Riverine Nitrogen Export from the Continents to the Coasts

Abstract:
Boyer, Elizabeth W.; Howarth, Robert W.; Galloway, James N.; Dentener, Frank J.; Green, Pamela A.; Vörösmarty, Charles J., We present an overview of riverine nitrogen flux calculations that were prepared for the International Nitrogen Initiative’s current global assessment of nitrogen cycles: past, present, and future (Galloway et al. 2004). We quantified anthropogenic and natural inputs of reactive nitrogen (N) to regional-scale watersheds of the world and the associated riverine N fluxes to the coastal zone. Anthropogenic inputs include fossil-fuel derived atmospheric deposition, fixation in cultivated croplands, fertilizer use, and the net import in human food and animal feedstuffs. Natural inputs from natural biological N fixation in forests and other non-cultivated vegetated lands, and fixation by lightning are also included. We use an empirical model relating total N inputs per landscape area to the total flux of N discharged in rivers based on watershed data from contrasting ecosystems spanning multiple spatial scales. With this approach, we simulate riverine N loads to the coastal zone from or each of the world’s watersheds and ocean basins. Our work provides an understanding of the sources of N to landscapes and rivers, and highlights how anthropogenic activities impact N cycling.

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