Supplementary Material

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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 (km³ 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 (km³ 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 for both the lumped and distributed schemes during the calibration and validation periods (lump = lumped, dist = distributed, cal = calibration, val = validation).

Figure S4 Comparison of basin-specific long-term annual total runoff, direct runoff and baseflow estimates from the lumped scheme against the 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 for 1991-2005; c) ET estimates from the lumped scheme (lump = lumped) for 1991-2005; and d) ET estimates from the distributed scheme (dist = distributed) for 1991-2005.









Figure S3









