tomorrow.io

Overview

# Tomorrow.io

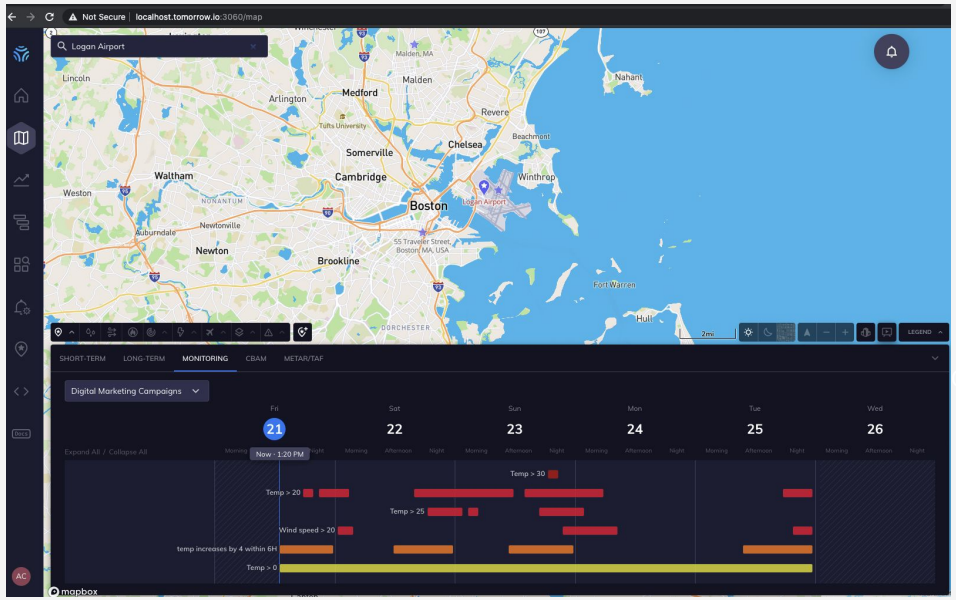
Climate Adaptation Platform, powered by Weather Intelligence.

tomorrow.io

# Tomorrow.io at a glance

- Started in **2016** in Boston; over **$300M** in capital raised to-date
- Locations in U.S., Israel, and India
- Deploying groundbreaking LEO **smallsat** constellation of **weather radars** and **sounders**
- Partnering with the U.S. Air Force, NASA, JetBlue, Uber, Ford, and more
- Approximately **240** employees (~**50%** in R&D)

# Scaling SaaS Weather Intelligence Globally




**Weather Intelligence Alert**

De-ice planes between 10 AM - 11 AM

**Weather Intelligence Alert**

Hail will start in 60 minutes. Move car to covered area and check road conditions

AEROMEXICO · Azul · DELTA · DRIZLY · evergy · facebook · Ford · FOX SPORTS · nationalgrid · IndiGrid · INMOBI · intact · ITS ConGlobal · jetBlue · KAJIMA · PATRIOTS · PORSCHE · Rappi · SB Energy · Denny's · Shipt · SWIGGY · Uber · UNITED · U.S. AIR FORCE · USTA - US OPEN · VIA · NASA · zomato

