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

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S1 Runoff threshold quantiles

Table S1. Summary of threshold quantiles for runoff [m^3/s] in the investigated Emme catchments.

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

S2 ROCa

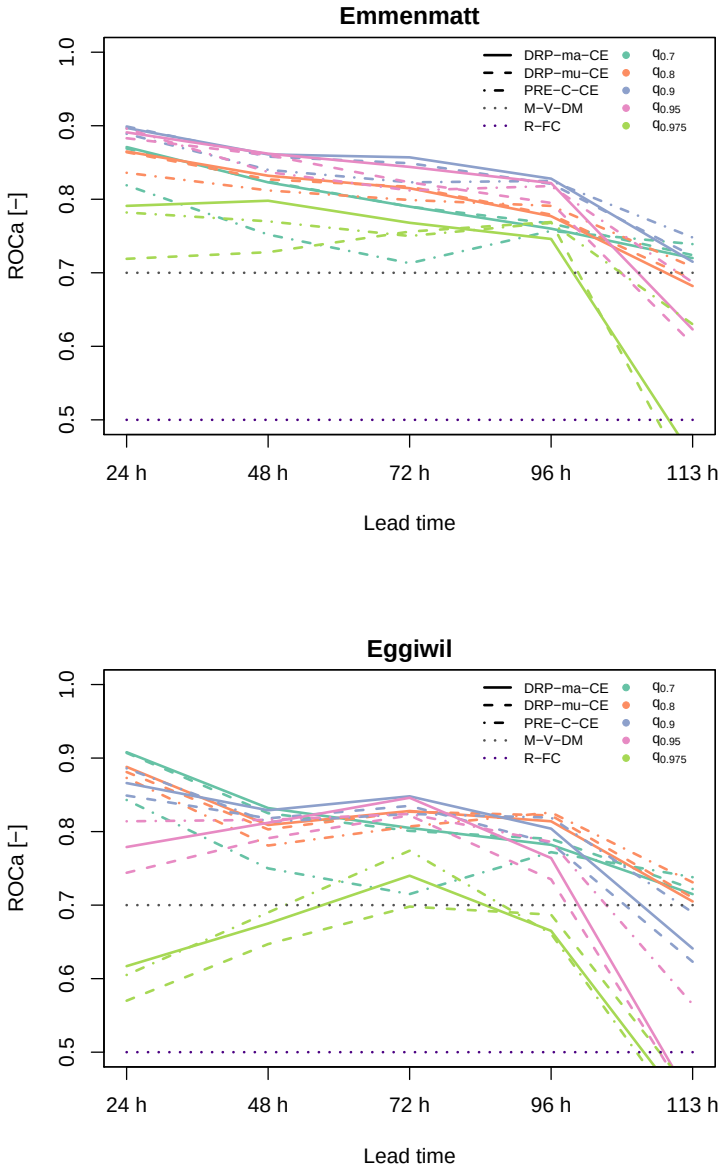

Figure S1. Evolution of ROCa in Emmenmatt (upper) and Eggiwil catchment (lower panel) for probabilistic DRP-ma-CE (solid), DRP-mu-CE (dashed) and PRE-C-CE (dashed-dotted) as a function of lead time for several quantiles. These values served as basis for the ROCa summary in the paper. Grey dotted line (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.

