The Preliminary Discussion on Downscaling Method in Meteorology and Hydrology Coupling

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In recent years, with the rapid development of the theory and method of numerical prediction, atmospheric observation technology and computer technology, numerical prediction models have been shown the great potential to objective quantitative forecasting of heavy rain. Its spatial resolution has been reached tens of kilometers or even more than a dozen kilometers, but input data are generally required to reach at least 1kilometer by 1kilometer or even higher spatial resolution for small and medium hydrological forecasting model at present. With the meteorological and hydrological continuous in-depth interdisciplinary, establishing coupling meteorological and hydrological forecasting model has become the inevitable trend of development. How to make use of large-scale numerical model data into the hydrological model has become a serious problem.

In order to resolve the problem of the scale's mismatch between meteorology and hydrology, this paper choose the precipitation which is a key factor in meteorology and hydrology coupling as studying object and discuss the downscaling of precipitation thoroughly. The statistical downscaling model SDSM, EOF iteration method, principal component analysis combined with stepwise regression method and dynamic combined with statistical downscaling method are introduced in detail. Then, a new method of downscaling is raised by Institute of Heavy Rain, CMA, Wuhan, the forecasting results show that the new downscaling method can meet the needs of hydrological model basically according to the test analysis.

Conclusions were as follows:

1. Need to be more directly addressed the assumption of statistical downscaling methods, such as large-scale climate and terrestrial climate elements of the temporal stability of the statistical relationship
2. Statistical downscaling approach is applied more and more down-scale method, but the physical mechanism of the formation of statistical relationship needs further understanding and studying

3. Need to understand the time scales and spatial scales between large-scale climate and ground elements of statistical relationship, if time scale and spatial scale are beyond, statistical relationship will no longer be set up and the establishment of statistical relationship changes over time and space relationship.
4. China Meteorological Administration, Wuhan Institute of heavy rain with its own academic strengths, proposed a set of new down-scaling method on the basis of the existing research. The forecasting result resolution calculated by the method can reach 2 kilometer by 2 kilometer. It found that the new downscaling method can meet the needs of hydrological model basically according to the test analysis, but there is a lot of work need to be done.

Key words: Statistical downscaling；Statistical-dynamical downscaling, meteorology and hydrology coupling

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