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SHIP OBSERVATIONS TEAM (SOT)

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E-SURFMAR VOS EXPERT TEAM STATUS REPORT (INCL. METADATA)

(Submitted by Pierre Blouch (E-SURFMAR))

Summary and purpose of the document

This document provides information on the status of the E-SURFMAR Expert Team on VOS. It also includes information on the status of the E-SURFMAR Metadata database, and how it relates to Pub47, and the WMO Observing Systems Capability Analysis and Review Tool (OSCAR), which for the surface-based observing systems metadata is currently under development, and will eventually replace Pub47.

ACTION PROPOSED

The Team will review the information contained in this report, and comment and make decisions or recommendations as appropriate. See part A for the details of recommended actions.

Appendices: A. Report on E-SURFMAR VOS component

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT**8.2.2 E-SURFMAR Expert Team VOS Status report****8.2.2.1 Status Report**

8.2.2.1.1 Mr Pierre Blouch (France) reported on the VOS activities by E-SURFMAR - the EIG EUMETNET operational service for Surface Marine Observations. He reminded that nineteen European NMS are financially contributing to the service which is still optional. In 2014, observations transmitted by European VOS and Shipborne Automated Weather Stations (S-AWS) represented 43% and 64% of all observations sent onto the GTS, respectively.

8.2.2.1.2 Although some of the topics were discussed in detail under other agenda items, Mr Blouch drew the meeting's attention to a number of developments carried out since SOT-7. In particular:

- (i) The progress in the procurement of S-AWS having specifications commonly defined by E-SURFMAR participants (EUCAWS project). Three prototypes were ordered to Sterela in 2014. In April 2015, the Site Acceptance Test was almost ended. First series should be available for purchases by the end of 2015. Details are presented under agenda item 8.3.3.1.
- (ii) E-SURFMAR ship-to-shore dataformats. These have been finalized in close cooperation with the JCOMM Expert Team on Marine Climatology (DMPA/ETMC). Dataformat #100 has been implemented in several S-AWS using IridiumSBD to report their observations ashore, including EUCAWS and the OceanoScientific systems. Dataformat #101, combined with the half compression technique, is devoted to conventional VOS. Its implementation in TurboWin is ongoing. Source codes of softwares necessary to convert raw data in BUFR may be freely distributed by Meteo-France.
- (iii) The developments and the maintenance of TurboWin financially supported by E-SURFMAR. NOAA adopted it for US recruited VOS. Details are given under agenda item 8.3.1.2).
- (iv) An experience with a "deck drifter". A recovered drifting buoy was put onboard a French Navy tug during her campaign in the Arctic in summer 2014. This makes a cost-effective way to re-use recovered buoys. The experience will be renewed in 2015 with two ships.
- (v) Data monitoring. Mr Blouch reminded that E-SURFMAR makes monitoring tools available to data buoy and VOS operators reporting their observations onto the GTS. See: <http://www.meteo.shom.fr/qctools/>. The meeting recognized the value of these tools which are widely used and appreciated by the community and asked E-SURFMAR and Meteo-France to continue this service.
- (vi) Impact studies. Several studies are ongoing at European NWP centres in order to measure the impact of surface marine observations (from buoys and ships) on Numerical Weather Predictions. Results are expected in 2015. The Team requested Pierre Blouch to inform SOT members when and where results of impact studies are available (*action; P. Blouch; asap*)

8.2.2.2 E-SURFMAR Metadata database

8.2.2.2.1 Mr Blouch gave a status of the E-SURFMAR metadata database. Whilst this database is regularly updated by E-SURFMAR participants, it is also fed by Pub47 metadata submitted to WMO by non-European NMS. During the intersessional period, the database became the main repository for VOSclim ship metadata. Several functionalities were also added: list of ships

reporting on the GTS but absent in the database, ancillary VOS taken into account and record of SOT Certificates.

8.2.2.2.2 E-SURFMAR proposes to add three new non-Pub47 fields in the VOS metadata database to tell if the ship is participating or not in ASAP, SOOP and/or GOSUD programmes (action...).