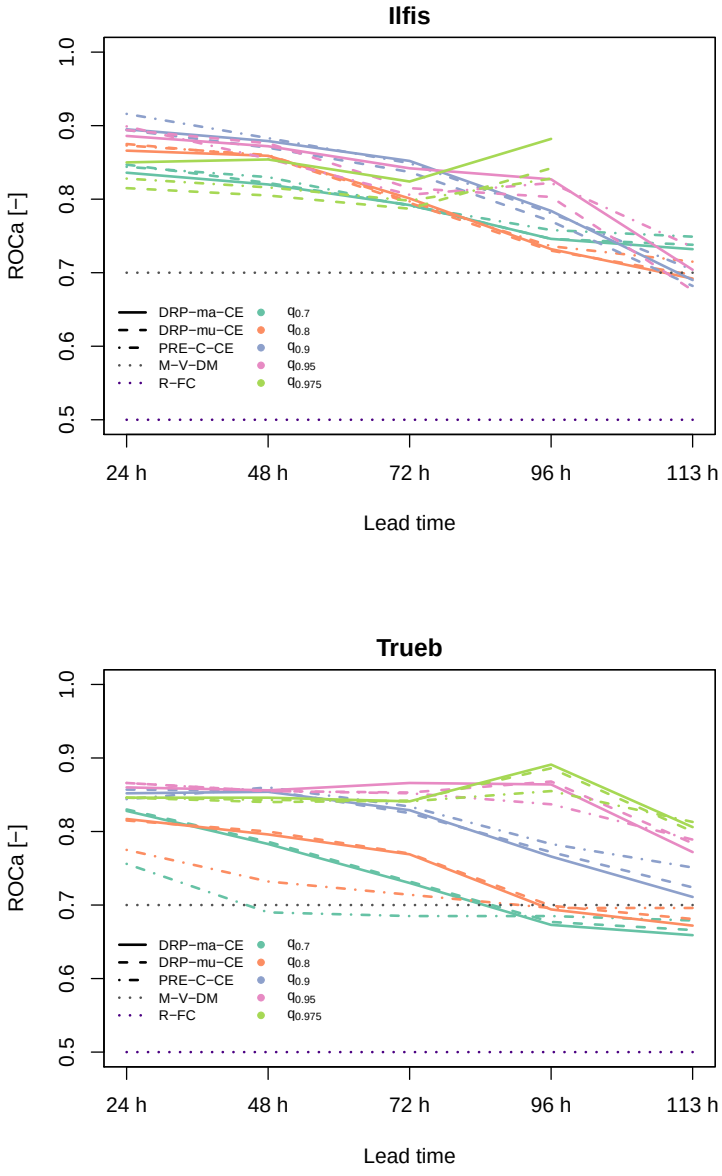

Figure S2. Evolution of ROCa in Ilfis (upper) and Trueb catchment (lower panel) for probabilistic DRP-ma-CE (solid), DRP-mu-CE (dashed) and PRE-C-CE (dashed-dotted) as a function of lead time for several quantiles. These values served as basis for the ROCa summary in the paper. Grey dotted line (M-V-DM) 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.

