



KI-unterstützte Digitale Zwillinge für Klimaresilienz in Städten

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Extreme weather events have become more frequent and more severe

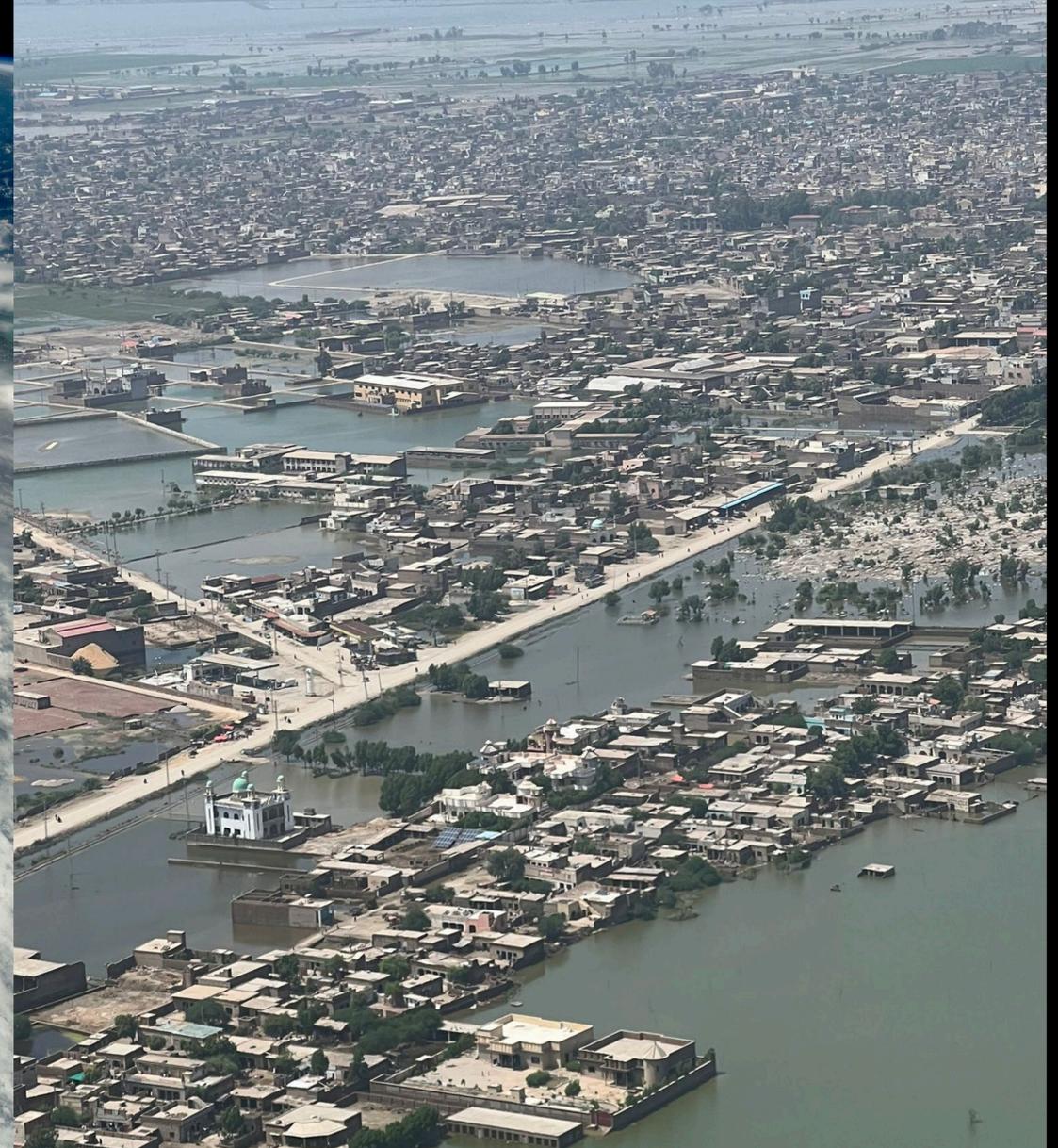
Mediterranean Heatwaves & Floods 2023
0.5% - 1% of GDP