8.2.2.2.3 Mr Blouch reminded that the E-SURFMAR metadata database is open to any PMO or VOS operator in the world who would use it (even in read-only mode). Pub47 metadata may be exported on the form of XML files that may be sent to WMO to comply with recruited country obligations.

8.2.2.2.4. The Panel requested E-SURFMAR to add three non-Pub47 fields to in the VOS metadata database to tell if the ship is participating or not in ASAP, SOOP and/or GOSUD programmes (**action; E-SURFMAR; asap**)

Appendix: 1

APPENDIX A**REPORT ON THE E-SURFMAR VOS COMPONENT**

Submitted by Pierre BLOUCH – E-SURFMAR Operational Service Manager

I. Background

E-SURFMAR is the operational service of EIG EUMETNET for Surface Marine observations. These include observations carried out by VOS and data buoys. EUMETNET is the Network of European Meteorological Services (<http://www.eumetnet.eu>). Nineteen countries out of the 31 EUMETNET members are currently participating in E-SURFMAR: Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Serbia, Spain, Sweden, Switzerland and United Kingdom.

E-SURFMAR objectives are to coordinate, optimize and progressively integrate the surface marine observations within the operational observation framework of EUMETNET. Until now, EUMETNET observation programme aim was to optimize the ground observing system to improve short-range forecasts over Europe. The scope is now extended to climatology and 1km scale weather prediction models in Europe. It must be noticed that E-SURFMAR is also supporting VOS activities outside the EUMETNET area of interest.

The E-SURFMAR Operational Service is funded through participant contributions, which are based on their respective Global National Incomes (GNI). The service was a subject of a comprehensive study, carried out in 2004, which defines its broad design and objectives. At the beginning of 2015, new impact studies led by Numerical Weather Centres such as ECMWF, were just achieved or in progress.

II. Data availability

E-SURFMAR is coordinating the activities of about 50% of the VOS in the world. In 2014, conventional EUMETNET VOS reported about 278,000 observations including sea level pressure, whilst EUMETNET S-AWS reported about 740,000 observations: 43% and 64% of world observations, respectively.

Germany, United Kingdom and the Netherlands remain the three European countries which provide the most numerous manned VOS reports: 16.7%, 12.8% and 5.0% of all those sent onto the GTS by the world fleet, respectively.

During the intersessional period, the average number of manned observations reported by European VOS ships in the North Atlantic regularly decreased: 291 pressure observations per day in 2012; 267 and 245 in 2013 and 2014, respectively. These numbers must be compared to the 400 observations reported each day in 2002. The average number of ships reporting these observations proportionally decreased from 408 in 2012 to 345 in 2014.

III. Automation

The automation of the observation onboard ships is a priority for E-SURFMAR.

E-SURFMAR participants are operating different Shipborne Automated Weather Stations (S-AWS):

- (a) France is operating 57 BATOS and 2 Mercury stations (integrated S-AWS) as well as 3 MINOS stations (autonomous S-AWS). Mercury stations and upgraded BATOS reports through Iridium SBD whilst Minos report through Argos and a few remaining BATOS are still reporting through Inmarsat-C Data Mode. Plans are to replace old S-AWS stations with modern ones built by Sterela: Mercury or EUCAWS;

- (b) Germany is operating 16 Vaisala MILOS stations (integrated S-AWS) which previously reported through Meteosat DCP (now email) and 2 ship's own systems. DWD plans to purchase EUCAWS stations in the coming years;
- (c) UK is operating a fleet of 39 AMOS (autonomous S-AWS reporting through Iridium SBD), three MINOS and one BATOS stations. Met Office plans to replace the MINOS and the BATOS with AMOS systems;
- (d) Norway is using 5 S-AWS stations based on a QLC-50 system on their research vessels;
- (e) Spain is operating a Vaisala MAWS 410 station which started to report back onto the GTS in June 2014.

