

# Mission to Planet Earth



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**Pint of Science**

16 May 2018

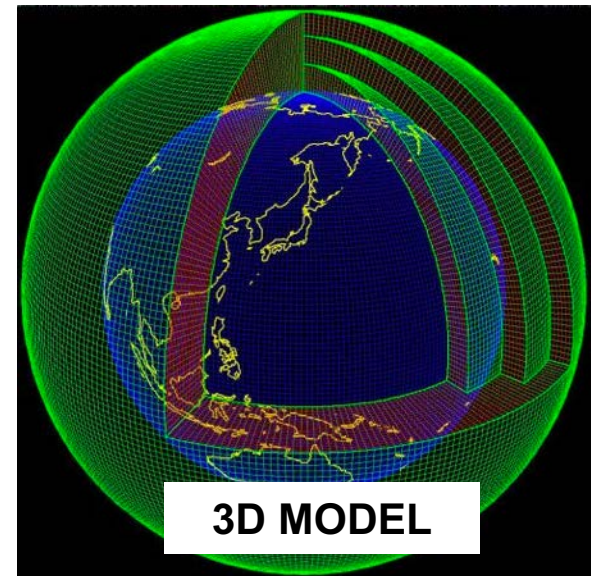
# Research Group



# Research Tools

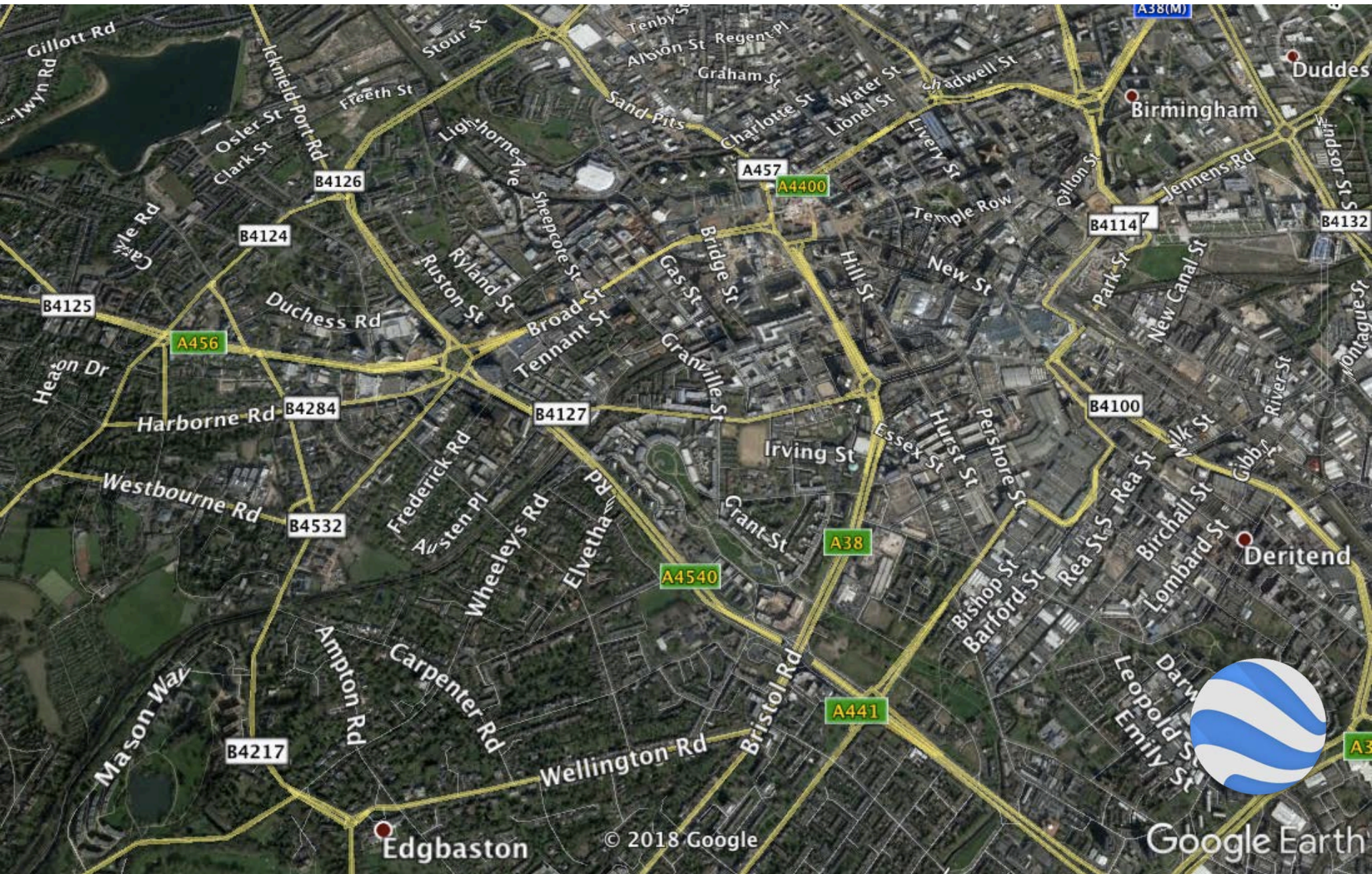


# Collaborators





# Satellite Images





# Spectrometers in the Lab



# Spectrometers in Space

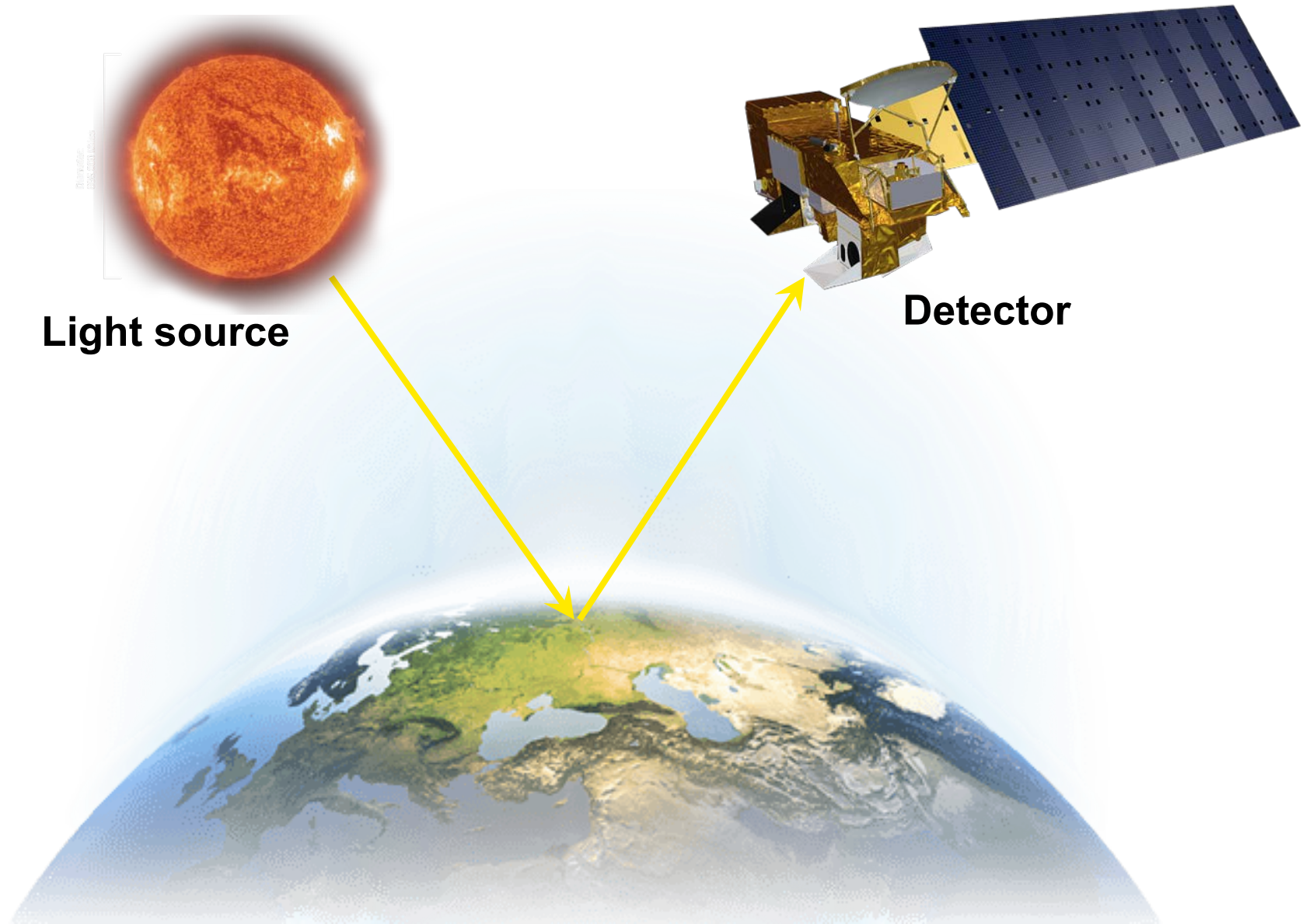




