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Supplement of

A hydrological emulator for global applications – HE v1.0.0

Y. Liu et al.

Correspondence to: Yaling Liu (cauliuyaling@gmail.com)

Figure captions

Figure S1 Comparison between the monthly GRDC observations and the VIC, and the UNH/GRDC runoff products at Amazon, Columbia and Yenisey basins for the period of 1986-1995. Note that the basin delineation here is consistent with that of Dai et al. (2009), the streamflow data of each basin (km^3 mon^{-1}) is transferred to the unit of mm mon^{-1} by dividing by the basin area, and each dot on the scatter plot represent 2-dimensional monthly runoff/streamflow values.

Figure S2 Comparison between the long-term annual mean VIC runoff product and the streamflow data in Dai et al. (2009) and UNH/GRDC runoff product during 1986-1995 across 260 global major basins. Note that the basin delineation here is consistent with that of Dai et al. (2009), and the streamflow of each basin (km^3 yr^{-1}) is transferred to the unit of mm yr^{-1} by dividing by the basin area.

Figure S3 Kling-Gupta efficiency of the simulated basin-level total runoff across the global 235 basins (lump = lumped, dist = distributed, cal = calibration, the x-axis labels of "lump_val" or "dist_val" represent lumped/distributed scheme during validation period).

Figure S4 Comparison of basin-specific long-term annual total runoff, direct runoff and baseflow estimates from the lumped abcd model against VIC product, across global 235 basins and for the calibration period of 1971-1990. Note that here only the total runoff is involved in the objective function.