S3 BSS

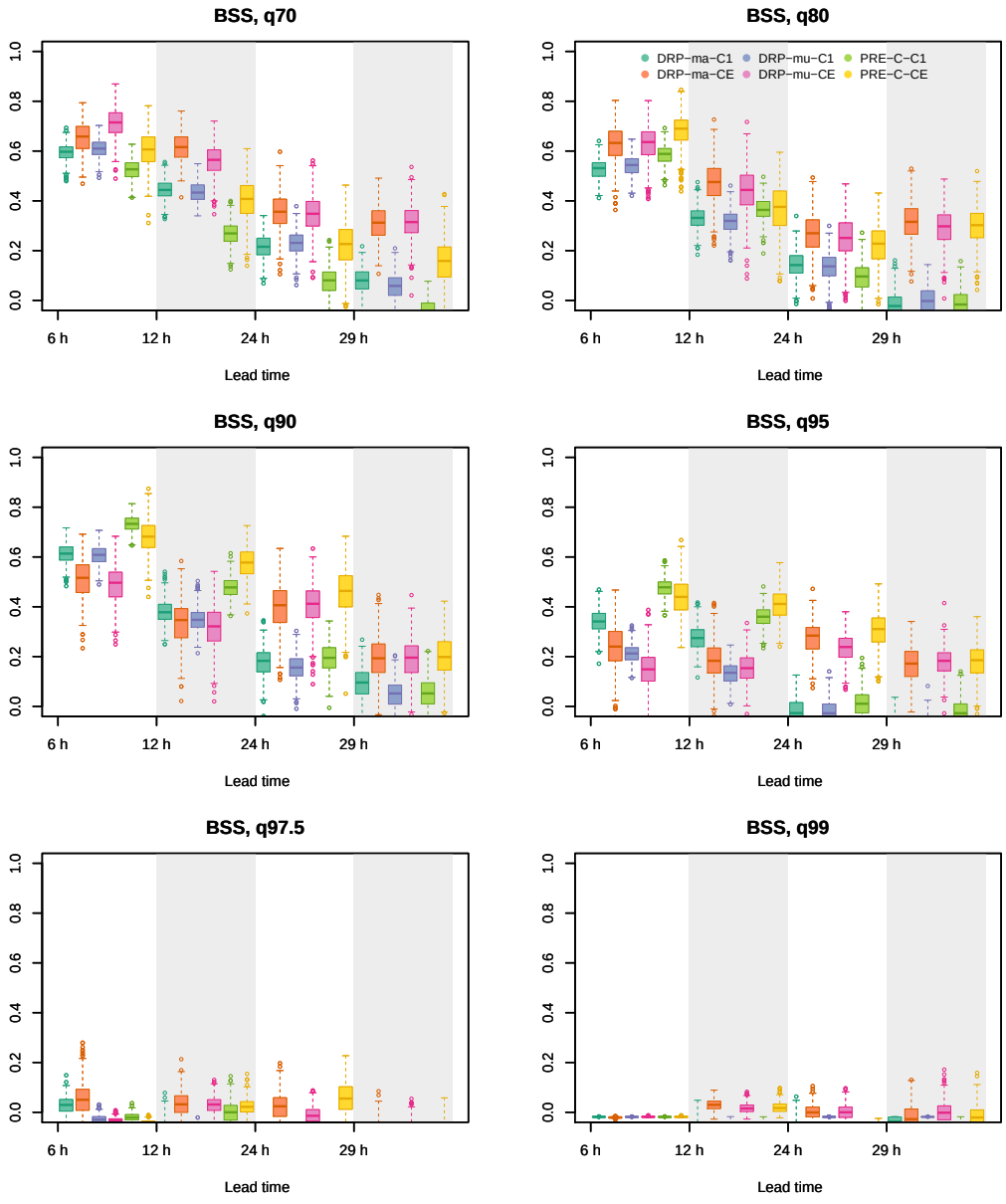

Figure S3. Comparison of BSS in Eggiwil catchment for deterministic DRP-ma-C1, DRP-mu-C1, PRE-C-C1 and probabilistic DRP-ma-CE, DRP-mu-CE, PRE-C-CE as a function of lead time for several threshold quantiles. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered 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.

