SPATIAL VARIABILITY OF SEA LEVEL RISE DUE TO WATER IMPOUNDMENT BEHIND DAMS

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Abstract

Dams have impounded ~10,800 km^3 of water since 1900, reducing global sea level by ~30.0 mm and decreasing the rate of sea level rise. The load from impounded water depresses the earth's surface near dams and elevates the geoid, which locally increases relative sea level (RSL). We computed patterns of dam-induced RSL change globally, and estimated that tide gauges, which are often close to dams, recorded only ~60% of the global average sea level drop due to reservoir building. Thus, RSL in the globally averaged ocean rose ~0.2 mm/yr more slowly than has been recorded by tide gauges, or ~10% slower than the measured rise rate of 1.5-2.0 mm/yr. Relative proximity to dams caused RSL to rise fastest in northeastern North America and slowest in the Pacific. This dam-induced spatial variability may mask the sea level "fingerprint" of melting sources, especially northern (Greenland) sources of glacial unloading.