

**Table 1.** Calibration and evaluation of model simulations under the four routing algorithms

Algorithms			D8	MD8	D $\infty$	RMD $\infty$	MFD-md	$\sigma$
Outlet flow (mm/day)	91-00	SF	0.596	0.596	0.596	0.596	0.596	0.000
		BF	0.585	0.588	0.587	0.588	0.589	0.001
	01-12	SF	0.522	0.522	0.524	0.522	0.516	0.003
		BF	0.508	0.522	0.511	0.521	0.507	0.007
RMSE (mm/day)	91-00	SF	0.270	0.271	0.271	0.271	0.274	0.001
		BF	0.230	0.228	0.233	0.230	0.232	0.002
	01-12	SF	0.326	0.329	0.327	0.326	0.331	0.002
		BF	0.284	0.282	0.282	0.281	0.283	0.001
NS	91-00	SF	0.749	0.748	0.748	0.748	0.742	0.003
		BF	0.746	0.751	0.740	0.746	0.741	0.004
	01-12	SF	0.812	0.808	0.811	0.811	0.806	0.002
		BF	0.823	0.826	0.826	0.827	0.824	0.001

\* $\sigma$  is standard deviation; RMSE is short for root mean squared error; NS is short for Nash-Sutcliffe coefficient; “91-00” and “01-12” represent the calibration period 1991-2000 and the evaluation period 2001-2012, respectively; SF is streamflow; BF is baseflow.

**Table 2.** Calibration and evaluation of HESS’s simulated flow on an annual series

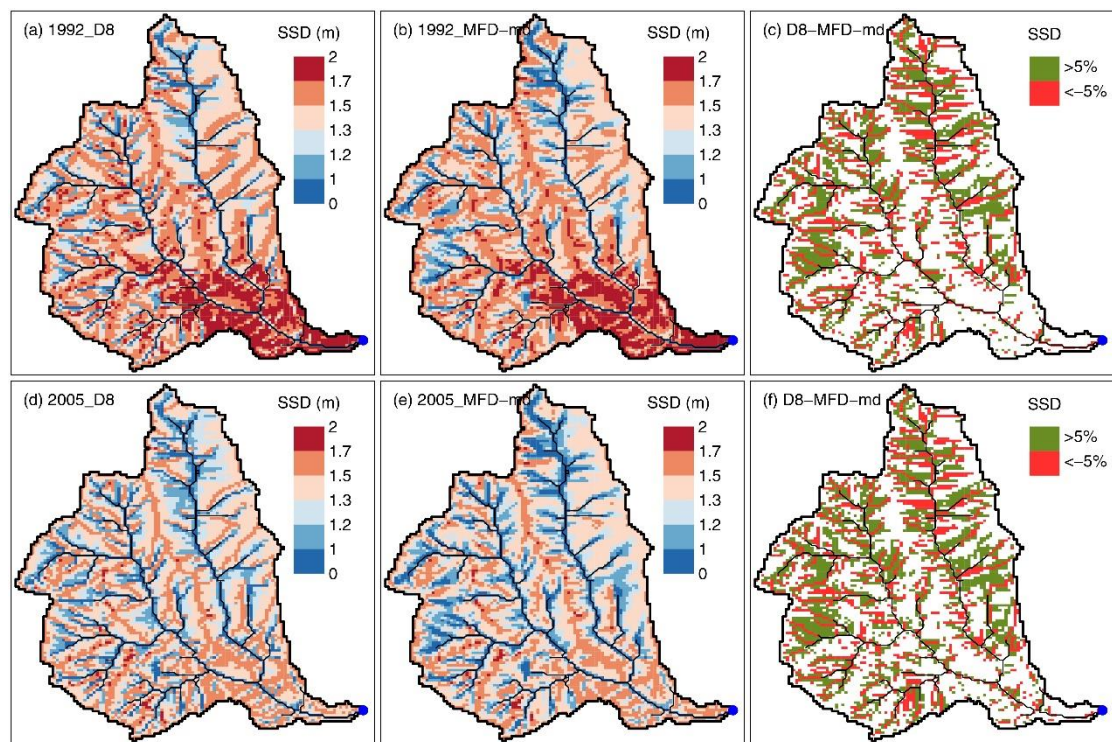
Year	SF (mm/day)							NS					
	Observed	D8	MD8	D $\infty$	RMD $\infty$	MFD-md	SF- $\sigma$	D8	MD8	D $\infty$	RMD $\infty$	MFD-md	NS- $\sigma$
1991	0.44	0.30	0.31	0.30	0.30	0.29	0.00	0.46	0.45	0.46	0.45	0.42	0.02
1992	0.32	0.35	0.35	0.35	0.35	0.34	0.00	0.93	0.93	0.92	0.93	0.93	0.00
1993	0.57	0.48	0.47	0.48	0.47	0.47	0.00	0.53	0.51	0.53	0.52	0.50	0.01
1994	0.38	0.33	0.34	0.34	0.34	0.34	0.00	0.53	0.56	0.52	0.55	0.56	0.02
1995	0.99	1.02	1.00	1.03	1.01	0.99	0.01	0.82	0.83	0.82	0.83	0.82	0.00
1996	0.51	0.58	0.59	0.58	0.58	0.59	0.01	-0.66	-0.61	-0.72	-0.67	-0.70	0.04
1997	0.57	0.58	0.59	0.59	0.59	0.59	0.00	0.62	0.62	0.61	0.62	0.62	0.00
1998	0.94	1.01	0.99	1.01	1.00	0.99	0.01	0.84	0.83	0.84	0.84	0.84	0.01
1999	0.74	0.78	0.77	0.77	0.77	0.78	0.00	0.89	0.87	0.89	0.88	0.88	0.01
2000	0.51	0.54	0.55	0.53	0.55	0.56	0.01	-1.17	-1.04	-1.08	-1.10	-1.25	0.08
2001	0.53	0.38	0.39	0.38	0.39	0.39	0.01	0.87	0.88	0.87	0.87	0.88	0.00
2002	0.38	0.23	0.24	0.22	0.23	0.23	0.01	0.92	0.93	0.92	0.92	0.93	0.00
2003	0.43	0.22	0.24	0.22	0.23	0.23	0.01	0.83	0.84	0.83	0.84	0.83	0.01
2004	0.40	0.39	0.40	0.39	0.39	0.38	0.01	0.97	0.97	0.97	0.97	0.98	0.00
2005	1.35	1.15	1.12	1.17	1.14	1.11	0.02	0.84	0.85	0.85	0.86	0.84	0.01
2006	0.81	0.61	0.62	0.62	0.62	0.62	0.00	0.84	0.83	0.85	0.84	0.83	0.00
2007	0.45	0.43	0.44	0.43	0.44	0.44	0.00	0.86	0.87	0.86	0.86	0.87	0.00
2008	0.38	0.33	0.34	0.33	0.34	0.33	0.00	0.92	0.93	0.92	0.93	0.93	0.00
2009	0.48	0.58	0.57	0.58	0.57	0.56	0.01	0.90	0.92	0.90	0.91	0.92	0.01
2010	0.58	0.54	0.53	0.54	0.53	0.52	0.01	0.83	0.82	0.83	0.82	0.82	0.01
2011	1.30	0.98	0.95	0.98	0.96	0.94	0.01	0.76	0.74	0.77	0.75	0.73	0.01
2012	0.45	0.42	0.43	0.42	0.42	0.43	0.00	0.88	0.88	0.87	0.88	0.88	0.00

