Permafrost is a subsurface phenomenon which cannot be directly measured with remotely sensed data. Nonetheless, relevant parameters and indicators can be captured with satellite data. Several studies have reported on applications of active microwave sensors to detect freeze/thaw states. Terrestrial ecosystems exhibit marked differences in dielectric properties between frozen and thawed states, resulting in changes in radar backscatter. Although most previous studies have been carried out based on the scatterometer measurements due to their global coverage and high temporal resolution, there is an increasing interest in the application of high resolution Synthetic Aperture Radar (SAR) for Earth observation owing to increasing availability of polarimetric space-borne SAR sensors. Particularly, the utilization of the fully polarimetric scattering matrix can offer an efficient and reliable means of collecting quantitative information on the seasonal changes of high latitude ecosystems. This study aims to evaluate the fully polarimetric signal scattered from frozen and thawed ground of taiga and tundra areas. Polarimetric ALOS PALSAR (L-band) data sets in the Eastern Siberian permafrost area acquired before and after the spring thaw have been investigated. Results show that it is difficult to distinguish signal from frozen and thawed forest using the single polarization measurement. But, changes in scattering mechanism across the frozen and thawed states can be clearly identified from polarimetric indicators. Experiment results for Siberian permafrost area illustrate that fully polarimetric SAR remote sensing can be a promising approach in monitoring spatio-temporal evolution of environmental processes in high latitudes without a priori information.