Hurricane Ian 2022
\$112 billion



Pakistan Floods 2022
\$15 billion

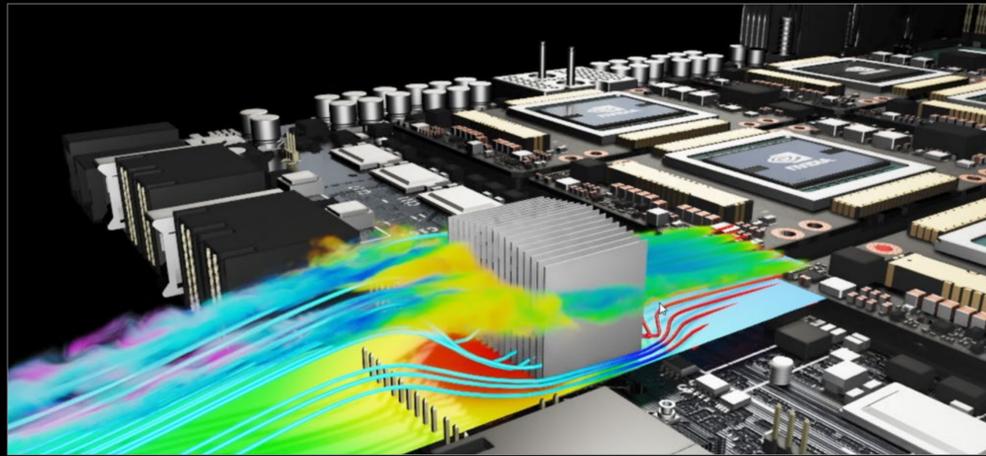


<https://abcnews.go.com/International/wildfires-rage-amid-heat-wave-greece-prompting-evacuations/story?id=101511245>