# Spectrometers in Space



# Spectrometers in Space



# **Spectrometers in Space**

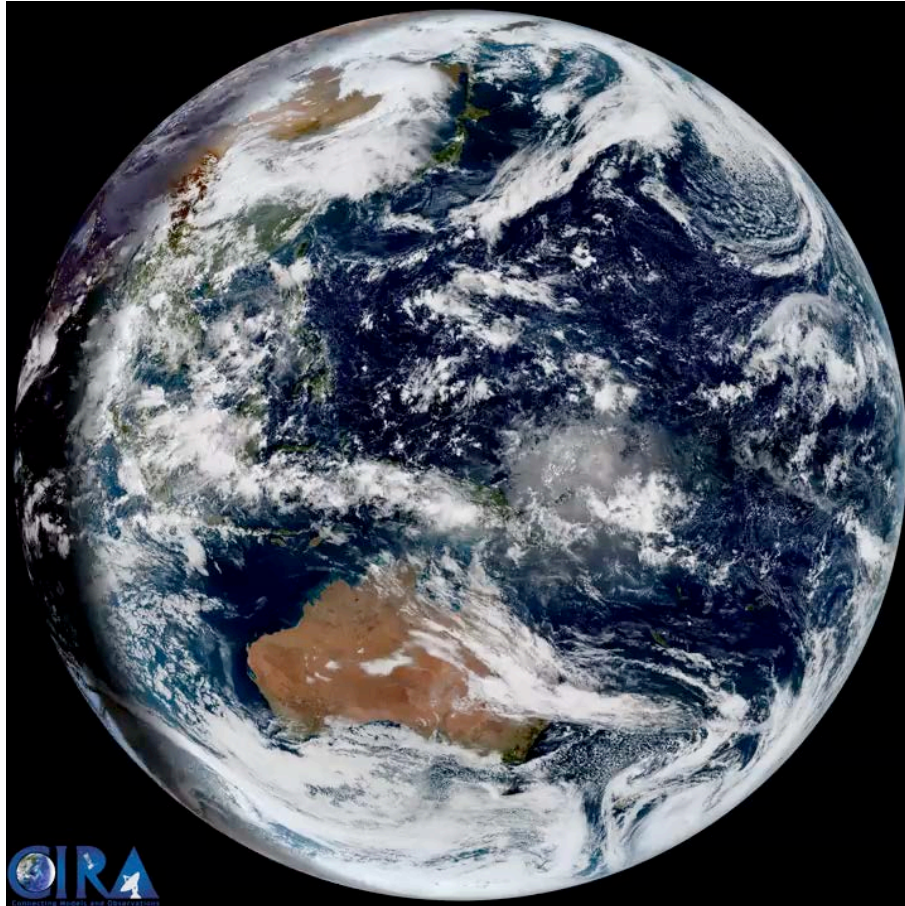
## **Low-Earth Orbiting Satellites**



