

pixxel

SEEING THE UNSEEN

DISCUSSION OVERVIEW 概要

1. Our WHY @ Pixxel Pixxelの目的

2. HOW we do it @ Pixxel Pixxelの手法

3. WAY ahead 今後の展望

地球の健康状態の監視システム

pixxel

THE HEALTH MONITOR FOR PLANET EARTH

Pixxel delivers high-quality hyperspectral data and transformative insights by spectrally fingerprinting the Earth through its cutting-edge constellation of hyperspectral imaging satellites.

MONITOR, DETECT & PREDICT what is happening worldwide at unprecedented detail.

Pixxelは、最先端の衛星群が地球を分光的に情報採取することで、高品質なハイパースペクトルデータと革新的な知見を提供しする。

世界中で起きていることを、かつてない詳細さで監視・検知・予測する。



THE WORLD'S HIGHEST RESOLUTION **HYPER**SPECTRAL CONSTELLATION

世界最高解像度ハイパースペクトル衛星群



かつてない解像度
**UNPRECEDENTED
RESOLUTION**

5M spatial resolution,
Up to 250 bands



全球観測
**GLOBAL
COVERAGE**

Access to every part
of the planet with 50X
more information



毎日観測
**DAILY GLOBAL
ACCESS**

24-hour revisit
anywhere on the
planet

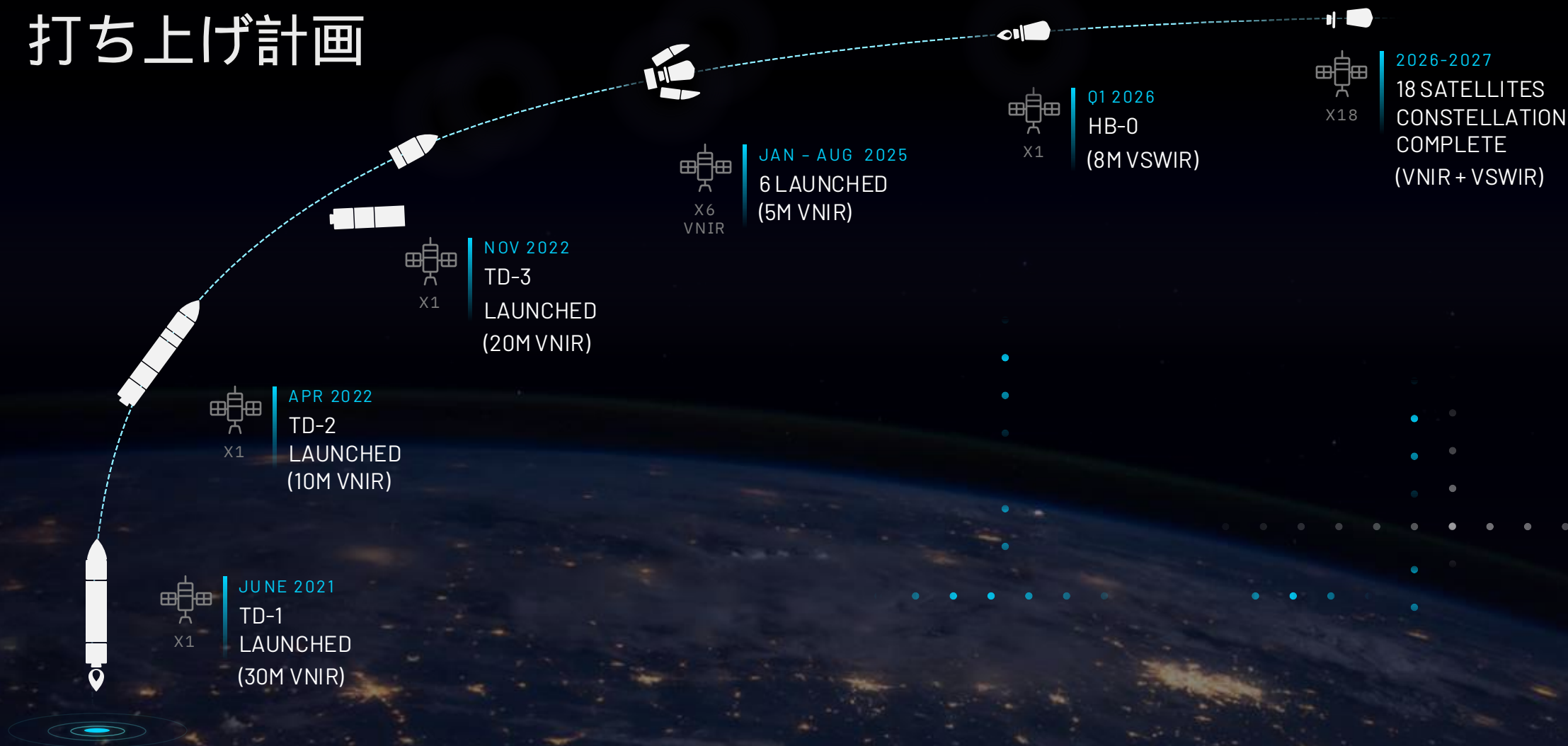


コンパクトな形状
**COMPACT FORM
FACTOR**

50-150kg class of
microsatellites

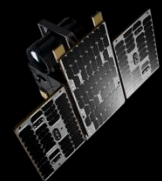
LAUNCH SCHEDULE

打ち上げ計画



CONSTELLATION AND SENSOR OVERVIEW

コンステレーションとセンサー概要



FIREFLY



HONEYBEE



Wavelength range	470 - 900 nm (VNIR)	470 - 2500 nm (VSWIR)
Total available bands	135 bands	~160 VNIR, ~100 SWIR
Total selectable bands	45 bands	Total: 72, VNIR - 46, SWIR - 26
GSD	5.4 meters	5 meters
Swath	40 km	10 km SWIR / 30 km VNIR
Orbit	Sun Synchronous Orbit (SSO), 97.65° inclination	Sun Synchronous Orbit (SSO), 97.45° inclination
Altitude	590 km	550 km (TBD)
Equator Crossing Time	10 - 11 AM	10 - 11 AM
Off-nadir angle /slew	+/- 30° (+/-20° recommended)	+/- 30° (+/-20° recommended)
Revisit time	24 hours	1 - 4 days (based on latitude)
Cloud cover thresholds*	<20%	<20%
Imagery bit depth	16 bit	16 bit

WHAT MAKES HYPERSPECTRAL SO SPECIAL?

ハイパースペクトルが特別である理由は何か？

Hyperspectral imaging (HSI) is a technique that analyses a wide spectrum of light instead of just assigning primary colours (red, green, blue) to each pixel, effectively spectrally fingerprinting the Earth to provide more information on what is imaged.

ハイパースペクトルイメージング (HSI) は、各ピクセルに赤・緑・青といった原色を割り当てるだけでなく、広範な光スペクトルを分析する技術である。これにより地球を効果的・分光的に情報採取し、撮影対象に関するより多くの情報を提供する。

50X MORE INFORMATION

他の種類の画像と比較して50倍の情報量
Compared to other types of Imagery



Hyperspectral

Hyperspectral is information in 100s of wavelengths or bands, going beyond the visible spectrum into infrared.