Figure S5 Spatial patterns of long-term annual ET (mm yr^{-1}) across global 235 basins: a) the mean of the LandFlux-EVAL merged data sets for 1989-2005; b) ET product from VIC simulation; c) ET estimates from the lumped abcd model (lump = lumped) for 1981-1990; and d) ET estimates from the distributed abcd model (dist = distributed) for 1981-1990.
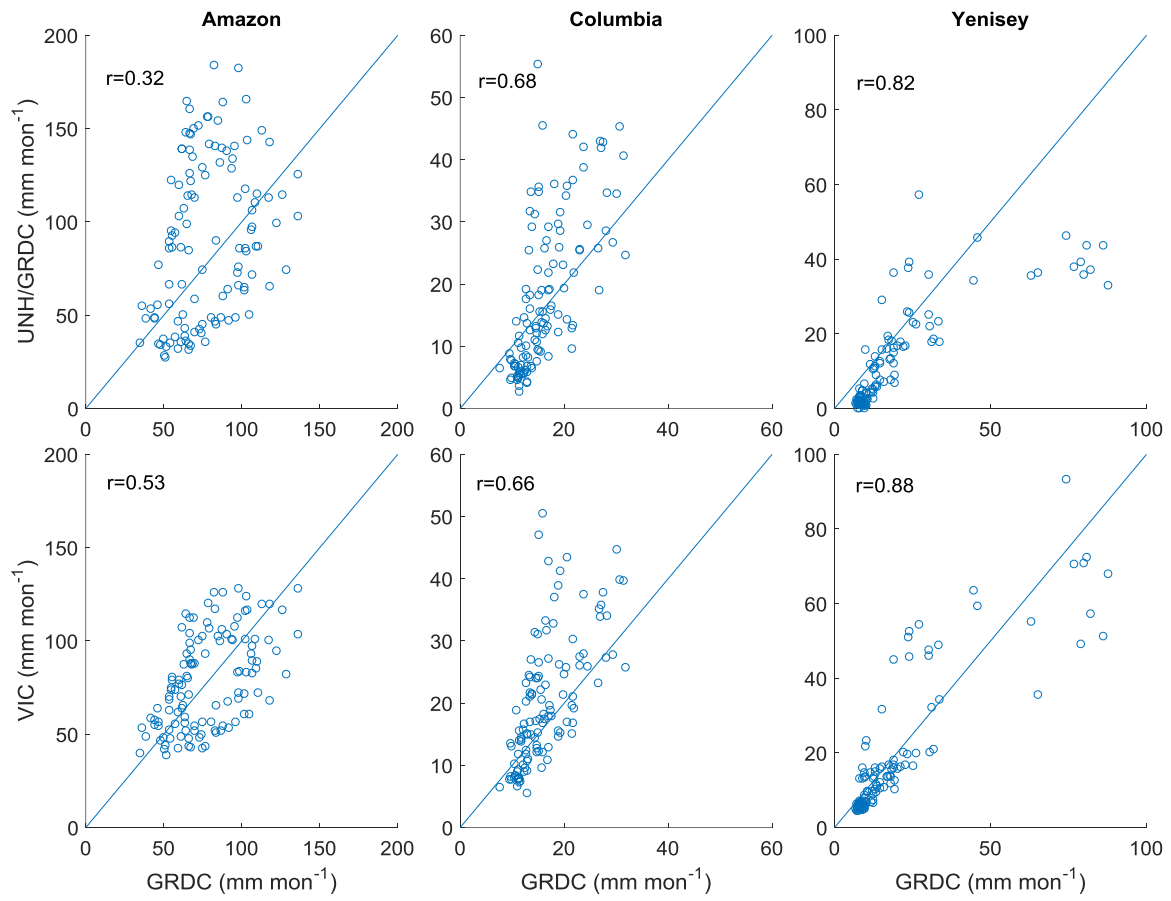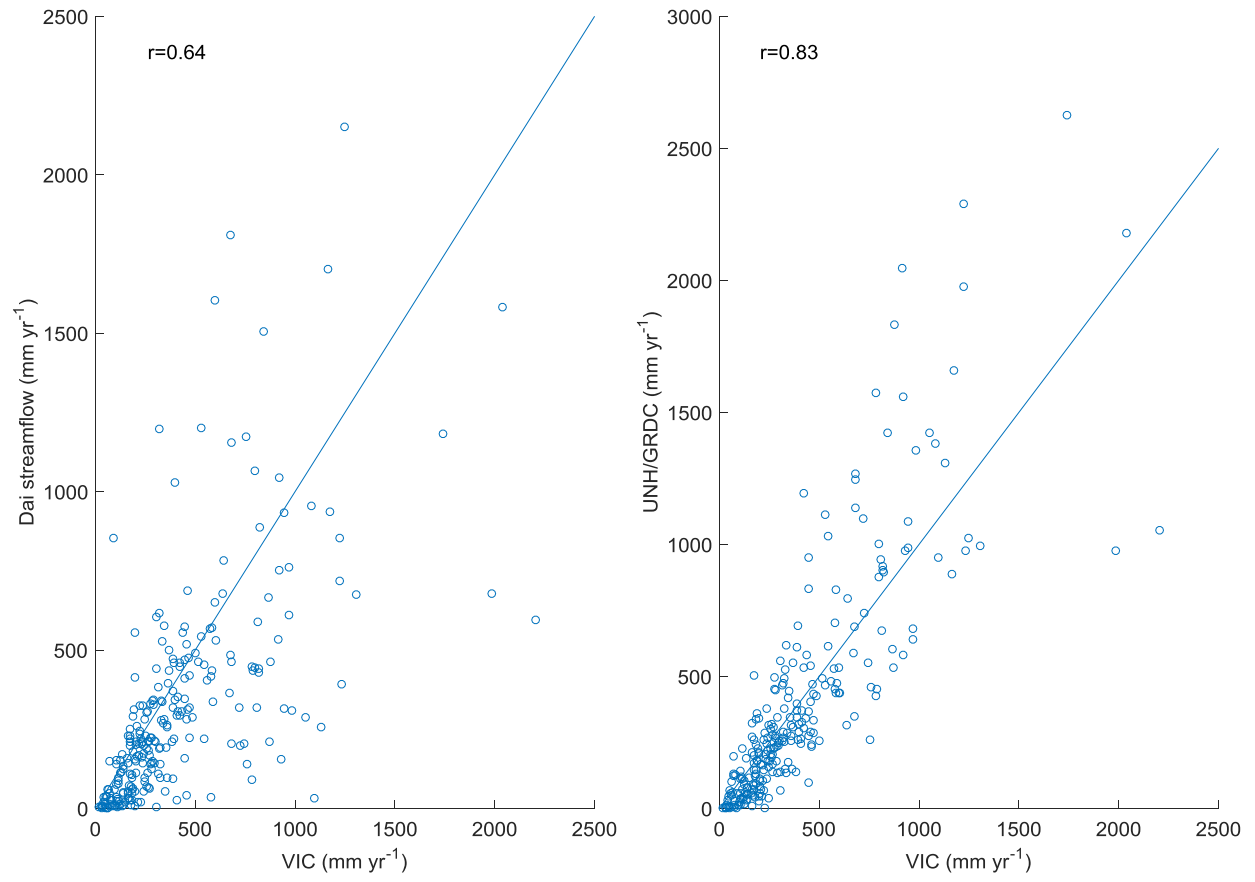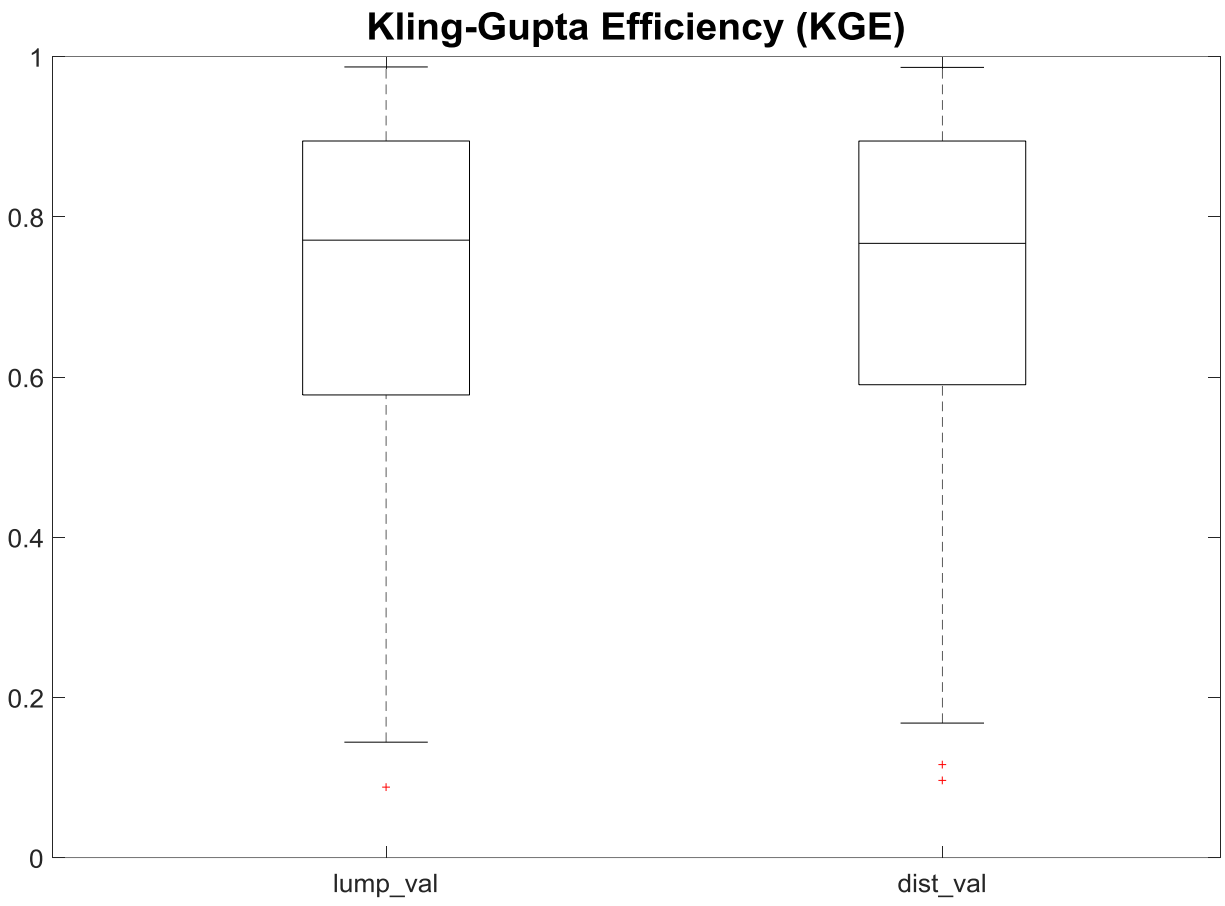
Figure S1

