

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

The screenshot shows the BloomWatch Pro website homepage. 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 green letters. Below it, a subtitle reads "Tracking global flowering phenology through NASA Earth observation and citizen science". There are two buttons: "Explore Live Data" and "Contribute". A search bar labeled "Search species, regions, or phenomena..." with a magnifying glass icon is located below the subtitle. To the right of the search bar is a button for "Advanced Filters". A section titled "Global Phenology Search" is shown with a "Search" button. At the bottom, a section titled "Real-Time Earth Visualization" is mentioned, stating "Powered by NASA Earth observation data including MODIS, VIIRS, and Landsat satellites". The background features a dark theme with a network of green lines forming a globe.



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)

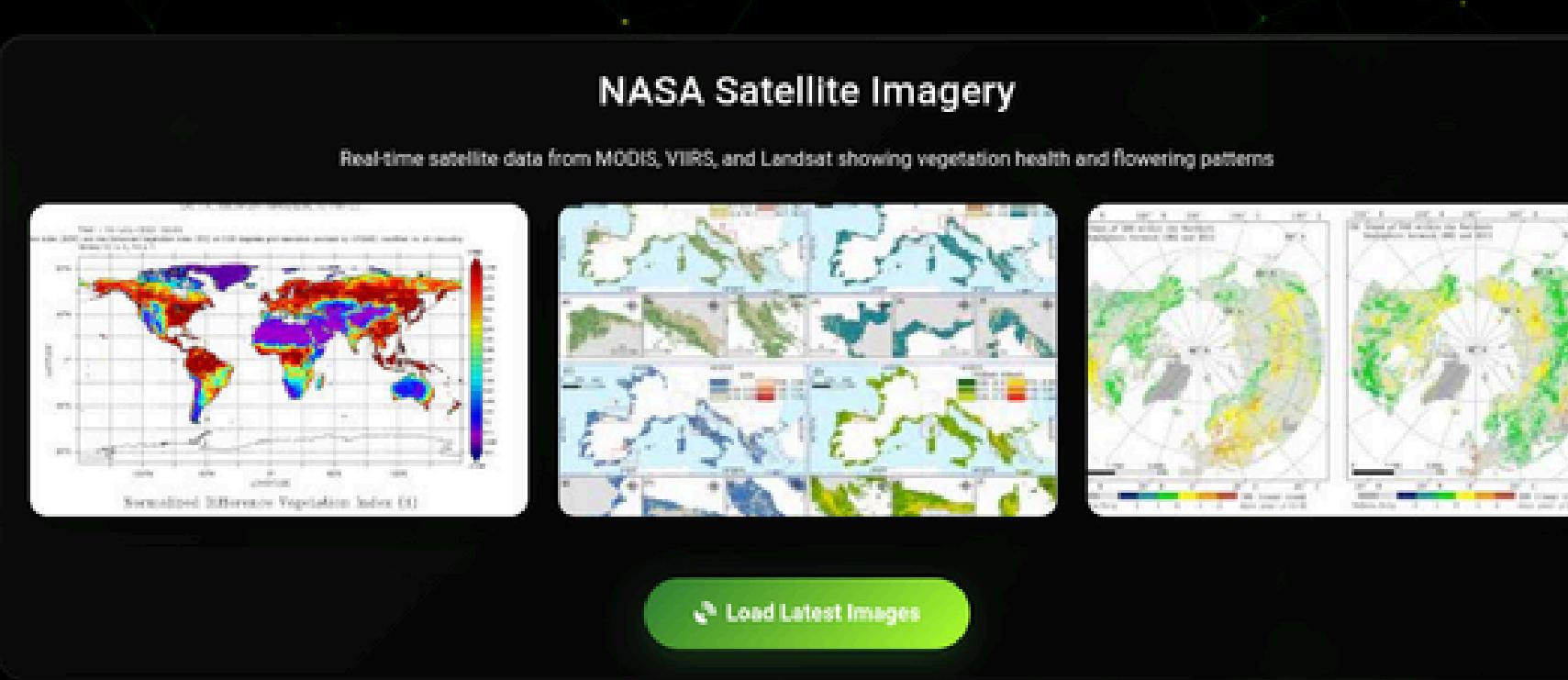
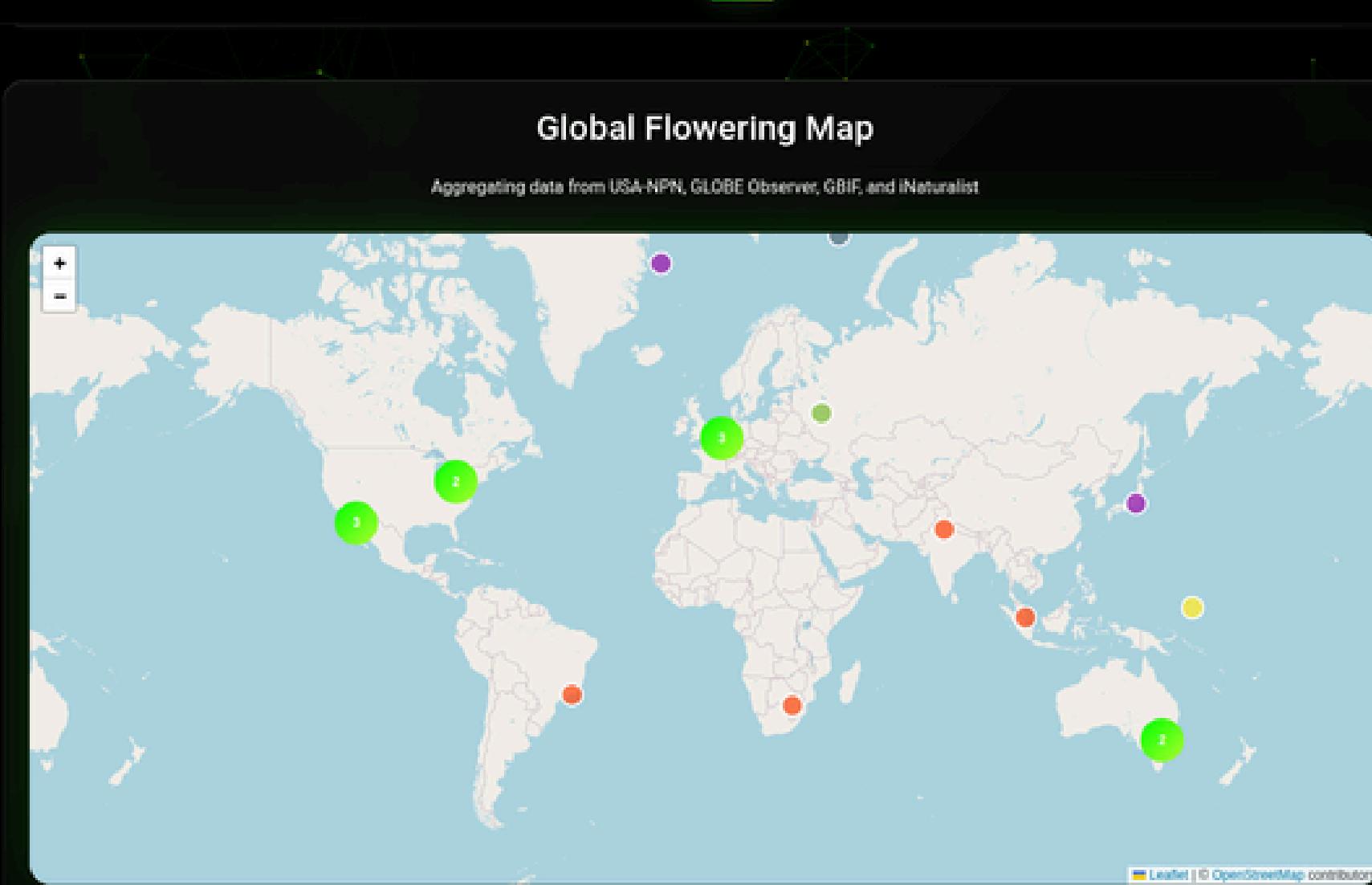
Real-World Impact