<https://commons.wikimedia.org/w/index.php?curid=123606695>

https://commons.wikimedia.org/wiki/File:Flood_in_Pakistan_2022.png

NVIDIA makes digital twins fast, powerful, and intuitive



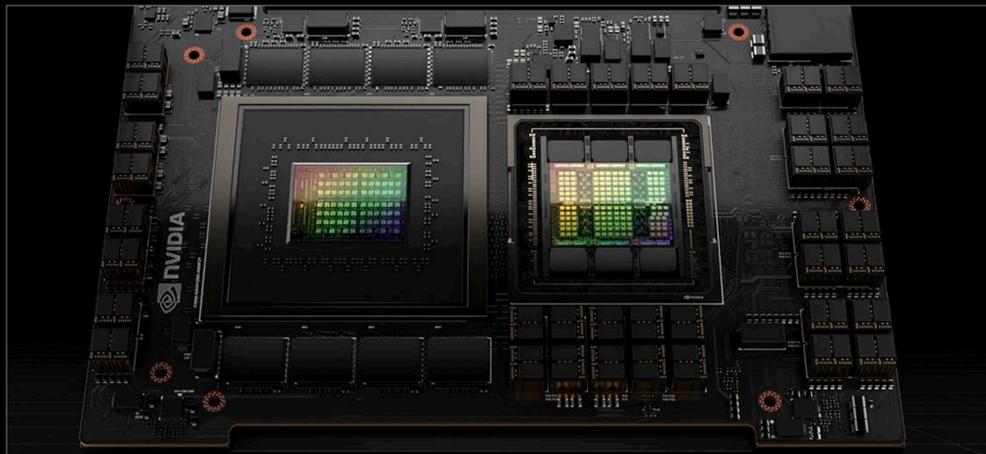
MODULUS
PHYSICS-ML



OMNIVERSE
USER EXPERIENCE



NUCLEUS