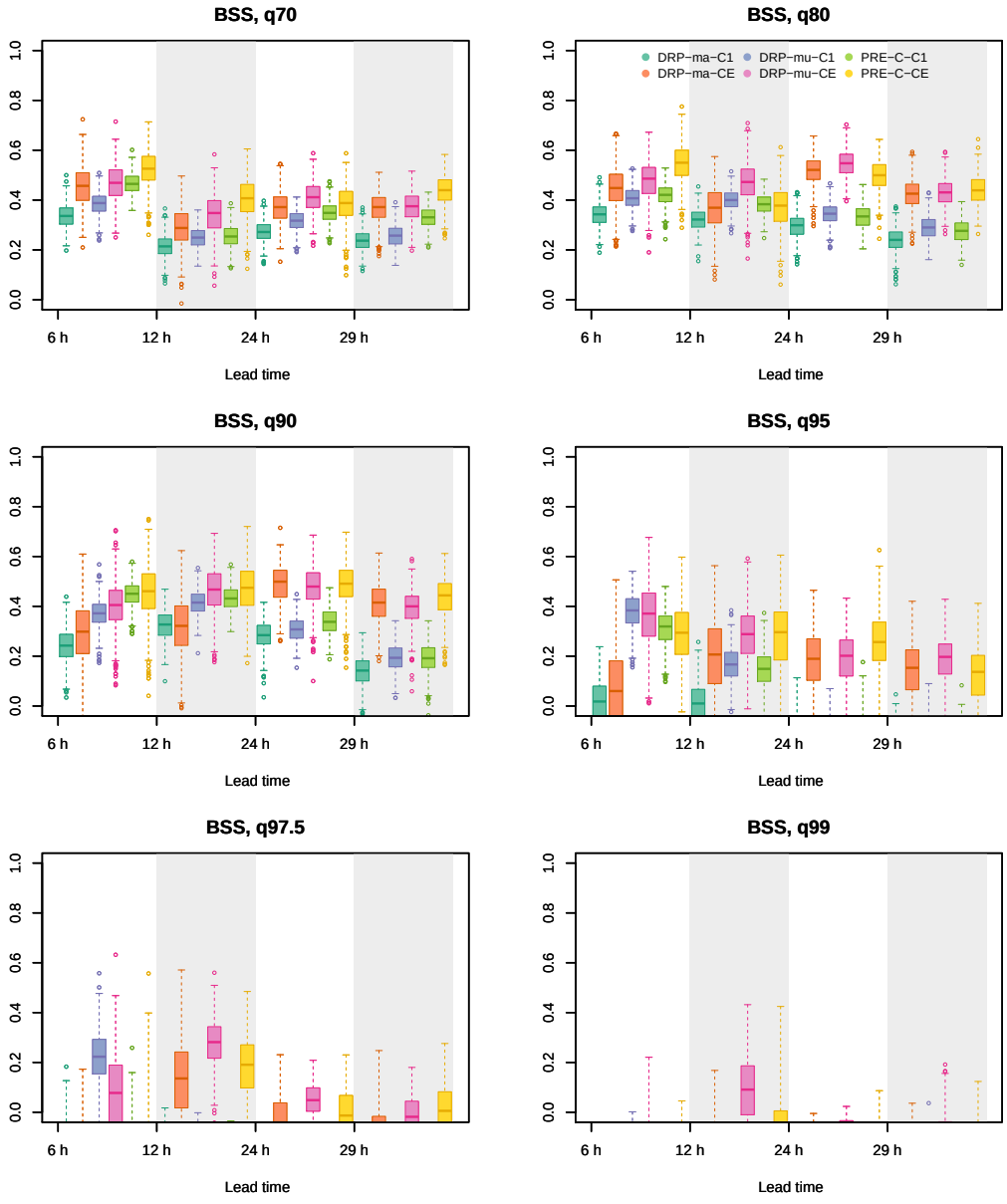

Figure S4. Comparison of BSS in Ilfis catchment for deterministic DRP-ma-C1, DRP-mu-C1, PRE-C-C1 and probabilistic DRP-ma-CE, DRP-mu-CE, PRE-C-CE as a function of lead time for several threshold quantiles. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered 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.

