Geophysical Research Abstracts
Vol. 20, EGU2018-14131, 2018
EGU General Assembly 2018

Tree-rings as recorders of tropical cyclones in Northeast Asia

Jan Altman (1), Jiri Dolezal (1,2), Jong-Suk Song (3), Olga N. Ukhvatkina (4), Alexander M. Omelko (4), Pavel V. Krestov (5), Alexander A. Zhmerenetsky (4), Anna S. Vosmishcheva (5), Tatyana Y. Petrenko (4), Toshihiko Hara (6), Vit Pejcha (1), Tomas Cerny (7), Petr Petrik (1), and Kerstin Treydte (8)

(1) Institute of Botany, Academy of Sciences of the Czech Republic, Zámek 1, Průhonice 25243, Czech Republic (altman.jan@gmail.com), (2) Department of Botany, Faculty of Science, University of South Bohemia, Na Zlaté Stoce 1, České Budějovice 37005, Czech Republic (jiriddolezal@gmail.com), (3) Department of Biological Science, College of Natural Sciences, Andong National University, Andong, Gyeongbuk 760-749, South Korea (jssong@anu.ac.kr), (4) Federal Scientific center of the East Asia terrestrial biodiversity Far Eastern Branch of Russian Academy of Sciences, Vladivostok 690022 Russia (ukhvatkina@me.com), (5) Botanical Garden – Institute of Far East Branch of Russian Academy of Science, Vladivostok 690024 Russia (pavel.krestov@icloud.com), (6) Institute of Low Temperature Science, Hokkaido University, Kita-ku, Sapporo 060-0819, Japan (t-hara@pop.lowtem.hokudai.ac.jp), (7) Department of Forest Ecology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Kamýcká 1176, 165 21 Praha 6, Czech Republic (cernyt@fld.czu.cz), (8) Swiss Federal Research Institute WSL, Dendro Sciences Unit, Zürcherstrasse 111, 8903 Birmensdorf, Switzerland (kerstin.treydte@wsl.ch)

Tropical cyclones have significantly increased in both the frequency and intensity over recent decades in the western North Pacific Ocean basin. We aim to provide new insights into the long-term typhoon variations by using a combination of release detection, radial growth trends and oxygen isotope compositions of late-wood tree-ring cellulose. Long-term tree-ring records will enable us to determine the changes in frequency and intensity of tropical cyclones over a large area. Our preliminary results indicate the high potential of all three techniques as proxies for typhoon reconstruction. Comparison of latewood δ^{18}O residuals (deviations from the mean of 4 individual tree-ring series) with instrumental records of past typhoons showed that negative deviations of tree-ring δ^{18}O values from the long-term mean correspond with the occurrence of typhoons in the same year. We found that the most intensive typhoons are followed by a high proportion of trees showing a major release along a latitudinal gradient in South Korea (Altman et al., 2013) and in Hokkaido (Altman et al., 2016). Our long-term reconstructions of past disturbances based on 220 cores from *Quercus mongolica* South Korea revealed increasing typhoon intensity over recent decades (Altman et al., 2013). This was confirmed here by further extensive analyses of $>$ 900 cores from several species. In addition, we identified higher disturbance frequency in northern latitudes in the past hundred years whereas in southern latitudes disturbance frequency was stable before and after 1920, where most of the climatological studies detected poleward migration of tropical cyclones.

References

Altman J., Dolezal J., Cerny T. & Song J.S. (2013) Forest response to increasing typhoon activity on the Korean peninsula: evidence from oak tree-rings. Global Change Biology 19: 498–504.

Altman J., Fibich P., Leps J., Uemura S., Hara T. & Dolezal J. (2016) Linking spatiotemporal disturbance history with tree regeneration and diversity in an old-growth forest in northern Japan. Perspectives in Plant Ecology, Evolution and Systematics 21: 1-13.