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*Supplement of*

## **Ensemble flood forecasting considering dominant runoff processes – Part 1: Set-up and application to nested basins (Emme, Switzerland)**

**Manuel Antonetti et al.**

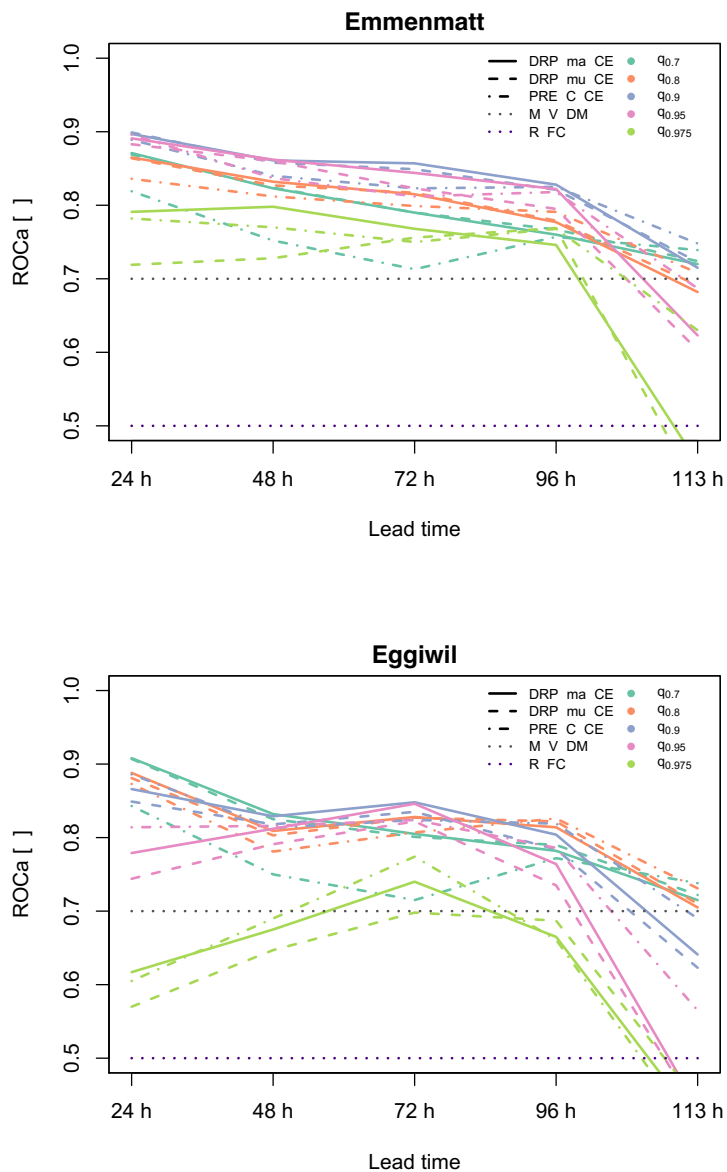
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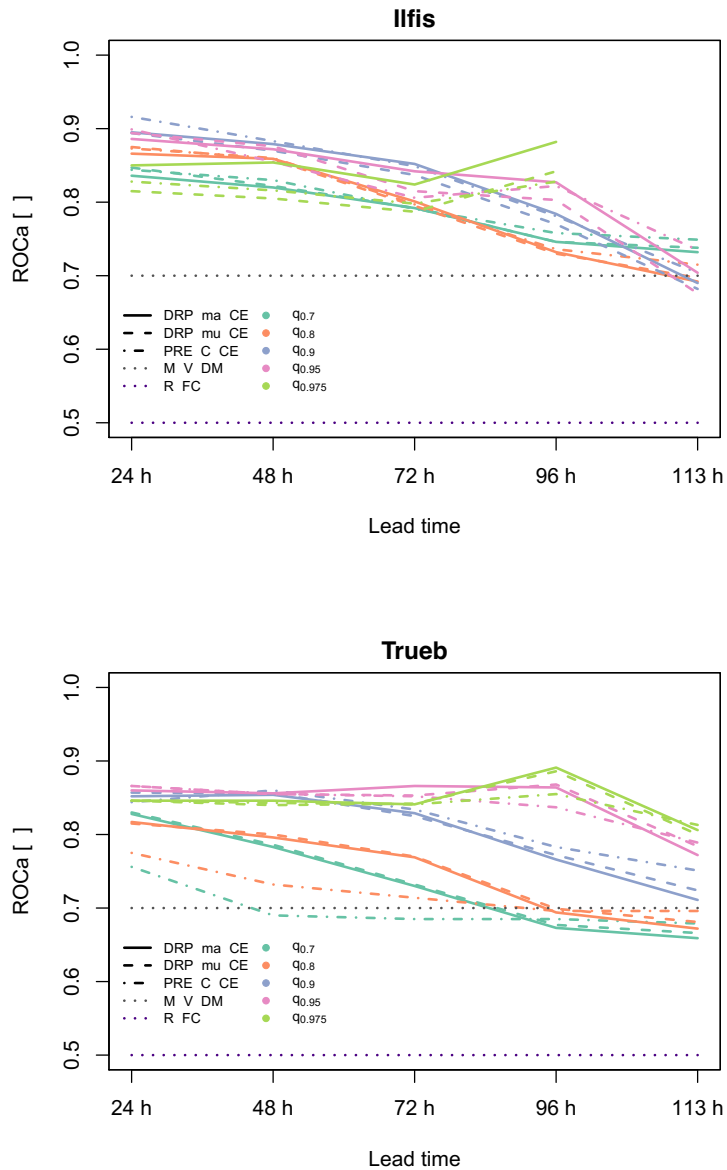
## S1 Runoff threshold quantiles

