

Hydrology and carbon pool characteristics regulate dissolved carbon export in a subtropical forest headwater stream

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Electronic Supplementary Material (ESM)

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Table S1. Basic information of each sampling reach in headwater stream

Sampling reaches	Latitude	Elevation (m a.s.l.)	Tributary	Forest types	Channel width (cm)
S1	26°19'21"N	524.2	no	<i>C. carlesii</i>	245
S2	26°19'17"N	517.0	yes	mixed	138
S3	26°19'23"N	485.4	no	–	214
S4	26°19'23"N	472.9	no	<i>C. carlesii</i>	252
S5	26°19'23"N	485.4	no	<i>C. carlesii</i>	279
S6	26°19'23"N	468.7	no	<i>C. carlesii</i>	275
S7	26°19'26"N	454.1	no	<i>C. carlesii</i>	310
S8	26°19'29"N	415.8	no	<i>C. carlesii</i>	135
S9	26°19'32"N	431.4	no	mixed	399
S10	26°19'30"N	427.3	no	<i>C. carlesii</i>	527
S11	26°19'29"N	417.6	yes	<i>C. carlesii</i>	422
S12	26°19'28"N	417.2	yes	<i>C. carlesii</i>	264
S13	26°19'39"N	409.3	no	<i>C. carlesii</i>	421
S14	26°19'39"N	411.9	yes	<i>C. carlesii</i>	145
S15	26°19'34"N	388.4	yes	<i>C. carlesii</i>	415
S16	26°19'46"N	386.0	yes	<i>C. carlesii</i>	204
S17	26°19'42"N	380.6	no	mixed	562

(A)



(B)



Figure S1. Field photographs of plant litter sampling: (A) Quadrat-based sampling in stream reaches, (B) plant litter collection using a 2 mm mesh net

Table S2. Response and explanatory variables used in the statistical analyses

Variable group	Variable type	Variable	Unit
Stream carbon	response	stream DOC concentration	mg·L ⁻¹
Stream carbon	response	stream DIC concentration	mg·L ⁻¹
Stream carbon	response	stream DOC export	kg·h ⁻¹
Stream carbon	response	stream DIC export	kg·h ⁻¹
Sediment	predictor	sediment DOC concentration	mg·L ⁻¹
Sediment	predictor	sediment DIC concentration	mg·L ⁻¹
Sediment	predictor	sediment TC concentration	g·kg ⁻¹
Sediment	predictor	sediment TC storage	kg·m ⁻²
Sediment	predictor	sediment <i>SUVA</i>	L·mg ⁻¹ ·m ⁻¹
Plant litter	predictor	plant litter DOC concentration	mg·L ⁻¹
Plant litter	predictor	plant litter DIC concentration	mg·L ⁻¹
Plant litter	predictor	plant litter TC concentration	g·kg ⁻¹
Plant litter	predictor	plant litter TC storage	g·m ⁻²
Leaves	predictor	leaves DOC concentration	mg·L ⁻¹
Leaves	predictor	leaves DIC concentration	mg·L ⁻¹
Leaves	predictor	leaves TC concentration	g·kg ⁻¹
Leaves	predictor	leaves TC storage	g·m ⁻²
Leaves	predictor	leaves <i>SUVA</i>	L·mg ⁻¹ ·m ⁻¹
Twigs	predictor	twigs DOC concentration	mg·L ⁻¹
Twigs	predictor	twigs DIC concentration	mg·L ⁻¹
Twigs	predictor	twigs TC concentration	g·kg ⁻¹
Twigs	predictor	twigs TC storage	g·m ⁻²
Twigs	predictor	twigs <i>SUVA</i>	L·mg ⁻¹ ·m ⁻¹
FWD	predictor	FWD DOC concentration	mg·L ⁻¹
FWD	predictor	FWD DIC concentration	mg·L ⁻¹
FWD	predictor	FWD TC concentration	g·kg ⁻¹
FWD	predictor	FWD TC storage	g·m ⁻²
FWD	predictor	FWD <i>SUVA</i>	L·mg ⁻¹ ·m ⁻¹
FWD decay class	predictor	decay classes 1 storage	g·m ⁻²
FWD decay class	predictor	decay classes 2 storage	g·m ⁻²
FWD decay class	predictor	decay classes 3 storage	g·m ⁻²
FWD decay class	predictor	decay classes 4 storage	g·m ⁻²
FWD decay class	predictor	decay classes 5 storage	g·m ⁻²
Hydrology	predictor	rainfall	mm
Hydrology	predictor	stream discharge	L·s ⁻¹
Hydrology	predictor	flow rate	m·s ⁻¹
Hydrology	predictor	water temperature	°C
Hydrology	predictor	pH	–
Hydrology	predictor	dissolved oxygen	mg·L ⁻¹
Hydrology	predictor	electrical conductivity	μS·cm ⁻¹