In addition, a few S-AWS stations were purchased by the E-SURFMAR Operational Service for its objectives. By the beginning of 2015:

- (a) Eleven BATOS stations out of the thirteen purchased in 2005-2007 have been installed on board European VOS: Irish and Italian Research Vessels as well as container carriers plying between Europe and Canada or Greenland. The remaining stations were kept for replacement parts.
- (b) Seventeen BAROS stations reporting through Iridium SBD were operating at the beginning of 2015: seven installed on upper air E-ASAP ships and ten installed on various ships plying in the Mediterranean Sea for most of them. For these latter, the installations and maintenance has been kindly provided by ENEA, Italy. Most of the BAROS report air pressure only. A few of them also report wind, air temperature and humidity thanks to a Gill multisensory.

In summer 2014, a recovered buoy was refurbished and used as a "deck drifter" on a French Navy Tug. Hourly sea level pressure were reported onto the GTS in FM13 and BUFR code during her campaign in high latitudes. The operation will be renewed with the same ship in 2015 and a second ship will be equipped: a cost-effective way to get pressure observations from remote areas.

The EUCAWS prototypes successfully passed the Factory Acceptance Test in December 2014. The Site Acceptance Test started in February 2015. Series should be available for order at the end of 2015. One must remind that the specifications were jointly defined by E-SURFMAR participants. The ability to enter visual observations in the S-AWS prior to the data transmission is ensured through a TurboWin software interface. Data transmission follows dataformat #100 (see below).

IV. Data communication

E-SURFMAR acquired a certain experience in matter of data communication. Most especially, a couple of systems has been developed and tested in order to reduce communication costs while migrating to BUFR without too many drawbacks. These systems include:

- (a) Iridium Short Burst Data on S-AWS. A dataformat, called #100, was designed for this purpose in collaboration with the JCOMM Expert Team on Marine Climatology (DMPA/ETMC) and the oceanographic community. It is made of a few optional blocks: atmospheric measurements, atmospheric visual observations, wave observations, ice observations and oceanographic measurements. Dataformat #100 was used for the first time for oceanographic observations by an OceanoScientific sailing ship. It is also used by E-SURFMAR BAROS and EUCAWS stations.

- (b) The so-called “half compression” data technique, which allows conventional VOS to report their observations through Inmarsat-C to a dedicated Short Access Code, with two 32-byte blocks only. During the intersessional period a new version of the format, called #101, was developed in collaboration with DMPA/ETMC. Its implementation in TurboWin 5.5 is ongoing. Meanwhile, the number of ships using this technique fell to under 20 (against 35 two years ago).

E-SURFMAR dataformats #100 and #101 are described in document:

http://esurfmar.meteo.fr/doc/o/vos/E-SURFMAR_VOS_formats.pdf

Both systems require a data processing chain ashore able to convert the Iridium SBD messages and the “half compressed” data into WMO codes (FM13 SHIP and FM94 BUFR) to be sent onto the GTS. The processing software has been developed by Meteo-France and it is made freely available to any NMS that would wish use it (Free Software License CeCILL).

V. VOS metadata

Because VOS metadata is essential for daily monitoring, performance evaluation and calculation of financial compensations to E-SURFMAR members, a metadata database has been developed within the service. Insofar non-European VOS are sailing in European waters, there were an interest in having all metadata available in this database. Since SOT-V, Pub47 metadata sent by non-European VOS operators to WMO are uploaded into the E-SURFMAR database as soon as they are available.

Extractions in CSV and XML formats are performed every day and made available on a FTP site (<ftp://esurfmar.meteo.fr/pub/Pub47>). These extractions presently include all Pub47 metadata available for active VOS and, separately, for any VOSclim (active or non-active). During the intersessional period, the E-SURFMAR metadata database became the main repository for VOSclim ship metadata (SOT-7 action 112).

Accounts may be created for VOS operators and PMOs in order they use the online interface to manage their fleets (<http://esurfmar.meteo.fr/doc/vosmetadata/>) and to perform queries on the database. The database handles digital images (part of Pub47 metadata) and masked identifiers (with limited access). It may serve to store inspections reports and it allows to edit quality reports which may be given to observers.

The database may display possible multi-recruited ships and it used to manage the VOS ancillary fleet (pseudo national fleet with country code ZZ). Since SOT-7, it has been allowing to record SOT Certificates (SOT-7 action 31).

