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Driving Numerical Weather Prediction with NVIDIA technology

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The performance focus of numerical weather prediction has traditionally been on the model and the large degree of parallelism offered by NVIDIA GPUs has attracted the attention of the modeling community early on. As a result, various forecast services run their operational model now on GPUs and it is expected that this trend will continue in the future. However, with the wealth of data being generated by models or high resolution sensors, other parts of the forecast pipeline are becoming bottlenecks, including pre-processing, assimilation or post-processing. New forms of data driven science enabled by AI, or digital twins offering interactive exploratory data analysis require not only increasing levels of processing power but also ask for advanced software infrastructure. NVIDIA's recent hardware announcements, including ARM CPUs, smart network interfaces and GPUs, as well software layers, ranging from machine learning frameworks to the Omniverse platform, are well in alignment with these requirements. In this presentation I will cover some of the technologies and ongoing activities at NVIDIA that relate to numerical weather forecast systems. This includes recent progress in model acceleration, esp in light of the recently announced Grace ARM CPU, as well as results in AI based projects, including bias correction and tropical cyclones detection. In addition, we will cover recent visualization techniques and digital twin infrastructure with the Omniverse platform.

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