INTEROPERABILITY



GRACE - HOPPER SUPERCHIP
ACCELERATED COMPUTING



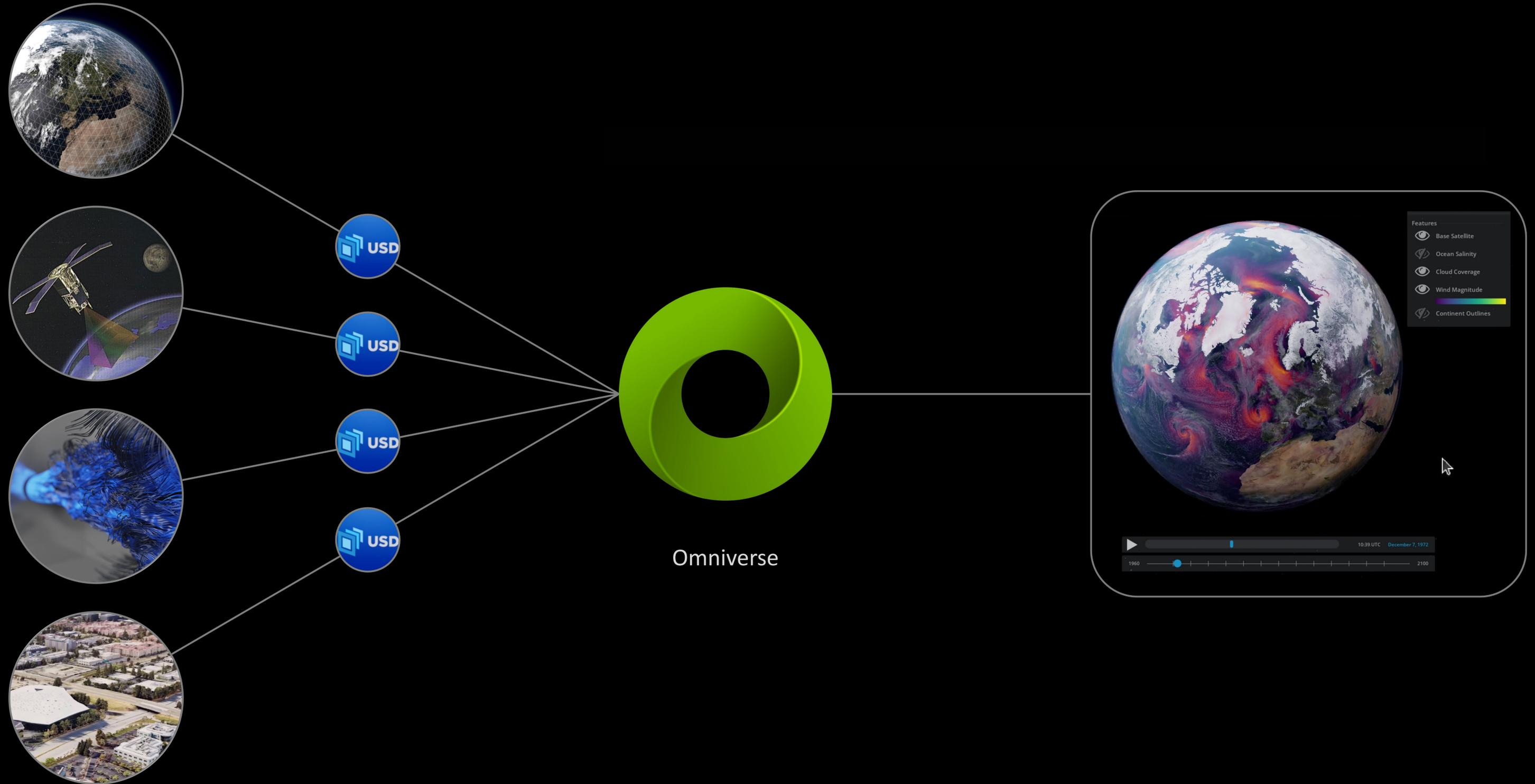
DGX - SUPERPOD
LARGE AI MODELS



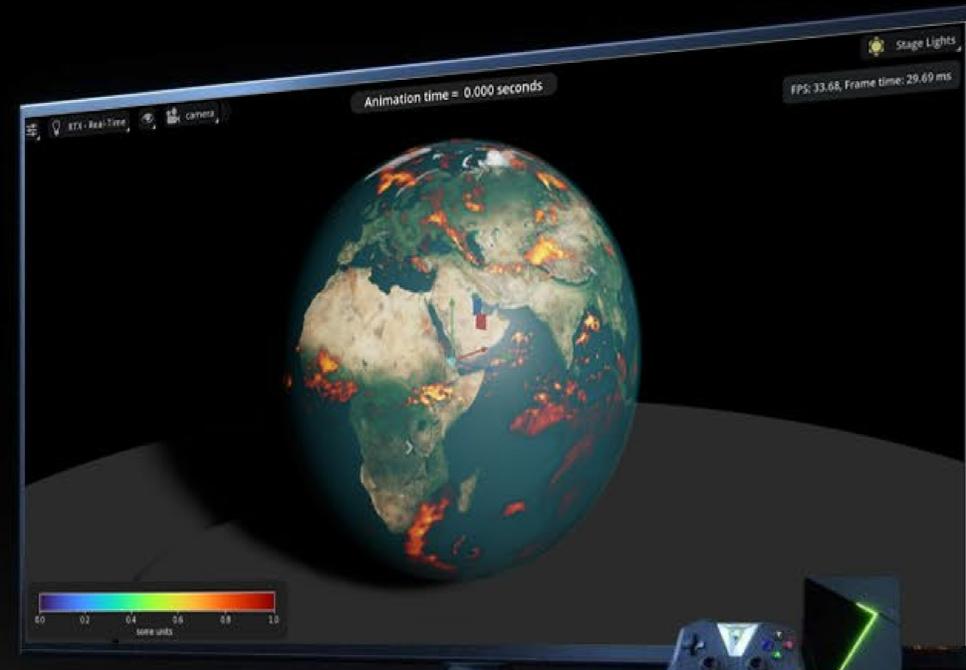
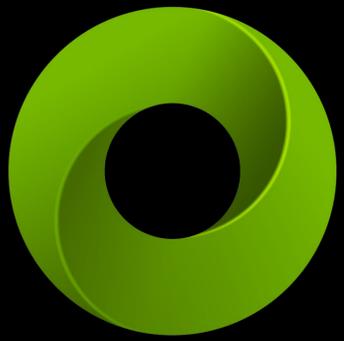
DGX Cloud & Omniverse Cloud
ACCESS TO ALL NVIDIA TECHNOLOGY FROM A BROWSER

