

GC41C-0823: Energy and Mass Changes of the Russian Permafrost Regions from Multi-Satellite and In-Situ Measurements

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We investigate changes in total water storage mass (GRACE), land-surface temperature (MODIS) and atmospheric CO₂ (AIRS) satellite-based and in-situ (runoff and bias corrected precipitation) measurements from August 2002 through December 2008. Our region of interest spans 75 to 165E and 50 to 80N centered on the Lena River watershed as a physical reference frame. We find energy and mass changes on the continuous and discontinuous permafrost zones indicating: 1) Arctic uplands such as the Siberian Plateau show strongly positive water equivalent mass and strongly negative land-surface temperature gradients during May. 2) Arctic lowlands such as the thaw-lake regions of Kolyma, Lena Delta, and Taymyr and the wetlands near Yakutsk show strongly negative water equivalent mass and strongly positive land-surface temperature gradients during September. 3) Areas with strongly positive water equivalent mass and negative land-surface temperature gradients during May show weakly positive CO₂ gradients, whereas areas of strongly negative water equivalent mass and strongly positive land-surface temperature gradients during September show strongly positive CO₂ gradients. This indicates permafrost ecosystem response is in phase with energy and mass changes over the period of measurements.