\*SF is short for observed streamflow; NS is short for the Nash-Sutcliffe coefficient; SF- $\sigma$  is standard deviation of simulated streamflow under four algorithms; NS- $\sigma$  is standard deviation of NS under four algorithms.

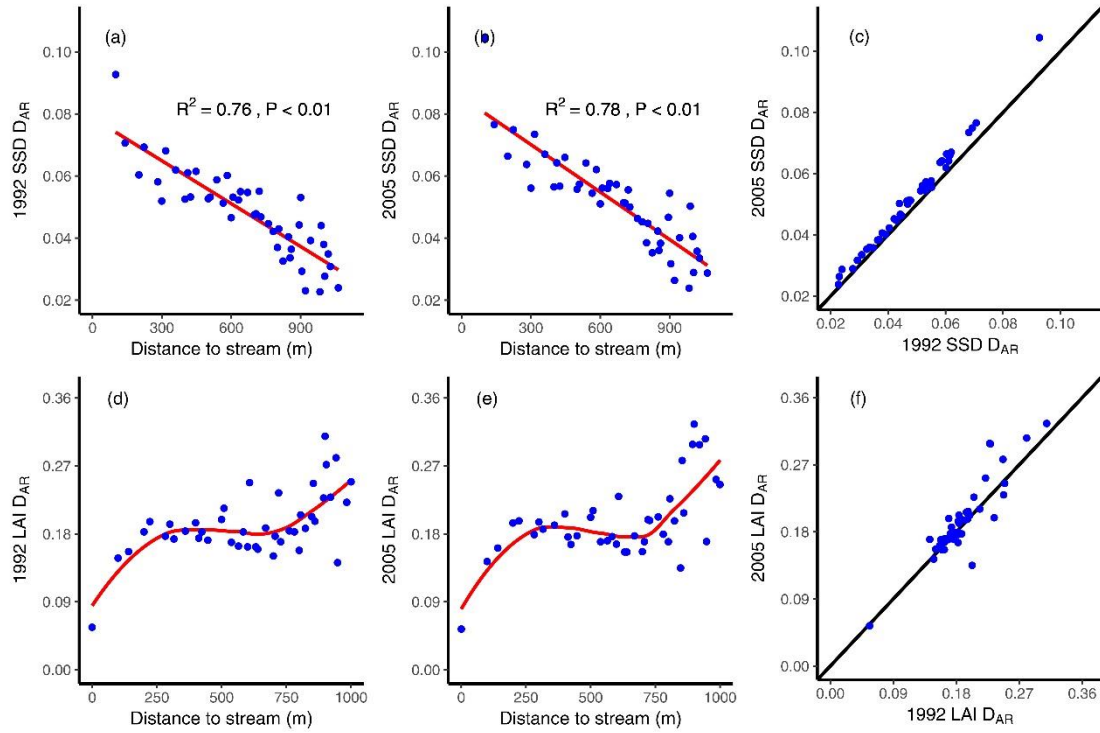
**Table 3.** Comparisons of modeled soil saturation deficit and leaf area index among the four routing algorithms averaged for the watershed