NVIDIA Omniverse for Interactive Digital Twins

Connecting 3D, Databases, Simulation and AI



Omniverse Cloud

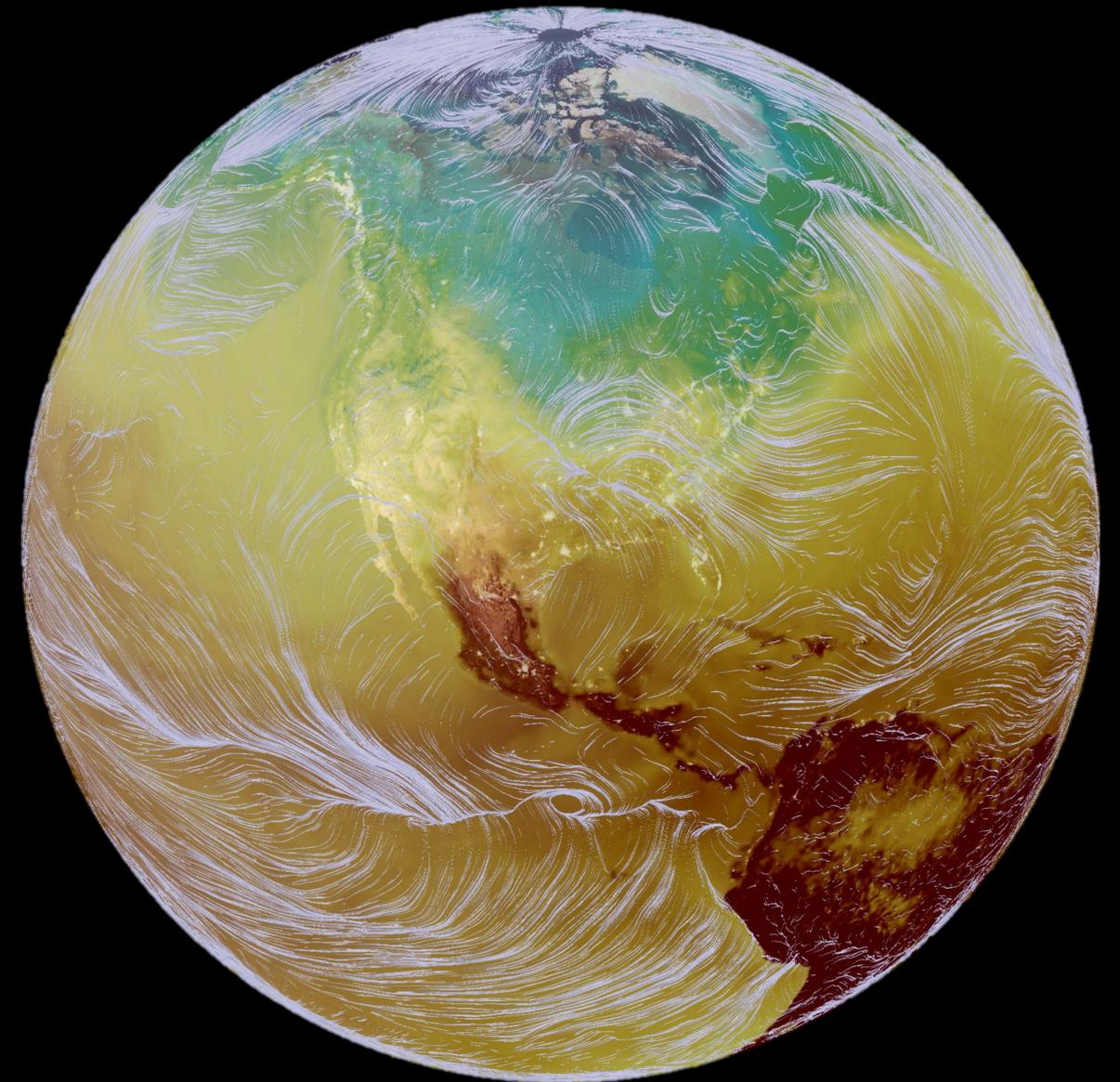


AI-Based 3D Earth and Space Observing Digital Twin

Partnership between Nvidia, Lockheed Martin and NOAA



- Ingest, analyze, and display data from 5 Earth system domains:
 - Atmosphere (Temperature and Moisture Profiles)
 - Ocean (Sea Surface Temperature)
 - Cryosphere (Sea Ice Concentration)
 - Land and Hydrology (Fire Products)
 - Space Weather (Solar Wind Bulk Plasma)
- One-stop-shop for all linked data sets.
- Easily configurable to other geospatial data sources and algorithms.