**Table S1.** Summary of threshold quantiles for runoff [ $\text{m}^3/\text{s}$ ] in the investigated Emme catchments.

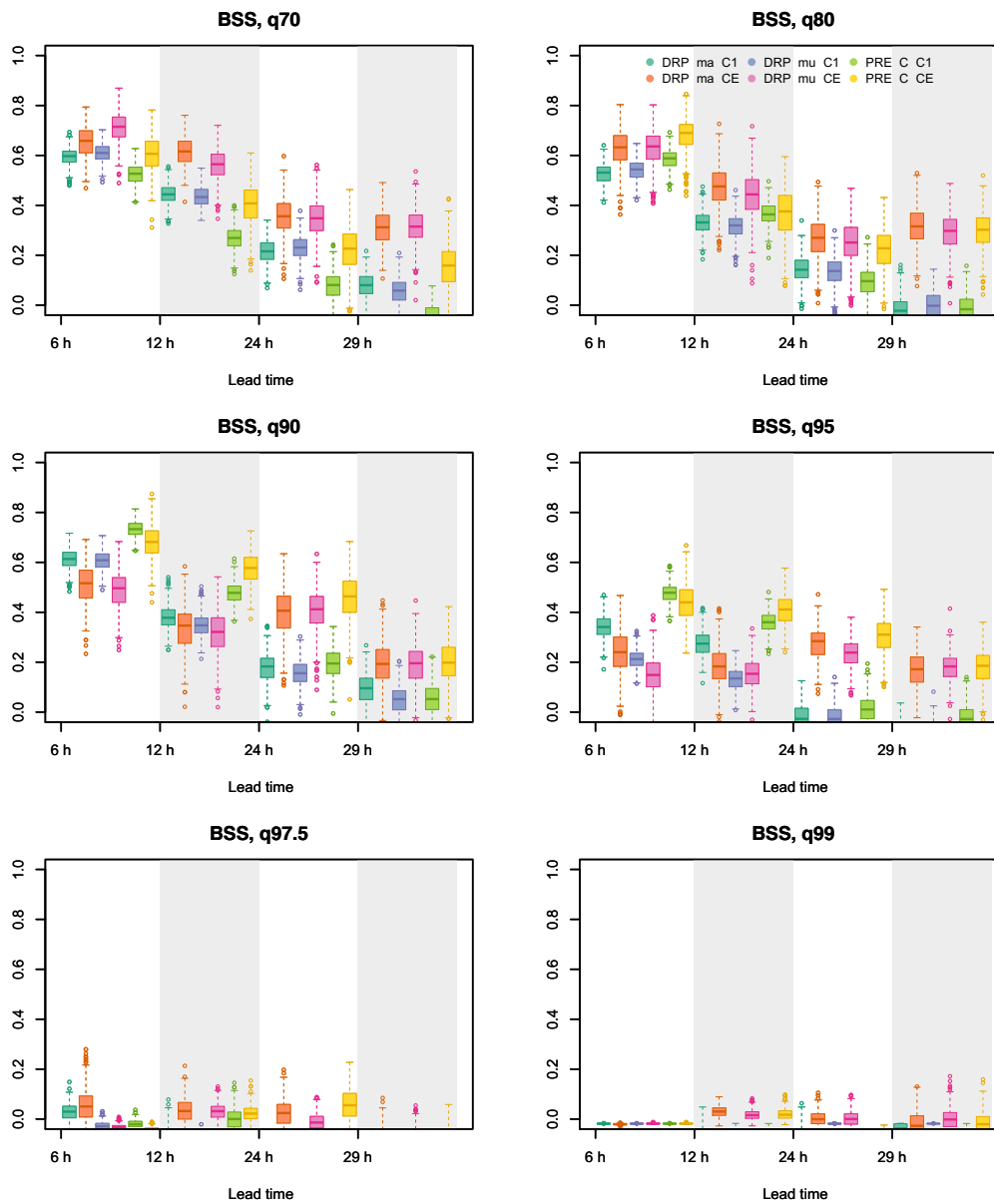
	<b>Q<sub>0.5</sub></b>	<b>Q<sub>0.6</sub></b>	<b>Q<sub>0.7</sub></b>	<b>Q<sub>0.8</sub></b>	<b>Q<sub>0.9</sub></b>	<b>Q<sub>0.95</sub></b>	<b>Q<sub>0.975</sub></b>	<b>Q<sub>0.99</sub></b>
<b>Emmenmatt</b>	18.7	21.4	26.4	33.1	40.6	61.6	92.4	120.6
<b>Eggiwil</b>	5.3	6.3	7.9	10.1	18.1	26.9	37.1	51.4
<b>Ilfis</b>	8.9	10.7	12.5	15.2	20.1	26.6	36.6	46.4
<b>Trueb</b>	2.4	2.7	3.0	3.5	4.4	5.9	7.6	10.0



