Jarmo Franssila, M.Sc. (Eng.)
Product Manager
Vaisala Helsinki
Finland

Broader automation of observations

AUTOSONDE and ASAP System in Spain

The Spanish Meteorological Institute has taken a decisive step to automate its synoptic sounding network. The introduction of three AUTOSONDE systems, scheduled for delivery this year, will enable the synoptic network to make fully-automated, unmanned observations. An ASAP system has also been supplied for shipboard observations.

The inauguration ceremony of the first AUTOSONDE System of INM took place in Tenerife in October. Mr. Enrique Martin Cabrera, General Director of INM, officially opened the ceremony.

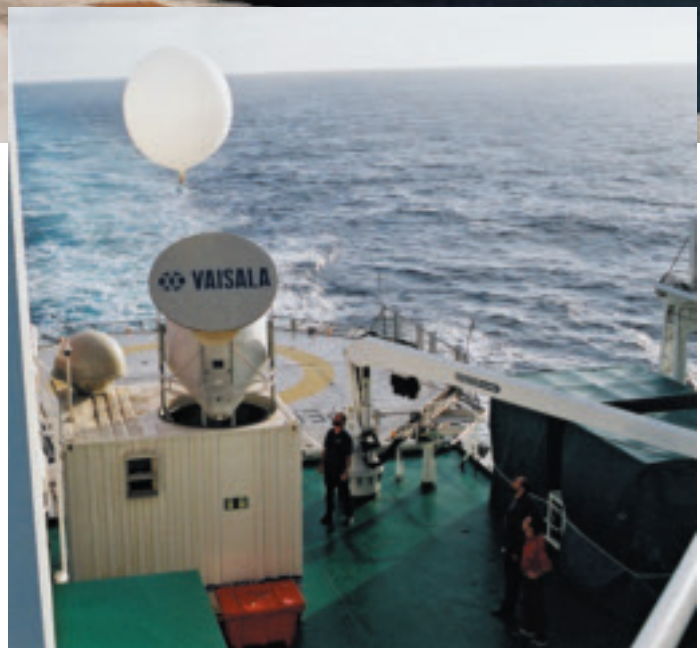
Fully-automated observations at unmanned stations

The fully-automated sounding stations will replace the current manned stations used by the Spanish Meteorological Institute (Instituto Nacional de Meteorología, INM) to perform synoptic upper air observations. The first of the series of AUTOSONDE Systems is already in operational use in Tenerife, in the Canary Islands. The next two AUTOSONDE Systems in Spain will be installed at the beginning of 2002 in Palma de Mallorca and at Madrid-Barajas airport.

Before installing the first AUTOSONDE System, the local meteorological office concluded that it would be best to relocate the sounding station away from the original manned station in the lively and crowded town of Santa Cruz. A new, more suitable site was available at a farm property some distance from Santa Cruz. Relocating the system required very little effort - only the construction of foundations for the shelter and for the Automatic Weather Station (AWS) mast. Additionally, electricity and telecommunications cabling were provided to make the system operational.

Full automation for enhanced data availability and safety

Unlike conventional sounding stations, the AUTOSONDE station can be set up easily, quickly and cost effectively, which facilitates its relocation, if necessary. The Vaisala AUTOSONDE System not only prepares and launches radiosondes and weather balloons, but also automatically receives the radiosonde signals and processes them into meteorological messages. The Vaisala AUTOSONDE performs up to 24 radiosonde observations without need for operator intervention, which allows a greater scope for site selection and observation schedules. The AUTOSONDE is a unique system that reduces operational costs, while improving the data availability and data quality of upper air observations.



Installed in June 2001, the latest version of the ASAP System performs soundings onboard a Spanish ship.

Observations over oceans with containerized ASAP Systems

Currently, weather observations over the oceans are highly important as in-situ measurements, due to the fact that oceans and seas cover 70 % of the globe. Moreover, soundings over oceans are utilized as reference measurements for the calibration of weather satellites, exerting a significant influence on the accuracy of weather satellite data.

