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# A photochemically resistant component in riverine dissolved black carbon

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Rivers transport combustion-derived dissolved black carbon (DBC) to the oceans at an annual flux that is much higher than required to balance the oceanic inventory of DBC. To resolve this mismatch we studied the long-term stability of DBC in ten major world rivers that together account for approximately 1/3 of the global freshwater discharge to the oceans. Riverine DBC was remarkably resistant against microbial degradation, but decomposition of nearly all chromophoric dissolved organic matter under extensive irradiation with simulated sunlight removed almost 80% of DBC. Photochemically transformed DBC was further microbially decomposed by more than 10% in a subsequent one-year long bioassay. Based on these findings, on a global scale, the estimated riverine flux of microbially degraded and photo-resistant DBC is sufficient to replenish the oceans with DBC and likely contributes to the dissolved organic matter pool that persists in the oceans and sequesters carbon for centuries to millennia.