Project acronym: S-TRACES

Project title: Shrubs - Tundra Response in the Arctic Climate/Environmental Shift

Project leader: Jiří Lehejček, Tomas Bata University, Zlín/Uherské Hradiště (Czech Republic)

Discipline: Earth Sciences & Environment

Station(s): CEN Whapmagoostui-Kuujjuarapik Research Station (Canada)

Unique geographical setting of Whapmagoostui-Kuujjuarapik Station enable us to continue working on paleoenvironmental reconstructions using abundant, circumpolar but chronically understudied proxy archive of Arctic tundra - Juniperus communis. The aims of proposed project are: 1) Paleoenvironmental: climate/environmental reconstruction referring to existing Atlantic juniper network; 2) Ecological: disentangling differences in growth limiting factors of individual trees and shrubs at their coexistence areas; 3) Methodological: difference quantification between standard shrub sampling (causing death) and bore drilling (injury) of juniper.

Detailed field, lab, and statistical wood anatomical approach will be applied (Buras et al. 2017). Residual juniper anatomical parameters chronologies will be analysed to test their climate sensitivity. Statistics of series coincidence and average running correlations of the best growth parameter(s) will be calculated to quantify master chronologies representativeness. Northern (peri)-Atlantic climate/environmental reconstruction will be developed using candidate transfer function. Same dataset together with increment cores of respective individuals will be used to address the third aim. Master chronology will be developed individually for “core” and “disc” sample datasets. Climate-growth relationship of both approaches will be revealed in order to decide if less invasive sampling method can be applied in future. Samples will be collected from both shrubs and trees at sites with their coexistence to answer the second aim. Detailed morphology and position of each individual will be recorded.

All series will be screened for “growth-divergence” using multivariate statistical approaches (Tumajer et Treml 2017), and “divergence-phenomenon” using moving/evolving correlations (Zang 2016). If identified, growth-divergence will be explained using morphological and microsite parameters of individual shrubs/trees.