transmissions ceased in late January 1982. It transmitted despite icy conditions and reached within 120 km of

James Bay.

The "northern" buoy transmitted operationally for about a month, but Edmonton was able to keep track of its position even after it beached on Southampton Island in the Bay of God's Mercy. The buoy was retrieved in the fall, still transmitting, and was even sending signals in January, long after recovery.

The entire 1981 project is still being evaluated, but first results indicate that data can be received in real-time and can be very useful for forecast and observational needs.

Recovery

The recovery of the "northern" buoy proved interesting. It started when Field Services Downsview staff asked Coral Harbour upper air station (Southampton Island) to help them retrieve the buoy. Since signals indicated it was about 140 km away, the OIC commissioned a group of local Inuit to go by Peter Head boat to the beaching site and look around. The search party spent three days searching but could not find the buoy. However, they did not consider their time wasted. As it was polar bear hunting season, they were able to shoot three good specimens and load them on the boat for the return trip.

Due to the good hunting other Inuits decided to hunt the area. One of these spotted the buoy frozen in the ice, chopped it out and secured it until it could be transported to Coral Harbour. During this time the buoy continued to transmit, so progress of the rescue could be monitored directly from AES Downsview. The entire recovery mission cost AES $1,500 plus a $500 reward paid to the Inuit. The money was considered well spent since each buoy costs at least $13,000.

Once retrieved, the buoy was flown back to Churchill, then sent by train and truck to Toronto. It was a proud moment for ACSN when the rescued buoy was put on display in the Downsview building lobby for three weeks. Instrument technicians found the buoy could be refurbished. Matt Stauder, project leader, says that "the buoy now stands a good chance of being redeployed for the 1983 Hudson Bay project or of being used for training purposes."

Further developments

The 1981 project was considered successful enough to launch a similar drifting buoy program in 1982. Two new Hermes buoys were shipped to Churchill and deployed by ship in northern Hudson Bay in August, once the ice had cleared. The main objective will be to continue real-time weather observations, but eventually it is hoped to test use of the buoys in Hudson Bay for wind speed, wind direction and air temperature measurements. The use of anchors and drogues on buoys of this type will also be tested.

Additional data received in real-time will eventually allow AES to support Hudson Bay shipping, drilling operations and other economic developments in the area.

Northeast Pacific programs

Since January 1980, the AES has deployed 16 Hermes buoys in the northeast Pacific. The first were part of the new Pacific area data systems (PADS). There were some initial operational problems but these were solved. In October 1980, AES deployed a second group of Hermes buoys — six in all — as part of the STREX project, (Storm Transfer and Response Experiment). The STREX project was a multi-national, north Pacific experiment, lasting 6 weeks in late 1980, and involved the use of other drifting buoys by non-Canadian agencies.

The six Hermes buoys were reliable. These buoys, with a mean life of 360 days, contributed data for detailing meteorological lows and highs, pressure gradients and overall surface level weather analysis. Of the six Hermes DCPs deployed in STREX in October 1980, two were still operating 16 and 18 months later, although both had drifted aground earlier.

Recovery

Just as in the Hudson Bay project, the Pacific region has its own interesting recovery story. A buoy deployed in October 1980 by the C.C.S. Parizeau as part of the PADS program, drifted all the way from 149 degrees west to Kodiak Island just off Alaska, where it went ashore in June 1981.

The buoy lay there for seven weeks until it was noticed by a Kodiak fisherman, Philip Harris. Unsure what it was, he wrapped the object in a net and took it home as a memento. Usually when people do a bit of beachcombing, the rule is: finders keepers, but not so in this case. After a couple of weeks Harris got the surprise of his life when U.S. Coast Guard and Weather Service officials called on him to pick up the buoy. How did they know Harris had it? Simple . . . the buoy had never stopped transmitting, and its position had been continually tracked by the AES computer in Edmonton. Mr. Harris did not give it up easily. After asking for a $1,000 reward, he eventually agreed to $100 compensation for return of the buoy.

In another month the U.S. Coast Guard brought the buoy south to Victoria, B.C. where AES officials and members of the Institute of Ocean Sciences found it was still functioning. Apparently after 495 days operation, it was still in excellent shape and batteries functioning normally. It is currently being outfitted for redeployment in the northeast Pacific, possibly by November 1982.

Matt Stauder, project manager (left) and George Payment (AFOO) stand beside Hermes buoy recovered from Hudson Bay and displayed in the lobby of the AES building, Downsview.

Future development

The AES Pacific program is an ongoing one. Several new Hermes buoy deployments have been made since the STREX era. Two sets of three buoys each have been deployed to drift through very data-sparse areas of the Pacific. The benefit of these two deployments, made for the AES by U.S. Coast Guard cutters on the longitude lines 157°W and 177°W, are being evaluated in the planning of further deployments after these buoys drift through and out of the targeted areas. There is also increasing

cooperation between the AES and U.S. ship operators for deployment and recovery. Not all buoys drift endlessly from one end of the ocean to the other. Some are carried at the back of bulk ships, e.g. an American tanker or a Japanese car carrier.

Commenting on the entire drifting buoy program, Bob Vockeroth, PADS project manager, comments "there is widespread agreement among WMO members that such simple buoys have demonstrated their cost-effectiveness in data-sparse areas such as the southern hemisphere. The northeast Pacific is not such an area. Nevertheless, it appears likely that if current work to increase buoy and drogue reliability and to provide additional useful data is successful, these buoys can be an economical alternative to large moored discus buoys in data sparse areas in the Pacific, Atlantic and elsewhere. In addition, they provide a valuable opportunity for cooperation between the international meteorological, oceanographic and climatological communities."