Satellites: Working Toward an Equitable and Sustainable Future

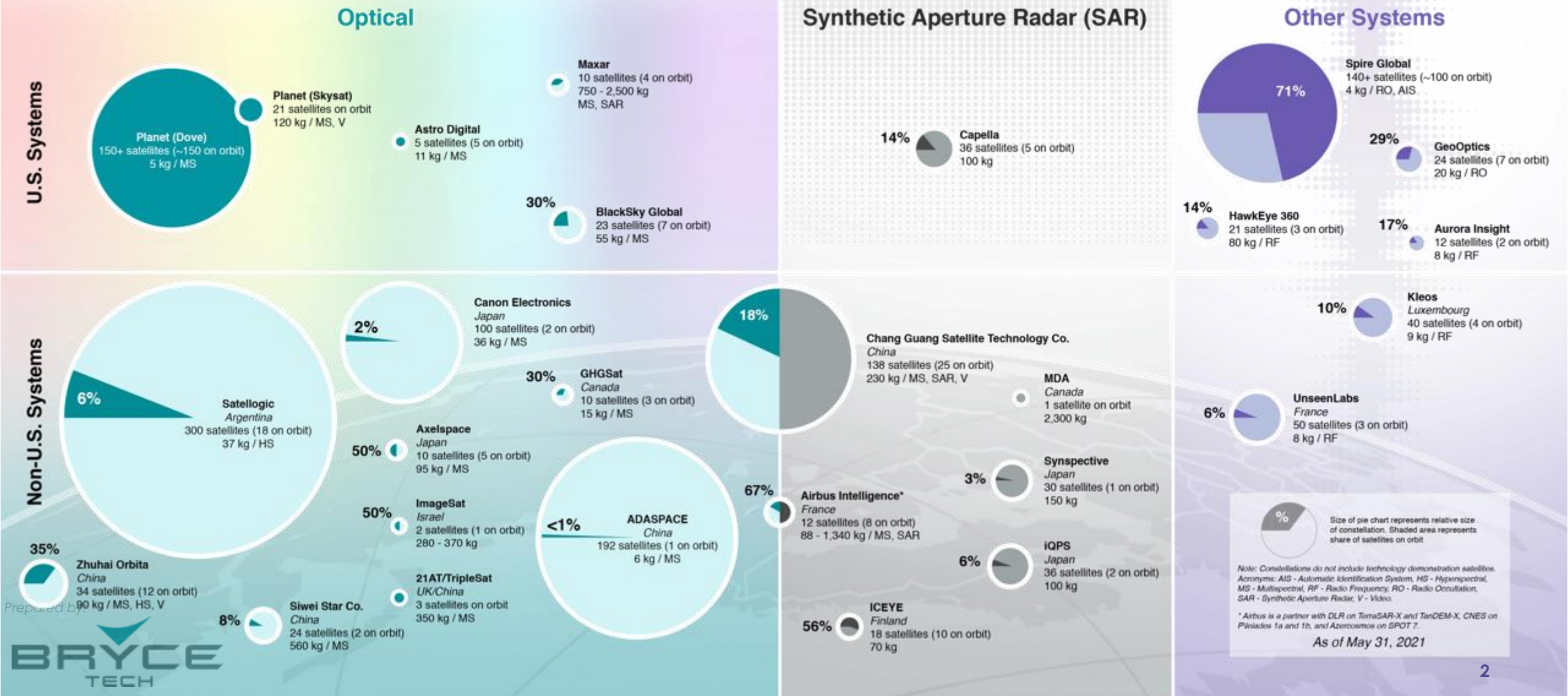
Satellite Industry Association

SIA The voice of the satellite industry

Case Study: Remote Sensing Services

Commercial Remote Sensing Satellite Systems

Systems with at least one operational satellite, by relative size of constellation, percentage of satellites on orbit, and sensor type



Earth Observation and Monitoring

Earth Observation (EO) satellites provide actionable data to measure climate change effects[1]

- E.g. glaciers, coastlines, essential human and wildlife habitats

Measuring greenhouse gas emissions and other environmental impacts

- Enables corporations to become informed about their environmental impact and incorporate reductions into their corporate missions

Enables enforcement of domestic regulations and international agreements

- Can catch polluters, illegal fishers, illegal deforestation

Measuring effectiveness of interventions

- Satellite data allows evaluation of how effective renewable energy or carbon capture programs are at combating climate change

