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Hydrology and Earth System Sciences
Discussions



# *Interactive comment on* "Quantitative precipitation estimation with weather radar using a data- and information-based approach" *by* M. Neuper and U. Ehret

**Anonymous Referee #2**

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General comment:

This article is very interesting and I think it could be published with some minor corrections. The approach used is complementary to what is commonly done. It makes it possible to identify interesting predictors to be taken into account in order to improve the quantitative estimation of rainfall. However, even if it can be a guide, I have some doubts about the ability of Information Theory to go further, that is make it possible, in practice, to improve quantitative estimation. The article is well written. A reader who not used with information theory is able, with a few "round trips" in the article, to understand the main ideas.



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Remarks on the substance:

* Page 2, line 24: It seems to me that the work of Vignal et al (1999) and (2000) only addresses the variability of Z from high altitude to the ground but not directly the variability of the Z-R relationship along the vertical.

* Page 12, line 11: the reflectivity factors of the MRR, due to the short wavelength used, can also sometimes be greatly attenuated, with consequences on the retrieved DSD.

* Page 12, line 11: why is the 3.5 moment used and not (the most commonly used) 3.67? Could you add a reference?

* Page 17, Line 11: A 15.3% reduction in uncertainty when RR0 is conditioned by dBZ1500Rad seems quite low, doesn't it? This proves that radar reflectivity is one of the most important sources of information but that there is a high variability in the Z-R relationship that limits entropy reduction. This explanation is suggested later (experiment 3) but could perhaps already be mentioned here. I think we are also suffering here from the effects of PVR and perhaps even attenuation for high intensities.

* Page 24, Line 3-5: I understand that DKL=3.43 bits and 5.04 correspond to the application of the Z-R Marshall Palmer relationship and that DKL=2.69 and 4.30 correspond to the optimized Z-R relationship. But I don't understand what differentiates 3.43 from 2.69 (and 5.04 from 4.30): what are the differences in terms of condition applied?

* Page 26, Line 22: after "attributed to the ambiguous relationship between radar reflectivity and rain rate", I think that "due to the natural variability of Drop Size Distribution" may be added.

* Section 3.6: Why kriging (often used method) was not considered for the rain-gauge approach?

Remarks on the form of the document:

* The publication of Cecinate et al (2017) cited on page 2 do not appear in the list of references.

* Section 1.1, page 3, is a little "orphaned". It may not be necessary to distinguish this paragraph from the introduction. Its content could appear just before the announcement of the plan (between lines 10 and 11 on page 3).

* Table 1: I propose to replace "[min, max]" by"[center of the min bin, center of max bin]" or something like that.

* Figures 4, 5, 6 and 7: I think that the texts of the legends should be enlarged.

* Figure 6: Wouldn't the figure in a log-log frame be more readable and give less weight to very weak reflectivities?

* Table 3: I propose to replace "RR0" by "RR0Dis" to highlight that disrometer is used (as for dBZ0Dis).

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