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tomorrownow.org

BILL & MELINDA GATES foundation

NCAR UCAR

THE WORLD BANK IBRD • IDA

# 6M Farmers Reached (and growing!)

**SMS agri-advisory program with KALRO, powered by high-resolution weather intelligence:**

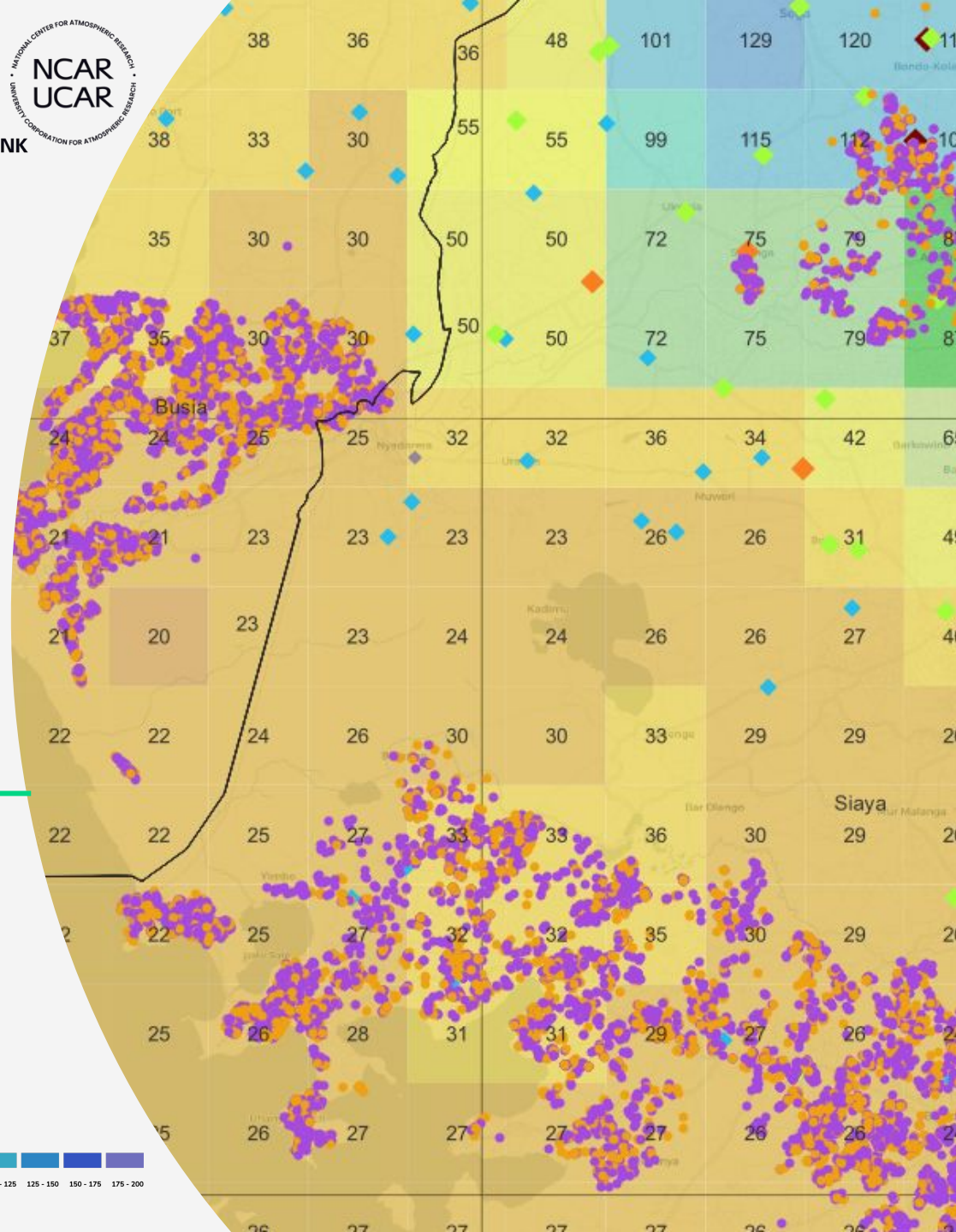
- Rapid scale - up to 6M farmers reached in 1 year
- High impact - Farmers more likely to report successful germination and less likely to report pests or damage to maize


KALRO tomorrow.io

tomorrownow.org

**West & Central Kenya**

Rainfall next 7 days from
17 October (October 17-24) at **3.5 km resolution**




**Small Scale Producers (SSP)**

- Female
- Male

Rainfall

0 - 1mm | 1 - 10 | 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 | 50 - 60 | 60 - 70 | 70 - 80 | 80 - 90 | 90 - 100 | 100 - 125 | 125 - 150 | 150 - 175 | 175 - 200

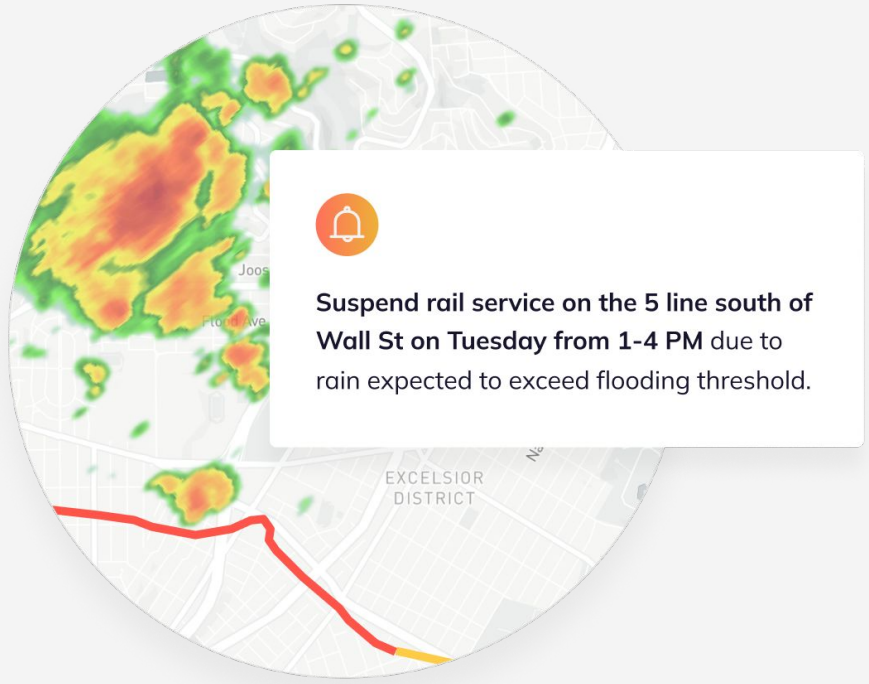
# Tomorrow.io Created Weather Intelligence™

Weather Intelligence isn't focused on the weather, it's focused on the predictive impact of the weather, automated decisioning, and operational optimization.

12°

Mostly cloudy with a 40% chance of rain on Tuesday for New York City.