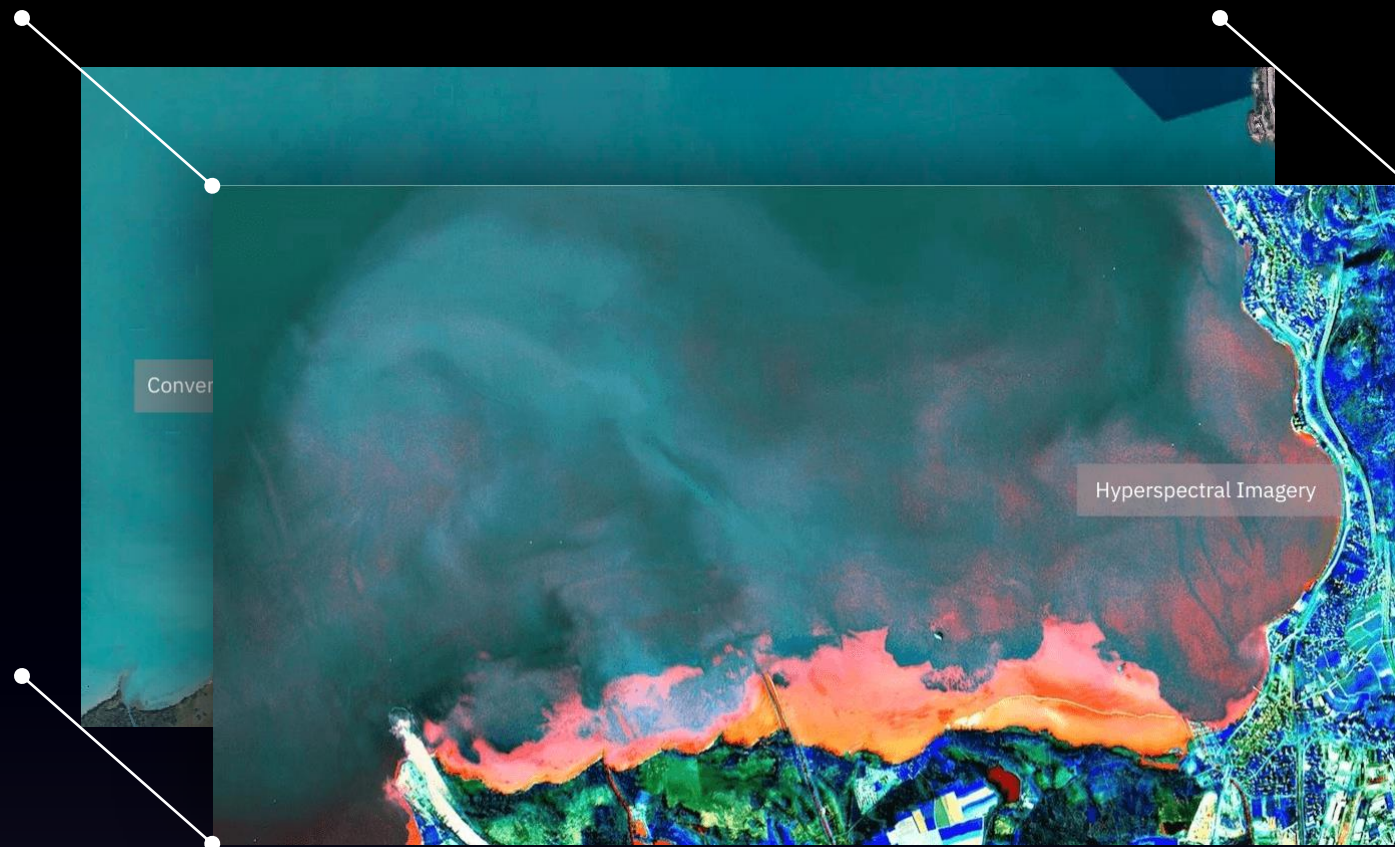
Multispectral

Multispectral is information in 10-20 wavelengths or bands across the visible and infrared range.



RGB

RGB is information in three broad visible wavelengths or bands.



Hyperspectral data clearly shows that the lake is contaminated with poisonous chemicals, which existing satellite data cannot detect.

COMPARISON: SPECTRAL RESOLUTION

比較：スペクトル分解能

FIREFLY