FWD – fine woody debris; DOC – dissolved organic carbon; DIC – dissolved inorganic carbon; TC – total carbon; *SUVA* – specific ultraviolet absorbance

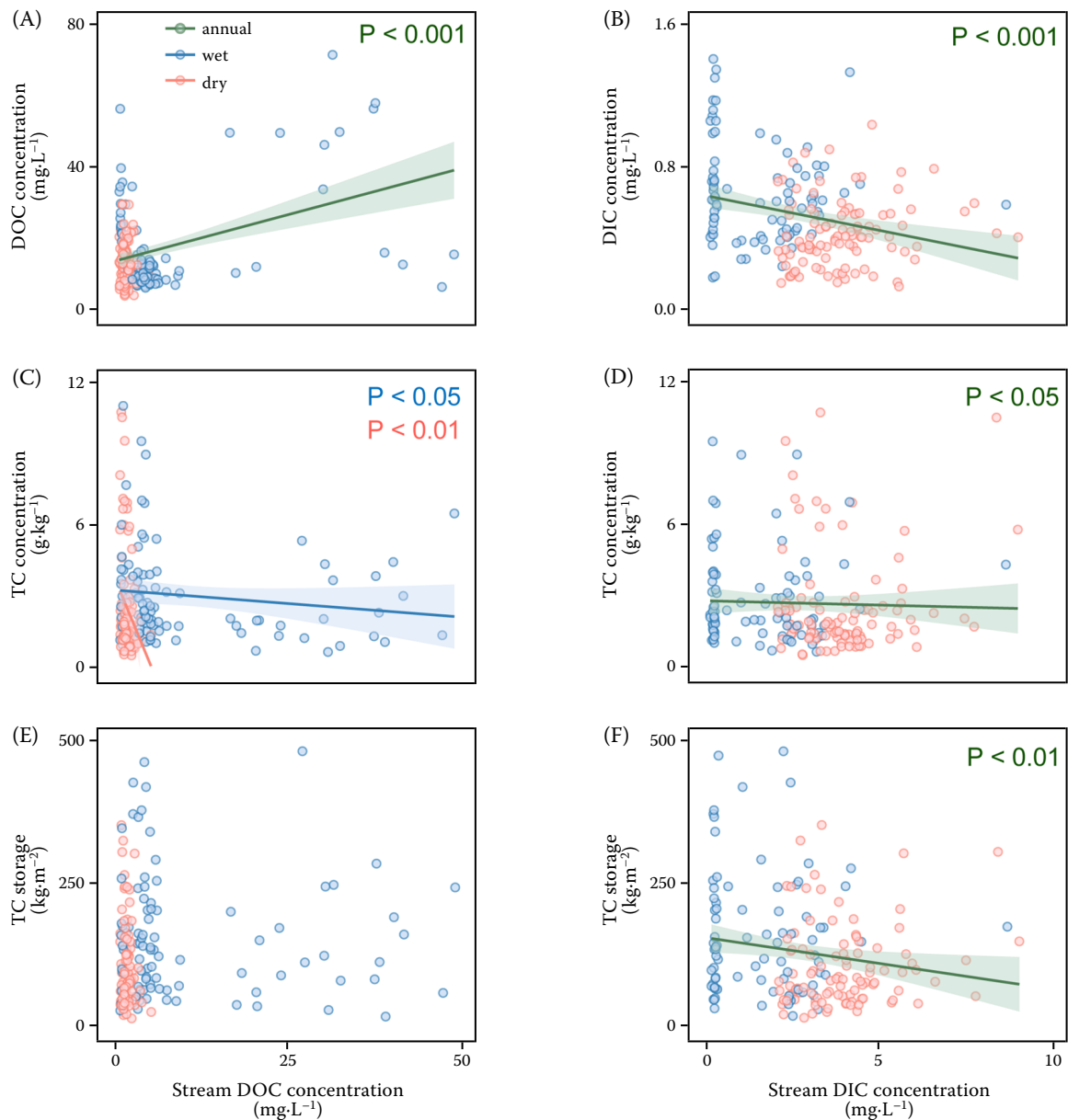
<https://doi.org/10.17221/68/2025-JFS>

Figure S2. Relationships between sediment carbon characteristics and stream carbon concentrations: (A, B) Relationships between sediment dissolved organic carbon (DOC) and dissolved inorganic carbon (DIC) concentrations and stream DOC and DIC concentrations; (C, D) relationships between sediment total carbon (TC) concentration and stream DOC and DIC concentrations; (E, F) relationships between sediment TC storage and stream DOC and DIC concentrations. Green lines – relationships based on the annual dataset; blue and red lines – relationships for the wet and dry seasons, respectively; lines and shaded areas – linear fits and 95% confidence intervals