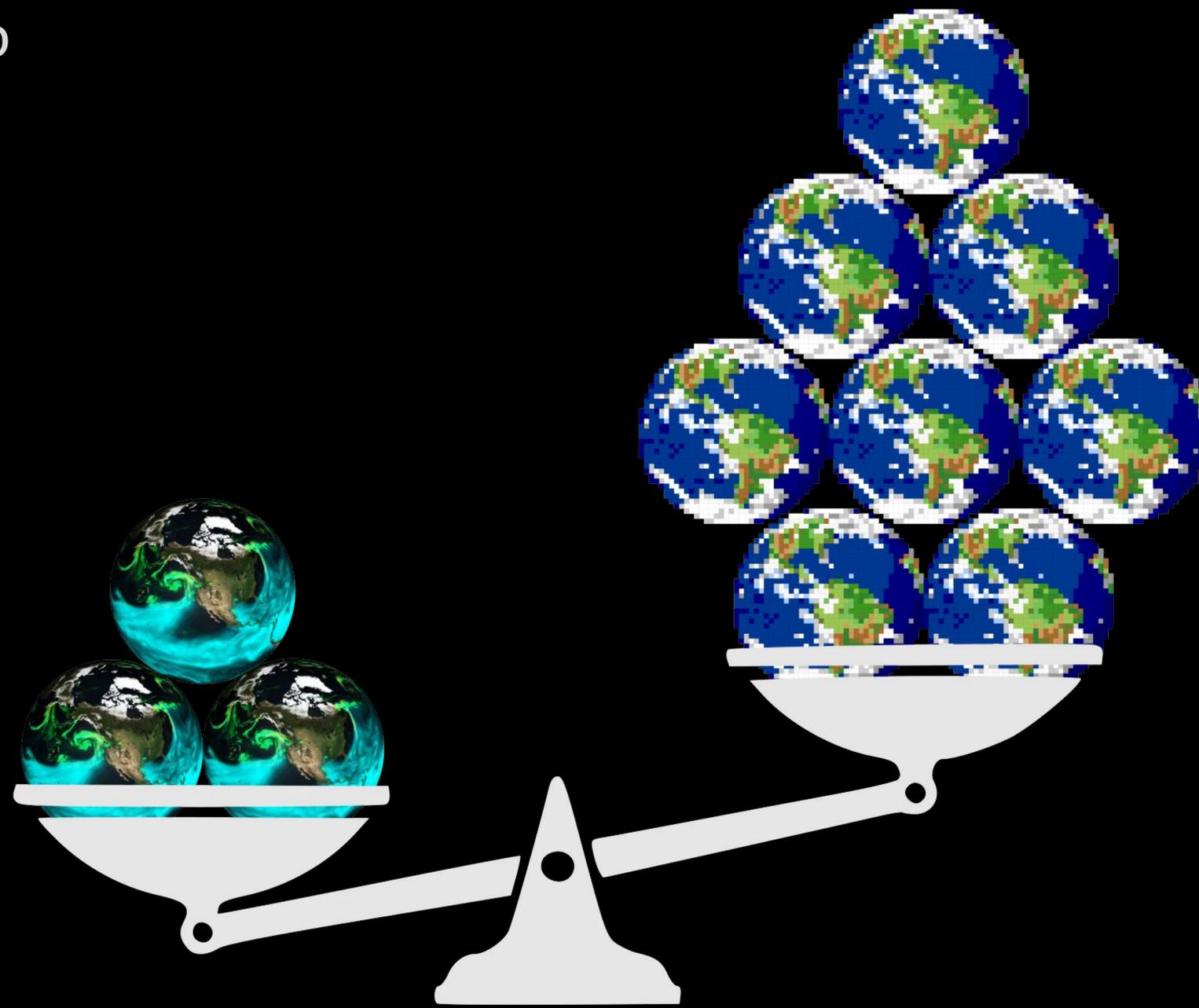
Which Requirements must Simulations fulfil to Predict Severe Weather Events?

High Resolution

Details like land-sea breeze, topography, or small-scale physics have a huge impact on the atmosphere, e.g. the track of a hurricane. High-resolution simulations are required to capture such small features.

Massive Number of Forecasts

Extreme events like floods are rare. Predicting rare extremes with high confidence requires a huge set (ensemble) of forecasts (~10,000 forecasts).



Under computational constraints, the number of forecasts must be balanced against their resolution.

