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Terrestrial organic matter transport in rivers from temperate and tropical regions

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Riverine organic matter is of geochemical interest both as an integrator of processes within drainage basins and as a source of terrestrial organic matter (TOM) to continental margin sediments, ultimately preserved in the geological record. The total riverine organic flux derives largely from forested catchments, which export roughly 0.12 Gt (Gt = $1x10^{15}$ g) OC/yr in the tropics, whereas temperate forests contribute about half this flux. The major source of TOM is vascular plants, which are confined essentially to land and produce a host of unique compounds which can be used as sensitive biomarkers for tracing terrestrial origins. The main objective of this study is to identify the dominant biomarkers in river/estuarine systems from different climatic regions, and to assess the metabolic and redox alteration processes that affect organic components as they transit from land to sea. Sediment samples were collected in rivers draining western Oregon (USA) and northern São Paulo State (Brazil), and analyzed as total and silylated total extracts by gas chromatography-mass spectrometry. The major biomarker contributions found in Oregon river samples were sterols and triterpenoids (sitosterol, campesterol, lupenone) derived mainly from the vegetation bordering the rivers, followed by n-alkanols and n-alkanes from epicuticular plant wax. Resin acids (e.g., dehydroabietic acid, a biomarker for conifers) were expected to be the major tracer input to these sediments; however, resin acids were detected at only trace levels. Autochthonous production (fatty acids and cholesterol) were important organic tracers detected only in higher altitude systems (e.g., spring bloom of algae, Deschutes River, $\sim$1000 m). In contrast, fatty acids (16:0, 16:1, 18:0, 18:1, 18:2) and cholesterol were by far the dominant biomarkers found in sediments

from Brazilian rivers. This indicates an extensive microbiological activity in tropical conditions. Higher plant biomarkers (sitosterol, brassicasterol, campesterol) were also important organic tracers detected, followed by lower amounts of plant wax lipids (mainly n-alkanols). Besides those major and minor biomarkers, indicators of anaerobic alteration (phytadienes) and sugars such as glucose and inositol (ubiquitous in origin) and mycose (a fungal metabolite product) were also found in the Brazilian river sediments. Therefore, during normal river flow conditions only organic biomarkers derived from the surrounding vegetation along the riparian zone of the Oregon Rivers studied are transported downstream. In the Brazilian river sediments, terrestrial organic signatures seem to be overwhelmed by organic compounds derived from the intense autochthonous microbial activity.