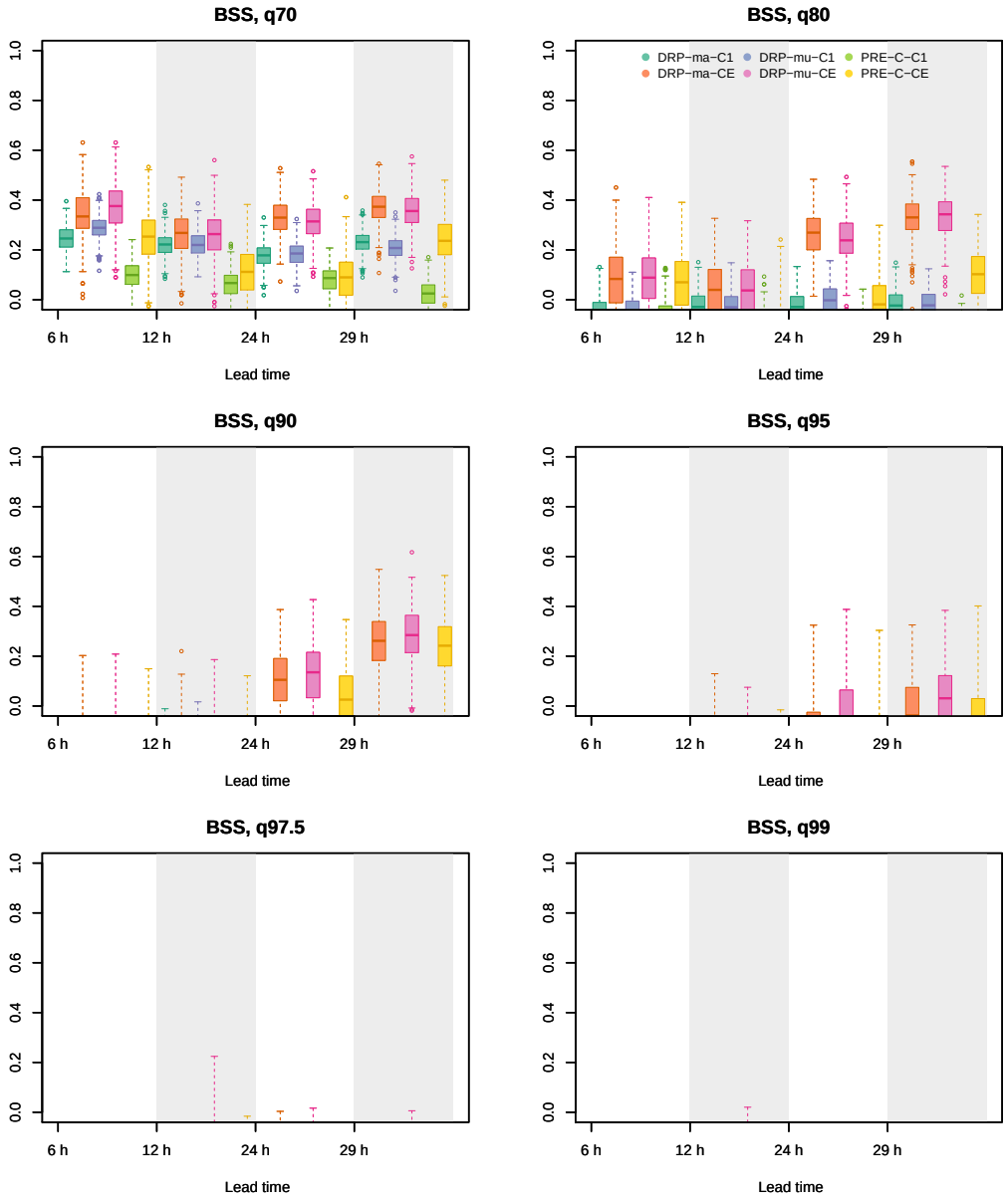

Figure S5. Comparison of BSS in Trueb catchment for deterministic DRP-ma-C1, DRP-mu-C1, PRE-C-C1 and probabilistic DRP-ma-CE, DRP-mu-CE, PRE-C-CE as a function of lead time for several threshold quantiles. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered 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.

