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Wind-stilling in the light of wind speed measurements based on the Czech experience

Rudolf Brázdil (1,2), Adam Valík (1), Pavel Zahradníček (2,3), Ladislava Řezníčková (1,2), Radim Tolasz (4), and Martin Možný (5)

(1) Masaryk university, Department of Geography, Czech Republic (ValikAdam@seznam.cz), (2) Global Change Research Institute CAS, Brno, Czech Republic, (3) Czech Hydrometeorological Institute, Brno, Czech Republic, (4) Czech Hydrometeorological Institute, Praha, Czech Republic, (5) Czech Hydrometeorological Institute, Doksany, Czech Republic

At the second half of the 20th century many meteorological services started with replacement of standard meteorological measurements by new automatic instruments. This change is reflected in the occurrence of significant break-points in long-term series of climatic variables. This is particularly the case of wind-speed measurements. In the Czech Republic this process started in the mid-1990s, when standard universal anemographs or anemoindicators were progressively replaced by the Vaisala WAA251 sensor (cup anemometer) and the WS425 sensor (ultrasonic). Because of their different technical parameters, there is necessary to study possible influences on the corresponding measurements. The paper is based on the comparison of parallel wind speed measurements by universal anemographs and Vaisala sensors at the CHMI meteorological stations Doksany and Kocelovice in the 2000−2016 period. Vaisala sensors measure, on average, higher wind-speeds than universal anemographs, particularly in calm situations and at low wind speeds. The differences between the two types of instrument do not depend on wind direction. Linear trends of homogenised daily mean wind-speed series from only a universal anemograph or combined from universal anemograph and Vaisala sensors generally exhibit no important differences in their significance or values. This could indicate that generally observed decreasing trends in mean daily wind-speeds (‘stilling’) cannot be attributed to changes of standard wind-speed measurements to automated devices; with respect to only two stations being investigated, this is biased by some uncertainty. In contrast, important differences in the two types of measurement, both in linear trends and their significance, appear for series of three daily readings (07:00, 14:00 and 21:00 h LMT).(This work was supported by Czech Science Foundation, project no. 15-11805S “Windstorms in the Czech Lands during the past 500 years”.)