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Supplement of

Ecosystem-specific patterns and drivers of global reactive iron mineral-associated organic carbon

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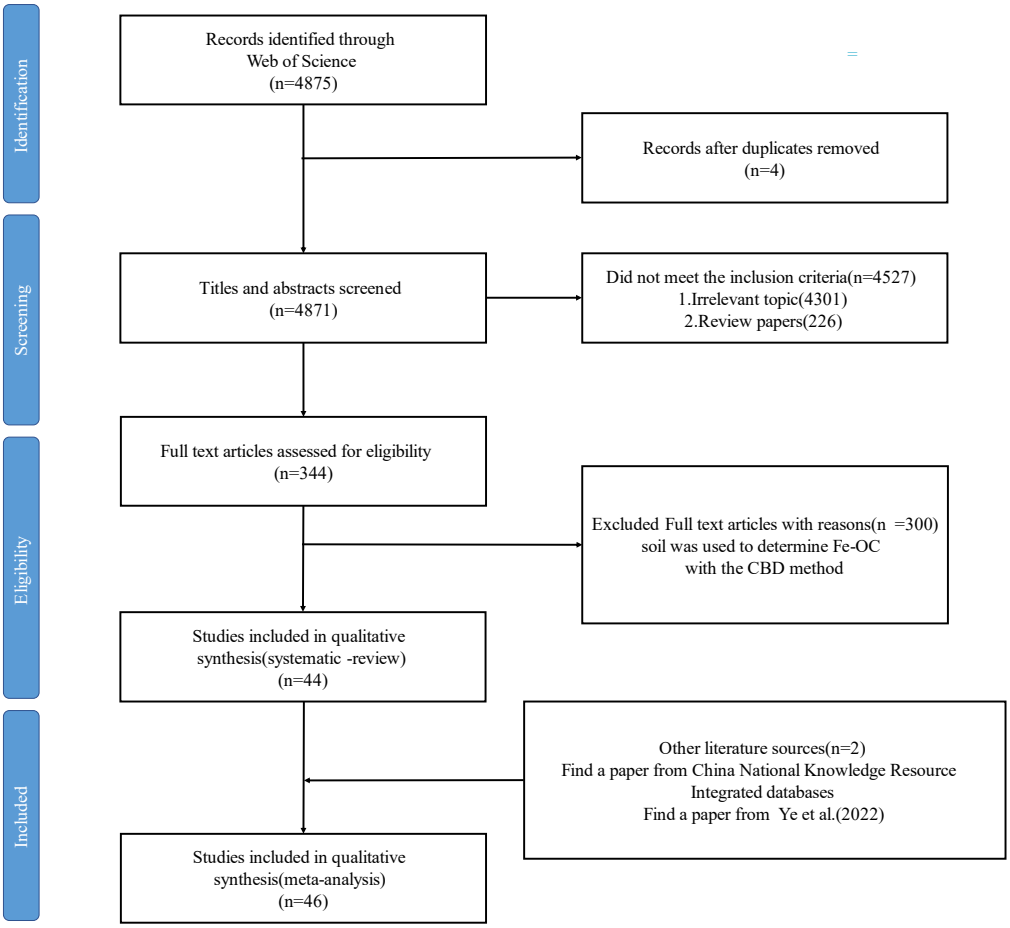

Figure S1. Preferred reporting items for systematic reviews and meta-analysis. See details of literature search methods: (https://www.webofscience.com/wos/alldb/summary/f8214414-7be5-4080-817b-7406a1f2247f-4f929e58/relevance/98)

