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Impact of additional AMDAR data in the AROME-France model during May 2017

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From 1st of May 2017, until the 15th of June 2017, the E-AMDAR operational service from EUMETNET disseminated more commercial aircraft data than usual on the Global Telecommunication System (GTS). Météo-France specifically requested the implementation of such trial. This has lead to an increase of commercial aircraft data density over France, especially of vertical profiles (ascents and descents). Météo-France already pays for additional data with respect to the basic E-AMDAR service. This trial aimed at assessing the potential of French airline companies to produce further data in collaboration with E-AMDAR and yield an observation network as dense as possible. This trial was the opportunity to check the impact of these additional data on forecast skill scores of the limited area and convective scale model AROME-France. A data denial experiment (OSE) has been carried out in May 2017, by removing E-AMDAR profiles (about 14% of data) to mimic the routine (non-trial) observing system. The reference system was the operational AROME-France 3D-Var that assimilated all extra data in real-time. However, no dedicated flag allowed to distinguish supplementary data from routine ones. Therefore a necessary step of the experimental methodology has been to identify which data profile could be pointed out as supplementary. The examination of forecast skill scores from the denial experiment shows that the removal of the additional observations is rather small and not systematically negative (depending upon the parameter of interest, the atmospheric level, and the forecast range). The experimental set-up will be extensively described and the results discussed on the basis of forecast scores, including precipitation scores, and illustrated on several case studies. Finally, a number of recommendations will be provided for a more optimal assimilation of AMDAR data in the AROME-France model.