	Soil saturation deficit (m)					Leaf area index ( $m^2m^{-2}$ )				
	D8	MD8	D $\infty$	RMD $\infty$	MFD-md	D8	MD8	D $\infty$	RMD $\infty$	MFD-md
Min	0.046	0.026	0.038	0.027	0.019	0.000	0.000	0.000	0.000	0.000
Max	1.857	1.906	1.842	1.880	1.883	1.252	1.253	1.254	1.256	1.253
Mean	1.379	1.375	1.382	1.376	1.360	0.271	0.278	0.263	0.274	0.288
$\sigma$	0.298	0.299	0.292	0.293	0.290	0.249	0.252	0.239	0.246	0.256

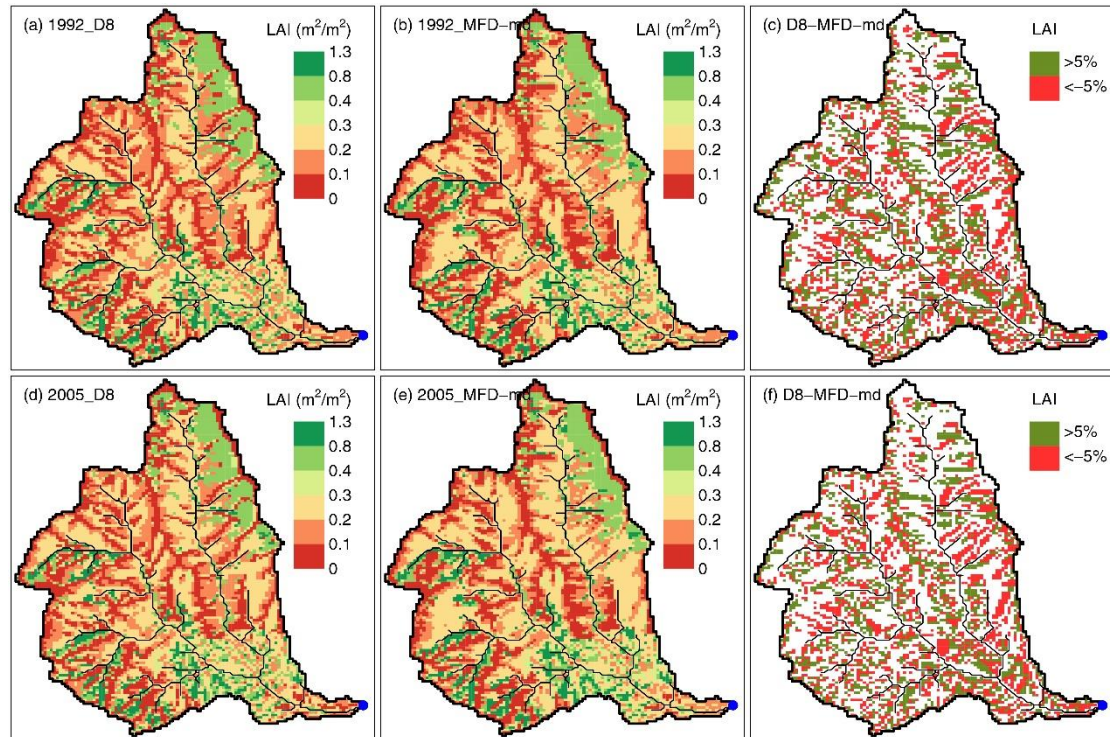
\*Statistics are calculated based on annual mean daily values averaged for the watershed for the study period.



**Figure 1.** The spatial patterns of simulated soil saturation deficit (SSD) under (a, d) D8 and (b, e) MFD-md algorithm; (c, f) the spatial pattern of differences in SSD between D8 and MFD-md algorithm.



**Figure 2.** Changes in the average relative deviation ( $D_{AR}$ ) of soil water saturation deficit (SSD) and leaf area index (LAI) as distances from channel increase under D8 and MFD-md algorithm for the 1992-dry and 2005-wet year.



**Figure 3.** The spatial patterns of simulated leaf area index (LAI) under (a, d) D8 and (b, e) MFD-md algorithm; (c, f) the spatial pattern of differences in LAI between D8 and MFD-md algorithm.