AI Weather Prediction Enables Large Ensembles with High Resolution

- AI weather emulators are cheap to run while approaching the quality of traditional weather models.
- Run a 1,000 member ensemble of a 10 day forecast on 8 GPUs in 90 minutes to:
 - Produce more accurate statistics
 - Capture rare extremes with higher certainty
 - Reveal previously hidden information about statistically rare outcomes for risk assessment

Modulus Provides Easy Access to Various AI Weather Models

FourCastNet

- Medium-range
- Resolution: 0.25°
- AFNO or SFNO
- [AFNO publication](#) [SFNO publication](#)

GraphCast

- Medium-range
- Resolution: 0.25°
- GNN
- [Link to publication](#)

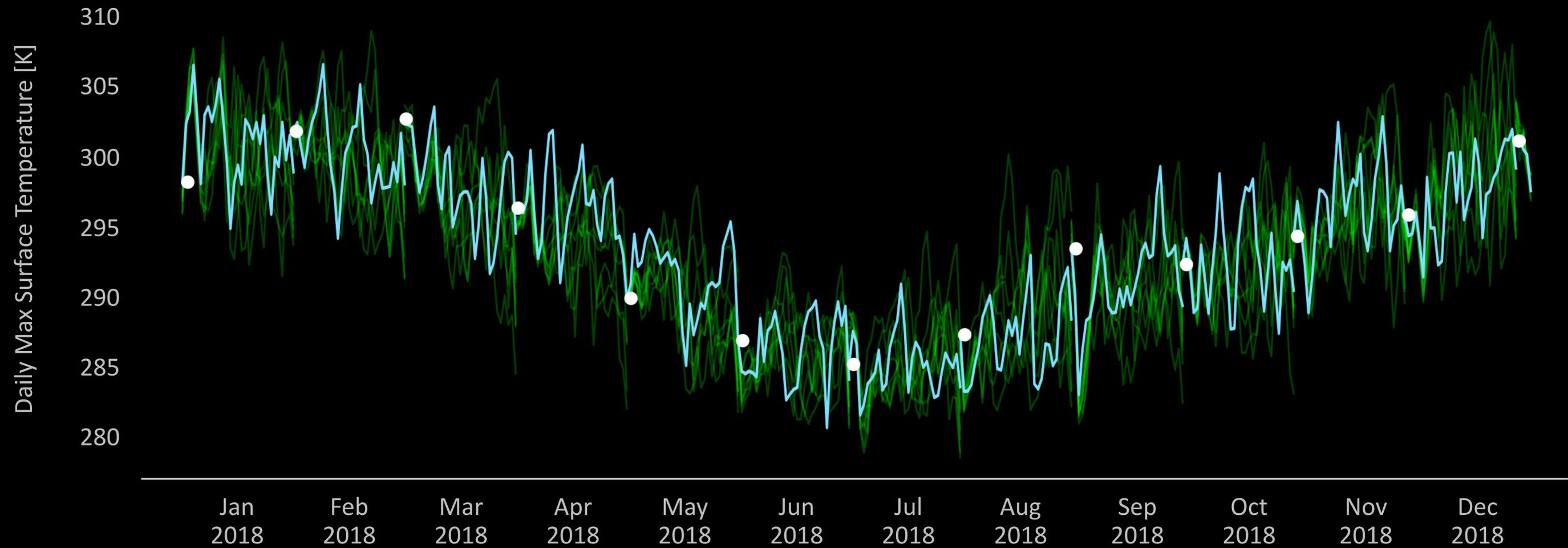
DLWP

- Medium-range & S2S
- Resolution: 1.4°
- CNN + U-Net
- [Link to publication](#)



Emulation to Complement Simulation

Buenos Aires



Resources

- Find the latest updates on Nvidia's products for weather and climate.
<https://www.nvidia.com/en-us/high-performance-computing/earth-2/>
- Explore Earth's atmosphere in your browser - an interactive visualisation of 1.25km ICON data from the day the iconic Blue Marble image was taken.
<https://www.nvidia.com/en-us/high-performance-computing/earth-2/demo/>
- Train AI weather models using Modulus.
<https://github.com/NVIDIA/modulus-launch/tree/main/examples/weather>
- Watch our CEO Jensen describing the path to simulate and visualize the global atmosphere at unprecedented speed and scale.
<https://youtu.be/GTJVpPsSwpl>
- Read about how AI and accelerated computing contribute to faster and more efficient weather predictions and climate projections.
<https://blogs.nvidia.com/blog/2023/07/05/ai-efficient-weather-predictions/>