S4 POD, FAR, FB

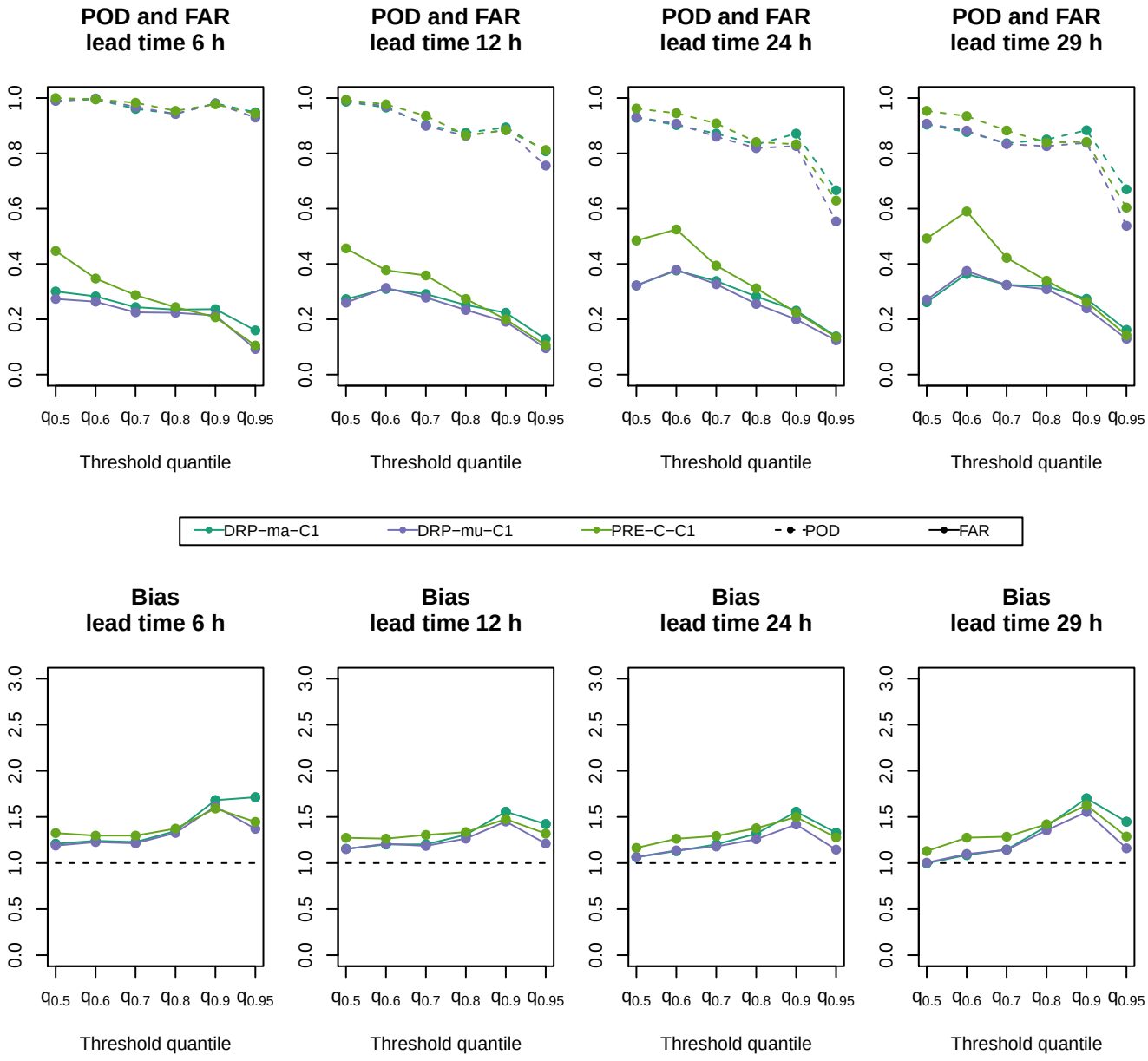

Figure S6. POD, FAR (upper panel) and FB (lower panel) for Emmenmatt catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.

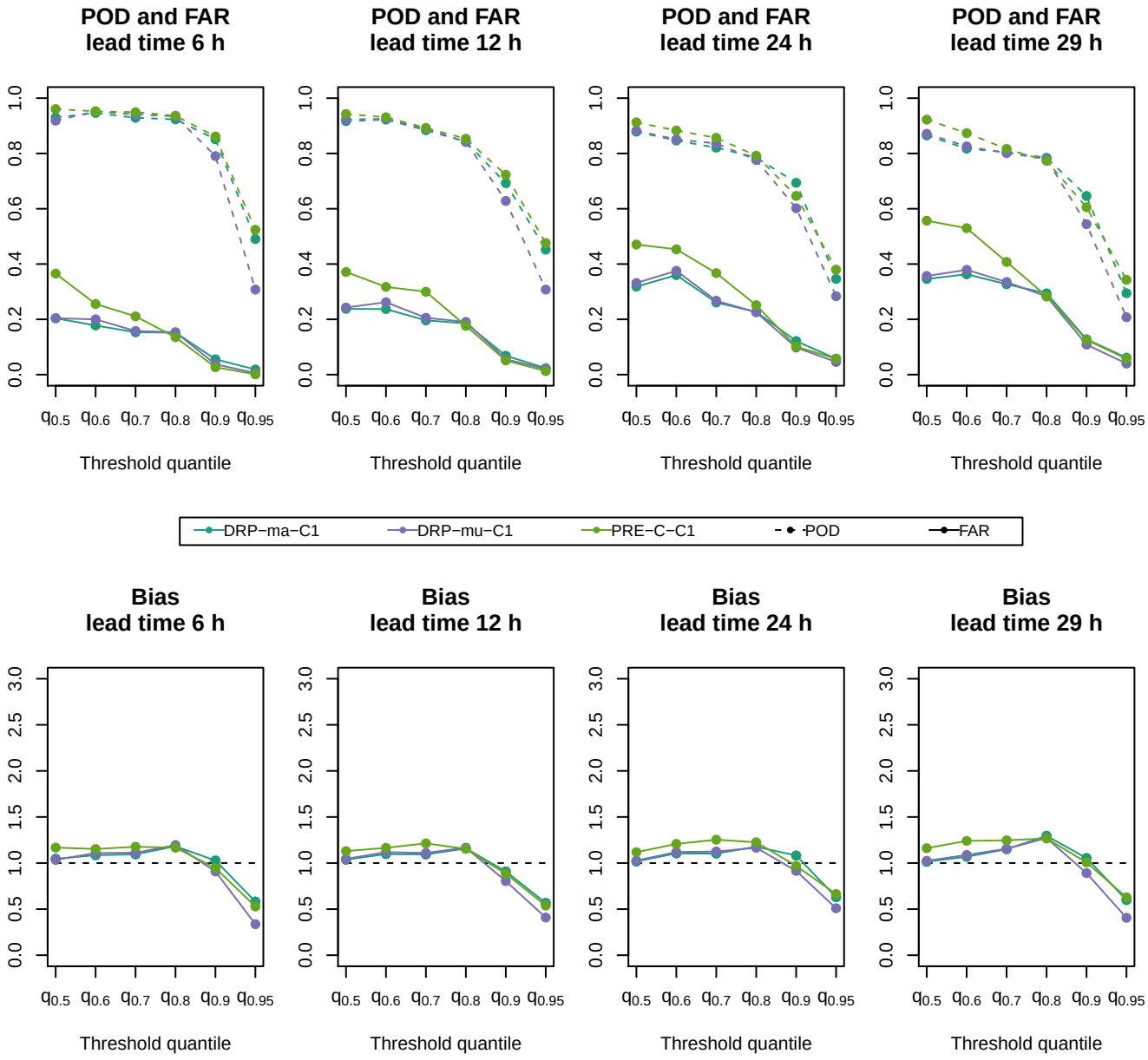

Figure S7. POD, FAR (upper panel) and FB (lower panel) for Eggiwil catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.

