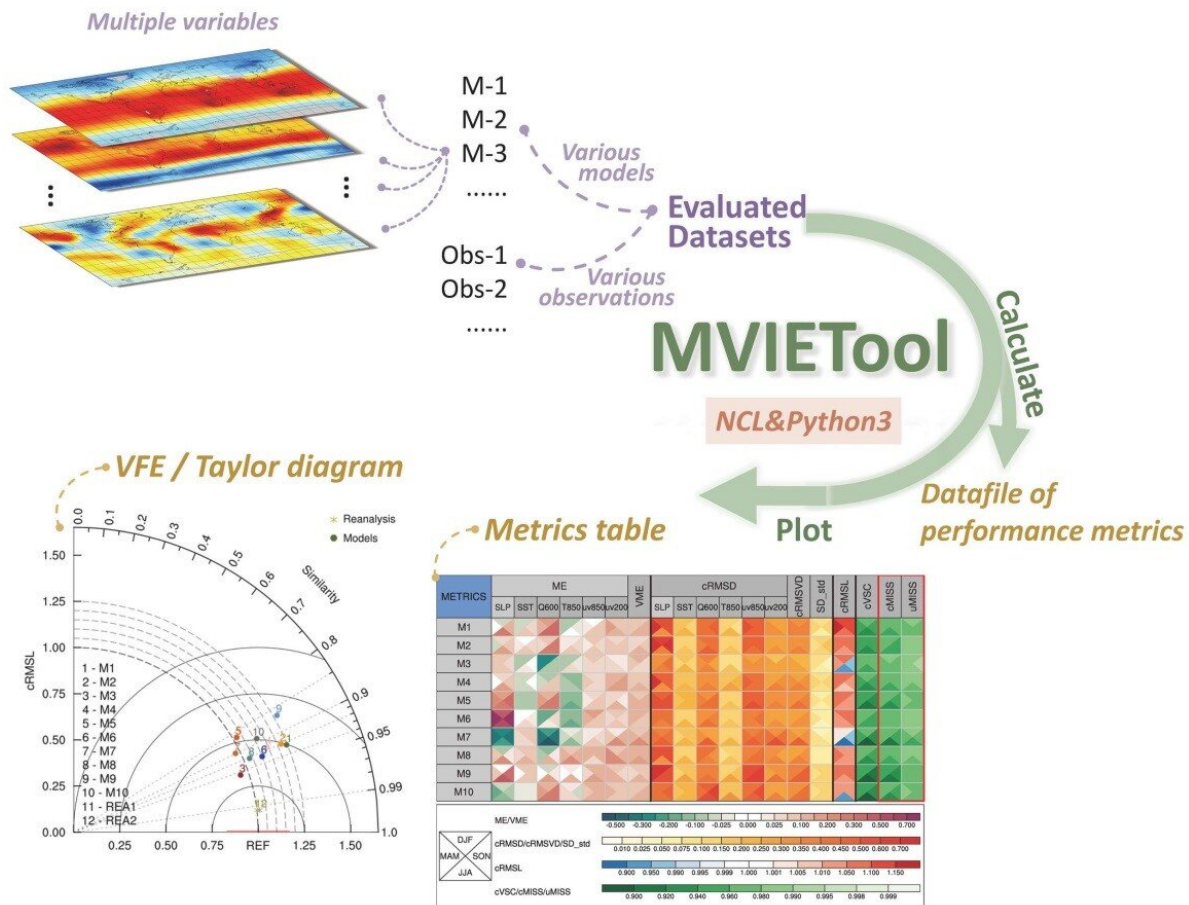# Meteorologists improve multivariable integrated evaluation method for climate model

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A schematic chart illustrates climate model evaluation with the MVIETooL. Credit: ZHANG Mengzhuo

The multivariable integrated evaluation (MVIE) method can help meteorologists to quantitatively evaluate the overall performance of a climate model in simulating multiple variables like air temperature, precipitation, and vector wind, against observed ones.

Recently, researchers from Nanjing University and the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences developed a simple-to-use Multivariable Integrated Evaluation Tool (MVIETool) coded with Python/NCL to facilitate climate model evaluation and models inter-comparison, improving the MVIE method.

The study was published in *Geoscientific Model Development* on May 28.

"The improved MVIE method can provide a more comprehensive and precise evaluation of climate model performance. With the support of the MVIETool, one can easily evaluate model performance in terms of each individual variable and/or multiple variables," said Zhang Mengzhuo from the School of Atmospheric Sciences, Nanjing University, the first author of the study.

In the improved method, the area-weighting is taken into the definition of statistics in MVIE, which makes the evaluation results of spatial fields more accurate. "The method allows a mixed evaluation of scalar and vector fields," said Prof. Xu Zhongfeng from IAP, the corresponding author of the study. "A multivariable integrated skill score is proposed as a flexible and normalized index to quantitatively measure a model's ability to simulate multiple fields."

In addition to climate model evaluation, the improved MVIE method may also be applied to other areas, e.g., machine learning. One may use the MVIE method to measure the overall accuracy of multiple variables generated by a machine learning model relative to the target values.

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