

BLOOMWATCH - PRO

Challenge: Tracking Climate Change Impacts on Global Flowering Patterns

By Thanay Krishna CU & Harinandan K



THE CHALLENGE

Climate change is disrupting global flowering patterns, creating phenological mismatches that threaten ecosystems and agriculture worldwide.



Fragmented monitoring methods

Gaps between satellite and ground observations

Need for real-time, global-scale tracking





OUR SOLUTION

BLOOMWATCH PRO INTEGRATES NASA SATELLITE DATA WITH CITIZEN SCIENCE AND AI TO MONITOR GLOBAL FLOWERING PATTERNS IN REAL-TIME.

- **3D EARTH VISUALIZATION**
- **AI SPECIES IDENTIFICATION**
- **GLOBAL CITIZEN SCIENCE**
- **PREDICTIVE MODELING**
- **CELLULAR REPRESENTATION (PROTO TYPE)**
- **GENOMIC INTEGRATION (FUTURE)**
- **EXTINCTION RISK PREDICTION**

The screenshot shows the BloomWatch Pro homepage with a dark background featuring a network of green nodes and lines. At the top, there is a navigation bar with the logo "BloomWatch Pro" and links for Home, Data, Earth, Map, Analytics, Predictions, Sources, and Contribute. The main title "BloomWatch Pro" is prominently displayed in large, bold, white letters. Below it, a subtitle reads "Tracking global flowering phenology through NASA Earth observation and citizen science". Two buttons are visible: "Explore Live Data" and "Contribute". A "Global Phenology Search" section contains a search bar with placeholder text "Search species, regions, or phenomena..." and an "Advanced Filters" button. At the bottom, a "Real-Time Earth Visualization" section is shown with a small thumbnail image of the Earth and the text "Powered by NASA Earth observation data including MODIS, VIIRS, and Landsat satellites".



SPACE AGENCY TECHNOLOGY

DATA PROCESSING

REAL-TIME DATA INGESTION FROM NASA EARTHDATA
QUALITY CONTROL AND VALIDATION
PHENOLOGY ALGORITHM APPLICATION

- MODIS & VIIRS & LANDSAT & EMIT

BloomWatch Pro

Home Data Earth Map Analytics Predictions Sources Contribute

Real-Time Earth Visualization

Powered by NASA Earth observation data including MODIS, VIIRS, and Landsat satellites

Load NASA Data Toggle Rotation Atmosphere Data Layers Take Tour

BloomWatch Pro

Home Data Earth Map Analytics Predictions Sources Contribute

Live Global Phenology Data

- Regions Tracked: 155 (Across 6 continents)
- Species Observed: 4,304 (Flowering plant species)
- Citizen Scientists: 31,471 (Active contributors)
- Satellite Images: 186,567 (Processed this month)