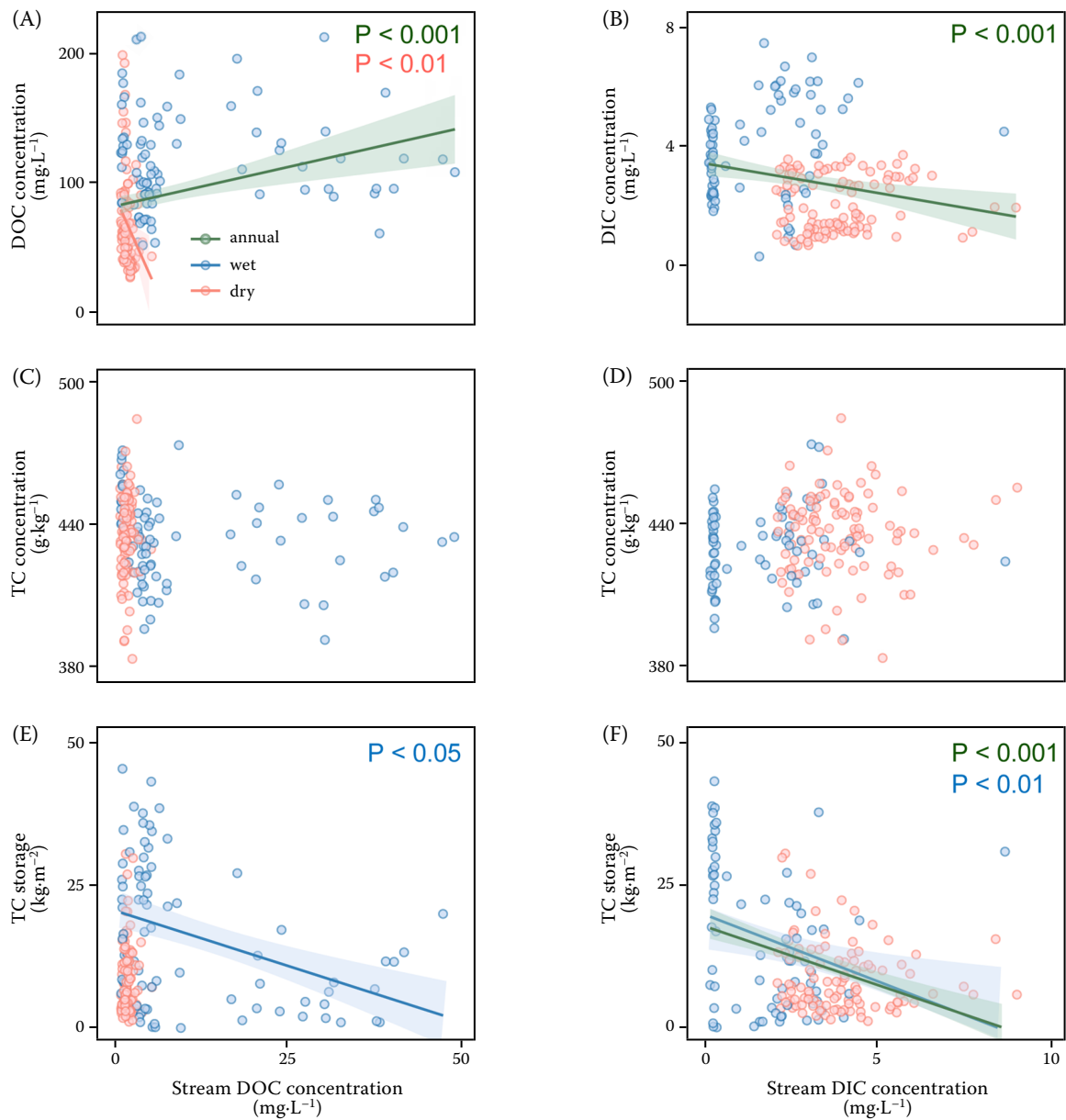
<https://doi.org/10.17221/68/2025-JFS>

Figure S3. Relationships between plant litter carbon characteristics and stream carbon concentrations: (A, B) Relationships between plant litter dissolved organic carbon (DOC) and dissolved inorganic carbon (DIC) concentrations and stream DOC and DIC concentrations; (C, D) Relationships between plant litter total carbon (TC) concentration and stream DOC and DIC concentrations; (E, F) relationships between plant litter TC storage and stream DOC and DIC concentrations. Green lines – relationships based on the annual dataset; blue and red lines – relationships for the wet and dry seasons, respectively; lines and shaded areas indicate linear fits and 95% confidence intervals.

