

LEVELS OF INTERVENTION

Intervention systems for immediate assistance

Vitrociset has identified the need for two different intervention-level weather forecasting systems for military observations and emergencies

If we examine what could happen during a massive environmental disaster, such as flood or earthquake, the first action is to identify the safe zones where the structures of vital importance can be set up (first level). To support this, it is essential to guarantee local monitoring of the weather situation to provide the tools necessary for dealing with the critical issues and preparing for the arrival of resources for the subsequent actions (second level).

A prime example could be a seismic event. In a zone hit by an earthquake, the first operation consists of sending trained personnel to search for and rescue survivors, and create vital structures such as field hospitals and tent cities.

Matters can be made worse by the breakdown in utilities and services, such as telecommunications, electricity, and road system. Within the framework of this scenario, it is necessary to have an activity that supports the rescue operation in the

meteorological field, as well as one which may help those in charge of the rescue operations evaluate the most suitable means of intervention (such as an immediate helicopter operation for the transport of equipment, men and relief goods).

Once the meteorological assistance at first impact is guaranteed, it should be possible to install a permanent weather service, at least until the restabilization of all the normal services supporting day-to-day living has been established. Another scenario is that of troops in a war zone. They may have parachuted into an inaccessible area, and need an initial field weather service to support subsequent aircraft operations.

The two intervention phases

Vitrociset has identified the need for two different intervention levels aimed at providing vital meteorological and forecasting support. The aim of a first-level intervention is to act promptly in the places where it is necessary to operate in emergency conditions immediately after the occurrence of a catastrophic event or, in the military field, immediately after the arrival of special troops in the theatre of operations.

The equipment for this type of intervention consists of a weather kit which is portable and easily installed, even for unskilled personnel. It includes the provision of the sensors necessary for measuring the meteorological values, which are then sent to a data processing center so they can be available, as needed.

The second intervention level involves the provision of mobile structures, equipped with more refined systems, for meteorology and data storage and processing. The intervention essentially consists of the transportation and installation of a mobile structure that serves as a weather office/station, staffed with skilled personnel who

can handle the data collection and formulate accurate local forecasts.

Tactical weather forecast kit

A first-level intervention, demands a 'pocket-sized' system which is sturdy and easy to install, capable of measuring the principle meteorological parameters. It must have the ability to file, process, and visualize the values measured using suitable display tools. It should generate alarms and send the data or alarms to remote monitoring stations. Therefore Vitrociset has identified a first-response system that meets the specific needs of an emergency situation.

The collaboration between the Italian company SIAP+MICROS and Vitrociset has produced the design of a weather forecast system contained in a sturdy carrying case, consisting of the following: compact weather station complete with support, PDA (handheld computer) for data display and processing, satellite phone (for voice communications, and as a modem to connect to the PDA to send weather data), professional binoculars, and compass.

Compact weather station

The compact weather station is able to measure weather parameters such as air temperature and humidity, atmospheric pressure, wind velocity and direction, rainfall, dew temperature, and geographic position, in compliance with ICAO standards.

The weather climatic station consists of a single unit which is cylindrical in shape. It has been designed for speed and ease of installation. The station can be installed either on a tripod, for field installations, or on other support systems, such as the top of a mobile vehicle of a field ISBU shelter container unit. The battery system is able to guarantee continuous functioning of the station for a period of about three months,

Connectivity to the station is through Bluetooth-type wireless technology, which connects to the handheld device supplied, or to any other compatible device. The lower part of the station houses the acquisition



Example of standard handheld device

“Two possible intervention systems have been developed for supporting activities in the meteorological field”

(data-logger) and communication (Bluetooth module) system, with an external antenna to increase the coverage range for connectivity to the station. On the side, on a dedicated support, is the GP5 antenna, enabling constant, continuous correlation of the weather data with polar coordinates.

The station is also equipped with an electronic compass, connected to the data-logger, which permits an easy identification, of the north, for the correct placement of the station itself during the installation. In the upper part of the acquisition system is the thermometer and humidity sensor, protected from the direct irradiation of the sensitive elements. The upper part contains the anemometer and wind direction gauge. At the end of the structure is housed a traditional tipping rain gauge.

Data display system

Using Bluetooth connection technology and dedicated software, it is possible to display instantaneous and historic station data in both table and chart form. The handheld unit complies with rigid MIL-STD-810F standards, which guarantee its functioning in extreme storage and use conditions (vibrations, blows, moisture, and temperature). So it is suitable for use in extreme situations such as those during emergency operations.

The proposed solution of displaying and managing the data using a separate device makes it possible to avoid interfering with the functioning and autonomy of the station, which acquires the data continuously and independently of the system. In fact, once the data is downloaded to the handheld unit, it is possible to access the database from anywhere, even outside the coverage of the station's Bluetooth signal. It is also possible to connect the handheld device and send the entire data file to a remote station (CED) using radio or telephone.

Communication system

The kit, in addition to the measurement station and its data display system, is

The Vitrociset Valigia compact weather forecast system



equipped with a dual-mode (satellite and GSM) satellite communication terminal, to permit maximum communication flexibility even in the absence of ground coverage. It also gives maximum connectivity with other devices, in particular with the handheld unit supplied and used for transferring the station data to remote stations.

A second-level intervention, is necessary to have a system that is self-sufficient, stable and capable of performing the functions of a weather center for the medium and long term. The field mobile structure may be subdivided into macro-elements such as logistics, telecommunications system, weather sensors, and the HWS/SW component, characterized by processing and storage capacity capable of guaranteeing the acquisition and presentation of the data coming from the meteorological instruments, the search for, and access to data by various and

heterogeneous sources, and the management of the communication system.

Telecommunications

The field weather systems continuously exchange information (data, graphic products, messages) with the specific centers or stations. For this purpose they are equipped with autonomous commercial-standard telecommunications systems with a data transmission capacity of 1Mb/sec. This permits a continuous bidirectional connection of the unit – ensured by satellite technology, Wi-MAX network, wireless network, and radio-fax – with the center or station in charge, and with the data and the TLC network-hosting infrastructure. For military purposes, they also come equipped with HF/VHF receiver-transmitters, which comply with the national and international and NATO military standards. The equipment provided with the field weather

Emergency weather stations



forecast system is flexible, and may be customized on the basis of the particular needs and scenario, logistic, environmental, and operational. The measurement of the conventional weather parameters at altitude may be provided by a radio probe system, weather-radar remote-sensing system (which, due to its limited size and weight and low power consumption, can easily be installed), and a system for measuring the surface weather parameters (atmospheric pressure, air temperature and humidity, wind velocity and direction, ground temperature, rainfall intensity, snow blanket height,) – all combined into a single piece of equipment of minimal dimensions.

To meet the need for intervention in the case of a natural calamity or military operations in a war zone, the two possible interventions systems have been developed to support meteorological activities. The first

system meets the need for an immediate intervention to rapidly install instruments that can provide the weather information necessary for an initial forecast analysis on the narrow intervention area, enabling decisions to be taken efficiently.

The second system combines with the first, and consolidates the basis of the weather-data measurements through the use of mobile labs for the collection, processing, and transmission/reception of weather data from a generic institutional weather center. Both systems are designed to give maximum support to decision-making in field operations in the particularly critical conditions of an emergency. ■

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Example of weather forecast kit and compact weather station