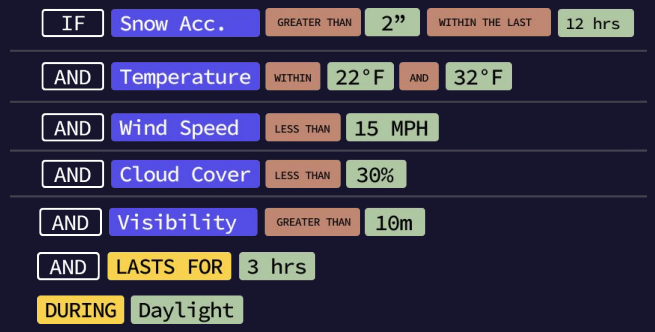
VS



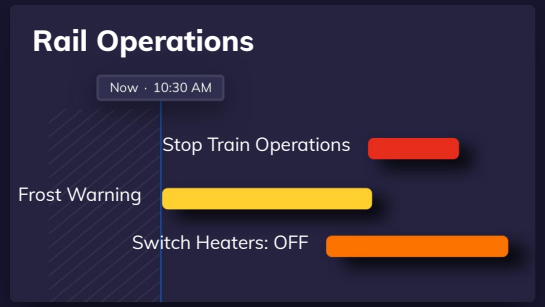

**Suspend rail service on the 5 line south of Wall St on Tuesday from 1-4 PM** due to rain expected to exceed flooding threshold.

# Operationalizing the Forecast

## Empowering organizations to standardize and automate operating protocols




Build **protocols** that **monitor** for **impact**

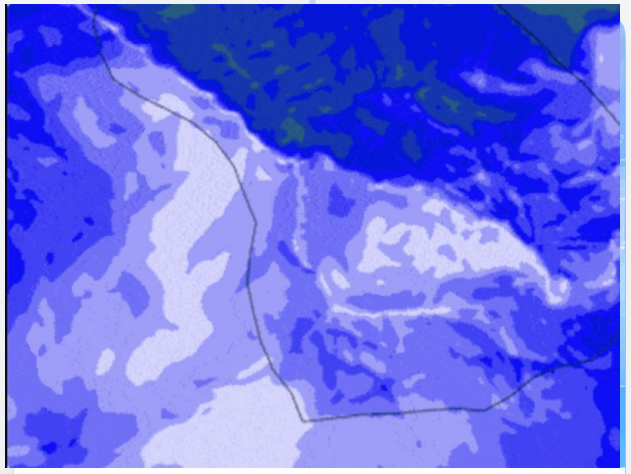



Get **signaled** when impact will occur

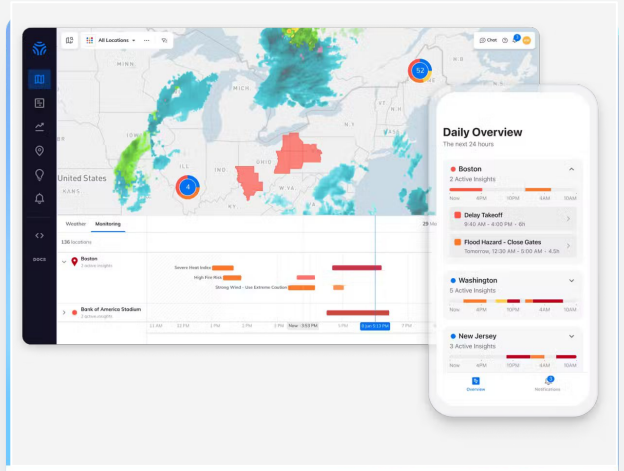

Drive **business outcomes**

# Tomorrow.io Differentiated on 3 Fronts

**Comprehensive Global Weather Observations & Measurements**



**Proprietary Weather Modeling. Powered by Physics, Supercharged with AI/ML.**




**Weather Intelligence SaaS/API**

# Quality Weather Information is Not Universal

Decades after the first weather radar was installed, **5 billion people still live outside of reliable radar coverage**

**No radar coverage over oceans,** where most high-impact weather originates

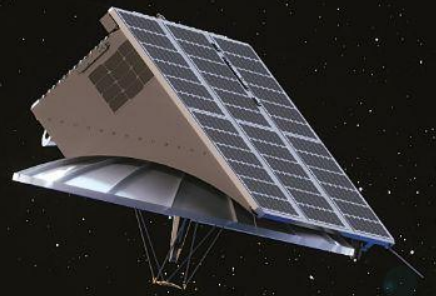
**Existing satellites do not offer a solution** for global high-revisit precipitation monitoring

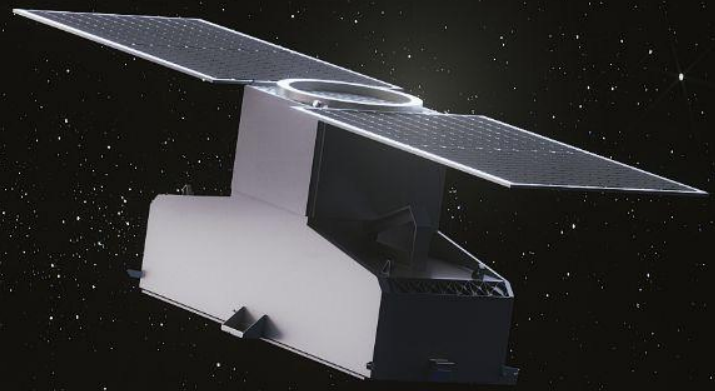
# The Global Radar Gap

More than 70 years after radar was invented, more than 5 billion people still live outside of radar coverage making even the most basic forecasts a dream for the vast majority of humanity.


