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Two-point analysis of coherent motions at the atmosphere-forest interface at mountainous site Bily Kriz

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The study is aimed at investigation of large-scale intermittent coherent structures (CS), which have been detected in turbulence time series measured at the Experimental Ecological Study Site Bily Kriz (800-900 m a.s.l.) in the Czech Republic. The site is situated on a steep (13°) SSW-faced slope near the top of a mountain ridge forested by a young Norway spruce plantation. Flow directions across the ridge (upslope or downslope) strongly prevail at the site. Recent results reveal that the periods of CS detected when the site is on the downwind (leeward) side of the ridge are significantly shorter than those detected when the site is on the upwind side but the "leeward" CS have relatively higher frequency of occurrence in the 30-min time series.

This contribution concentrates on a two-point analysis of the horizontal wind velocity component, u´. The high-frequency data are collected using three-dimensional sonic anemometers installed at the mean tree height (12.5 m) at two masts positioned in the downslope direction, the distance between them being 94 m. A method based on the continuous wavelet transform and the cross wavelet transform is used for detection of the characteristic temporal scale of CS, the fraction of time they occupy ("persistence") and the intensity of turbulence associated with the averaged amplitude of u´ during the occurrence of CS. Differences in the structures due to different stability conditions (daytime vs. nighttime) and flow directions (upslope vs. downslope) are examined. Subsequently, possible sources of individual low-frequency oscillations are discussed.

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