



Closing the large-scale water budget with observations of terrestrial water storage from GRACE

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The Gravity Recovery and Climate Experiment (GRACE) satellite mission provides data estimating monthly changes in the Earth's gravity field. Because the changes in these GRACE gravity fields are primarily due to changes in the vertically-integrated water column, these data can be inverted to solve for spatially averaged changes in continental water storage. The accuracy of the GRACE data actually improves at longer length scales, providing direct measurements which can be used to close the water budget at regional to global length scales. GRACE data can thus be used to assess modelled large-scale water storage predictions. In addition, GRACE data combined with measurements of river discharge can be used to estimate precipitation minus evapotranspiration (P-ET), spatially averaged over large river basins. Finally, evapotranspiration can be found as a residual by subtracting these estimates of P-ET from estimates of precipitation. These observationally based estimates of ET and P-ET can be used to assess the output of atmospheric general circulation models, as well as macroscale hydrologic models.