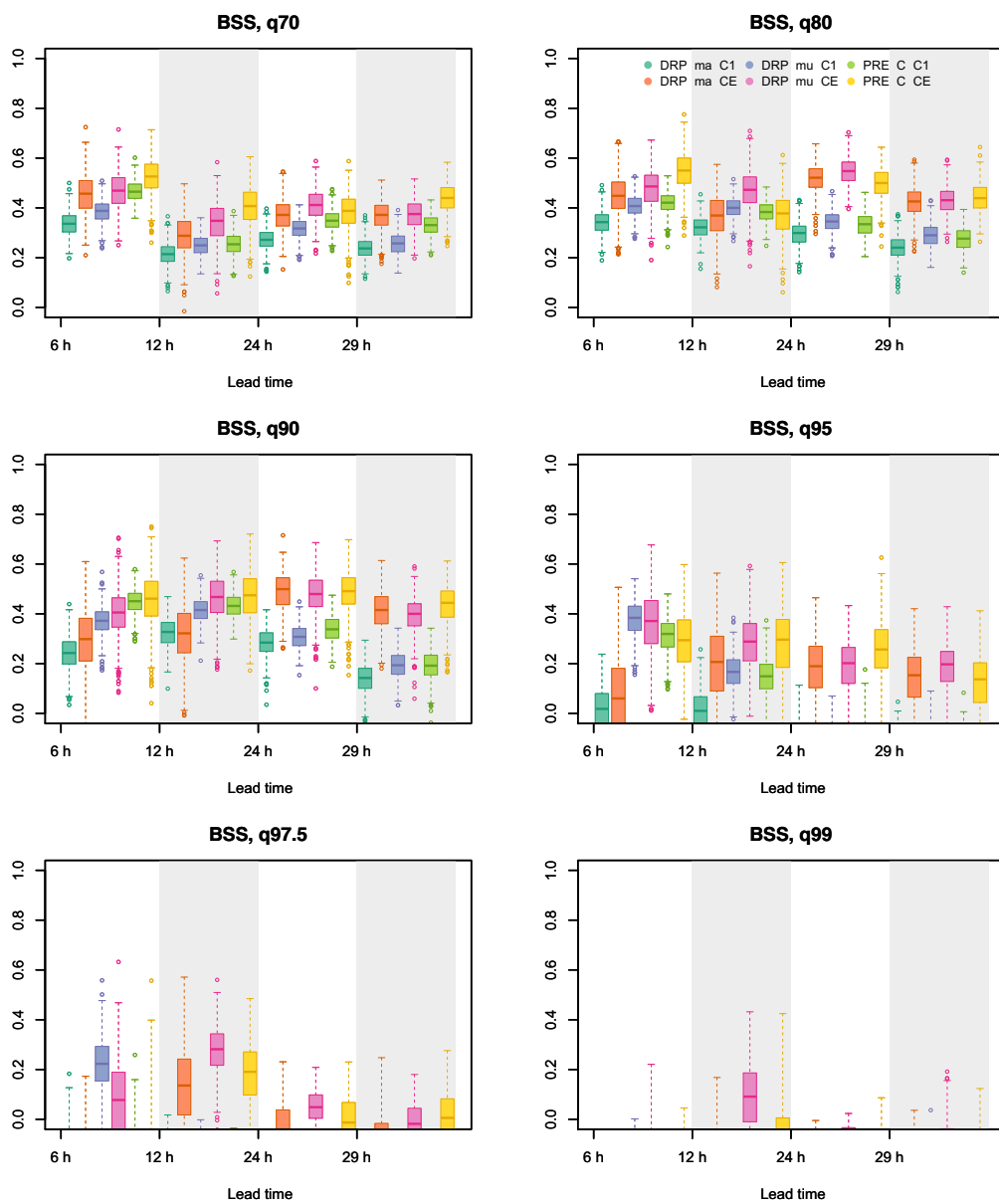
**Figure S1.** Evolution of ROCa in Emmenmatt (upper) and Eggiwil catchment (lower panel) for probabilistic DRP-ma-CE (solid), DRP-mu-CE (dashed) and PRE-C-CE (dashed-dotted) as a function of lead time for several quantiles. These values served as basis for the ROCa summary in the paper. Grey dotted line (M-V-DM) indicates ROCa of 0.7, which is minimum value that is still useful for decision makers (Buizza et al., 1999). An unskilful forecast would yield a ROCa of 0.5, which is indicated by the purple dotted line (R-FC). A window of 24 hours was taken for the computations, e.g. values from 25 h to 48 h were considered for the 48 h lead time.