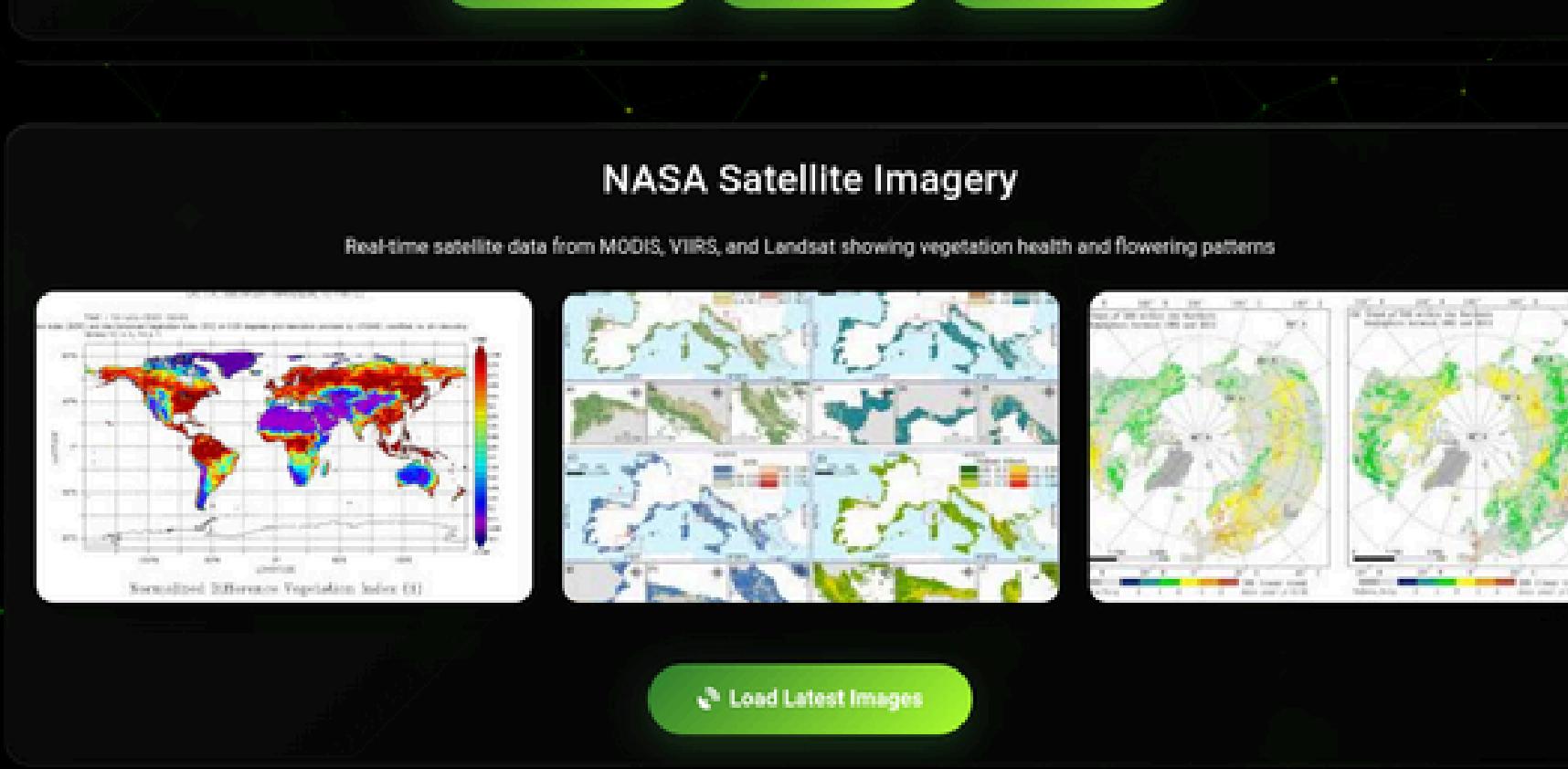
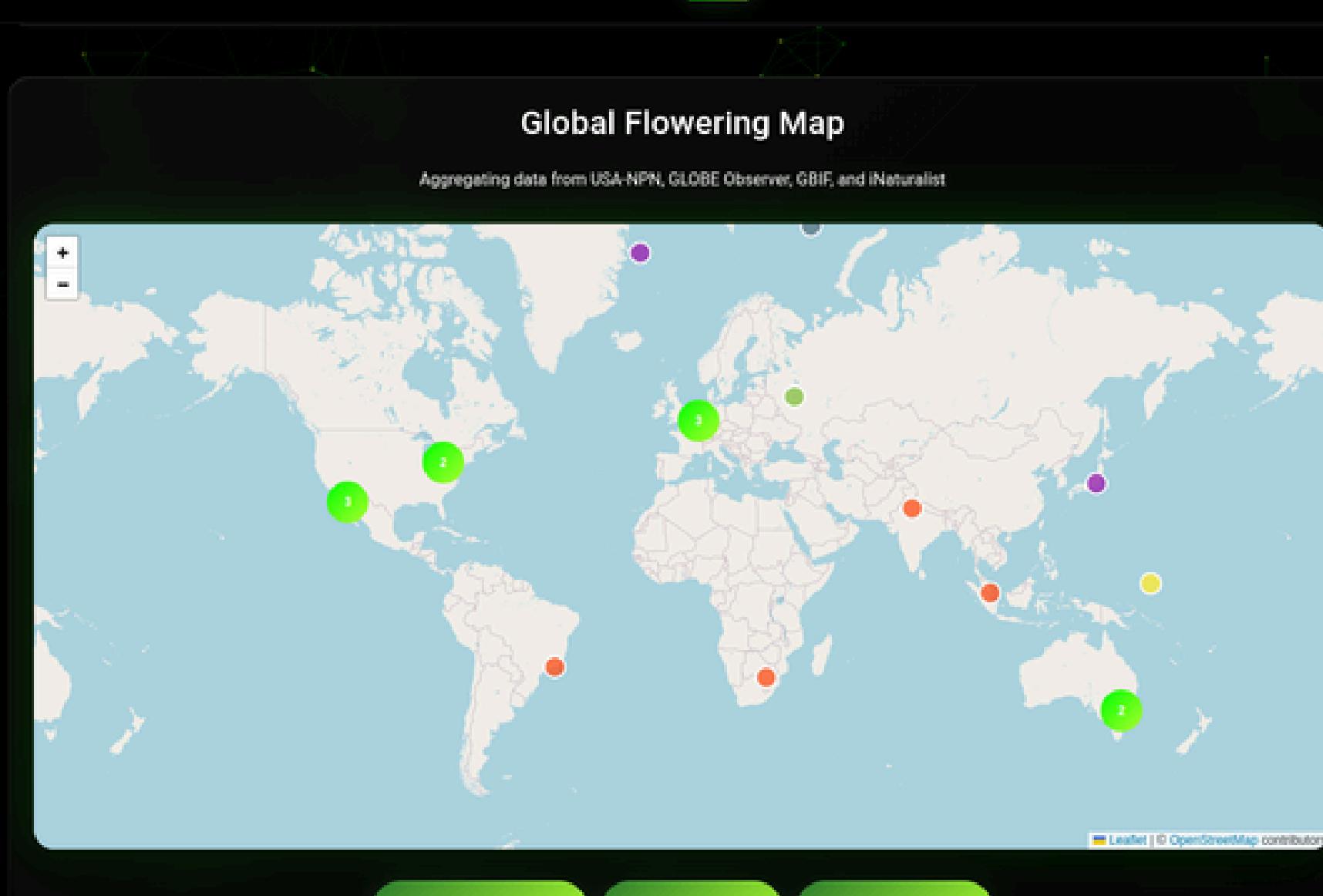
Real-World Impact