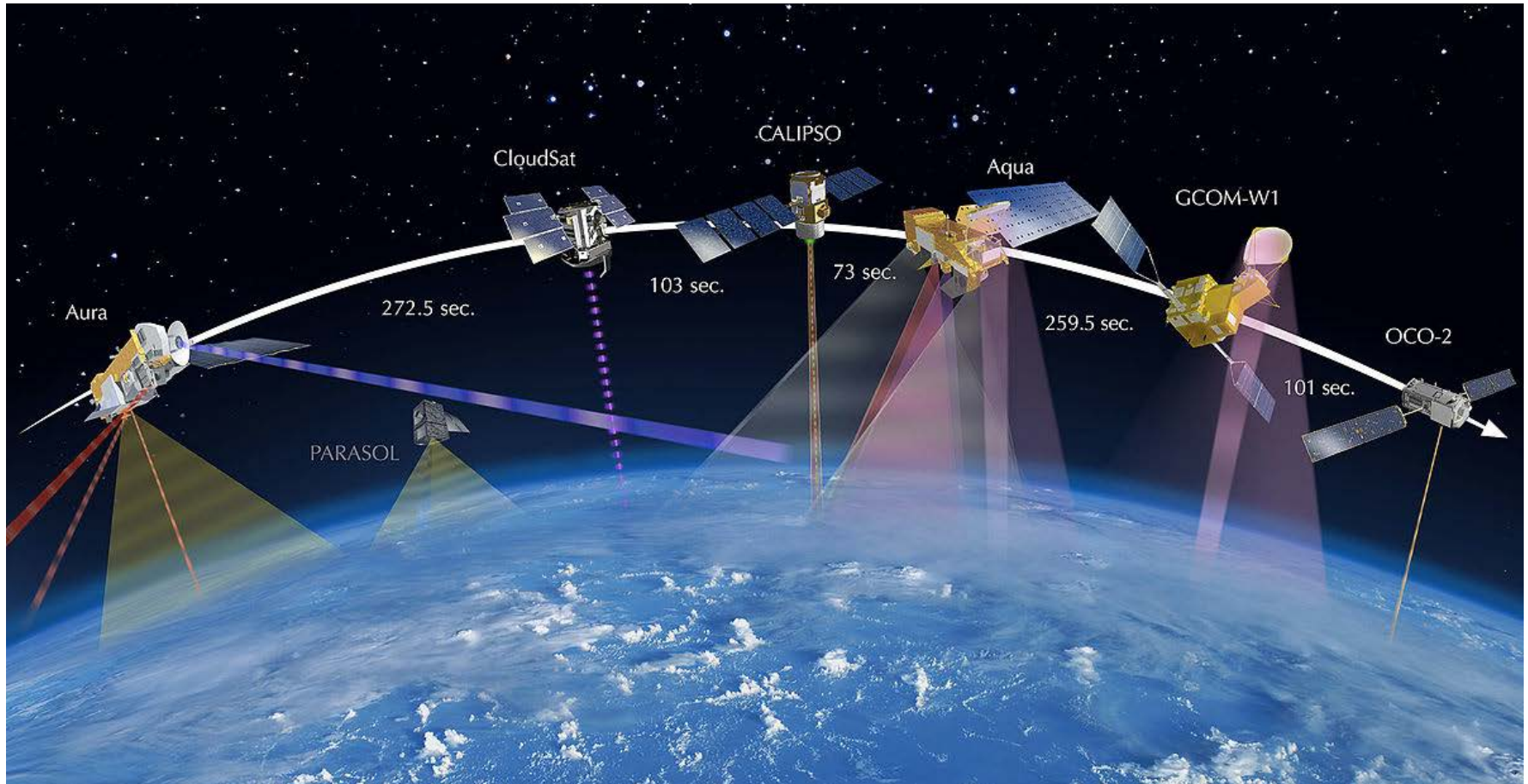


# Spectrometers in Space

## Geostationary Satellites



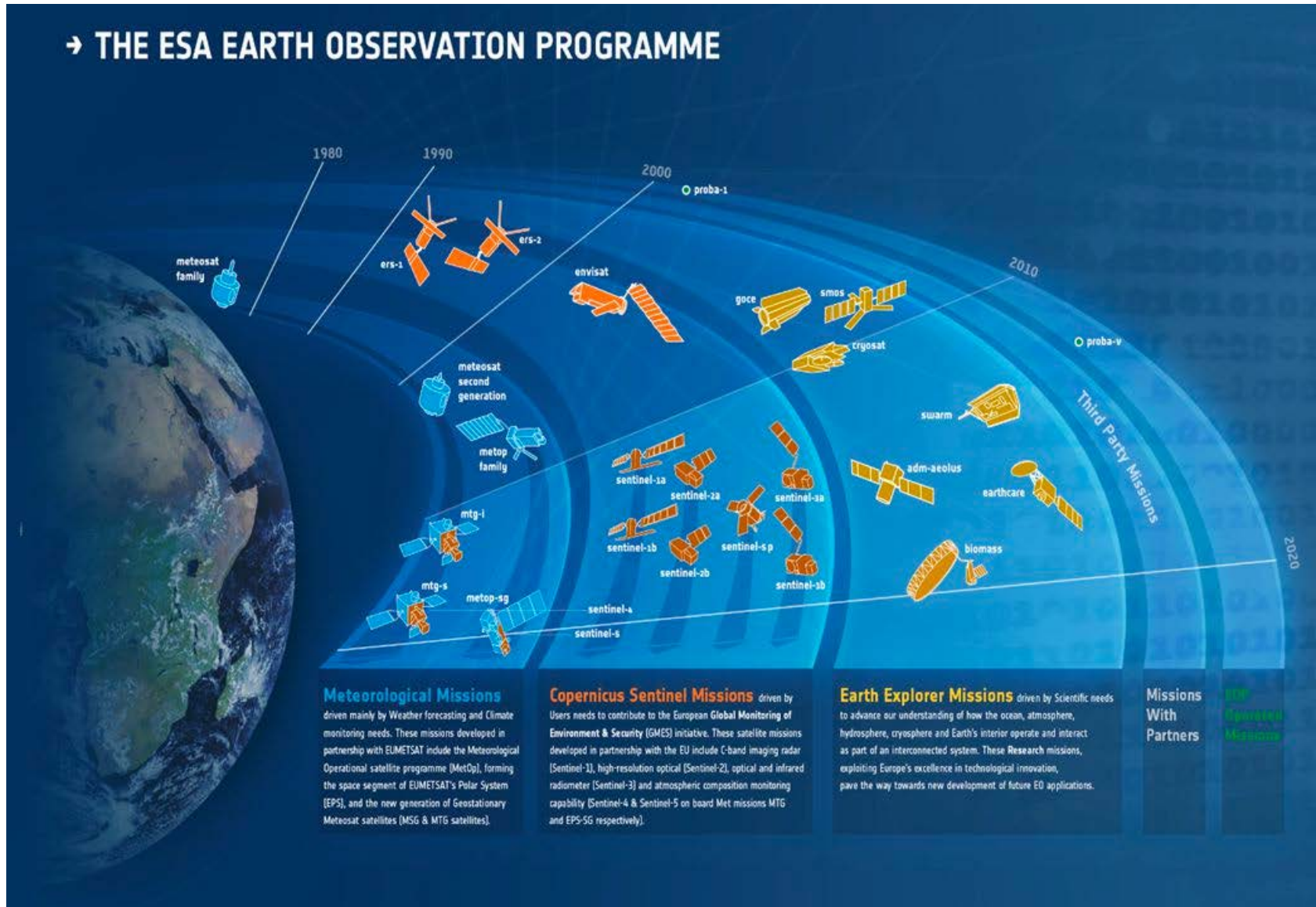
# NASA Afternoon-Train (A-Train)





