

Comparison of precipitation-depth measurements for Belfort Model 5-780, ETI Noah-IV, and OTT Pluvio-N rain gages for the National Atmospheric Deposition Program

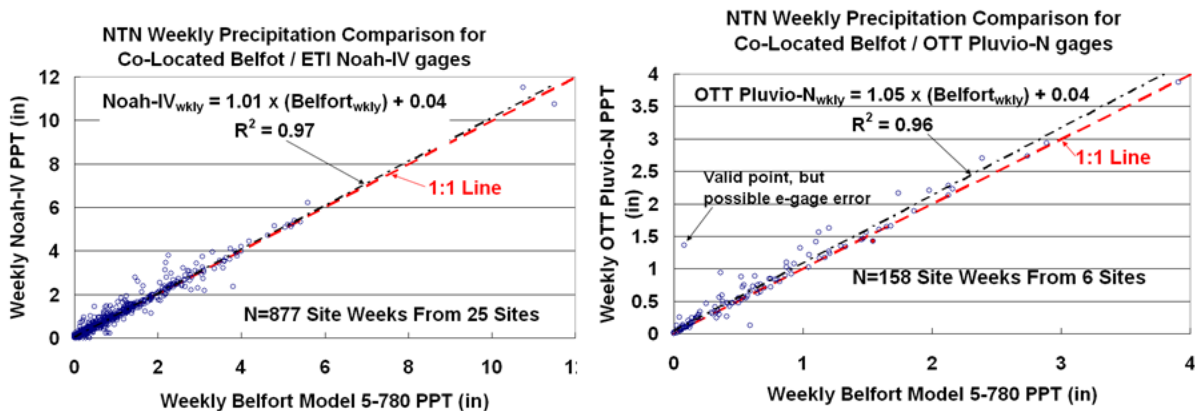
Gregory A. Wetherbee¹, Mark F. Rhodes², and RoseAnn Martin¹

Precipitation-depth data were obtained by co-located mechanical Belfort Model 5-780^a (Belfort) and electronic ETI Noah-IV^a and OTT Pluvio-N^a (e-gage) precipitation gages at National Atmospheric Deposition Program (NADP) / National Trends Network (NTN) sites. At present, approximately 50 percent of the NADP Belfort precipitation rain gages have been retrofit with e-gages. Quantification of potential bias in e-gage records is crucial for accurate reporting of atmospheric wet deposition.

Data were available for 25 Belfort gages co-located with ETI Noah-IV gages and 6 Belfort gages co-located with OTT Pluvio-N gages during the study period January 1, 2007 to May 12, 2010. The available record for each site varied between 24 to 605 days where both co-located gages provided valid data. Electronic files containing the e-gage records are submitted to the NADP Program Office (PO), where they are verified. For this study, daily precipitation depth obtained from the Belfort charts was compared to corrected e-gage records obtained from the PO.

Weekly sums of the daily data for each site are compared in scatter plots in Figure 1. Slopes for the regression equations comparing data from the gages indicate that weekly Noah-IV precipitation-depths are approximately 1 percent higher than the Belfort depths, and weekly OTT Pluvio-N depths are approximately 5 percent higher than the Belfort depths. Median weekly percent differences are 4.2 percent for the Noah-IV gage and 13 percent for the OTT Pluvio-N gage. Estimated median percent differences for the period of record for each site ranged from -20 percent to 10 percent. Additional work is needed to develop algorithms and/or correction factors for adjustment of historic Belfort gage records to account for any artificial shifts in precipitation-depth and atmospheric deposition trends resulting from NADP e-gage retrofits.

Figure 1.



¹U.S. Geological Survey, Water Resources Discipline, Office of Water Quality, Branch of Quality Systems, Lakewood, CO

²University of Illinois, Illinois State Water Survey, NADP Program Office

^aUse of trade or firm names is for identification purposes only and does imply endorsement by the U.S. government.