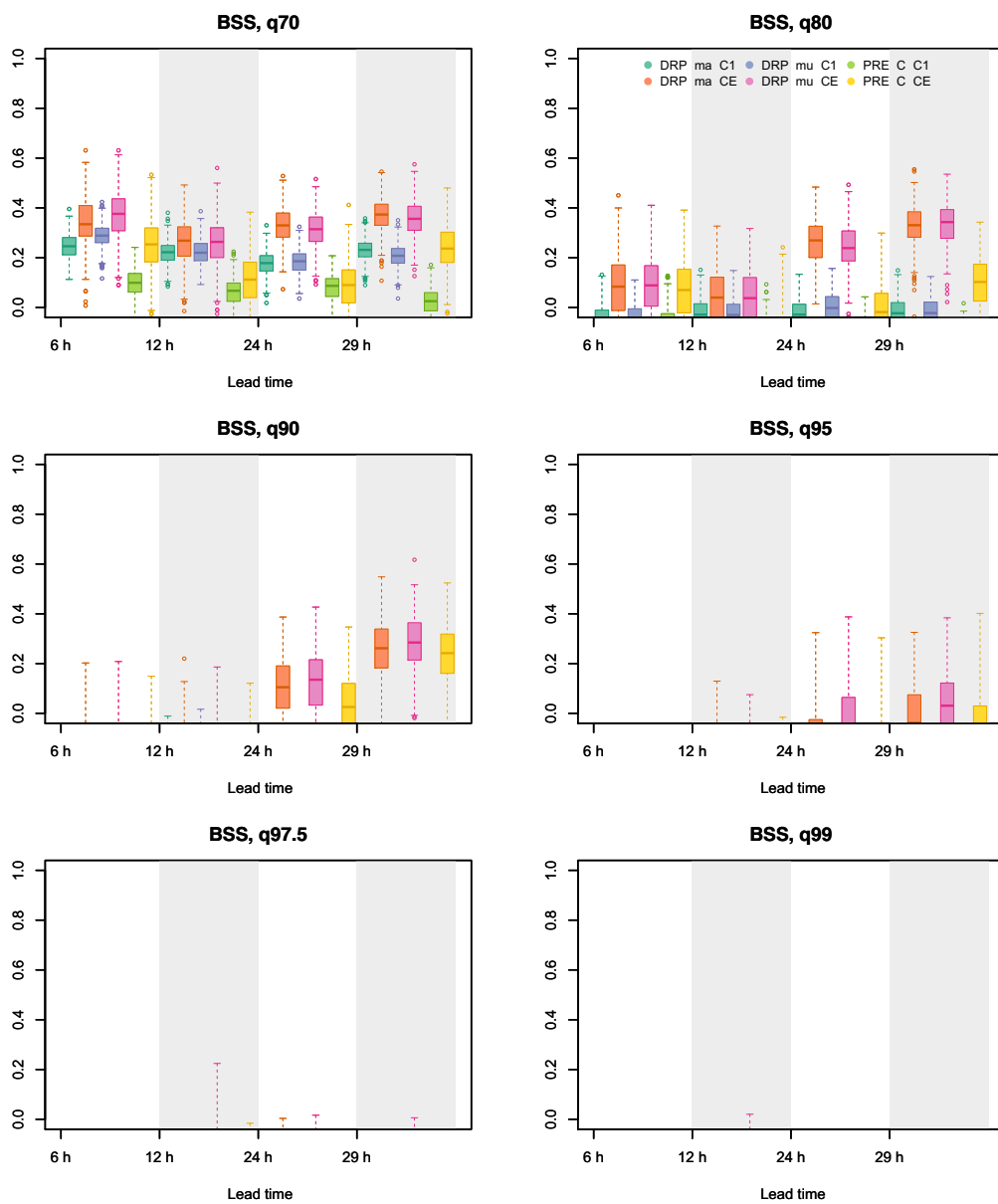
**Figure S2.** Evolution of ROCa in Ilfis (upper) and Trueb catchment (lower panel) for probabilistic DRP-ma-CE (solid), DRP-mu-CE (dashed) and PRE-C-CE (dashed-dotted) as a function of lead time for several quantiles. These values served as basis for the ROCa summary in the paper. Grey dotted line (M-V-DM) indicates ROCa of 0.7, which is minimum value that is still useful for decision makers (Buizza et al., 1999). An unskilful forecast would yield a ROCa of 0.5, which is indicated by the purple dotted line (R-FC). For 113 hours lead time and the  $q_{0.975}$  threshold quantile there was not enough data for the computations in Ilfis basin. A window of 24 hours was taken for the computations, e.g. values from 25 h to 48 h were considered for the 48 h lead time.