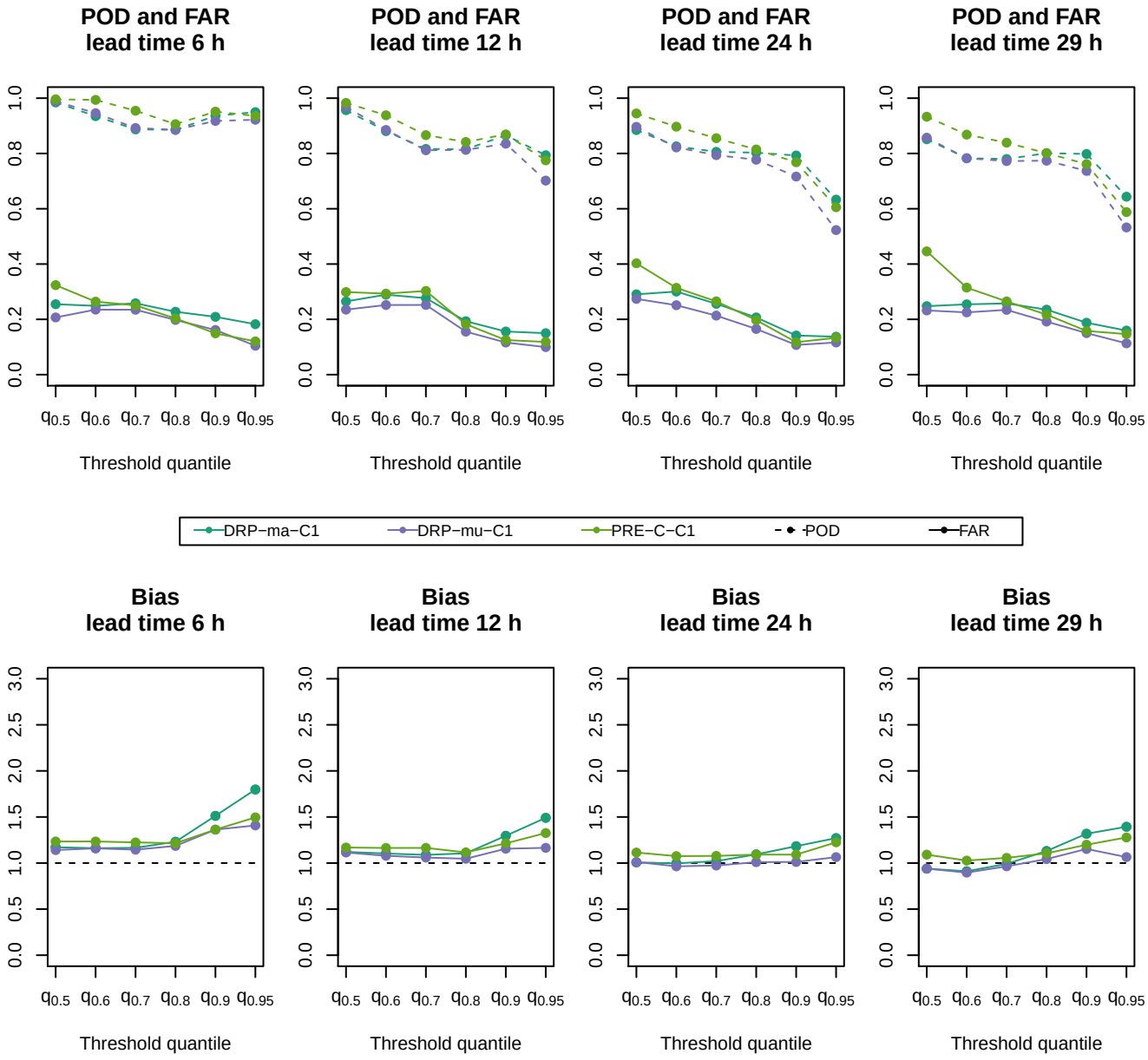

Figure S8. POD, FAR (upper panel) and FB (lower panel) for Ilfis catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.