**Limited**
Global Coverage

# Meet the Tomorrow.io Constellation





**Tomorrow.io's constellation of 20 small satellites will provide:**

- Full Global Coverage
- <1 hour average revisit rate
- World's first near real-time precipitation measurements and 3D atmospheric profiles
- Dramatic improvement in real-time weather forecasts, tropical cyclone warnings and flood alerts

**Hybrid constellation of 30 small satellites in Low Earth Orbit**

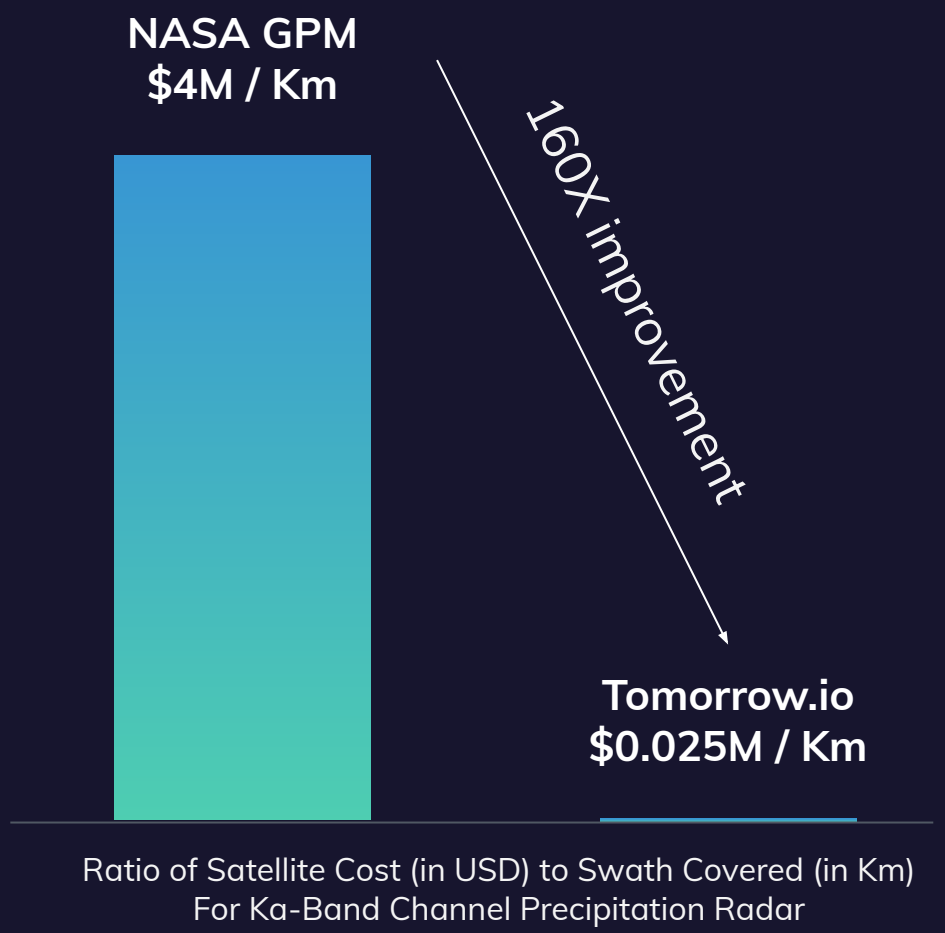
- 12 Ka-band radars
- 18 MW radiometers

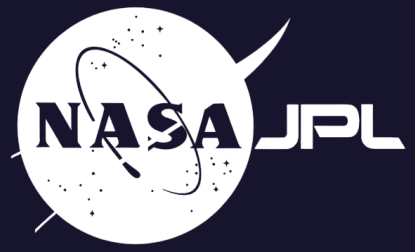
**Timeline:**

- Launched in Q2/23