# ESA Earth Observation Platforms

## → THE ESA EARTH OBSERVATION PROGRAMME



# The Rest of the World



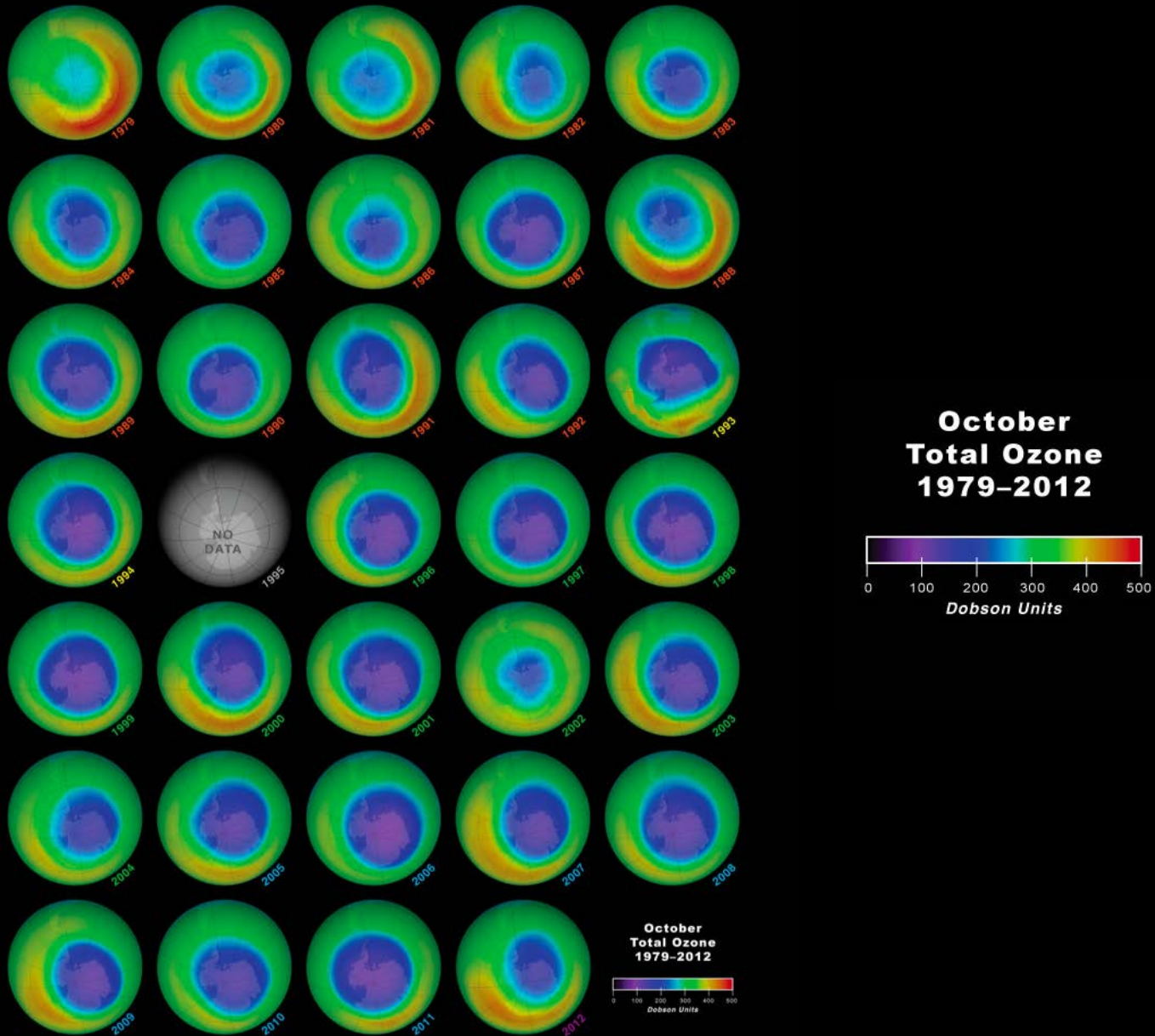
