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Further development of the EUMETNET Composite Observing System (EUCOS)

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EUCOS, which stands for EUMETNET Composite Observing System, is a EUMETNET programme whose main objective is a central management of surface based operational observations on a European-wide scale serving the needs of regional scale NWP. EUMETNET is a consortium of currently 26 national meteorological services in Europe that provides a framework for different operational and developmental co-operative programmes between the services.
The work content of the EUCOS Programme includes the management of the operational observing networks, through the E-AMDAR, E-ASAP, E-SURFMAR and E-WINPROF programmes. The coordination of NMSs owned territorial networks (e.g. radiosonde stations and synoptic stations), data quality monitoring, fault reporting and recovery, a studies programme for the evolution of the observing networks and liaison with other organisations like WMO are among the tasks of the programme.

The current period of the EUCOS programme has a five year duration (2007-2011) and a two stage approach was proposed in the programme definition. During the transition phase 2007-2008 no new programmatic objectives had been set because amongst others the Space-Terrestrial (S-T) study which investigated the relative contributions of selected space based and ground based observing systems to the forecast skill of global and regional NWP models had to be finalised first.
Based on the findings of this study EUCOS currently prepares a redesign of its upper-air network. The original EUCOS upper-air network design was prepared in 2000 in order to define a set of stations serving the common general NWP requirement. Additional considerations were to make it possible to supply a common set of performance standards across the territory of EUMETNET Members and to ensure that the radiosonde network interleaved with AMDAR airports.
The EUCOS upper-air network now requires a redesign because of several reasons. There is a need to take into account the significant evolution of the AMDAR network. Member states were not able to install the proposed EUCOS radiosonde network design with 4 ascents per day at most of the sites. The results from the S-T study are available with recommendations for the network design. Data assimilation of NWP models has improved significantly with advanced capability to make use of high time resolution data. The guidelines for the redesign of the EUCOS upper-air network will be derived from a study which is currently organised by EUCOS and conducted by ECMWF and several national Met. services. They contribute by running OSEs for different observation network setups with their model suites. The S-T study has shown that despite of all the additional new satellite observations, the degrading of the current terrestrial observing system to a basic (GUAN+GSN) network would have a significant negative impact on the forecast skill.
The expected result from the envisaged OSEs is to find an optimum setting of upper-air measurements in space and time which maintains forecast skill.

Throughout the second phase of the programme (2009-2011) the revised EUCOS design will be implemented.

In the field of observation targeting EUCOS supported the PREVIEW Data Targeting (DTS) project. The main goal of this project was to develop and to assess the feasibility of an operational adaptive control of the operational observing system. The DTS project was lead by Met Office and co-funded by EUCOS and the

European Commission (within the PREVIEW project). The main software, an interactive web-based tool, was developed by ECMWF and ran on their computer system during the trial phase which lasted from February until December 2008. During the trial the focus was on improving short range (1-3 days) forecasts of potentially high-impact and/or high-uncertainty weather events in Europe. Forecasters from all EUMETNET members had had the chance to submit sensitive area prediction requests on a daily basis. Afterwards the DTS displayed the sensitive areas calculated by ECMWF, Météo-France and Met Office and the lead user (an experienced forecaster) could then use the system to issue requests for additional, unscheduled observations.
The trial has shown that a data targeting system can be routinely used. Targeted observations were successfully deployed from E-ASAP units, by the E-AMDAR programme and in 21 countries. 88% of the additionally requested radiosondes from land stations have been launched. Furthermore, the DTS was used to support research field campaigns like THORPEX-IPY, THORPEX-PARC and MEDEX. During the envisaged MEDEX Phase 2 campaign in autumn 2009, the DTS will be used as an operational tool to aid research.

Further tasks for EUCOS will be the proposal and implementation of a new E-programme responsible for running a central data hub and centralised monitoring, setting of new objectives for the programme components E-ASAP, E-AMDAR, E-SURFMAR and E-WINPROF, and an extension of quality monitoring activities. An example for new programme objectives is the introduction of a humidity sensor on commercial aircraft within the E-AMDAR programme.