Figure S2

Figure S3

Kling-Gupta Efficiency (KGE)

Figure S4

Figure S5

(a) LandFlux-EVAL

ET (mm/yr)
- 0 - 100
- 100 - 200
- 200 - 300
- 300 - 400
- 400 - 500
- 500 - 600
- 600 - 700
- 700 - 800
- 800 - 900
- 900 - 1,000
- >1,000

(b) VIC

(c) lump

(d) dist
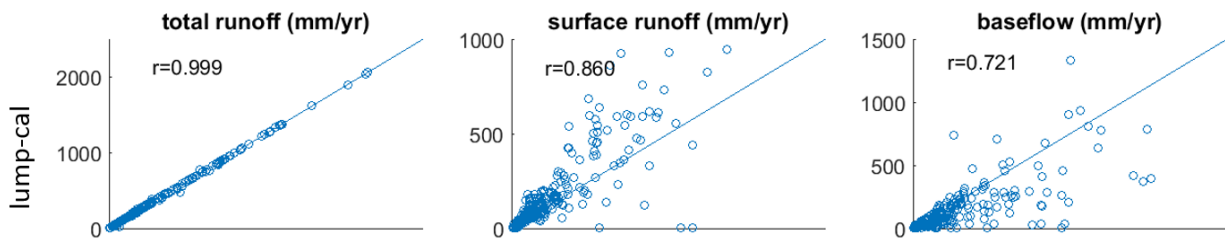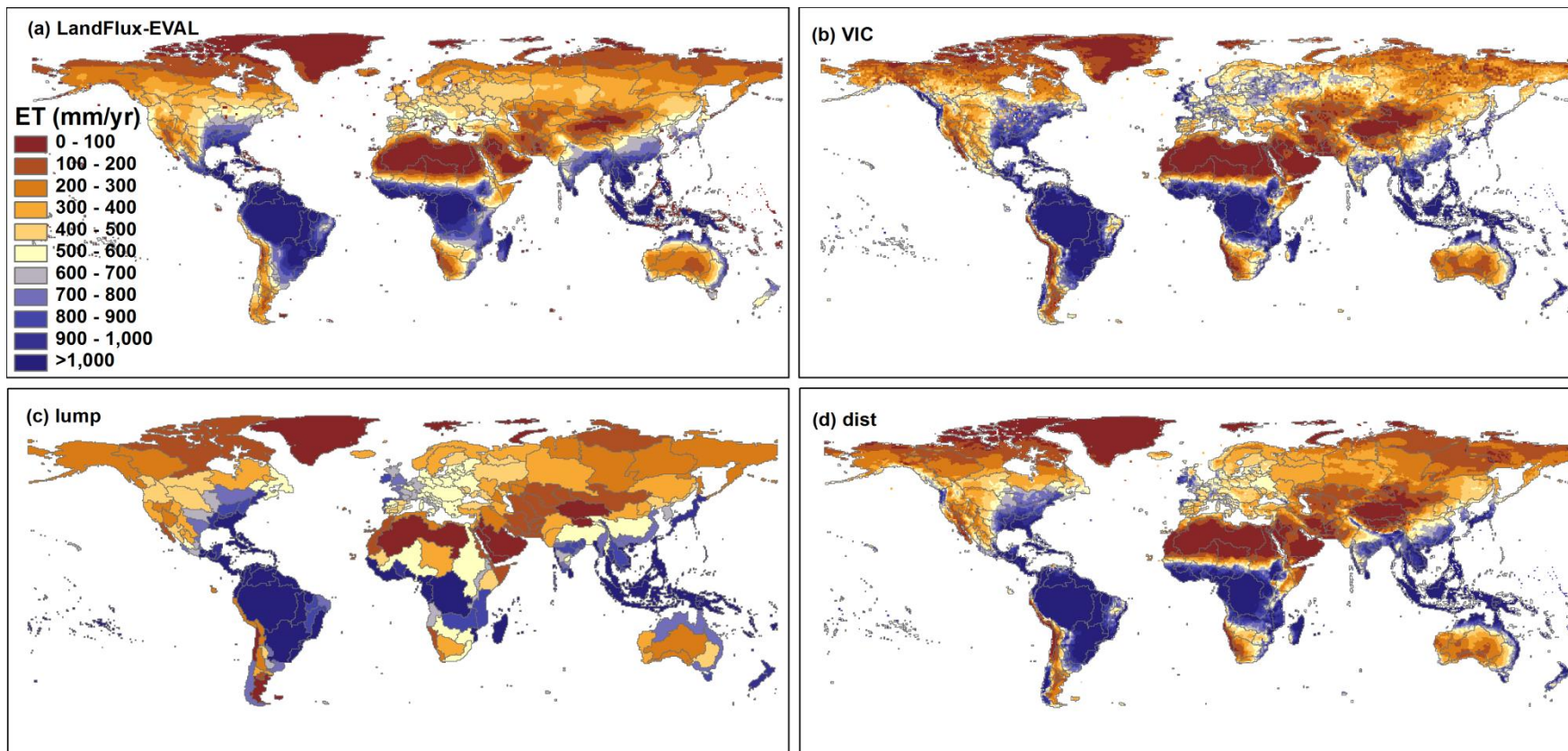
1   Table S1 Runtime for model calibration and simulation at Amazon basin for the lumped (lump)

2   and distributed (dist) "*abcd*" model scheme, as well as for the VIC model.

	calibration	1000 years' simulation
lump	0.16 min	0.03 s
dist	11.05 min	3.20 s
VIC	N/A	~ 1 week

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