

VIEW ABSTRACT

TOWARD A REGIONALIZED TERRESTRIAL-OCEAN-ATMOSPHERE ECOSYSTEM MODEL (TOTEM): LAND-OCEAN AQUATIC CONTINUUM (LOAC) CARBON CYCLE

Terrestrial-Ocean-atmosphere Ecosystem Model (TOTEM) is a process-based biogeochemical box model of the global carbon-nitrogen-phosphorus cycles. The model describes the physical and biogeochemical behavior of these elements on the decadal to centennial scale in the four domains of the Earth's surface: land, atmosphere, coastal ocean, and open ocean. TOTEM has been established during the 1990s and has enjoyed various scientific and educational applications. There is a renewed interest to TOTEM in the context of the recent debate associated with the Land-Ocean Aquatic Continuum (LOAC) carbon cycle. A recent synthesis paper showed that lateral transport of carbon along this aquatic continuum has been substantially increased by anthropogenic perturbations since preindustrial, pointing to a need to address them more explicitly in global biogeochemical models. TOTEM is employed by the Carbon Cascades from Land to Ocean in the Anthropocene (C-CASCADES) Project, a EU Horizon 2020 Marie Skłodowska-Curie Innovative Training Networks (MSCA-ITN) project led by Pierre Friedlingstein and Pierre Regnier. Within C-CASCADES, a group of 15 early-stage researchers and other Ph. D. students/postdocs are jointly developing a regionalized version of TOTEM addressing the specific characteristics of the LOAC carbon cycle in the tropical, temperate, and high latitudinal zone. The new TOTEM adds various features including reservoirs of lakes and permafrost, fluxes of riverine CO₂ release and permafrost thawing, and a more detailed modeling of coastal zone processes. We discuss present-day carbon budgets of three regions and model simulation results.

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DETAILS

Poster presentation

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