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SHIFT: a spatial-heterogeneity improvement in DEM-based mapping of global geomorphic floodplains

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Table S1. Correlation of FHG parameter *b* from HydroBASINS Level-3 to Level-5 basins and relevant hydroclimatic factors. This table presents the correlation of the FHG parameter *b* from HydroBASINS level-3 to level-5 basins with relevant hydroclimatic factors. Tests at different scales (level-4 and level-5 basins) are added to increase the sample size and confirmed that AI and LAI have statistically significant relationships with the exponent *b*. Terrain factors, specifically elevation mean and standard deviation, exhibited significant but weaker positive correlations with level-4 and level-5 basins. Soil factors showed inconsistent and generally insignificant correlations. The results for level-4 and level-5 basins were filtered to include only basins with at least 1000 reference grids at a 1-km resolution, ensuring reliable estimation of *b*. The 33 largest basins are those presented in Figure 4 of the revised manuscript. Terrain data are sourced from MERIT-Hydro. Soil data are derived from the Soilgrids 2.0 dataset (Poggio et al., 2021), with zonal averages calculated within a 10-km buffer based on hydrological distance. While some correlations are not very strong, the results meet expectations, highlighting AI as a primary factor, with LAI playing a secondary role, and the other factors showing less observable mechanisms.

		AI	LAI	Elevation Mean	Elevation STD	Clay	Silt	Sand
Level-3	All	0.335***	0.083	-0.007	0.121	0.152*	0.170*	-0.041
	Largest	0.680***	0.668***	-0.165	0.208	0.314	-0.134	-0.042
Level-4		0.338***	0.256***	0.131**	0.246***	-0.067	0.050	-0.003
Level-5		0.405***	0.349***	0.104***	0.188***	-0.033	-0.019	0.033

Note: *** indicates $p < 0.001$, ** indicates $p < 0.01$, * indicates $p < 0.05$.

Figure S1. Spatial Distribution of parameter *a*. The coefficient *a*, which varies from 0.0001 to a maximum of 0.12 across all basins, is also optimized. The spatial pattern of parameter a is less clear due to its dependence on the estimated parameter *b*. Generally, basins with lower *a* values correspond to those with larger *b* values, particularly in arctic regions, suggesting a dynamic balance between these two parameters. However, this observation is not uniform across all regions, as seen in the Pearl River basin in Asia.