During the intersessional period, another pseudo national fleet, with country code ZY, was created to host identified ships that report many observations on the GTS but are not members of a national VOS Fleet or self-recruited as an Ancillary VOS vessel.

Following a SOT-7 request (SOT-7 action 52), a link was created on the database homepage (after login) to display a list of ships that regularly report on the GTS but are not either members of a national VOS Fleet or self-recruited as an Ancillary VOS vessel, or in the ZY fleet. VOS Focal Points and VOS Program Managers are invited to use both this lists and the ZY fleet list to see if these ships could not be part of their national fleet.

Following another SOT-7 request (SOT-7 action 53), E-SURFMAR is maintaining the non-mandatory lists of descriptors for logE, awsP and awsC. VOS Focal Points and VOS Program Managers are invited to use these entries or to propose new ones to be added in the lists.

See: ftp://esurfmar.meteo.fr/pub/Pub47/logE_awsP_and_awsC_entries.pdf.

The database interface gives also access to the E-SURFMAR monitoring tools as well as a few functions such as tracking maps, last observation position map and observation counters for a

selection of ships on a given period. Non-Pub47 metadata (e.g. ship contact details) may be also entered in the database. These metadata include a list of email addresses which may be used by the VOS to report her observations ashore (whitelisting) and the MMSI Id. which allows to track the ship on the marinetraffic.com website thanks to her AIS system.

Some NMS are using the E-SURFMAR database as their primary database.

The study of putting the GOSUD metadata into the E-SURFMAR database (SOT-7 action 120) did not really start during the intersessional period. As for ASAP and SOOP ships, metadata already exist elsewhere. E-SURFMAR proposes to add three non-Pub47 fields in the database to tell if the ship is also participating or not in these programmes.

The database is used by Meteo-France and E-SURFMAR to provide metadata - such as the height of the anemometer and the method of obtaining the SST -, which are added to the observation data of their fleet in FM94-BUFR bulletins.

No WebEx training could be organized during the intersessional period. The corresponding action (SOT-7 action 1) is postponed.

VI. Compensations and funding

Since E-SURFMAR started in 2003, financial compensation is paid every year to VOS operators for the observations carried out by their ships. In 2014, 0.267 € were paid for each manned observation and 0.133 € for each automated measurement. A transition which will see the same compensation paid for a manned or an automated observation, is ongoing. It will end in 2017.

Compensation is also paid to those National Meteorological Services who bear the communication costs. As for previous years, in 2014, 0.16 € were paid for each report sent by a conventional VOS and 0.04 € for each report sent by an AWS. The share of compensations between the operators and NMSes are based on the observations carried out in the previous year.

Since 2008, the service has been financially supporting KNMI for their work on the development and enhancements of the TurboWin program. TurboWin is more and more used by all VOS in the World. It was adopted by NOAA during the intersessional period.

VII. Data monitoring and data quality

Since the E-SURFMAR design study was carried out, air pressure data reported by EUMETNET ships have been monitored as a matter of priority. Despite many actions, the quality of measurements reported by conventional VOS did not increase significantly since SOT-V if we compare to those of AWS reports. Human readings often introduce non systematic errors on sea level pressure observations. Double correction of the pressure height of the barometer above the waterline is still a common error, although TurboWin includes warnings to the observers about this issue.

E-SURFMAR developed monitoring tools for VOS (and data buoys). These, available at <http://www.meteo.shom.fr/qctools/>, include monthly statistics of differences with model outputs, dataplots and plots of differences with model outputs over the past two weeks, blacklists of VOS reporting dubious pressure values...These tools may be used by all VOS and Data Buoy operators. They are not restricted to EUMETNET members/platforms.

VIII. Impact studies

Several studies are ongoing at European NWP centres in order to measure the impact of surface marine observations (from buoys and ships) on Numerical Weather Predictions. Results are expected in 2015.

IX. Meetings and Web sites

The 11th VOS-TAG meeting was held in Exeter, on 19-21 May 2014. Next is planned in Rome, on 26-28 May 2015.

E-SURFMAR public web pages: <http://www.eumetnet.eu/>

Working area (password protected): <http://esurfmar.meteo.fr/wikisurf-wa/>