- 7% (Crop Loss Reduction)
- 12 (Research Institutions)
- 92% (AI Identification Accuracy)
- 40% (Pollinator Protection)

Global Flowering Map

Aggregating data from USA-NPN, GLOBE Observer, GBIF, and iNaturalist

Pro Controls Start Demo



USER EXPERIENCE

- Interactive 3D Earth & Moon View
- 3D Global Phenology Map
- AI-Powered 3D Species Analysis
- Real-time 3D Visualization
- Seamless Citizen Science Participation
- Immersive Time-Lapse Exploration

Interface Elements

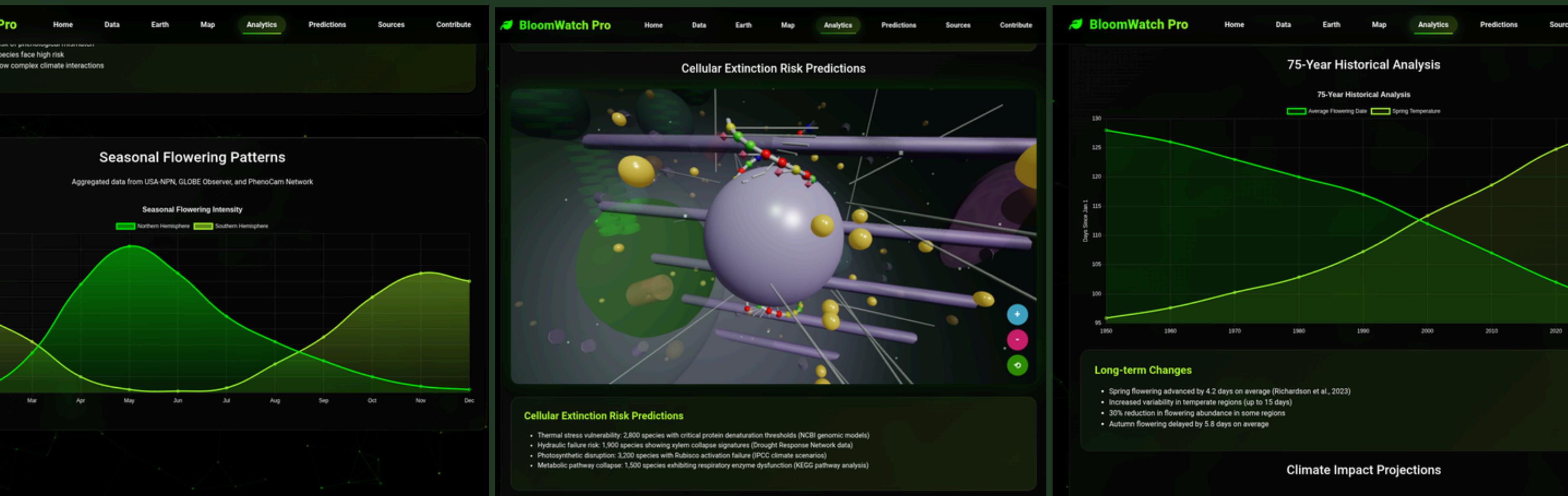
- Holographic Dark Theme with Glassmorphism Effects
- Fully Responsive 3D Interface for All Devices
- Gesture Controls for Intuitive Interaction
- 3D Guided Tour with Spatial Audio
- Dynamic Floating UI Panels for Real-Time Data