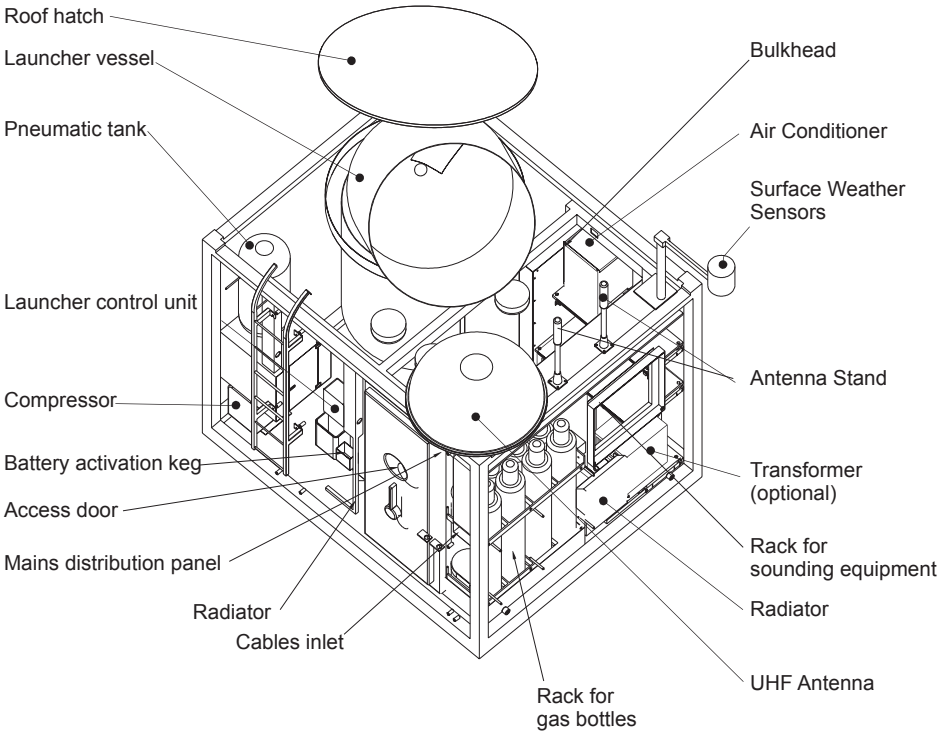
The Automated Shipboard Aerological Program (ASAP) was started in 1981 as a cost-effective way of obtaining upper air weather data over data-sparse ocean areas. Under the program, upper air observation stations have been set up that are operated on board cargo ships, allowing observations to be made over the oceans at a reasonable cost. Vaisala has been involved in the program from its very early stages, developing the Integrated Shipboard Aerological Container. The vessels enlisted in the ASAP program typically make two launches per day from the Vaisala Container. Some perform up to four soundings a day. The observations performed under the ASAP program have become a vital part of global ocean observing systems.

The Vaisala Integrated Shipboard Aerological Container contains an automatic upper air observation system that launches radiosondes, receives the radiosonde signals and processes them into meteorological messages. The system also transmits the messages in standard WMO message format, TEMP SHIP, to Land Earth Station (LES) using geostationary Inmarsat satellites. Upon reception the TEMP SHIP message is subsequently transmitted to the Global Telecommunication System (GTS) for international use.

The container, which is a modified 10-foot sea container, compliant with ISO standards, houses all the equipment needed for performing upper air observations. It can be fitted on various types of vessel, and operates reliably under changing environmental conditions. The system is easy to transport and lift, and can be installed on the ship and removed without affecting the ship's schedules. The ASAP System operates independently of everyday shipboard activities, requires only a connection to the power supply and occupies only a small section of the open deck. The automatic and easy-to-use ASAP System does not require a qualified upper air technician to operate it. Instead, a member of the ship's crew can carry out the sounding preparations in less than half an hour. Only a short period of training is needed to introduce the system operation and the basics of soundings.

