The vulnerability of permafrost carbon in greenhouse gases production and consumption dynamic is a key factor for understanding the potential carbon feedback mechanism to the atmosphere from thawing permafrost. Northern hemisphere permafrost carbon pools represent about 50% of the global below-ground organic carbon pool and thus are important to understand the global carbon cycle (Tarnocai & Canadell, 2009). Due to future climate change predictions these environments are likely to experience massive changes associated with the potential release of currently buried soil carbon (Schuur & Al, 2008). Understanding the driving parameters controlling the rate of carbon release from permafrost terrain is a key factor in understanding the global Arctic carbon climate feedback mechanism. While it is widely accepted that the rate of carbon release is strongly related to soil temperature, bulk soil carbon concentration (Dutta et al., 2006) and carbon age (Fontaine et al., 2007), recent studies have shown that certain combinations of conditions are needed for microorganisms to decompose soil organic matter more efficiently (Dungait et al., 2012). Also, long term mobilization rates are unknown and therefore needed in order to better understand the long term changes in the rate of carbon remobilization (Elberling et al., 2013). In this study, we will present incubation results from more than 150 samples from different Arctic localities and diverse periglacial landscape units from tundra to thermokarst lake sediment. The first 4 months of incubation under different conditions will be discussed and the mechanisms driving carbon release-decay will be assessed.