- 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
- 3D Global Map
- AI-Powered 3D Analysis
- Real-time 3D Visualization
- Citizen Science

Interface Elements

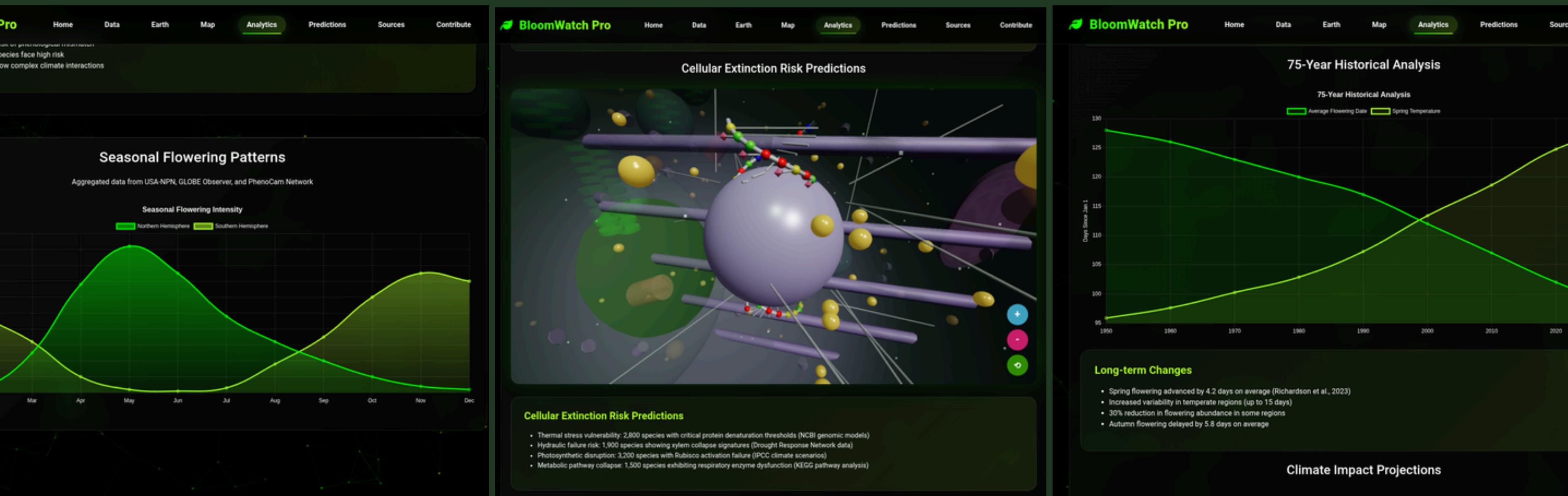
- Holographic dark theme with glassmorphism effects
- *Fully responsive 3D interface for all devices*
- *Gesture controls for intuitive interaction*
- *3D guided tour with spatial audio*

IMPACT & APPLICATIONS

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- 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 screenshot displays the BloomWatch Pro platform's user 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, source, coverage, resolution, variables, access, and relevance level (e.g., Medium Relevance, High Relevance). The datasets listed include MODIS/Terra+Aqua Land Cover Dynamics (MCD12Q2), VIIRS/NPP Land Surface Phenology (VNP22C2), VIIRS Vegetation Indices 16-Day (VNP13A1), PhenoCam Network V3 Dataset, USA-NPN Nature's Notebook, GLOBE Observer Wildflower Blooms, GBIF-mediated Occurrences, and iNaturalist Research-Grade Observations.

Medium-Relevance Datasets (Vegetation Phenology Proxies)

MODIS/Terra+Aqua Land Cover Dynamics (MCD12Q2) Medium Relevance

Source: NASA LP DAAC
Coverage: 2001–2023, Global
Resolution: 500m, annual
Variables: Onset of greenness, peak greenness, EVI2 amplitude
Access: Earthdata, Google Earth Engine

VIIRS/NPP Land Surface Phenology (VNP22C2) Medium Relevance

Source: NASA LP DAAC
Coverage: 2013–present, Global
Resolution: 0.05° (~5.6 km), annual
Variables: Greenup onset, maturity, senescence dates
Access: Earthdata

VIIRS Vegetation Indices 16-Day (VNP13A1) Medium Relevance

Source: NASA LP DAAC
Coverage: 2012–2024, Global
Resolution: 500m, 16-day
Variables: NDVI, EVI, EVI2, reflectance bands
Access: Earthdata, Google Earth Engine

High-Relevance Datasets (Direct Flowering Observations)

USA-NPN Nature's Notebook High Relevance

Source: USA National Phenology Network
Coverage: 2009–present, Continental United States
Variables: Species, phenophase, observation date, observer ID
Access: Web interface & API, CSV downloads
License: Open access with attribution policies

GLOBE Observer Wildflower Blooms High Relevance

Source: NASA GLOBE Observer
Coverage: 2025 campaign (March–June 2025), Global
Variables: Wildflower bloom photos, bloom color, location, date
Access: App-based submissions, GLOBE API
License: NASA open data, CC BY for photos

PhenoCam Network V3 Dataset Medium Relevance

Source: Northern Arizona University
Coverage: 2000–present, North America + global sites
Resolution: Site-level, daily to 3-hourly
Variables: GCC, NDVI time series, phenology metrics
Access: Download portal, API for time-series

GBIF-mediated Occurrences High Relevance

Source: Global Biodiversity Information Facility
Coverage: 2000–present, Global
Variables: Species, date, location, flowering annotations
Access: GBIF API, CSV/GeoJSON downloads
License: Open data (CC0 or CC BY)

iNaturalist Research-Grade Observations High Relevance

Source: iNaturalist (via GBIF or direct API)
Coverage: 2008–present, Global
Variables: Species, date, location, flowering annotations
Access: iNaturalist API, GBIF exports
License: 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>