Comparison and analyses of existing objective, quantificational blocking indices

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There are existing objective, quantitative blocking indices that could be classified into five types: the departure method, the Tibaldi and Molteni method, the dynamical index(PV-index), the dynamical potential vorticity (PV) based index, and the circumfluent type method. Persistent blocking highs can be associated with destructive weather including low temperatures, snowfall, and anomalous freezing from January 1st to February 2nd 2008 in China. Using the daily reanalysis data provided by National Centers for Environmental Prediction-National Center for Atmospheric Research (NCEP/NCAR), the merits and flaws of these five objective methods are studied individually, including the intensity size and frequency of block. Generally speaking, each method has both advantages and clearly identifiable limitations because of the mathematical formulation for each objective blocking index. This issue demonstrates that it's difficult to identify atmospheric blocking precisely as the atmosphere possesses a nearly infinite number of degrees of freedom. However, based on the merits and flaws of these blocking indices summarized in this study, investigators and operational meteorologists could apply these blocking indices better if they can select an index compatible with their study objectives, or improve upon and innovate a new method.