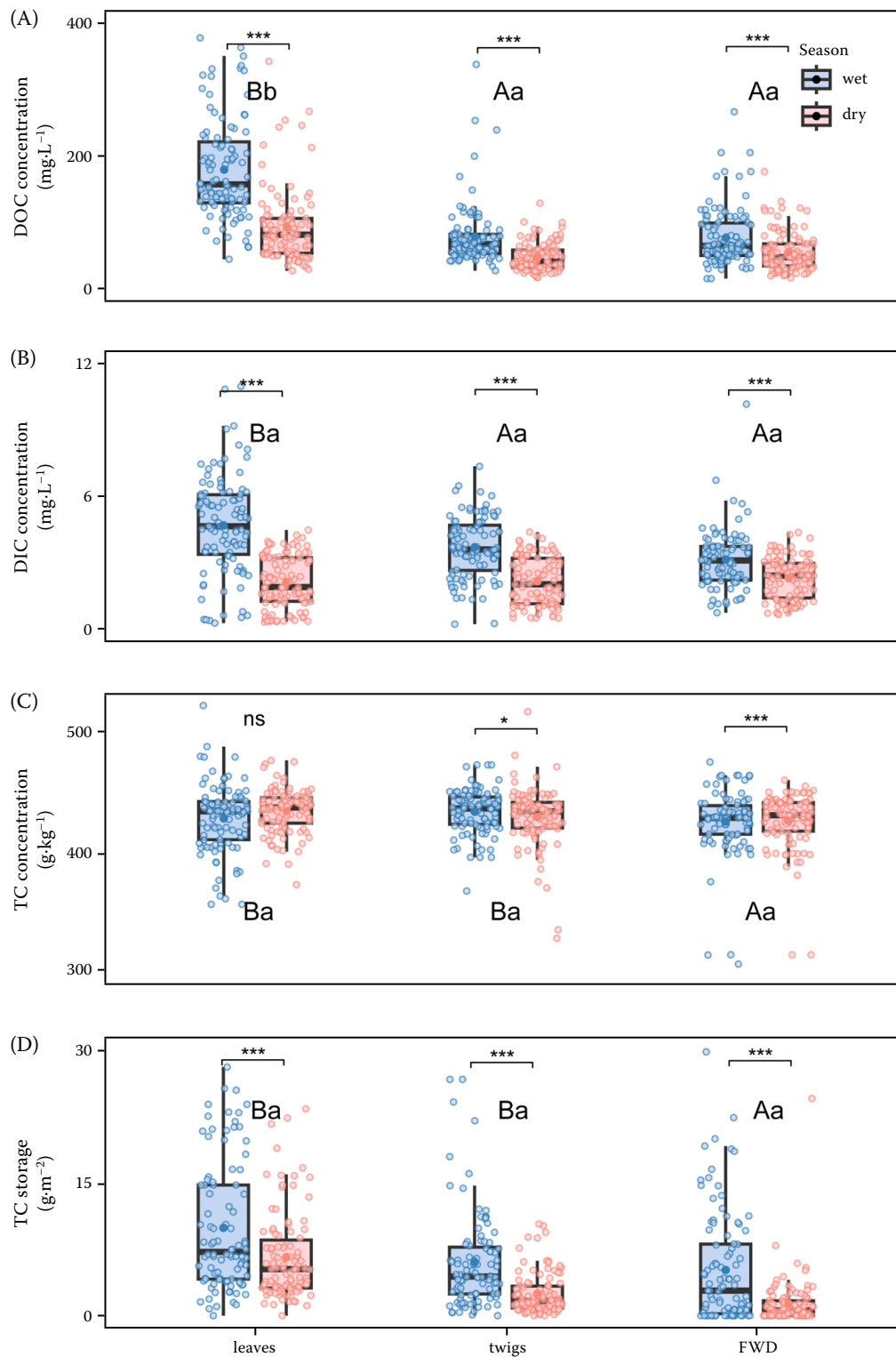


Figure S4. Seasonal variation in carbon characteristics of different plant litter components: (A) Dissolved organic carbon (DOC) concentration; (B) dissolved inorganic carbon (DIC) concentration; (C) total carbon (TC) concentration; (D) TC storage in leaves, twigs, and fine woody debris (FWD)

Asterisks – significant differences between seasons ($^*P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$); ns – no significant difference; uppercase letters – significant differences among litter types during the wet season; lowercase letters – differences during the dry season ($\alpha = 0.05$); boxplots – the median and interquartile range; solid dots – mean values (coloured by season)