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Planning for AMDAR Inter-comparison Activities

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Summary and purpose of document

. This document describes the activities and planning of activities related to AMDAR observations inter-comparison. The activities enclose comparison with numerical weather prediction model data, for evaluation of meteorological parameters, as well as location and altitude evaluation.

ACTION PROPOSED

The Meeting is invited to read, comment and offer suggestions on information presented.

Planning for AMDAR Inter-comparison Activities

Introduction

This document describes the activities and planning of activities related to AMDAR observations inter-comparison. The AMDAR information will be evaluated by comparing the meteorological parameters as well as the location (horizontal position and altitude). This requires a reference, which can be found for meteorological parameters in (operational) numerical model information, and, for the location, in air traffic control related information, such as Mode-S Enhanced Surveillance (EHS) and Automatic Dependant Surveillance Broadcast (ADS-B) position information.

Meteorological information comparison

Wind temperature and humidity (when available) will be compared. Pressure will serve as altitude definition. Comparison will be made against (operational) numerical model information, for which the quality performance is known by means of long term statistics of comparison with other wind, temperature and humidity observations (such as radiosondes)

The following items are essential when a numerical model is used as a reference:

1. Use an operational global model (e.g. ECMWF)
2. Use preferably multiple models
3. Use forecast lead-time of at least the assimilation cycle
4. Space and time interpolation
    a. Perform a linear interpolation in time,
    b. Bilinear in horizontal space, and
    c. log linear in pressure
5. Use at most forecast increments of 3 hours, preferable 1 hour
6. Interpolate between forecast from the same analysis

Meta information, such as ascending and descending or flight phase of the aircraft is required. When necessary, additional information from the aircraft can be obtained by collocating ADS-B or Mode-S EHS information with AMDAR information.

Position comparison

The accuracy of the location of AMDAR observation needs to be determined. Possible methods to perform these checks can be:

1. When close to the ground the observation should be close to an airport
2. The estimated horizontal speed from successive observations should be within reasonable limits
3. The estimated rate of climb/descent from successive observations should be within reasonable limits
4. Position/altitude checks using additional information from Mode-S EHS or ADS-D

As an example of the last item the altitude versus time and horizontal position of two AMDAR's are shown together the same parameters from Mode-S EHS information, see Figure 1.Clearly the AMDAR have a location deviation of a few kilometers when landing on Amsterdam Airport Schiphol.

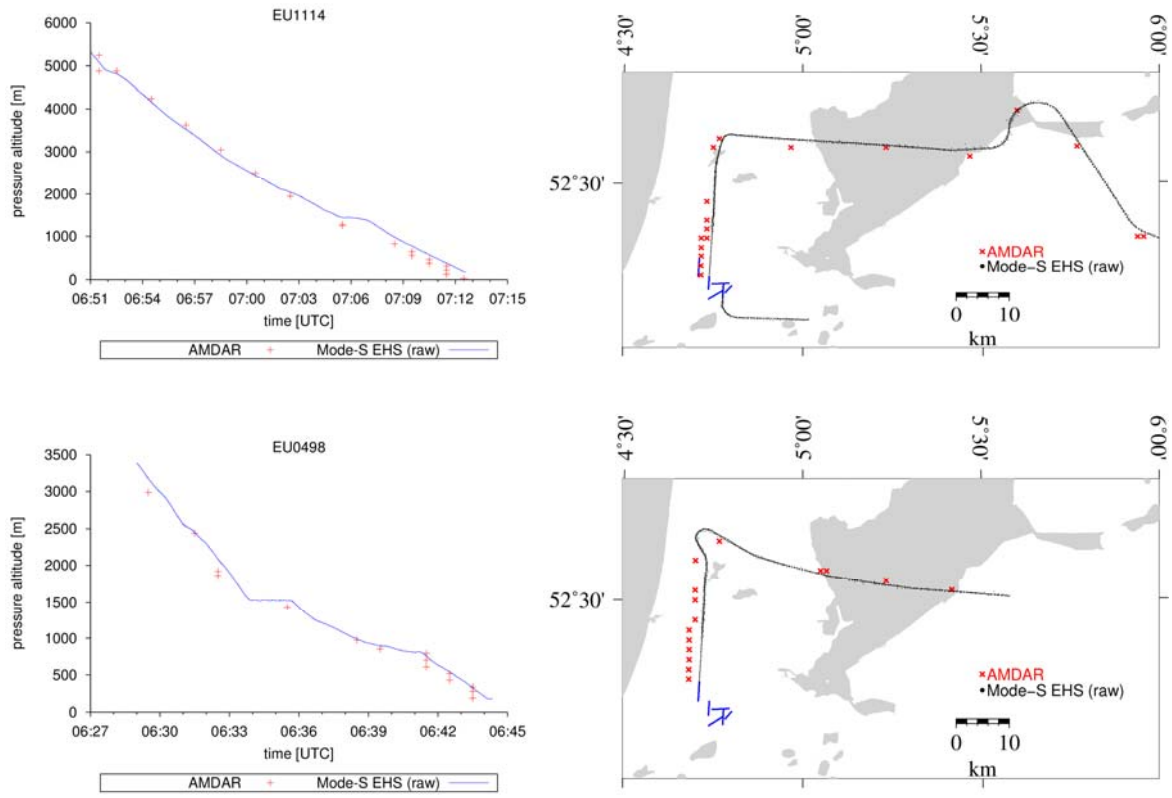

Figure 1: Examples of altitude and position comparison of AMDAR EU1114 (top panels) and EU0498 (bottom panels) together with (raw) Mode-S EHS position information.

Planning

1	Define period for AMDAR inter-comparison	Q2-2014
2	Define reference models	Q2-2014
3	Gather AMDAR observations	Q2-2014
4	Acquire AMDAR tail-numbers , through 1. Officially distributed list, or 2. Combination of Mode-S EHS/ADS-B data sets	Q3-2014
5	Collocate with Mode-S EHS or ADS-B for position comparison	Q3-2014
6	Compare wind, temperature and humidity with model parameter 1. Develop comparison software and tools 2. Define binning strategies etc.	Q4-2014
7	Reporting	Q2-2015