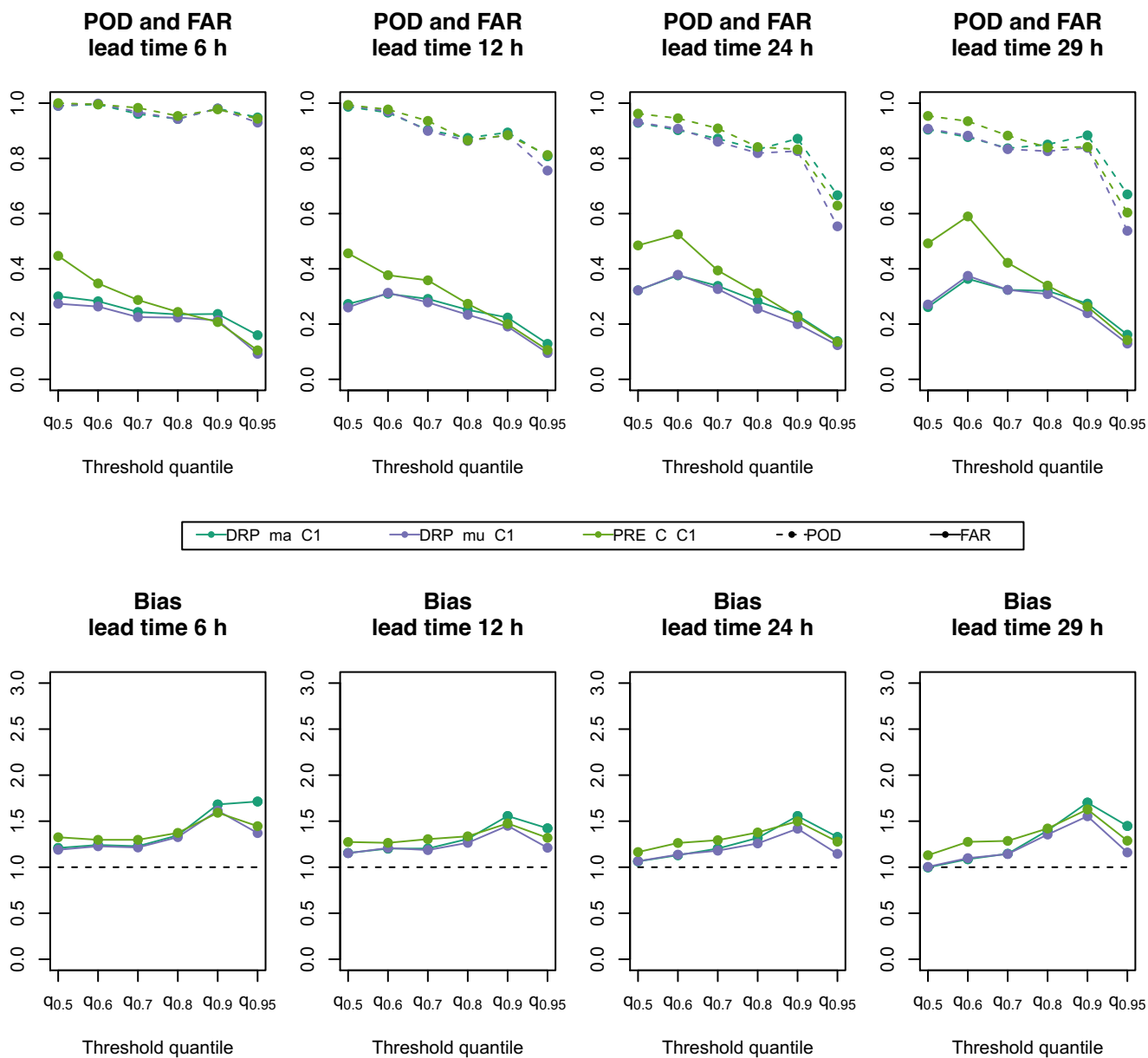
**Figure S3.** Comparison of BSS in Eggiwil catchment for deterministic DRP-ma-C1, DRP-mu-C1, PRE-C-C1 and probabilistic DRP-ma-CE, DRP-mu-CE, PRE-C-CE as a function of lead time for several threshold quantiles. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time. The boxplots represent the sampling uncertainties of the score computations obtained with 500 iterations of bootstrapping, which is further explained in the companion paper.



