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Analysis of Satellite-Derived Vegetation Index, Temperature, and Snow Albedo in Alaska

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Arctic vegetation systems are highly controlled by climate warming. As a consequence of known increased temperature of about 0.3 ˚C per decade, vegetation cover in the arctic system can be altered in a number of ways. The Seward Peninsula of Alaska has shown significant vegetation transitions from coniferous boreal forest to deciduous shrub tundra region, both of which may be particularly sensitive to disturbances and climate influences. Shrubs in arctic tundra can significantly modify the surface energy balance and snow melting timing. The Council area in the Seward Peninsula was reported that shrubs density increased over the past 30 years. Increasing shrubbiness with warming can result in changing distribution and physical characteristics of snow because the taller shrubs can capture and hold more snow. Better understanding of the relationship of vegetation system to the snow albedo and temperature is important in order to determine the trends of arctic vegetation system and interpret effectively. This study utilizes the optical satellite remote sensing data over the period 1985 - 2010, which provide unique insights into global primary productivity patterns and changes therein and its technology has the potential to detect and monitor broad-scale changes in Arctic at a variety of spatial and temporal scales. We describe the spatial relationship between satellite-derived Normalized Difference Vegetation Index (NDVI), Land Surface Temperature (LST), and snow albedo. It is also hypothesized that the relationship between three indices be linear, and the linear regression are conducted using three different indices retrieved from Landsat TM/ETM+ imagery taken between 1985 - 2010. This study is, therefore, expected to provide information not only on the temporal changes in Arctic vegetation and the relationship between vegetation system, but also on the surface temperature and timing of snow melt. The result will provide us comprehensive understanding of vegetation changes in the high latitude region as well as helping us to predict future assessment of the changes on the global warming.