IMPACT & APPLICATIONS



- Scientific Research
- Agriculture
- Conservation
- Education
- Pre prediction

-2 research institutions using platform with 3D data visualization
-7% crop loss reduction through 3D predictive modeling
-40% improvement in pollinator protection with 3D habitat mapping
-Global classroom adoption with immersive 3D learning experiences
-Predicting species extinction risk through molecular stress thresholds and climate-driven cellular failure



The image shows the BloomWatch Pro platform interface. At the top, there are two navigation bars: one for 'Sources' and one for 'Map'. Below these are sections for 'Medium-Relevance Datasets (Vegetation Phenology Proxies)' and 'High-Relevance Datasets (Direct Flowering Observations)'. Each section contains several dataset cards, each with a title, relevance level (e.g., 'Medium Relevance'), source, coverage, resolution, variables, and access information.

Dataset Category	Dataset Title	Relevance	Source	Coverage	Resolution	Variables	Access
Medium-Relevance Datasets (Vegetation Phenology Proxies)	MODIS/Terra+Aqua Land Cover Dynamics (MCD12Q2)	Medium Relevance	NASA LP DAAC	2001–2023, Global	500m, annual	Onset of greenness, peak greenness, EVI2 amplitude	Earthdata, Google Earth Engine
	VIIRS/NPP Land Surface Phenology (VNP22C2)	Medium Relevance	NASA LP DAAC	2013–present, Global	0.05° (~5.6 km), annual	Greenup onset, maturity, senescence dates	Earthdata
High-Relevance Datasets (Direct Flowering Observations)	USA-NPN Nature's Notebook	High Relevance	USA National Phenology Network	2009–present, Continental United States	Species, phenophase, observation date, observer ID	Web interface & API, CSV downloads	Open access with attribution policies
	GLOBE Observer Wildflower Blooms	High Relevance	NASA GLOBE Observer	2025 campaign (March–June 2025), Global	Wildflower bloom photos, bloom color, location, date	App-based submissions, GLOBE API	NASA open data, CC BY for photos
Other Sources	VIIRS Vegetation Indices 16-Day (VNP13A1)	Medium Relevance	NASA LP DAAC	2012–2024, Global	500m, 16-day	NDVI, EVI, EVI2, reflectance bands	Earthdata, Google Earth Engine
	PhenoCam Network V3 Dataset	Medium Relevance	Northern Arizona University	2000–present, North America + global sites	Site-level, daily to 3-hourly	GCC, NDVI time series, phenology metrics	Download portal, API for time-series
Other Sources	GBIF-mediated Occurrences	High Relevance	Global Biodiversity Information Facility	2000–present, Global	Species, date, location, flowering annotations	GBIF API, CSV/GeoJSON downloads	Open data (CC0 or CC BY)
	iNaturalist Research-Grade Observations	High Relevance	iNaturalist (via GBIF or direct API)	2008–present, Global	Species, date, location, flowering annotations	iNaturalist API, GBIF exports	CC BY-NC / CC BY for research-grade

THANK YOU

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Join us in monitoring Earth's flowering patterns and understanding climate change impacts through immersive 3D visualization

<https://bloomwatch-pro.vercel.app>