**Figure S4.** Comparison of BSS in Ilfis catchment for deterministic DRP-ma-C1, DRP-mu-C1, PRE-C-C1 and probabilistic DRP-ma-CE, DRP-mu-CE, PRE-C-CE as a function of lead time for several threshold quantiles. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time. The boxplots represent the sampling uncertainties of the score computations obtained with 500 iterations of bootstrapping, which is further explained in the companion paper.

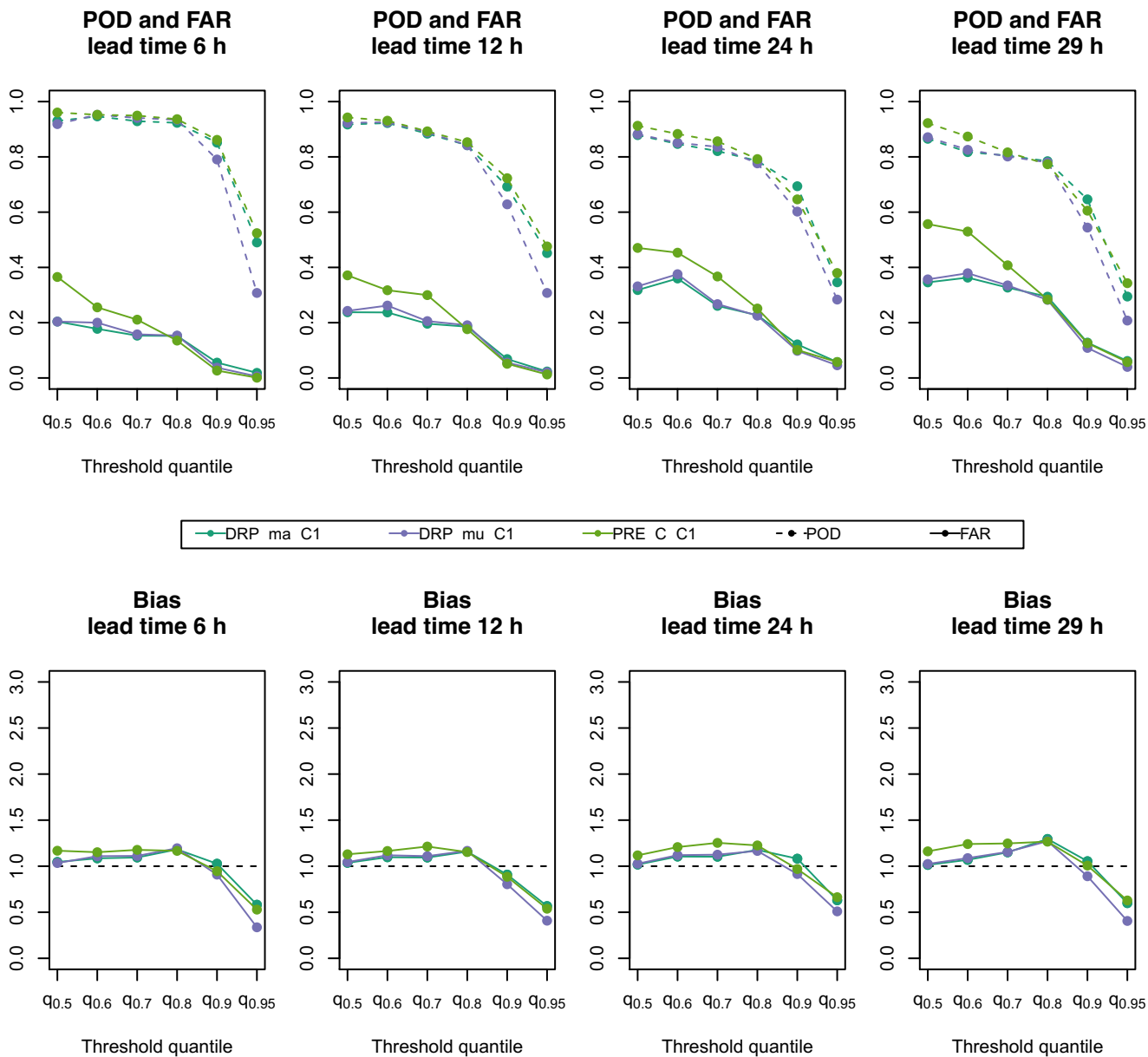


