

# 1 Gauge Adjustment

Gauge adjustment itself is not a “problem” in radar meteorology, but rather a solution to problems associated with range effects, calibration levels, and to a limited extent (implicitly) effects caused by the vertical profile of reflectivity (VPR, see Section ??). A review of gauge adjustment methods and practises in Europe has been drafted by COST 717 (Gjertsen et al. 2003) and can be consulted for more detail. Generally, gauge adjustment can be defined as a term used to describe any procedure whereby the characteristics of radar data are modified such that they correspond as well as possible with the quantity given by gauge measurements (Michelson 2003).

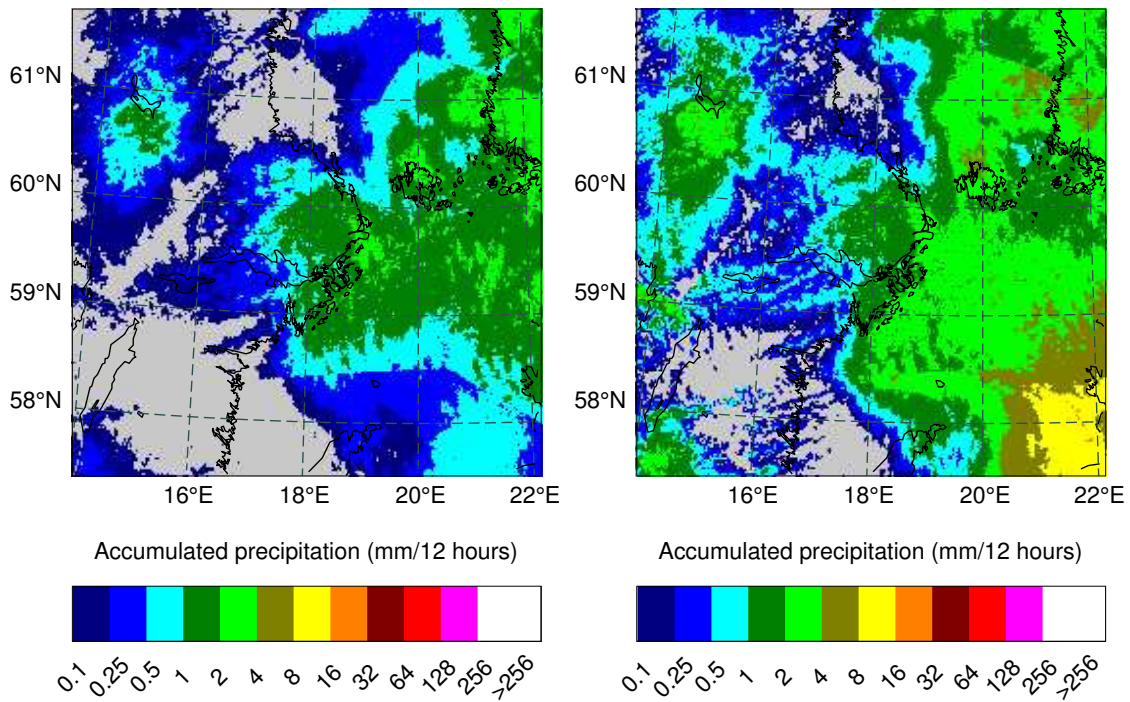
Numerous gauge adjustment techniques have been devised throughout the last several decades, and the reader is referred to Gjertsen et al. (2003) for more detail about them. Probably the most common and widespread family of techniques is based on the gauge-to-radar (G/R) ratio. Other common methods involve probability matching of gauge and radar-based probability density functions. Many variations on these general themes exist. Bulk adjustment implies that the same adjustment factor is applied globally to all radar data. Range (or distance) adjustment implies that the adjustment factor is only based on range or ground distance. Spatial adjustment implies that the adjustment is carried out at the pixel level.

Gauge adjustment has also been used on an experimental basis to investigate systematic calibration differences among different radars in a heterogeneous network, where gauge accumulations provide the reference level (Gekat et al. 2003; Michelson 2003).

Figure 1, taken from Koistinen and Michelson (2002), illustrates how a spatial gauge adjustment technique based on G/R influences a 12-hour radar-based accumulation.

## 2 References

- Gekat, F., Meischner, P., Friedrich, K., Hagen, M., Koistinen, J., Michelson, D. B., and Huuskonen, A., 2003. The State of Weather Radar Operations, Networks and Products. In Meischner, P. (Ed.), *Advanced Applications of Weather Radar*, Chapter 1. Springer. 340 pp.
- Gjertsen, U., Šalek, M., and Michelson, D. B., 2003. Gauge adjustment of radar-based precipitation estimates - a review. COST 717 Working Document WDD\_02\_200310\_1.
- Koistinen, J. and Michelson, D. B., 2002. BALTEX Weather Radar-based Precipitation Products and their Accuracies. *Boreal Env. Res.* 7(3), 253–263.
- Michelson, D. B., 2003. *Quality Control of Weather Radar Data for Quantitative Application*. Ph. D. thesis, Telford Institute of Environmental Systems, School of Environment and Life Sciences, University of Salford. 281 pp.



(a) Radar.

(b) Gauge adjusted radar.

Figure 1: Comparison of unadjusted (a) and gauge-adjusted (b) 12-hour accumulated precipitation, centred over the coverage area of Radar Arlanda. February 7, 2000, 18 UTC.