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Winds, heat transfer, solar radiation, relative humidity, phase changes of water and surface hydrology are calculated within each grid cell, and the interactions with neighboring cells are used to calculate atmospheric properties in the future. Numerical weather prediction (NWP) uses mathematical models of the atmosphere and oceans to predict the weather based on current weather conditions.

Conceived by Harry R. Glahn and D.A. Lowry of the U.S. National Weather Service, this method involves the use of data relating to past weather phenomena and developments to extrapolate the values of certain weather elements, usually for a specific location and time period.

Numerical Weather Prediction (Weather Models) Numerical weather prediction (NWP) is a method of weather forecasting that employs a set of equations that describe the flow of fluids These equations are translated into computer code and use governing equations, numerical methods, Weather Predic-

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Quantitative precipitation forecasts can be derived from statistical forecasting models, weather radar, synoptic forecasts, satellite-based remote sensing, or numerical weather forecasting (meteorological) models. Many of the radar-based methods are based on advective schemes that assume the rainfall storm pattern remains constant and moves at a constant velocity.

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Bayesian probabilistic arguments are used to derive idealized equations for finding the best analysis for numerical weather prediction.

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However, there are limitations to using classical computers—even supercomputers—in developing numerical weather and climate prediction models.¹ Also, the process of analyzing the weather data by traditional computers may not be fast enough to keep up with ever-changing weather conditions.² Even local weather forecasting, which is rapidly evolving all the time, can stand to benefit from improved forecasting.

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The basic idea of numerical weather prediction is to sample the state of the fluid at a given time and use the equations of fluid dynamics and thermodynamics to estimate the state of the fluid at some time in the future.

ECMWF's Annual Seminar from 14 to 18 September 2020 focuses on recent progress and future prospects in numerical methods for atmospheric and oceanic modelling. Sam Hatfield, one of the organisers this year's event, is looking at ways of reducing the computational cost of producing weather forecasts by using lower precision in the calculations.

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Subsequent developments in computer power, in the use of satellite observations, and in meteorological science, have made numerical weather prediction or NWP by far the most successful approach to weather forecasting, with useful skill to 5 days ahead on average (sometimes much more) and forecasts for the first day often accurate in their detail down to weather features of a few tens of kilometres across.

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