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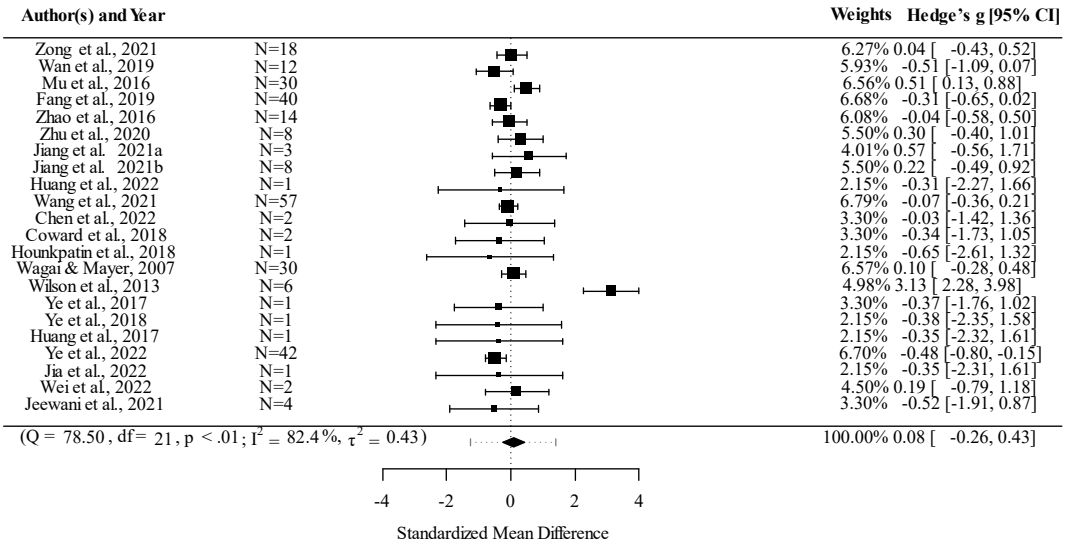
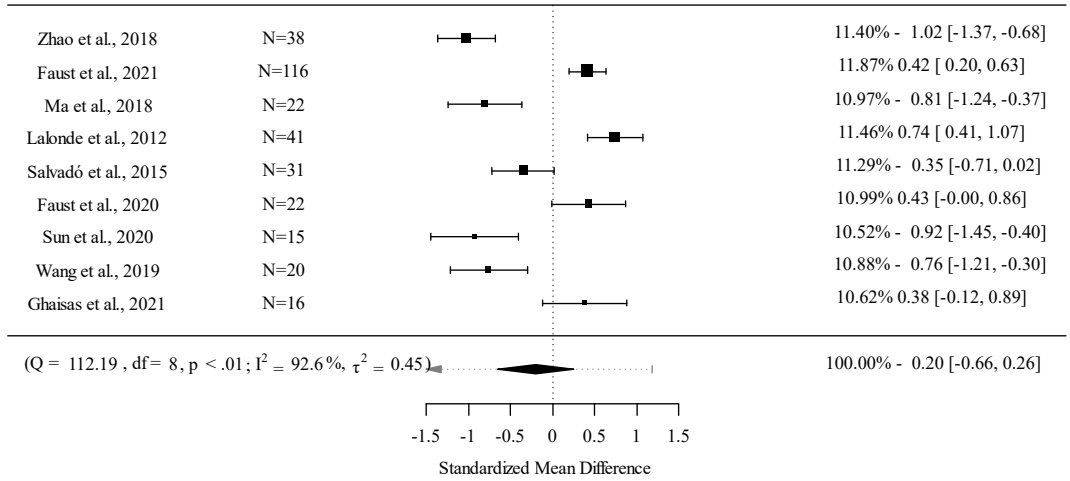
(a) Terrestrial