- Constellation fully operational by EOY 2025

# Radical Cost Reduction for Spaceborn Weather Radar

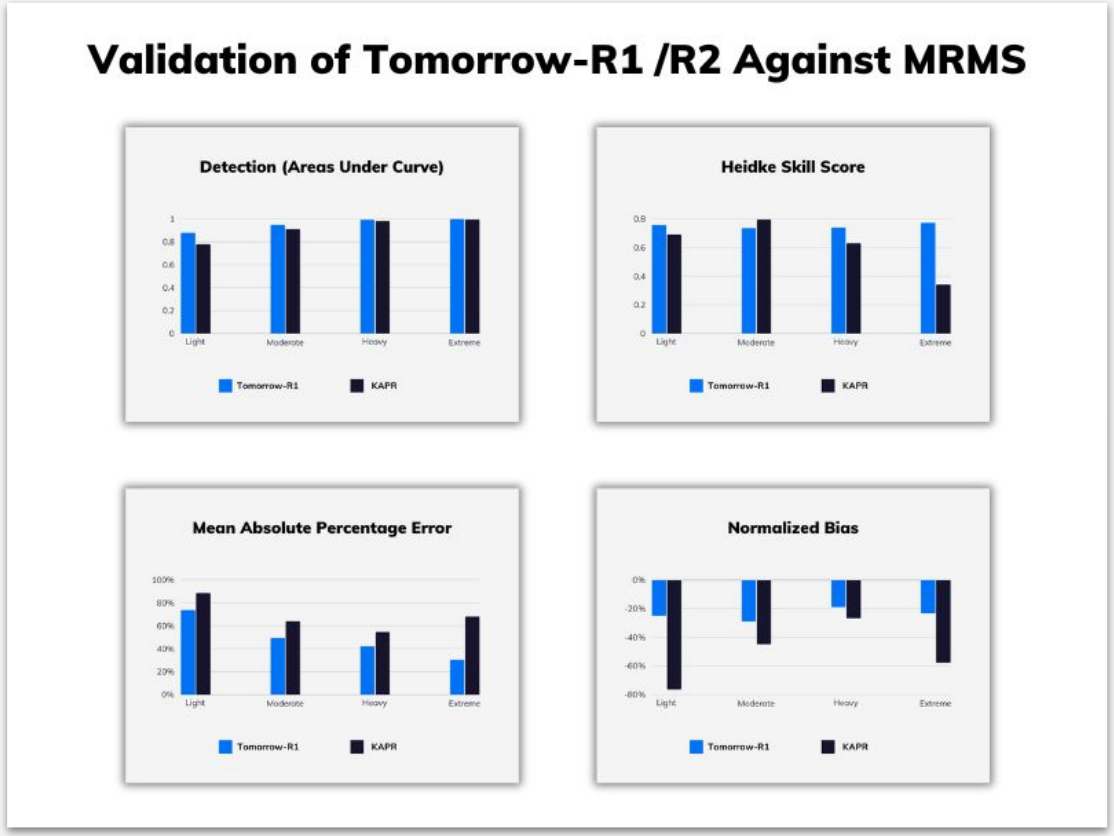
- Leveraging NASA/JAXA proven science and investing in massive cost reduction to enable operational utility and cost-effective science continuation
- 160X improvement in cost per scan from existing state-of-the-art

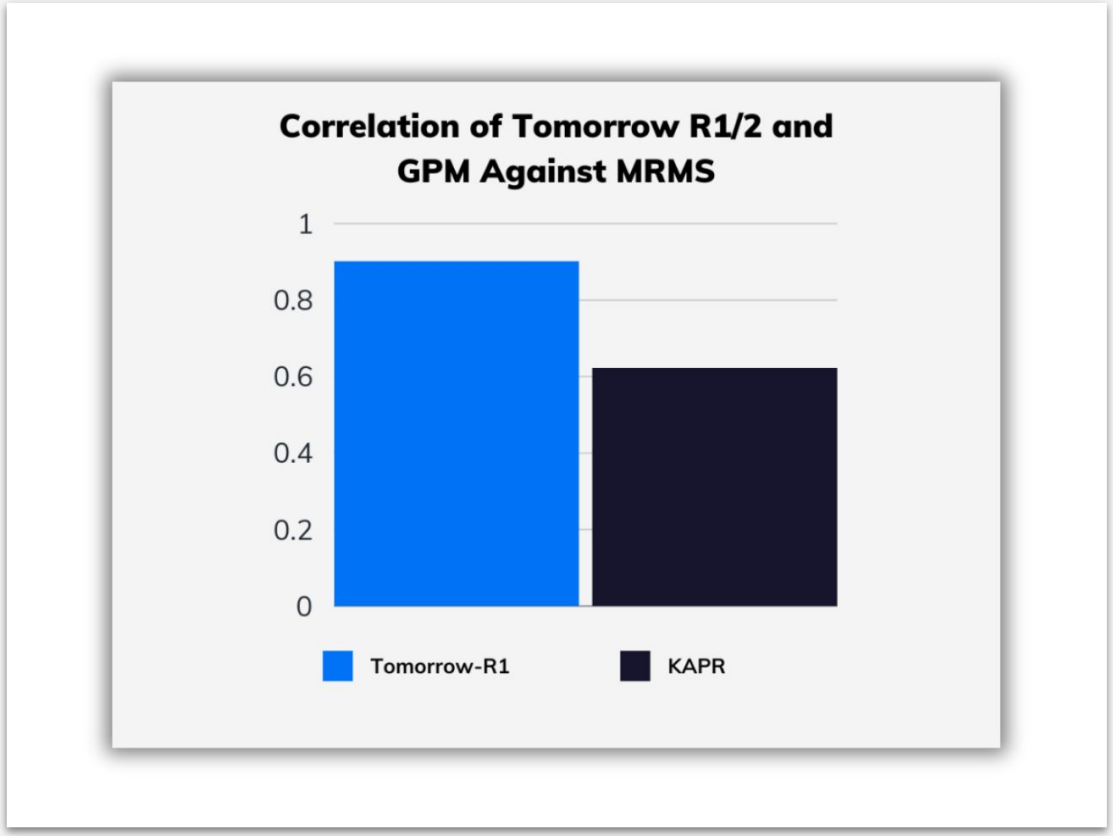





***"A new [active radar] instrument architecture that is compatible with low-cost satellite platforms...will enable constellation missions and revolutionize climate science and weather forecasting."***

