

Method for Grade Evaluation of Automatic Meteorological Stations based on Satellite Data

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Abstract:

The environment configuration of meteorological station will affect its representation. However, there is no uniform evaluation criteria in this respect. Statistical analysis was carried between the meteorological data from automatic meteorological stations and the urban morphological parameters in Beijing area, which was calculated through the Landsat satellite remote sensing data of six years (1990, 1994, 2000, 2005, 2011, 2013) in summer. The results show that:

- (1) Land use type, landscape index, building height and sky view factor can be good environment parameters to reflect the three-dimensional stereoscopic environmental configuration around meteorological stations in the form of "digital", and these indicators were calculated through satellite remote sensing data.
- (2) Correlation analysis and regressive analysis was carried between these four environment parameters and meteorological factors. The results show that among all the urban morphological parameters, contagion index, largest patch index, aggregation index, building height and sky view factor were the main parameters, which had a significant correlation with meteorological factors. The main factors affecting the change of temperature were contagion index, largest patch index, urban area, water area and sky view factor etc. The change of humidity was affected by contagion index, largest patch index, aggregation index, urban area, water area etc. The relationship between the urban morphological parameters and wind speed was weak, there were only two morphological parameters had significant correlation with wind speed, which were largest patch index and urban area. This might because wind speed can be affected by many factors, such as weather system, altitude and so on.
- (3) By contrasting the response intensity of the landscape index of 2km buffer and 5km buffer of the meteorological stations, and discussing the representation area of meteorological stations through wind transmission source distribution, we found that 5km buffer area is the best representation area of the meteorological stations.
- (4) In this study, using the response intensity of the urban morphological parameters corresponding to meteorological factors, a preliminary approach was established to evaluating automatic meteorological stations through urban morphological parameters. Meanwhile, the representation of meteorological stations was divided into five levels and the representation level of 20 meteorological stations in Beijing was estimated.

Key words: Automatic Weather Stations, Representativeness, LandSat-5, Sky View Factors