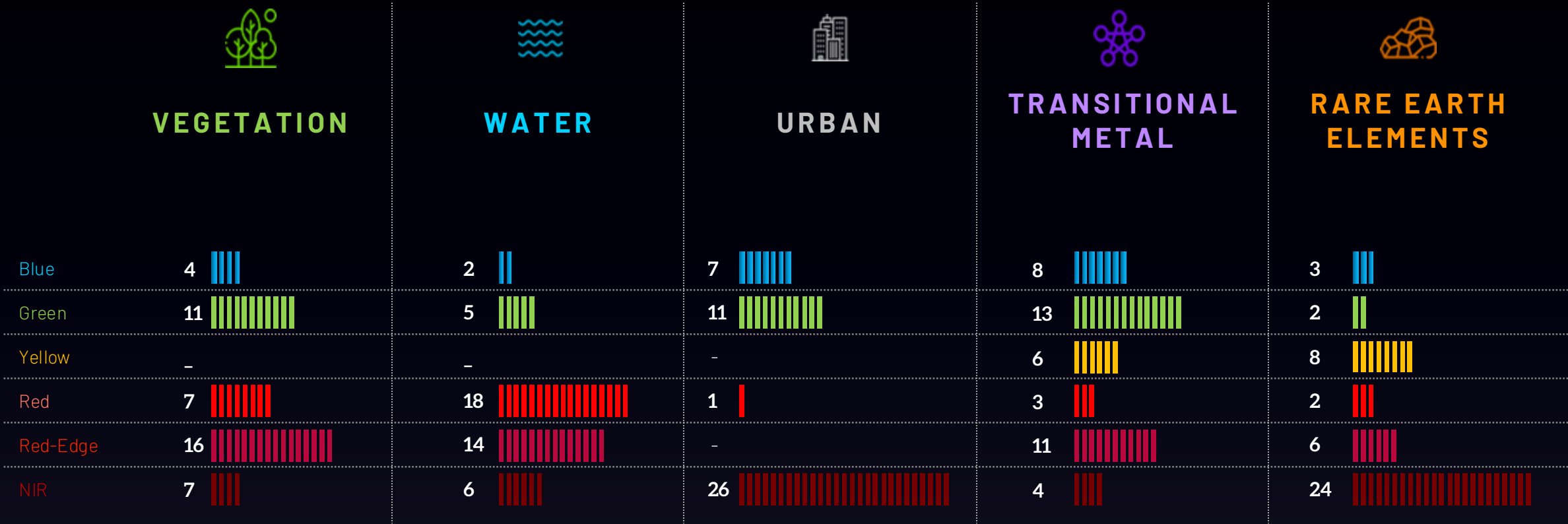
MULTISPECTRAL SATELLITE

Colour	Range	Average Bandwidth	# of Bands	# of Bands	Range	Average Bandwidth
Blue	472 - 498 nm	4.4 nm	8	1	450 - 510 nm	60 nm
Green	501 - 567 nm	4.4 nm	20	1	510 - 580 nm	70 nm
Yellow/Orange	571 - 619 nm	5.9 nm	18	1	585 - 625 nm	40 nm
Red	623 - 696 nm	6.4 nm	24	1	630 - 690 nm	60 nm
Red-Edge	700 - 749 nm	5.8 nm	16	1	705 - 745 nm	40 nm
NIR	752 - 890 nm	8.0 nm	49	2	770 - 1040 nm	135 nm

