



A Satellite Perspective on Continental-Scale Energy Balance and Heat Transport

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Recent efforts to balance the surface and atmospheric energy budgets on global and regional scales using satellite-derived observation or observation-integrating datasets will be highlighted. In the absence of closure constraints, unrealistically large imbalances are found between net radiation into the surface and corresponding turbulent heat fluxes, particularly over the global oceans. These imbalances can be traced, in part, to the fact that component fluxes tend to be estimated independently with no explicit reliance on closure constraints. A new approach for simultaneously introducing energy and water cycle balance constraints will be described that adjusts all component fluxes based on their relative uncertainties. The method yields estimates of all components of the energy and water cycles and provides explicit metrics for assessing the extent to which global and regional budgets can be balanced within assumed error bounds. This presentation will provide an overview of the resulting continental-scale energy budgets and their annual cycles. The behavior of fluxes in land and oceanic regions will be contrasted in the context of understanding the annual cycle of heat transport between the oceans and continents.