Geophysical Research Abstracts
Vol. 14, EGU2012-6154-1, 2012
EGU General Assembly 2012

Land-Surface Temperature Changes on the High-Latitudes of the Northern Hemisphere and Permafrost Biosequestration Stability

R.R. Muskett

University of Alaska Fairbanks, Geophysical Institute, Fairbanks, Alaska, United States (reginald.muskett@gmail.com, 907 474-2691)

Radiant solar energy and water are fundamental to life on Earth. Water through its heat capacity can re-distribute heat over the land-surface and within the near sub-surface. The stability of permafrost is affected by changes in land-surface temperature and snow cover. We investigate land-surface energy change effects using the NASA Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA-Terra. We utilize land-surface temperature (morning overpasses, clear-sly conditions) MOD11A3 version 5 datasets from March 2000 through April 2010. Our analysis focuses land-surface temperatures and changes on the 65N polar region. We divide the 65N region into a triad of 120-degree sectors enclosing Eurasia, Far East Russia - Western North America and Northeastern North American - Northwestern Europe. Over the 10-year period changes in land-surface temperature, particularly changes in the number of days above and below 0-degree Celsius can be detected. On lands 65N and above during 2000 the number of days above 0 degrees C is 97 and during 2010 is 111, an increase of 14 days in 10 years. Land-surface temperatures during 2010 show an increase of 2.1 +/- 0.2 degrees C (P-value 0.01), on average from those during 2000 with a regression R-square of 0.97. Increase of land-surface temperature in boreal winter and summer are factors in permafrost stability and biosequestration changes.