空へ挑み、宇宙を拓く





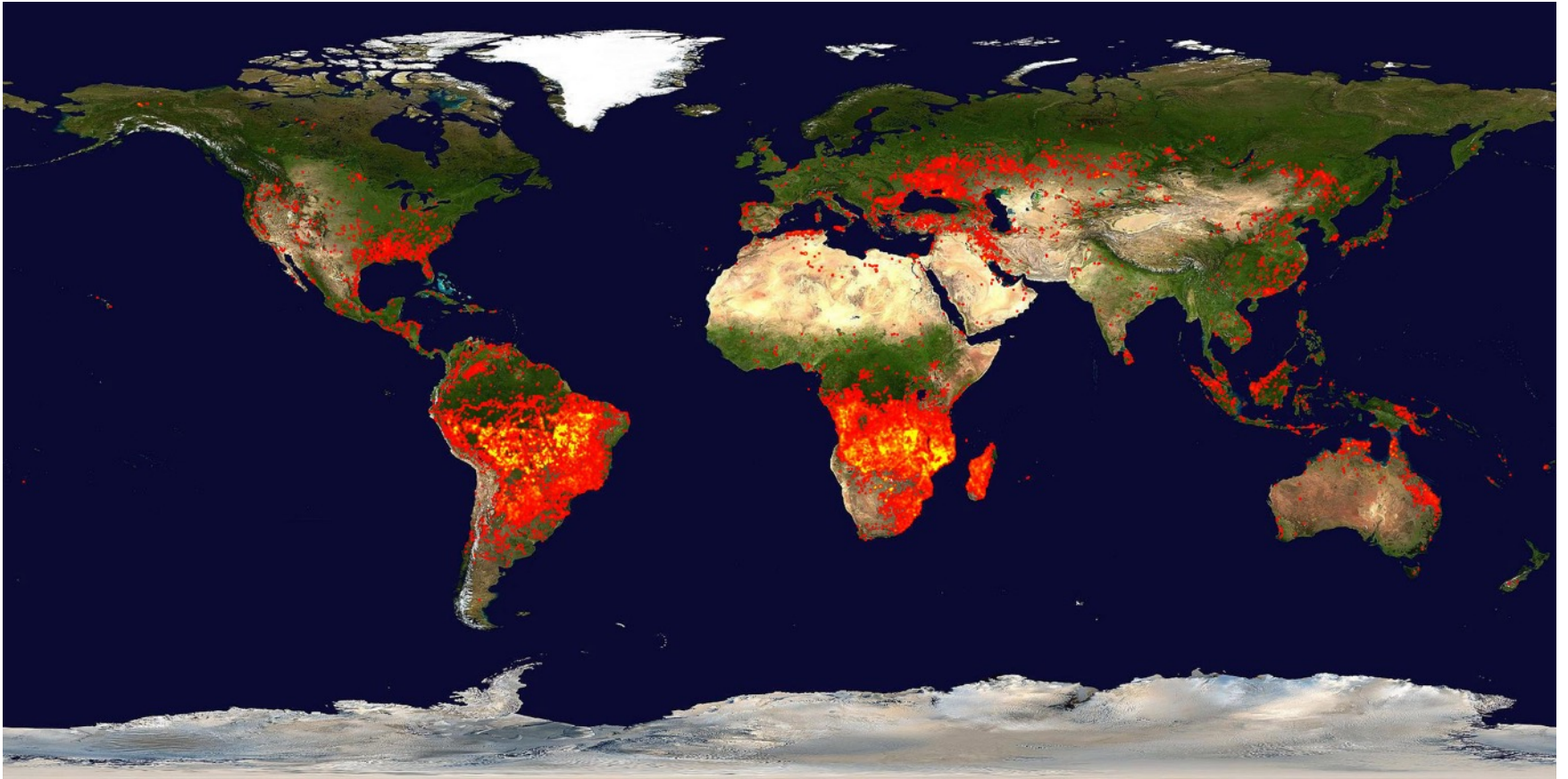
**Space-based observations have  
contributed to understanding the  
Earth system**