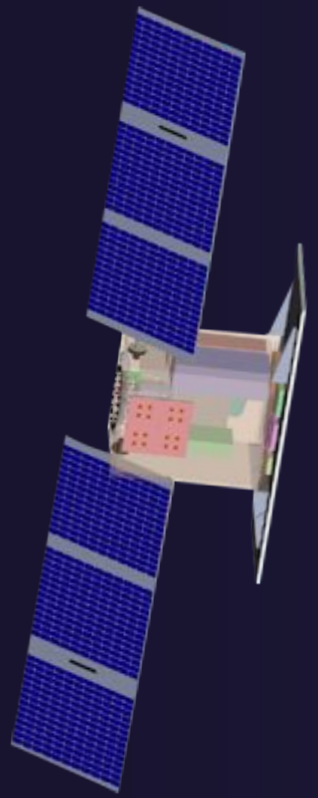
# **Pathfinder Results:** Higher correlation to US NEXRAD precipitation product (MRMS) than NASA's current state-of-the-art GPM satellite



# Full Atmospheric and Oceanic Observation System

Radar



3D Clouds & Precipitation

Tides and sea level rise

Coastal erosion

Sea heights

Marine wind/Wave warnings

Storm structure and intensity

Real-time Disaster warnings

Tropical cyclone forecasts

Real-time global precip

Flood alert

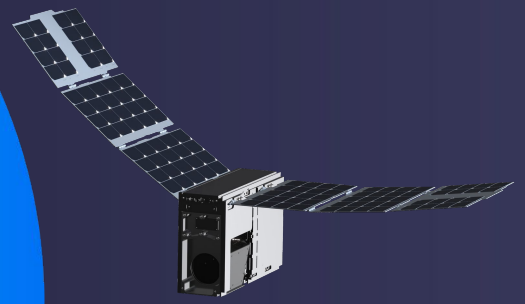
Drought monitoring

3D Temperature Profiles

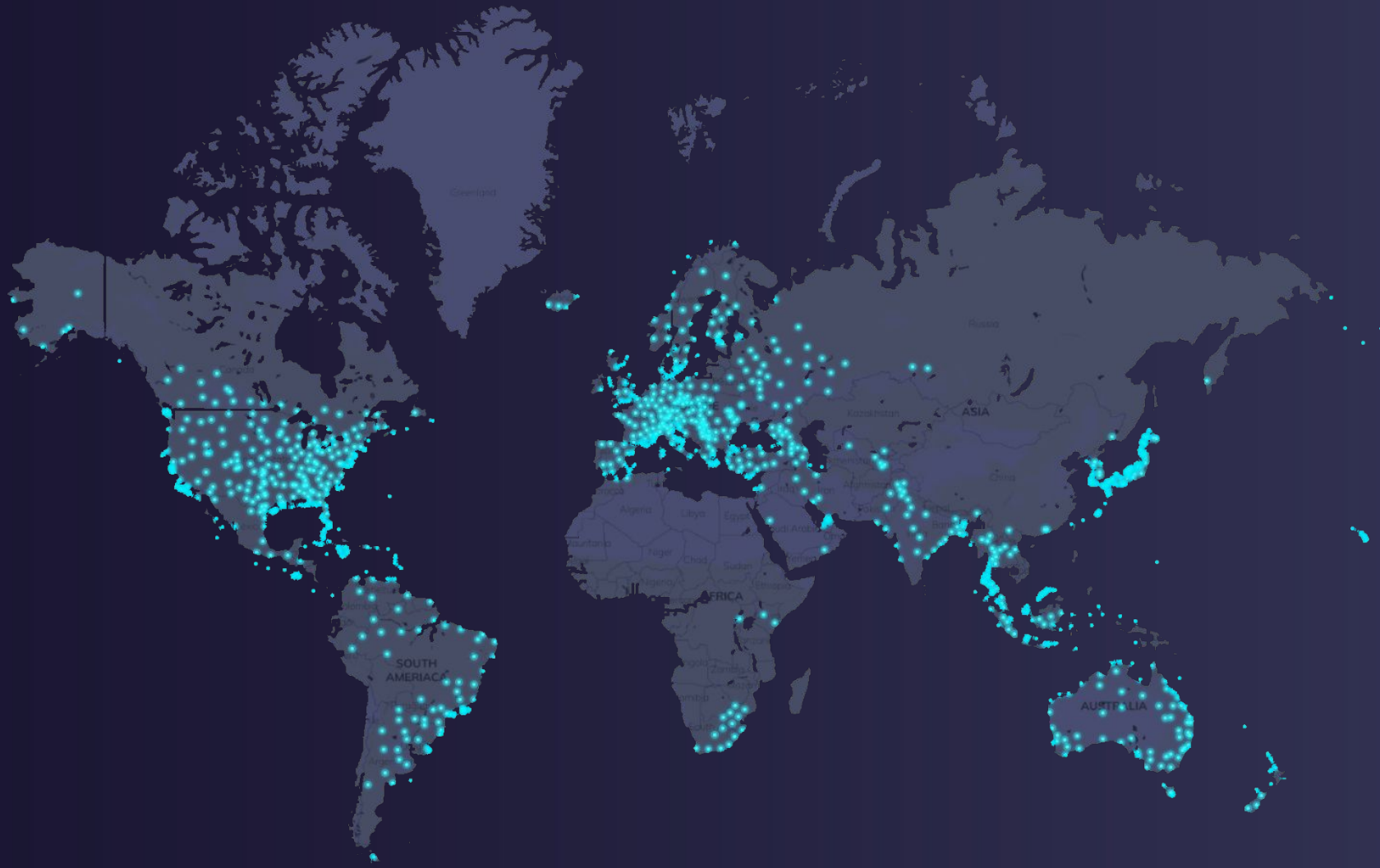
3D Humidity Profiles

Storm moisture structure

Microwave Sounders



# Global Wx radar gap | Data required where DoD operates

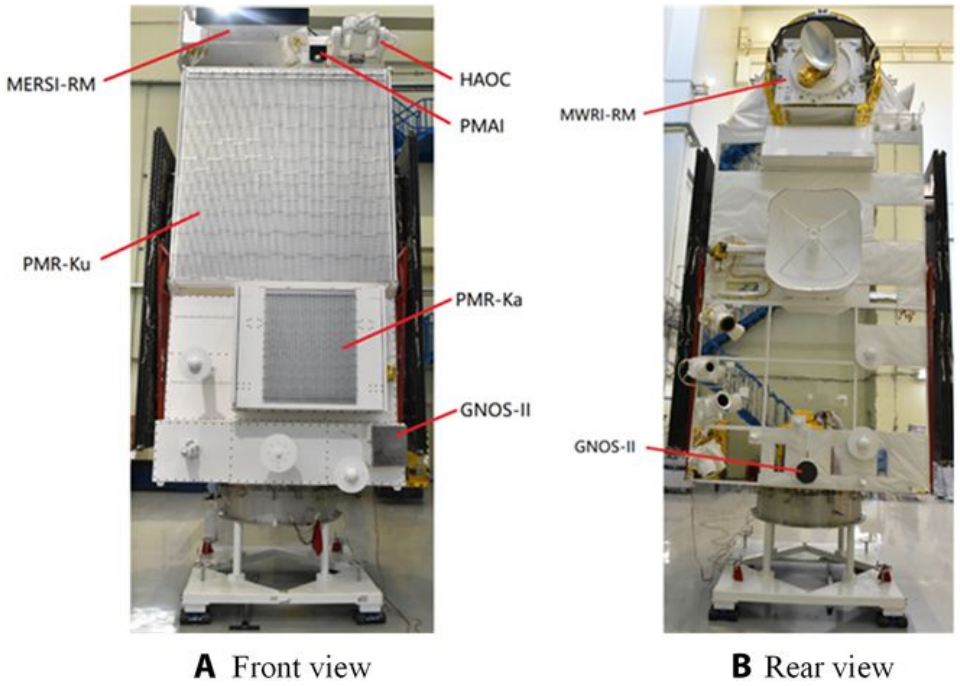


# PRC launching advanced weather satellites

Journal of Remote Sensing
A SCIENCE PARTNER JOURNAL

REVIEW ARTICLE

## FY-3G Satellite Instruments and Precipitation Products: First Report of China's Fengyun Rainfall Mission In-Orbit




**A** Front view **B** Rear view

In April '23, China launched FY-3G which is a derivative of the NASA/JAXA GPM architecture. FY-3G features the following payloads:

- Dual-frequency (Ku+Ka) band radar w/ 300 km swath
- Microwave imager (conical scan) w/ 26 channels (~900 km swath)
- Vis/IR imager with 8 channels and 500m resolution
- GNSS-R/RO receiver
- SWIR polarimeter

The article states that an identical satellite will be launched in 2028, followed by an FY-5 "constellation" consisting of 2 additional precipitation measurement satellites and an atmospheric dynamics satellite to measure wind (possibly wind lidar).