**Figure S5.** Comparison of BSS in Trueb catchment for deterministic DRP-ma-C1, DRP-mu-C1, PRE-C-C1 and probabilistic DRP-ma-CE, DRP-mu-CE, PRE-C-CE as a function of lead time for several threshold quantiles. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time. The boxplots represent the sampling uncertainties of the score computations obtained with 500 iterations of bootstrapping, which is further explained in the companion paper.

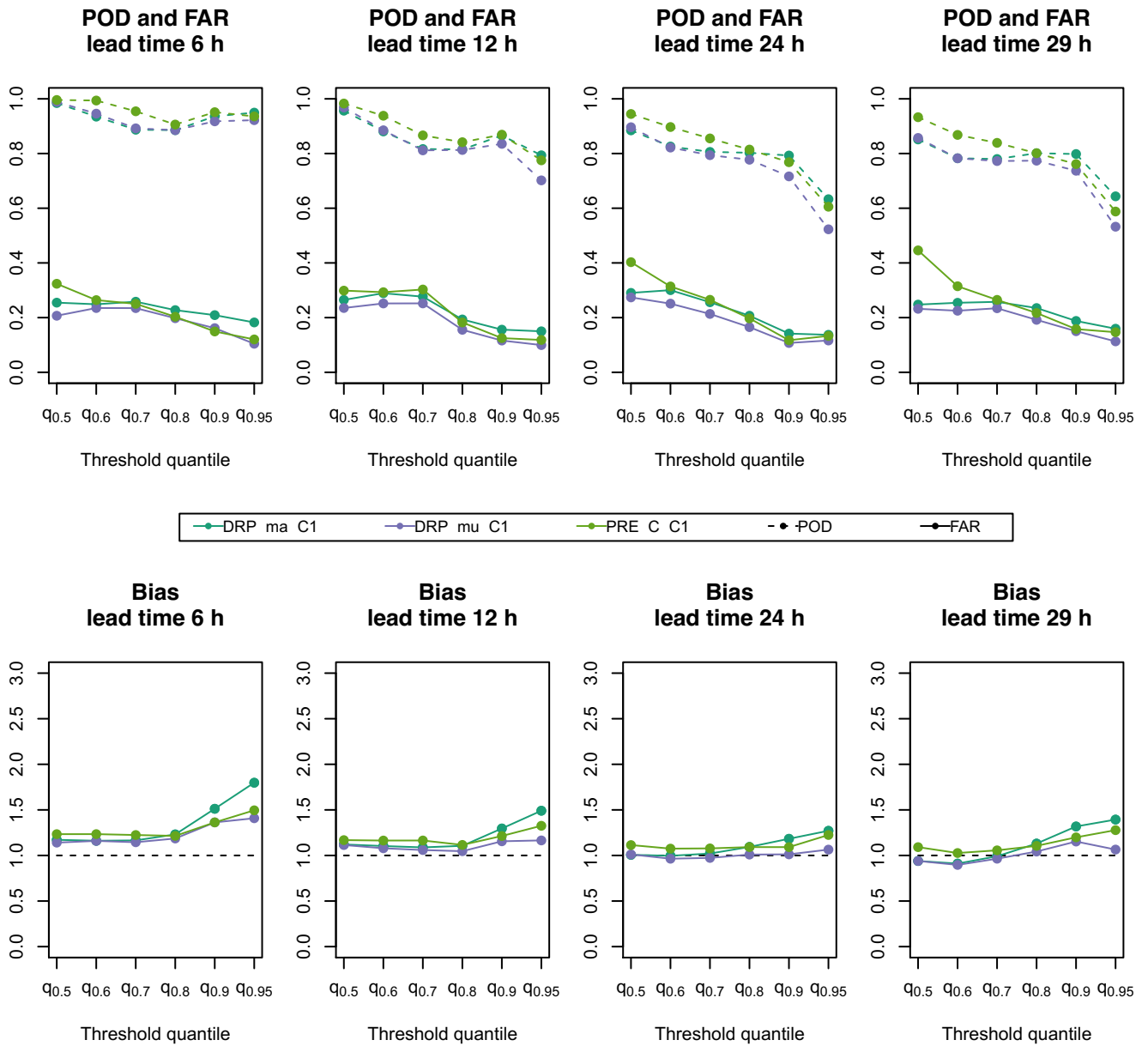


**Figure S6.** POD, FAR (upper panel) and FB (lower panel) for Emmenmatt catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.