FIREFLY DEFAULT SPECTRAL BAND COMBINATIONS

FireFlyスペクトルバンドの標準的な組み合わせ

Developed by our hyperspectral scientists with a focus on selected applications



WHAT SETS PIXXEL APART

Pixxelの優位性

50倍以上の情報量

50X MORE
INFORMATION



Our resolution: 5M
Best resolution to date: 30m

4分の1の打ち上げコスト



2.5X LOWER
LAUNCH COST

Our satellite: 50kg
Competitors: 100 to 400kg

10分の1のコスト

10X LOWER
COSTS



1/10th the cost it takes other
global companies to
manufacture + operate

2倍の計画遂行速度



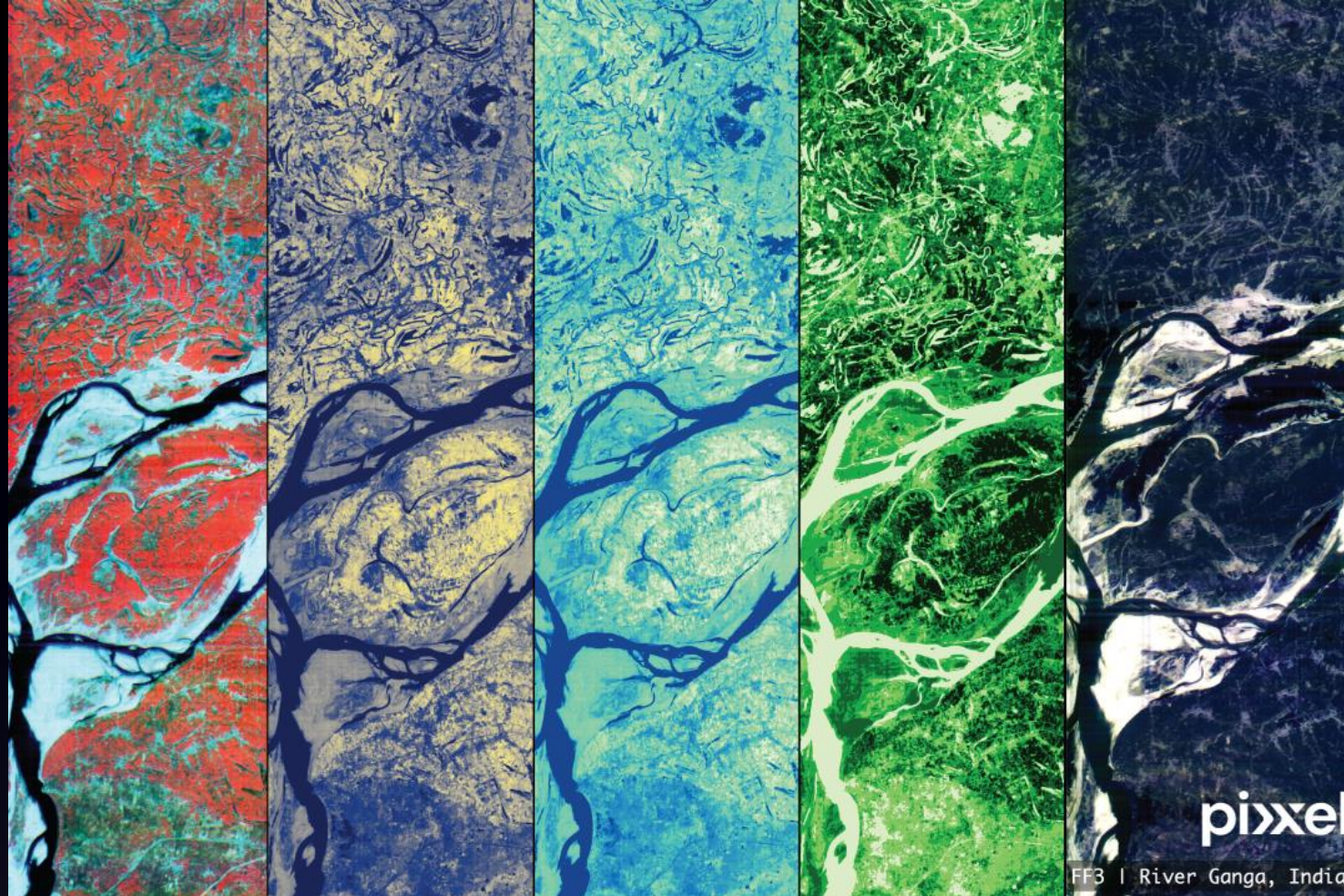
2X FASTER
EXECUTION

First satellite
manufactured in just
under 6 months

pixxel

FIRST LIGHT FROM OUR 5M FIREFLIES

5m分解能のFirefly初画像



Ganga River Delta, India: Soil moisture monitoring and vegetation health

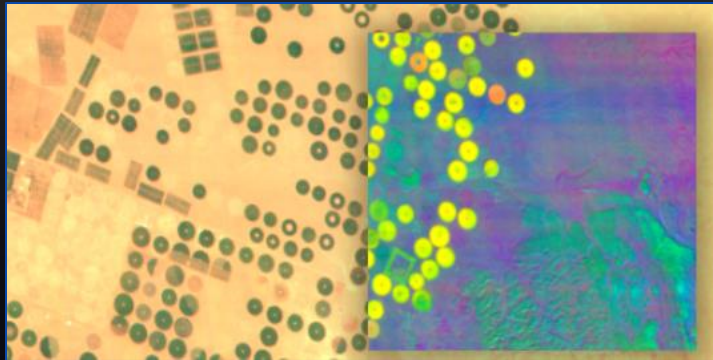
インド・ガンジス川デルタ：土壌水分モニタリングと植生健全性

APPLICATIONS 利用例

Hyperspectral imagery opens up unique opportunities across industries.