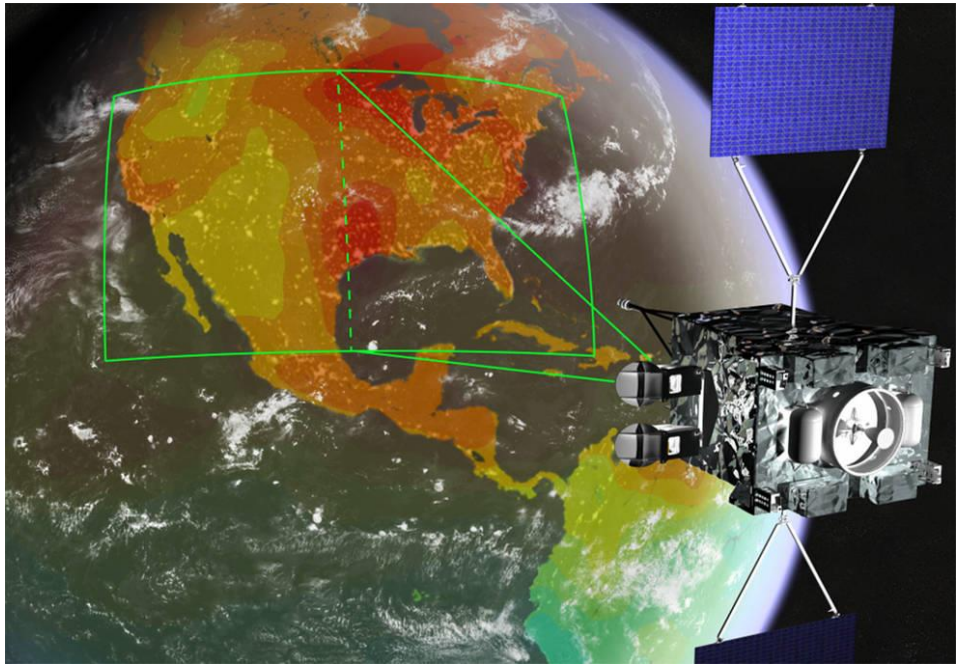
1. See, e.g., Karen Jones and Samira Patel, "Toward Environmental Accountability: Transforming Satellite Data Into Action," Aerospace (Aug. 2021) p. 3-6. https://aerospace.org/sites/default/files/2021-09/Jones_EnvAccountability_20210826.pdf.

U.N. SUSTAINABLE DEVELOPMENT GOALS & THE U.S. COMMERCIAL SATELLITE INDUSTRY

- U.S. commercial remote sensing satellite industry leverages innovative technology to facilitate global sustainability, identify human rights abuses, and improve natural resource conservation and management.

IDENTIFYING CARBON EMISSIONS TO MITIGATE CLIMATE CHANGE

- U.S. commercial satellites can detect carbon emissions, methane leaks, etc. providing improved monitoring of global green house gas emissions.
- GHGSat[1] developed the first sensor for small satellites that can detect methane (CH4) emissions and locate individual sources of CH4 from 500km above earth, attributing emissions directly to individual facilities.
- Carbon Mapper[2] JPL and Planet created a high sensitivity, moderate resolution payload and agile satellite platforms that deliver required precision spatial coverage and temporal sampling.
- GeoCARB NASA/Lockheed Martin/Oklahoma University payload to launch in 2023 on SES satellite and monitor carbon dioxide and monoxide, methane[3]
- Oil companies using satellite data to monitor leaks proactively[4]

