



Supplementary material: Assessing water and energy fluxes in a regional hydrosystem: case study of the Seine basin

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1. Performance of the ORCHIDEE-CaWaQS coupling: hydrology

Groundwater (GW) simulation shows satisfactory performance overall as the RMSE and MSE are below 4 m in 40% and 44% of the stations, respectively. In terms of the regional scale aquifer dynamics 67% of the piezometers show a correlation (CC) larger than 0.5, whereas 25% of the piezometers exhibit a KGE larger than 0.5.

In the Vernon station (main catchment of the Seine basin), bias was estimated as 1.6% with 0.77 KGE and 0.82 CC; the overall performance was satisfactory (Figure 3a). Considering the sub-catchments, 6 out of 14 stations at the main sub-catchments show a KGE above 0.7 and 8 stations show a CC larger than 0.7. The estimated bias ranged between -12.6–23.8%. At the basin scale, a total of 38.5% of the stations show KGE values (not shown) larger than 0.5.

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Supplementary Table S1. Statistical criteria (2001–2018 period) from 267 piezometers distributed in the basin

	RMSE	MAE	RMSE	MAE
Value range (m)	Piezometer count (-)		Cumulative percentage (%)	
]0.0–2.0[	61	83	23	25
]2.0–4.0[	47	64	40	44
]4.0–6.0[	45	59	57	62
]6.0–8.0[	30	41	68	75
]8.0–10.0[	20	23	76	82
>=10	64	61	100	100
	CC	KGE	CC	KGE
Value range (-)	Piezometer count (-)		Cumulative percentage (%)	
]0.7–1.0[	114	35	43	13
]0.5–0.7[	65	32	67	25
]0.4–0.5[	22	17	75	32
]0.2–0.4[	33	36	88	45
]0.0–0.2[	23	30	96	56
]–∞–0.0[	10	117	100	100

Upper table: Root Mean Square Error (RMSE), Mean Absolute Error (MAE). Lower table: Pearson correlation coefficient (CC), and Kling-Gupta Efficiency (KGE) coefficient.