

K computer runs largest ever ensemble simulation of global weather

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Ensemble forecasting is a key part of weather forecasting today. Computers typically run multiple simulations, called ensembles, using slightly different initial conditions or assumptions, and then analyze them together to try to improve forecasts. Now, using Japan's flagship 10-petaFLOPS K computer, researchers from the RIKEN Advanced Institute for Computational Science (AICS) have succeeded in running 10,240 parallel simulations of global weather, the largest number ever performed, using data assimilation to reduce the range of uncertainties.

The assimilation of the 10,240 ensemble data sets was made possible by a cross-disciplinary collaboration of data assimilation experts and eigenvalue solver scientists at RIKEN AICS. The "Local Ensemble Transform Kalman Filter" (LETKF), an already efficient system, was further improved by a factor of eight using the "EigenExa" high-performance eigenvalue solver software, making possible a three-week computation of data from the 10,240 ensembles for simulated global [weather](#). By analyzing the 10,240 equally probable estimates of atmospheric states, the team discovered that faraway observations, even going beyond 10,000 kilometers in distance, may have an immediate impact on eventual state of the estimation. This finding suggests the need for further research on advanced methods that can make better use of faraway observations, as this could potentially lead to an improvement of [weather forecasts](#).

Provided by RIKEN

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