(b) Marine



(c) Wetlands

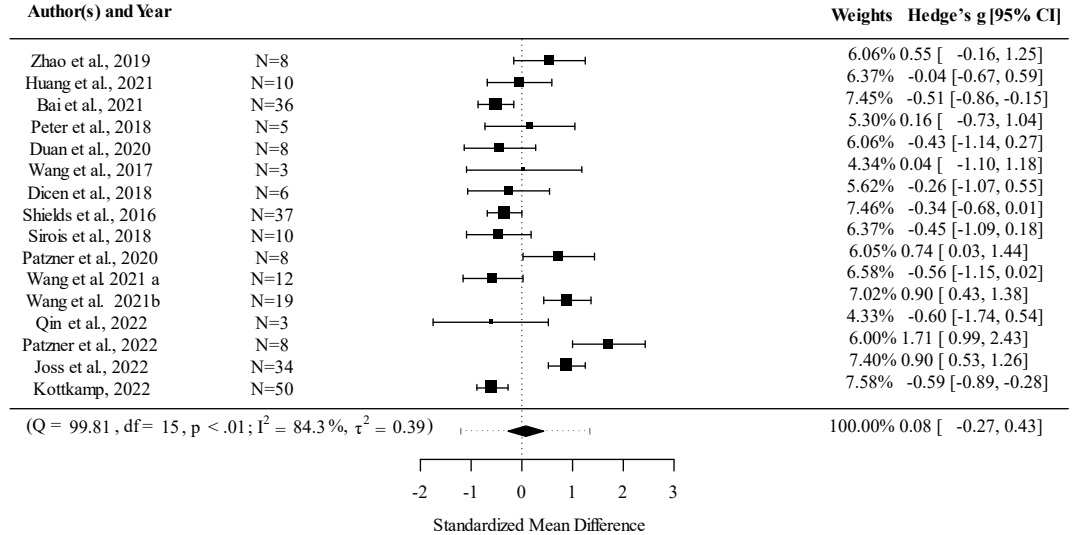


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Figure S2. The effect sizes and confidence interval of the small sample sizes (i.e., a single published article) on Fe-OC contents in terrestrial (a), marine (b) and wetlands (c), respectively. The value of the coordinate corresponds to the effect sizes, which is calculated by using the standardized mean difference between the control group and the treatment group. The total samples classified by continent, marine and wetlands are the control group, and the samples of a single case are the treatment group. The square size of each treatment group corresponds to the relative sample size. The horizontal line extending from each grid represents the confidence interval. The weights and confidence intervals of each group of effects are shown on the right. The position of each grid means that the Fe-OC of each treatment group is either higher (to the right of the dotted line) or lower (to the left of the dotted line) than that of the control group. The vertical dotted line is the zero effect quantity, and the confidence interval that does not overlap with the zero effect quantity is significantly different from the Fe-OC of the control group. Partial effects and their confidence intervals do not overlap with zero effects. The letter N represents the number of samples.

43 **Table S1.** The molar ratios of Fe-OC:Fe_d across marine sediments and wetland ecosystems.

Location	Fe-OC：Fe_d	References
East China Sea	1.53 ± 1.28	Ma et al., 2018
South Yellow Sea, China	1.68 ± 1.80	Ma et al., 2018
Bohai Sea, China	1.59 ± 1.37	Wang et al., 2018
Barents Sea	2.56 ± 1.76	Faust et al., 2020, 2021
Arctic shelf	3.04 ± 1.73	Salvadó et al., 2015
Intermediate/old river delta	5.02 ± 5.85	Shields et al., 2016
Changjiang Estuary/East China Sea shelf	0.23 ± 0.14	Zhao et al., 2018
Margin sea, China	2.75 ± 3.07	Sun et al., 2017
Mississippi River	2.76 ± 1.50	Ghaisas et al., 2021
Global oceans (n = 42)	6.10 ± 7.5	Lalonde et al., 2012
Global oceans (n = 320)	**2.56 ± 0.19**	**This study**
Martinique Beach, Canada	0.4 ± 0.7	Sirois et al., 2018
Min River Estuary, China	11.0 ± 4.5	Bai et al., 2021
Petland, China	6.23 ± 3.34	Huang et al., 2021
Freshwater wetland of Sanjiang Plain, China	2.24 ± 1.52	Duan et al., 2020
Boreal lake sediment	5.92 ± 3.34	Peter et al., 2018
Permafrost peatland	0.26 ± 0.09	Wang D et al., 2021
Large-Scale wetlands (19.96˚–52.04˚N, 87.44˚E–132.33˚E)	12.62 ± 11.46	Wang S et al., 2021
Drained thaw lake basins near Utqiaġvik	7.40 ± 5.18	Joss et al., 2022
Delmarva Peninsula in the eastern U.S.A	20.69 ± 27.89	Kottkamp et al., 2022
Mt. Shen Nong Jia, China	84.75 ± 111.95	Zhao et al., 2019
Global wetlands (n = 251)	**13.47 ± 1.81**	**This study**

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