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Machine Learning for Weather

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Machine Learning refers to a set of techniques for developing software routines by reverse engineering them from data. With this approach, it is possible to develop capabilities beyond those we can build by hand. Using these techniques, we can improve all aspects of the numerical weather prediction pipeline. In this presentation, I will review some of the main ideas behind machine learning and describe breakthroughs which have been or may be achieved. Examples include autonomous sensors, intelligent in-painting and downscaling, inverse modeling, acceleration of data assimilation, improvements to model parameterizations, model-free nowcasting, detection of severe weather, and many more. It is important for scientists to understand both the potential and limitations of these techniques as machine learning is here to stay, and it has the potential to revolutionize science over the coming decades.

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