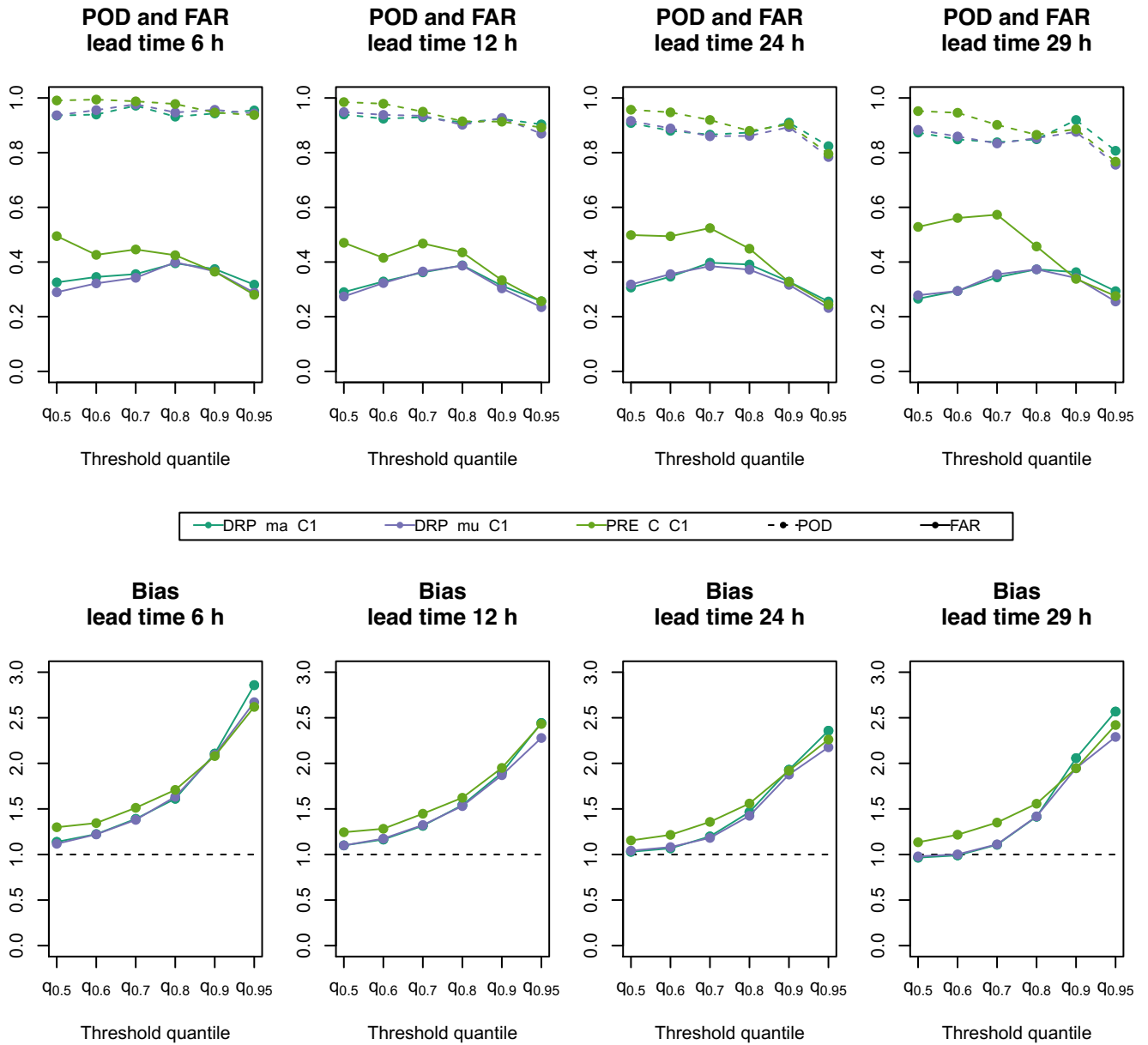




**Figure S7.** POD, FAR (upper panel) and FB (lower panel) for Eggiwil catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.



**Figure S8.** POD, FAR (upper panel) and FB (lower panel) for Ilfis catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.



**Figure S9.** POD, FAR (upper panel) and FB (lower panel) for Trueb catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.