ハイパースペクトル画像は様々な産業分野にユニークな可能性をもたらす。

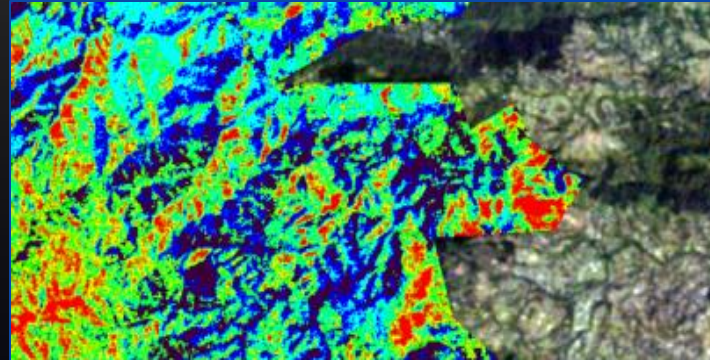
AGRICULTURE 農業



Tubarjal, Saudi Arabia

- Early stress detection
- Crop variety classification
- Crop yield prediction
- Soil nutrient analysis

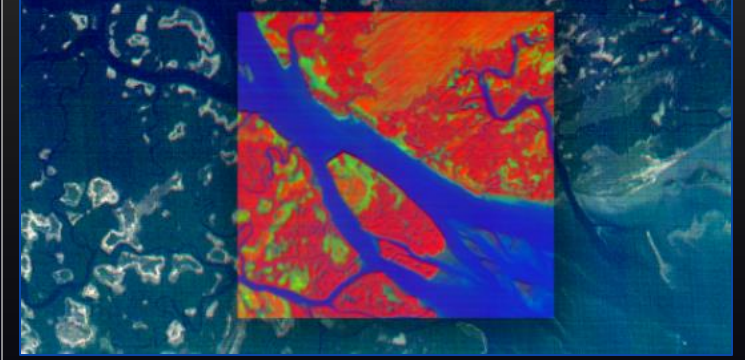
FORESTRY 森林



Central Valley, USA

- Species and sub-species classification
- Vegetation stress detection
- Forest fire and health monitoring
- Above-ground biomass estimation

ENVIRONMENT 環境



Saloum Delta, Senegal

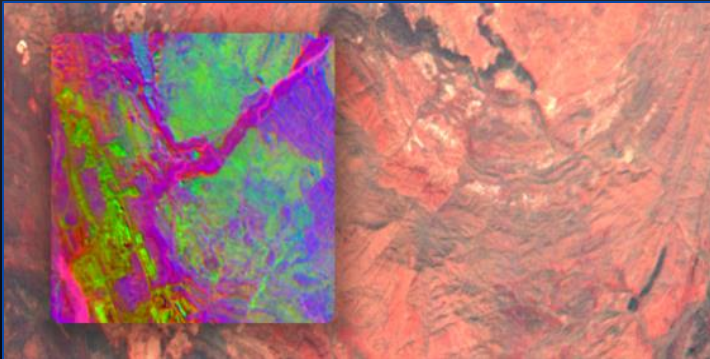
- Biodiversity mapping
- Water quality monitoring
- Biomass and carbon measurements
- Climate change detection

APPLICATIONS 利用例

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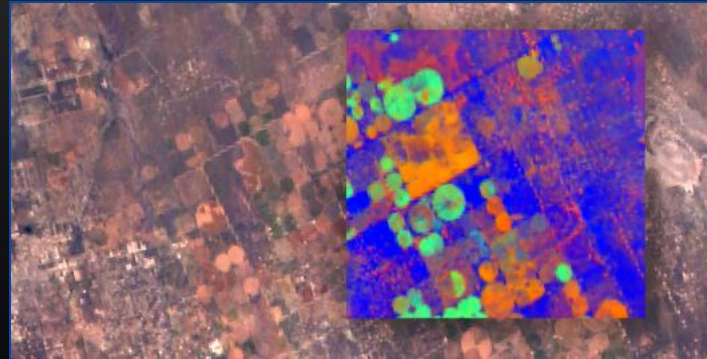
MINING 鉱業



Hamersley, Australia

- Mineral detection
- Abandoned mine land remediation
- Tailing dams monitoring
- Environmental compliance