# The hole in the ozone layer



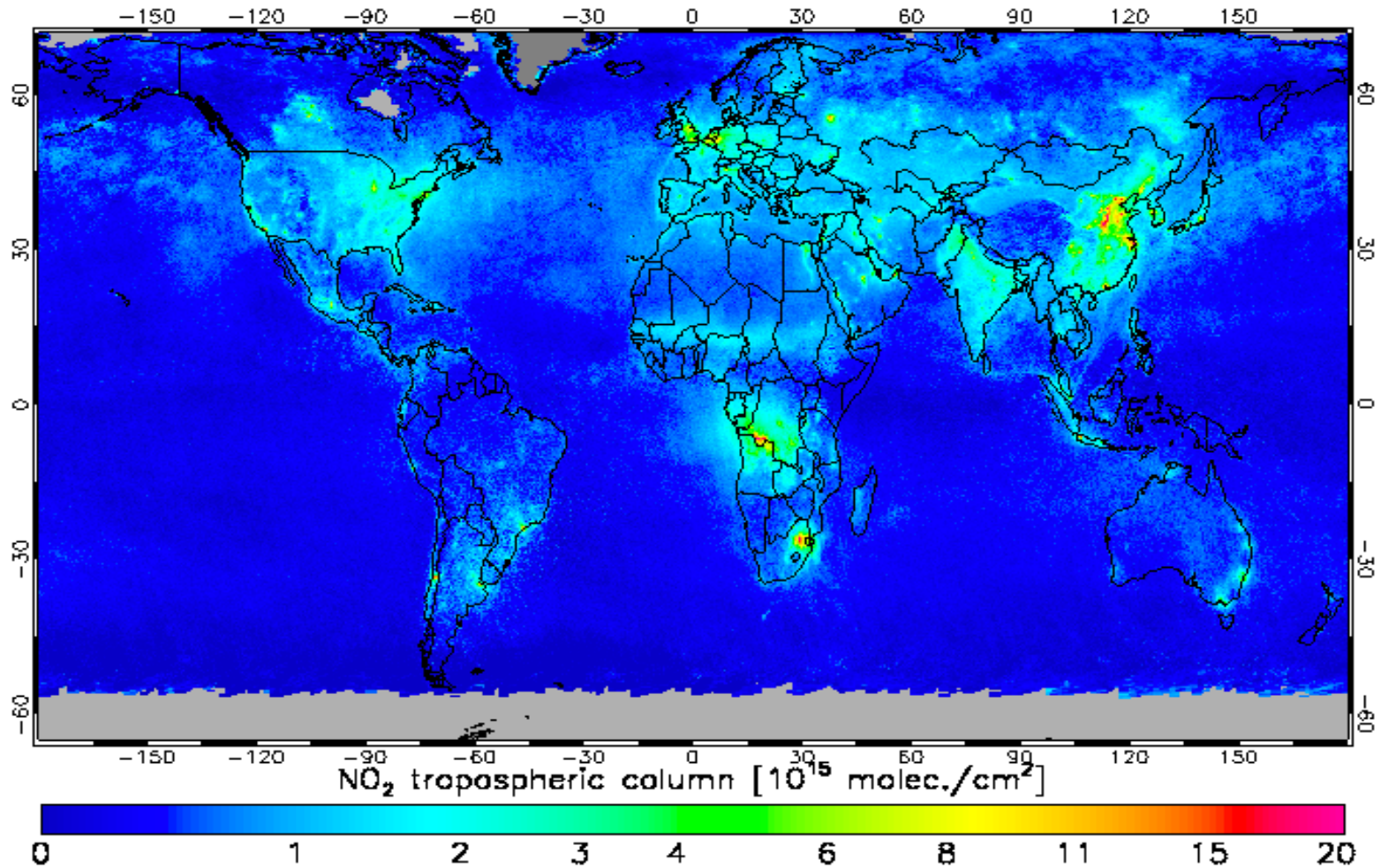


# Wild and Agricultural Fires



**Fires in June-August 2010**  
(NASA MODIS sensor)

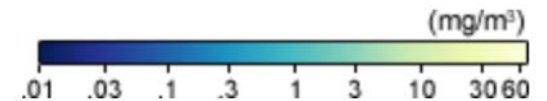
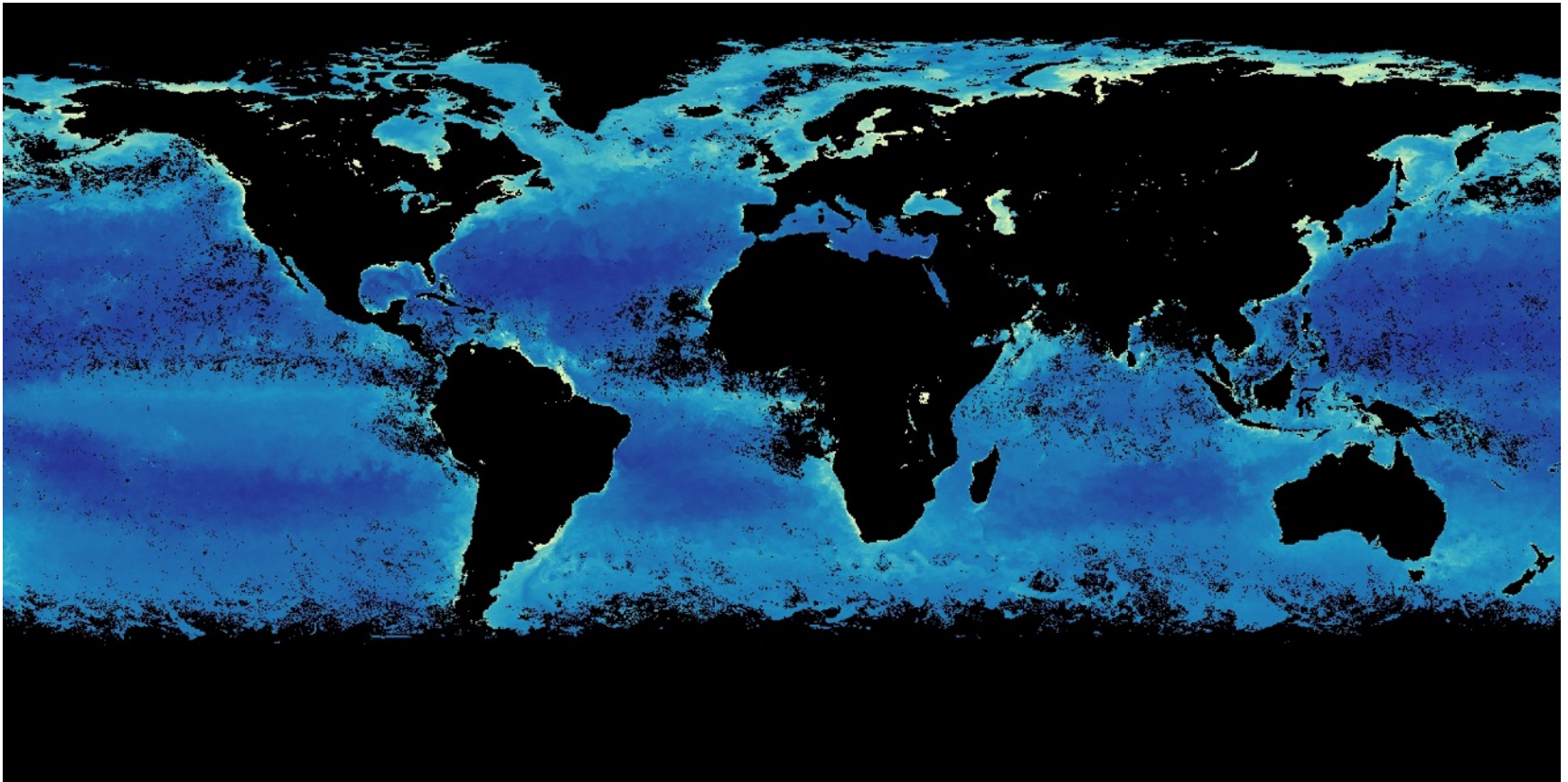
