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The impact of the AMMA radiosonde data on the French global assimilation and forecast system

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The high vertical density soundings recorded during the 2006 AMMA campaign
are assimilated into the French Numerical Weather Prediction ARPEGE 4D-Var system, with and without a bias correction for relative humidity. Four different experiments are carried out to assess the impact of the added observations. The analyses and forecasts from these different scenario are evaluated over western
Africa. For the full experiment using all data together with a bias correction, the humidity analysis is in better agreement with surface observations and independent GPS observations than for the other experiments. AMMA data also improve the African Easterly Jet (AEJ) on its South-Easterly side and when they are used with an appropriate bias correction, the daily and monthly averaged precipitation are in relatively good agreement with the satellite-based precipitation estimates. Forecast scores are computed with respect to surface observations, radiosondes, and analyses from the European Centre for Medium range Weather Forecasts (ECMWF).
The positive impact of additional radiosonde observations (with a relevant bias correction) is found to propagate downstream with a positive impact over Europe at the two and three-day forecast range.