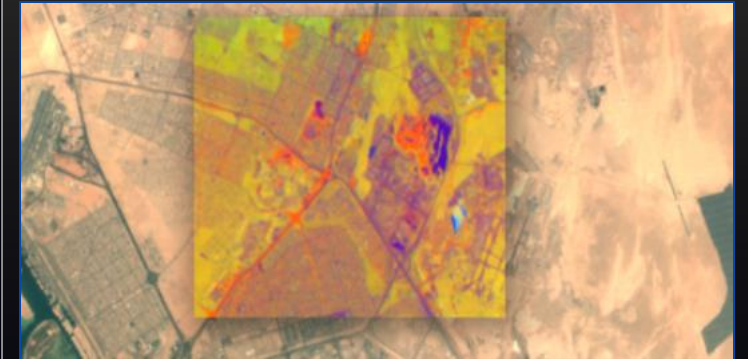
ENERGY エネルギー



Permian Basin, USA

- Pipeline Right-Of-Way monitoring
- Spill and leakage detection
- Assets monitoring
- Environmental impact assessment

GOVERNMENT 行政



Musaffah Industrial Area, Abu Dhabi

- Disaster preparedness and response
- Land use and land cover monitoring
- National security applications
- Crisis response

BURDEKIN SHIRE, AUSTRALIA オーストラリア バーデキン・シャイア

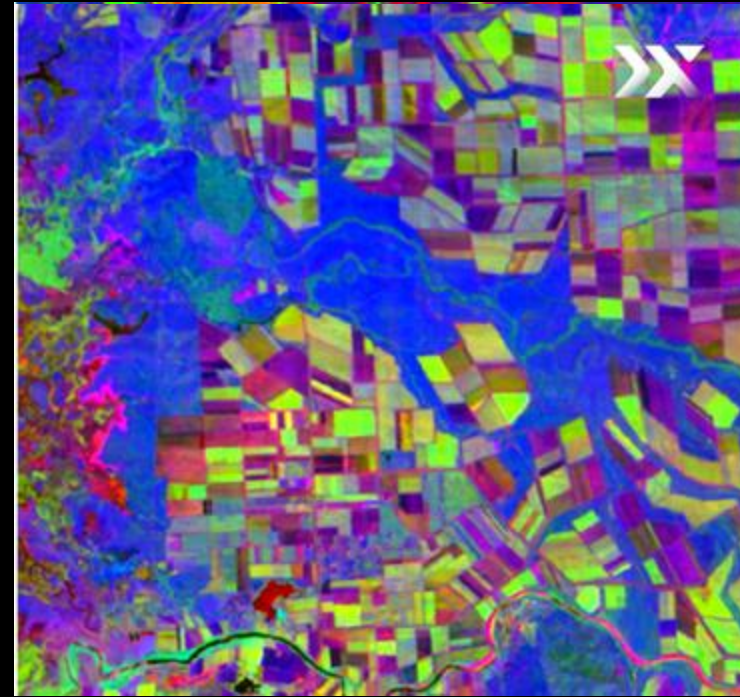
Crop monitoring: Crop growth stage, chlorophyll content, biomass, and yield

作物モニタリング：作物の生育段階、クロロフィル含有量、バイオマス、および収量

RGB



HSI



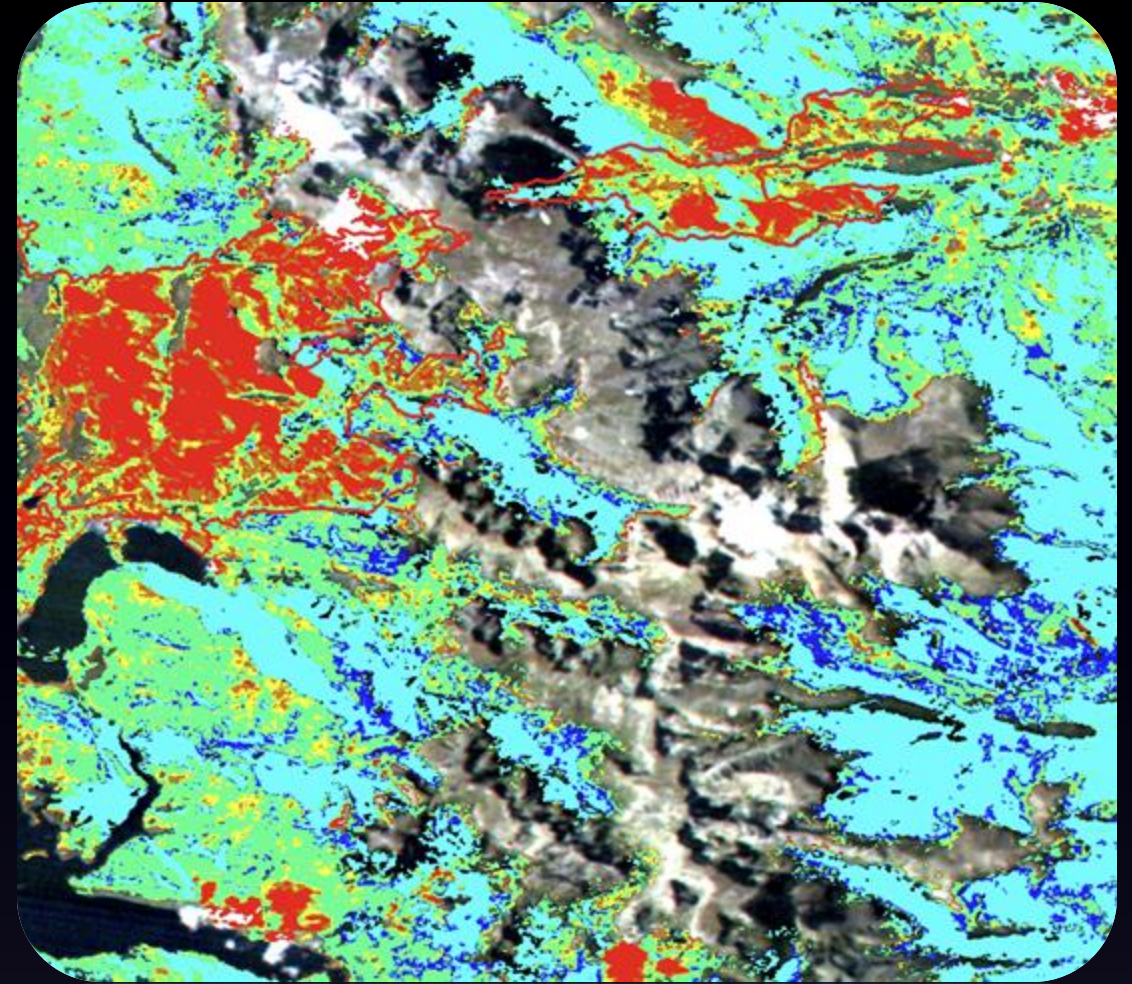
Hyperspectral can highlight definable stress and moisture quantities and pinpoint pests and diseases.
ハイパースペクトル技術により作物ストレスや水分量を可視化し、害虫や病害を特定可能