| MWRI-RM channels (GHz) | MERSI-RM channels (μm) |
|---|---|
| **V/H:** 10.65, 18.7, 23.8, 36.5, 50.3, 52.61, 53.24, 53.75, 89.0<br>**V only:** 118.75±3.2, 118.75±2.1, 118.75±1.4, 118.75±1.2, 165.5 ±0.75,183.31±2.0, 183.31±3.4, 183.31±7 | 0.65, 0.865, 0.940, 1.38, 1.64, 3.8, 10.8, 12.0 |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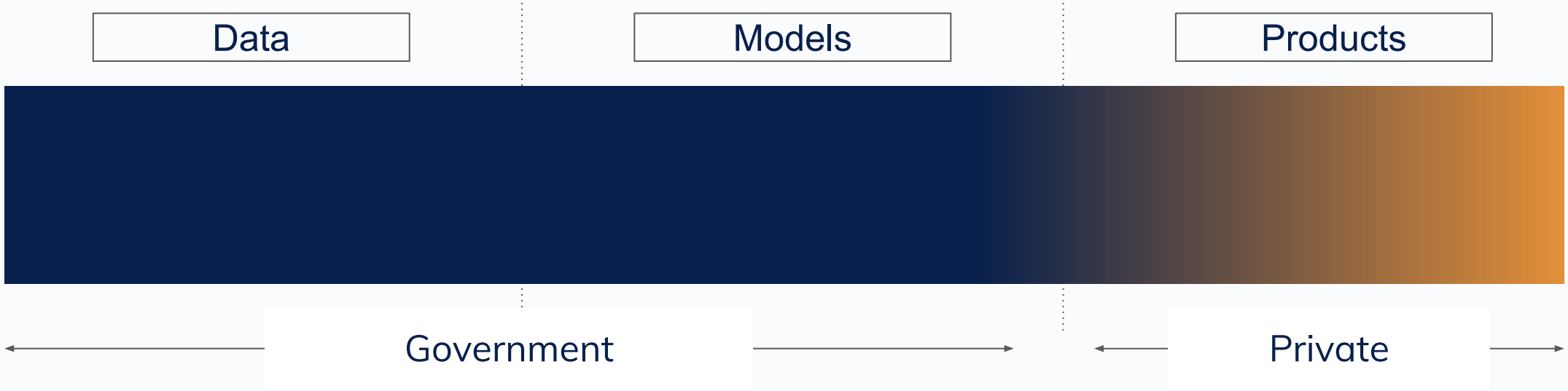
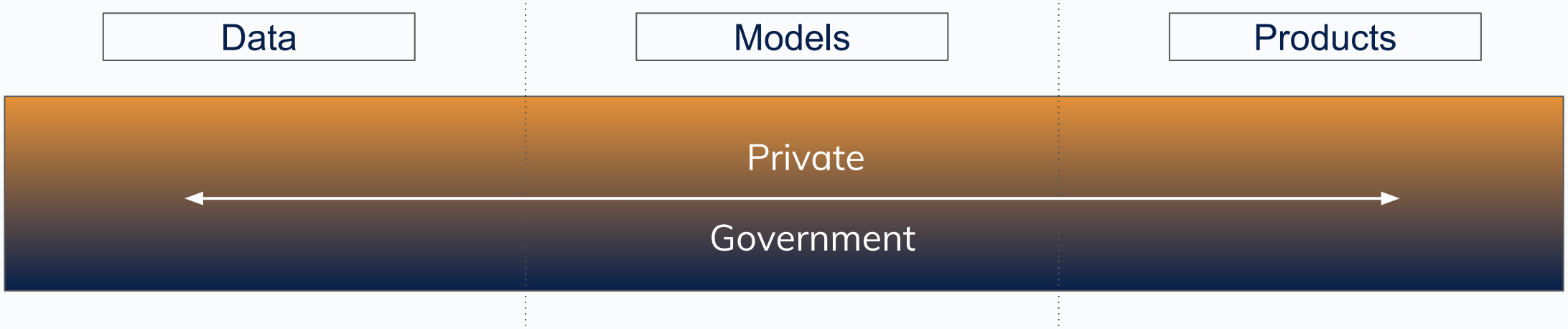
# The Traditional Weather Enterprise




- Most of the work done by government agencies
- Private market focused on repackaging data, few contributions to underlying technology
- Access to reliable and useful weather/climate information - still a dream for most of world

# Weather Enterprise 2.0




- Urgent need for improvement requires “whole-of-nation” approach
- Private market can and should take a much more significant role to augment and support government mission
- Industry is innovating across the value chain

# Key structural changes

- Industry is not reliant on government as a customer (dual use technologies benefit industry and gov agencies)
- Leveraging private capital to develop and deploy new technologies
- Taking on risk of deployment (launch), replenishment, and will continue to innovate on new payloads, sensing modalities, modeling systems, and more

The result is that **industry will likely surpass government** in observations and modeling in the next few years. Industry and government must **develop better mechanisms for public-private partnership** in the weather enterprise

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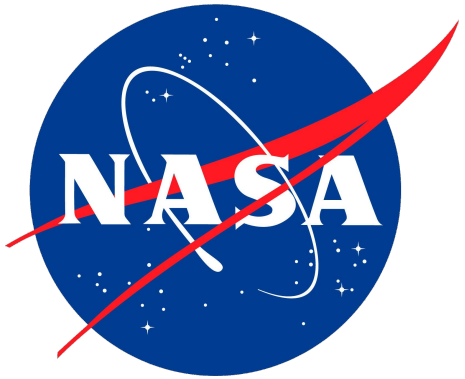
# USG has limited mechanisms for purchasing commercial weather data


## CWDP

So far limited to limited scope of technologies and data types




## CSDA

Limited to scientific applications not operational meteorology


## CWDP

Zeroed out in FY24 NDAA and Appropriations bill

**Other agencies like USDA, DOE, DOI, etc. have unique needs which may not fit within the purview of these entities and yet have limited purchasing power for commercial weather solutions**

COMMERCIAL WEATHER ALLIANCE

SAILDRONE

ORBITAL MICRO SYSTEMS

FROSTYFLAKE

tomorrow.io

SOFAR

BRANDYWINE PHOTONICS

WindBorne Systems

GS GREENSIGHT

BOULDER ENVIRONMENTAL SCIENCES & TECHNOLOGY

STRATODYNAMICS INC.

NEXTGEN FEDERAL SYSTEMS

*A coalition of 11 commercial weather companies* ***dedicated to promoting public-private partnership*** *and industry collaboration to* ***innovate across the entire U.S. weather and climate enterprise*** *value chain*

# Legislative Opportunities

- Weather Act 3.0
- NASA Reauthorization
- Farm Bill
- NDAA