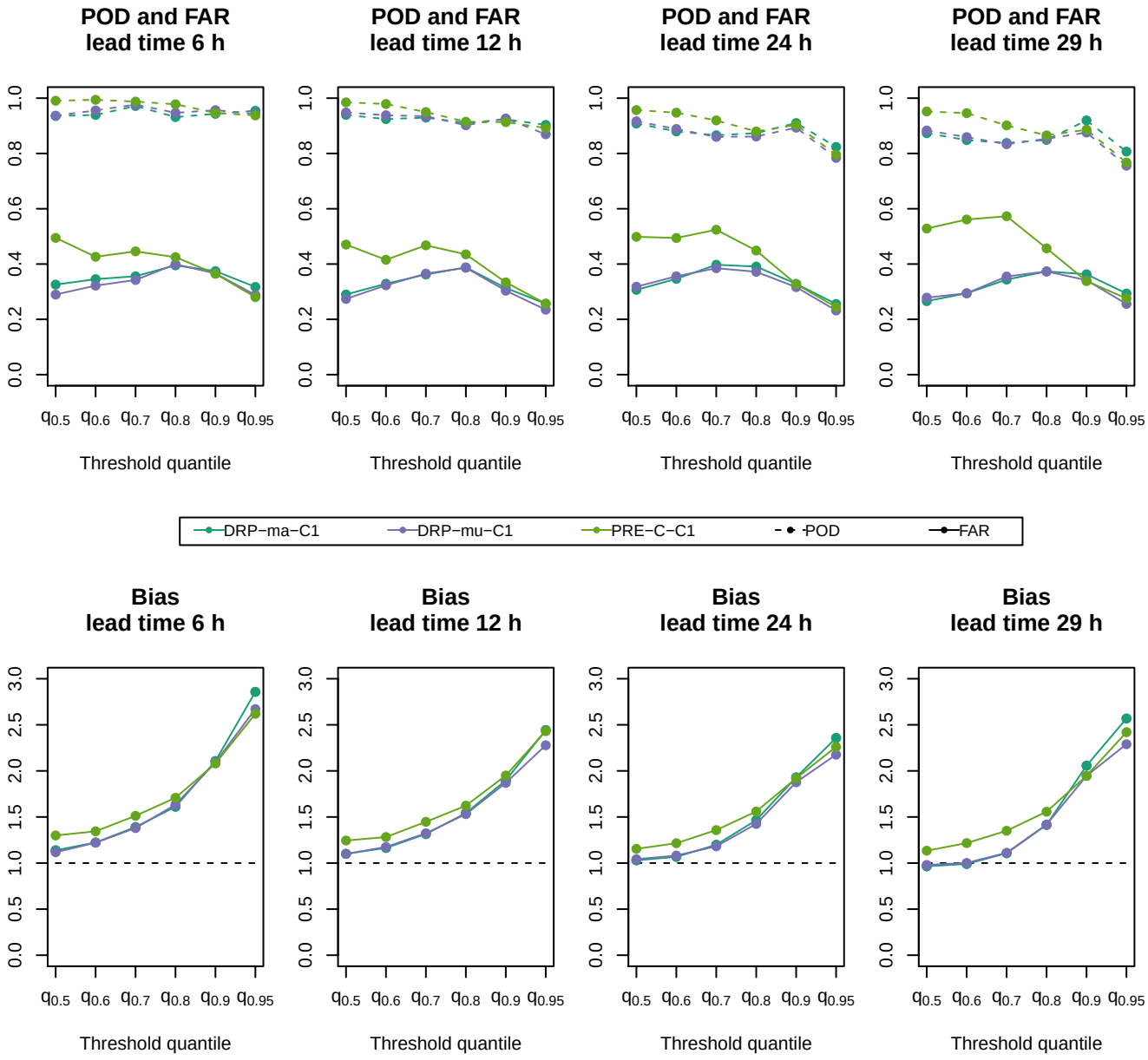

Figure S9. POD, FAR (upper panel) and FB (lower panel) for Trueb catchment as a function of threshold quantile and for several lead times for DRP-ma-C1, DRP-mu-C1 and PRE-C-C1. A window of 6 hours was taken for the computations, e.g. values from 19 h to 24 h were considered for the 24 h lead time.