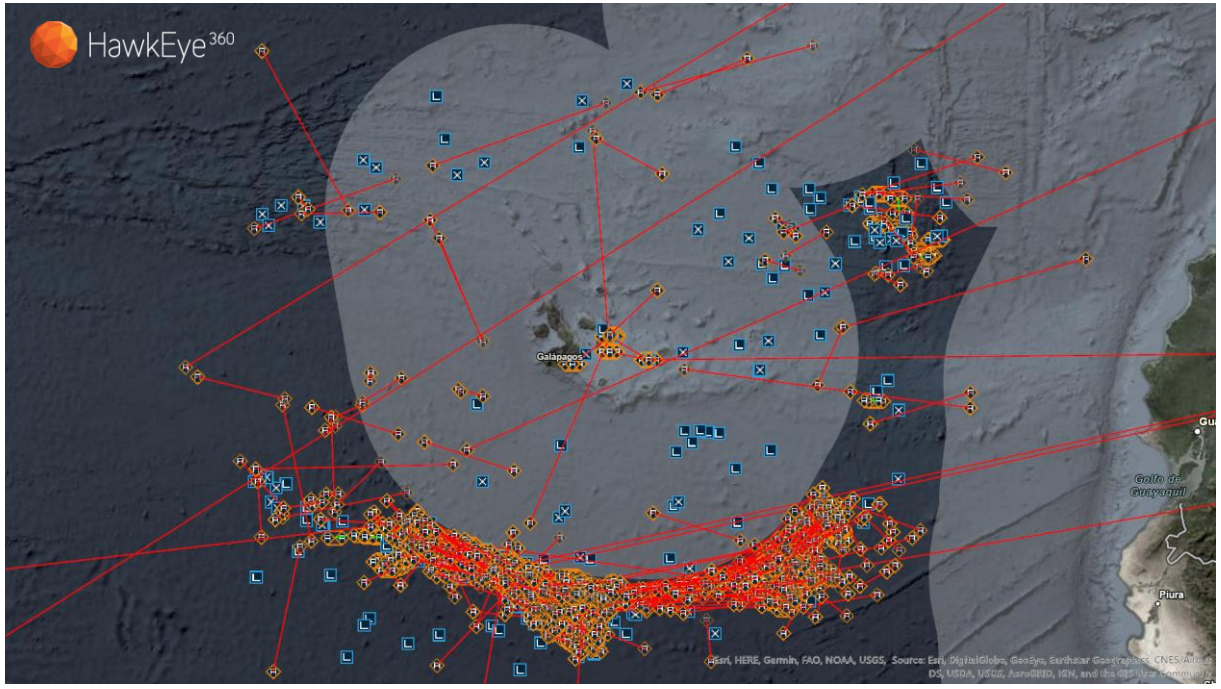


NASA/Lockheed Martin/Oklahoma University GeoCARB

1. “What we Do,” GHGSat. https://www.ghgsat.com/en/what-we-do/.
2. "Technology,' Carbon Mapper. https://carbonmapper.org/our-mission/technology/
3. “GeoCARB: A New View of Carbon over the Americas” https://www.nasa.gov/feature/jpl/geocarb-a-new-view-of-carbon-over-the-americas/
4. Nasralla, Shadia. “Satellites Reveal Major New Gas Industry Methane Leaks”, Reuters, 25 June 2020

MARITIME AND ARCTIC MONITORING FOR OCEAN SUSTAINABILITY

- U.S. RF/SAR/optical satellites provide improved maritime domain awareness, identify changes in arctic sea ice, and identify human behavior in remote marine domains.
- HawkEye 360 RF satellites detect and geolocate VHF and X-Band radar to identify fishing vessels engaging in illegal fishing to prevent overfishing, habitat destruction and associated negative externalities including forced labor.
  - Allow for improved interdiction of IUU-F to preserve ocean habitats and fish stocks
- SAR satellites monitor glacier velocity and velocity gradient to several centimeters, even in dense cloud cover, to track sea ice melt.



HawkEye 360 detects and geolocates RF emitters with no associated AIS signal in expansive marine terrains.

IDENTIFYING ILLEGAL DEFORESTATION

- Commercial satellite imagery and data is leveraged to monitor forests, identify illegal deforestation, and detect forest fires, preventing biodiversity loss and promoting carbon sequestration.
- Norway International Climate and Forests Initiative leverages KSAT, Planet, and Airbus data to protect tropical forests and make data available publicly.[1]
- Hyperspectral sensors can give information on forest fire indicators, potassium emission and carbon dioxide absorption during fires, and survey burn ratio after fires.[2]

Planet monitors deforestation in Bolivian Andes over 6 months; 2000+ hectares cleared

[1]O'Shea, Tara, "Universal Access To Satellite Monitoring Paves The Way to Protect The World's Tropical Forests", Planet, 2 March 2021, https://www.planet.com/pulse/universal-access-to-satellite-monitoring-paves-the-way-to-protect-the-worlds-tropical-forests

[2]Amani, Stefania, "Hyperspectral Characterization of Wildfires", https://portal.nifa.usda.gov/web/crisprojectpages/1024675-fire-weather-observation-sensor-fwos-system.html