FOREST HEALTH – FIRE REGROWTH 森林保全 - 火災後の再生

- Using the narrowband chlorophyll index highlighted lighter regrowing ground vegetation
- New growth appears as bright red compared to the more static growth of the surrounding forest
- 狭帯域クロロフィル指数を用いることで、再生中の地表植生がより明るく強調される
- 周囲のゆるやかな成長の森林と比較して、新たな森林の成長の方が鮮やかな赤として現れる

Less Healthy

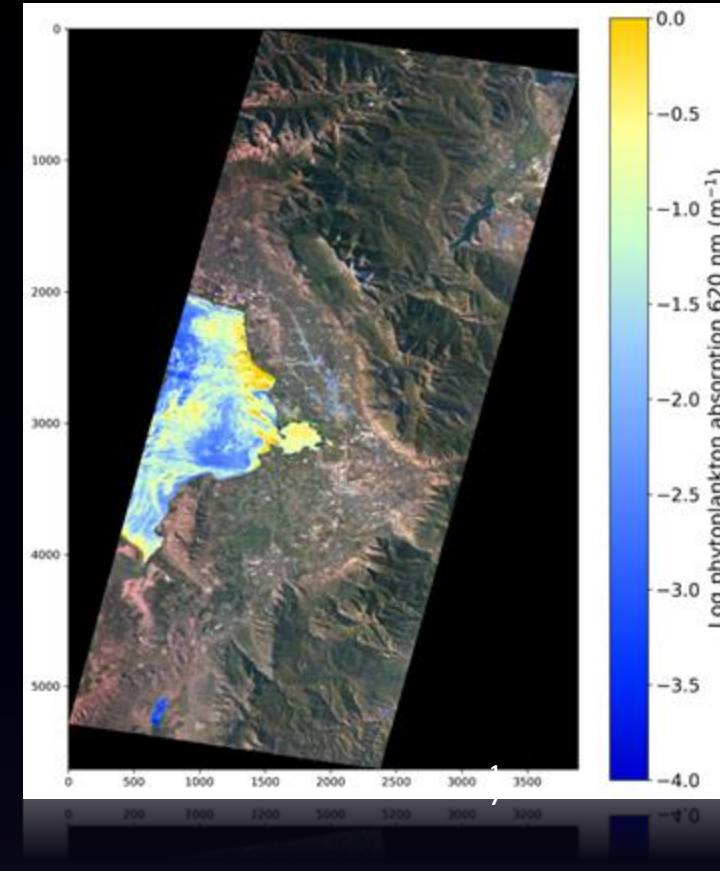
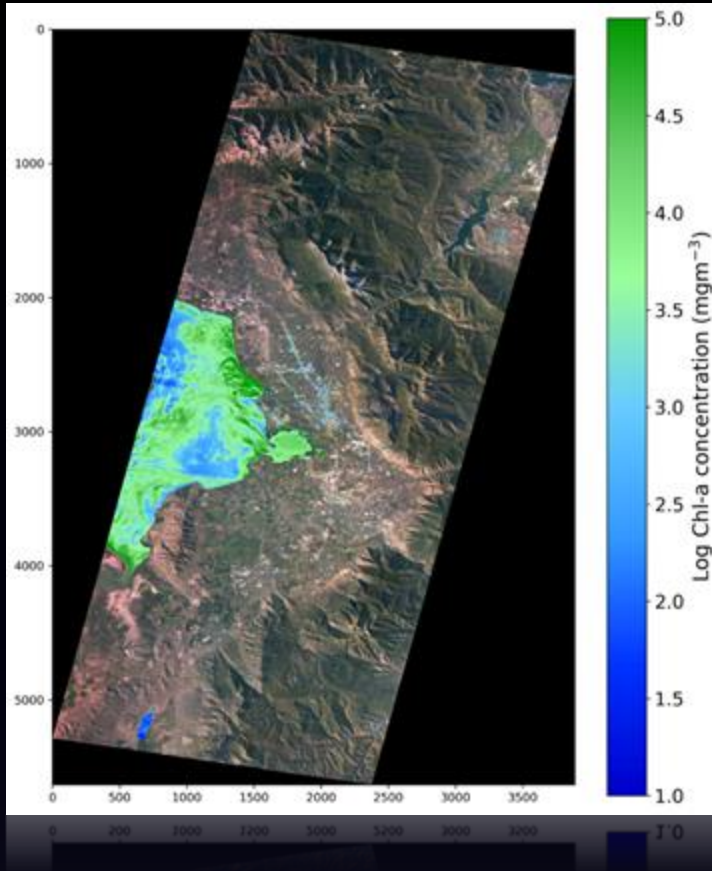
More
Healthy