New ASAP System in Spanish waters

The newest version of Vaisala's ASAP System was delivered to Spain in June. The system was installed on the 'Esperanza del Mar', a ship which serves as a hospital ship for Spanish fishermen and operates from the



ASAP System Structure in a schematic drawing.

Canary Islands off the coast of Northwest Africa.

Safe and reliable structure

For maximum safety, the interior of the container is divided into two compartments (see fig 2). The operator room (electronics compartment) houses the sounding system, an air conditioner, a transformer for different mains supply setups and a rack for eight helium bottles. The launcher is located in the launch compartment, separated by a bulkhead and safety boom from the electronics compartment. The weather observation system comprises a Vaisala DigiCORA III Sounding System with UPS and Inmarsat C satellite transceiver options, which cater for upper air data, and a Vaisala MILOS 520 Data Collection and Processing System for automatic surface weather observations. The interface between the MILOS and the ship's navigation system is used for true wind calculation. The MILOS provides surface weather data and sea water temperature for the DigiCORA III, the satellite transceiver of which is in turn utilized by the MILOS for sending SYNOP SHIP messages. The Inmarsat C maritime communication system has proven its reliability in ASAP use, offering a success rate of 99 % in transmission.

Radiosonde launches made easy

To make a sounding, the operator prepares the radiosonde, places it and the balloon into the launcher vessel and closes the safety boom of the launch compartment. After that, there is no need for the operator to enter the launch compartment until the sounding terminates. All further activities can be carried out in the electronics compartment of the container. The balloon is then filled inside the launcher vessel and immediately after that, at the push of a button in the control panel, the actual launching activities are started. The launcher vessel ascends vertically to the roof level of the container, the hatch opens, the launcher vessel tilts to 45 degrees away from the wind (which means there is no need to maneuver the ship for radiosonde launches), and a transvector blows to send the balloon and the radiosonde on their way. After the launch, surface data is collected from the MILOS Station, and the DigiCORA Sounding System starts computing sounding data. After these steps, the operator need not interfere with the progress of the sounding. The operation proceeds automatically until the sounding is terminated by balloon burst or by manual termination. The computed message TEMP SHIP will automatically be transmitted via the Inmarsat C system.

There is good reason to suppose that the number of soundings carried out onboard ships will increase in the future. New routes are being made so that ASAP systems will better cover ocean regions where observations are currently sparse. Additionally, more frequent operation on the selected routes is needed. Vaisala offers an advanced shipboard observation system, consisting of a complete set of products allowing cost-effective, reliable and independent observations in harsh marine conditions. ■

SPA Energia y Medio Ambiente supplies Vaisala upper air products in Spain

SPA Energia y Medio Ambiente, S.P.A., acts as the representative of the Vaisala Upper Air Division in Spain. In addition to its commercial activities, the company carries out its own engineering, development and production at its Madrid premises. The company has broad experience in the design and manufacture of high-tech devices and systems, and has many references from the aeronautics, naval and industrial sectors.

The company has a number of operating divisions, each of which specializes in its own area of design and engineering. The Projects and Systems Division designs and manufactures industrial and military equipment, such as shelters, test benches, specialized vehicles, power generator sets and ambulances. The Vehicle Maintenance Division provides development, manufacturing and customer training services in projects for rebuilding and upgrading armored vehicles. The Energy and Environmental Division develops and manufactures the products needed in water purification, waste treatment, NBC protection and meteorology. These products comply with ISO and/or Military Standards. The Aerospace Ground Equipment Division is responsible for the design and manufacture of ground support equipment for aviation, producing pneumatic starters using gas turbines, electric starters, pnenumatic and hydraulic test benches, aircraft tow tractors and engine test benches.