PROTECTING WILDLIFE

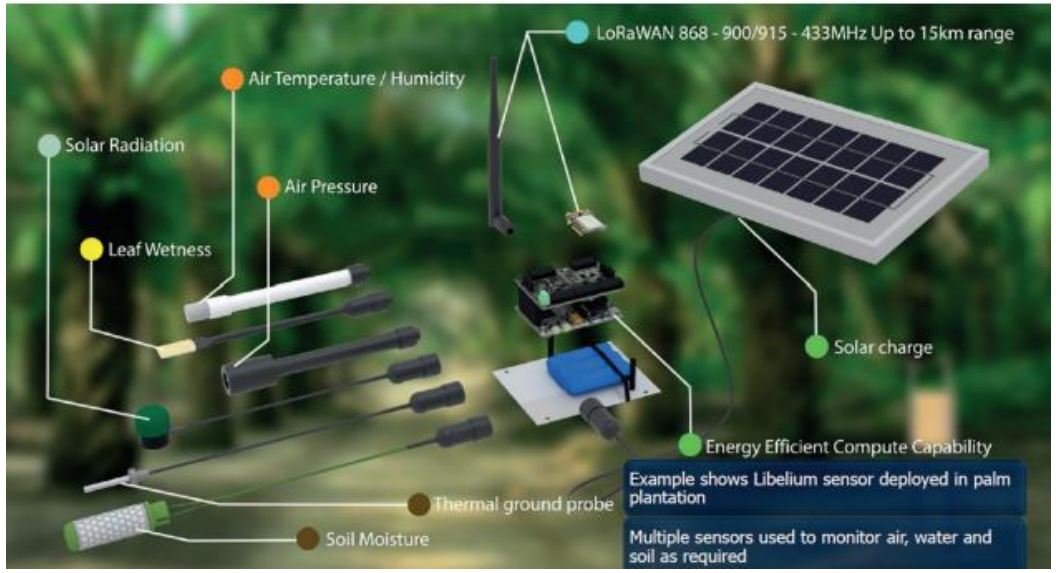
15 LIFE ON LAND

- RF satellites identify signals indicative of human behavior in broad spans of territory, helping to improve situational awareness.
- Used to identify poachers in large areas and better direct limited interdiction resources to preserve wildlife and biodiversity.

HawkEye 360 RF geolocations identifying poachers in the Garamba National Park, DRC

FOOD SECURITY

- Satellite data can be leverage to identify drivers of food insecurity throughout the world.
- Famine Early Warning Systems Network tracks famines in South Sudan using satellite data, allowing early warning of potential food shortages and identify areas that need help.[1]
- Ability to optimize fertilizer usage and water usage through precision agriculture and planning.
- Satellite communications enables the use of sensors in fields and on farm animals– IoT is the future of Ag.
- GPS allows for precise planting of crops and use of fertilizer.



Wireless sensor node, Inmarsat (2017)

[1]Solomon, Salem, "Satellite Images Used to Track Food Insecurity in South Sudan", Voice of America, 2 June 2017, https://www.voanews.com/a/satellite-images-used-track-food-insecurity-south-sudan/3884619.html

PUBLIC HEALTH

- Using population and area-mapping data provided by satellites, efforts have been successful in providing healthcare in marginalized communities
- In Nigeria, local health officials were able to finally eradicate wild polio by using satellite data to update local maps and accurately track missed areas from the vaccination campaign[1]
- Satellite imagery was critical in mapping remote communities in the DRC during the Ebola outbreak of 2018[2]
- Additionally used in air quality monitoring and determining impacts on local health
- Remote sensing data can help determine environmental factors that influence the spread of disease, including Lyme disease, cholera, malaria[3]

[1] "Technology Behind GRID3Program Helps Eradicate Wild Polio in Nigeria", Columbia University, 22 Oct 2020 https://news.climate.columbia.edu/2020/10/22/grid3-technology-polio-nigeria/

[2] "When Mapping Saves Lives: Supporting Ebola Response in DRC, Maxar, 17 June 2018, https://blog.maxar.com/earth-intelligence/2018/when-mapping-saves-lives-supporting-the-ebola-response-in-drc

[3] Beck, Louisa, et al., "Remote Sensing in Human Health: New Sensors and New Opportunities", Emerging Infectious Diseases Vol 6, No. 3, June 2000 https://wwwnc.cdc.gov/eid/article/6/3/00-0301_article

Thank you!

Questions?

For more information, please contact info@sia.org or visit www.sia.org

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