Rocky Mountain National Park, CO

ロッキーマウンテン国立公園（コロラド州）

ALGAL BLOOM MONITORING 藻類繁殖のモニタリング



Dangerous algal blooms are an increasingly common phenomenon, and knowing both where they are occurring from space, and what kind of algae is causing them are essential for best understanding their conditions and safety.

有害な藻類の異常増殖は発生頻度が高まっている現象であり、宇宙からその発生場所を把握し、原因となる藻類を特定することが、現状と安全性の適切な理解に不可欠である。

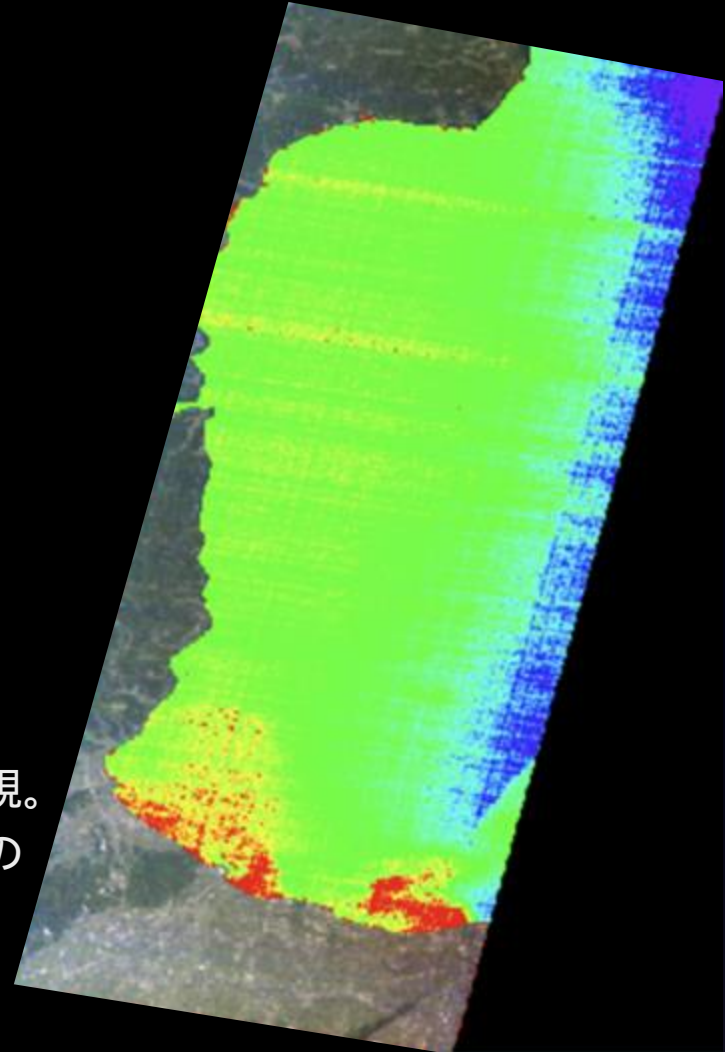
TOYAMA BAY, JAPAN 日本、富山湾

Level	Bottom of Atmosphere - Reflectance - L2A
Date of Image Capture	October 4, 2024
Region	Toyama, Japan
No.of Bands	67
Spatial resolution	30m



WATER QUALITY MONITORING 水質モニタリング

- Water pollution after the Shikoku earthquake is monitored by looking at the mud and iron content in the bay water.
 - Areas of runoff can be seen along specific areas of the coastline, highlighting where dangerous areas of the water may be with high turbidity and debris.
 - An Iron and Mud index was used to highlight these areas of high runoff and points of inundation.
- ・ 四国地震後の水質汚染を、湾内の泥と鉄分濃度を調査することにより監視。
 - ・ 海岸線の特定区域に沿って流出域が確認され、水質が濁りやすく漂流物の多い危険な海域を示している。
 - ・ 鉄分と泥の指標を用いて、これらの高流出域と浸水箇所を強調した。





Making satellite imagery actionable
by seeing the unseen.

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