# Air Pollution



**Nitrogen dioxide (NO<sub>2</sub>) in June 2008**  
(KNMI/NASA OMI sensor)

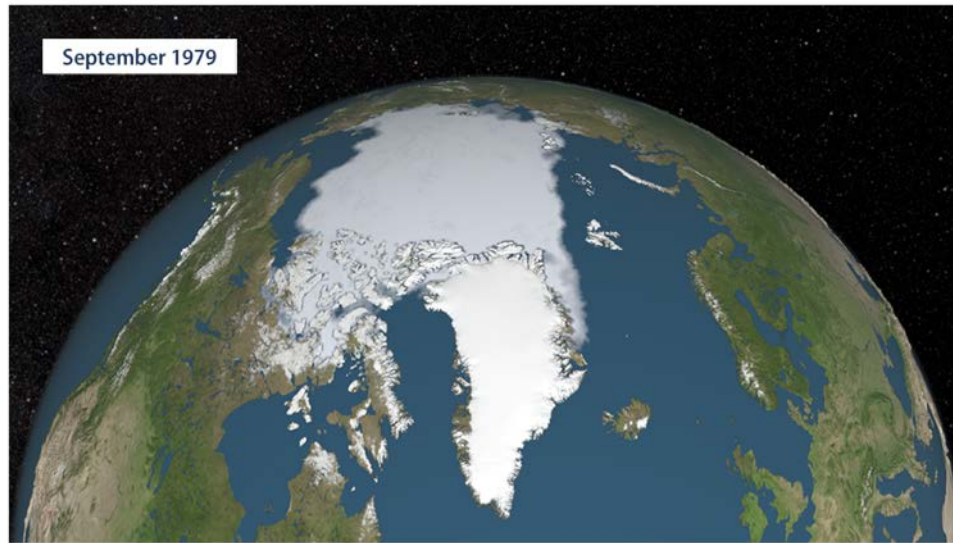


# Ocean Productivity



**Chlorophyll content in August 2006**  
(MODIS sensor)

# Arctic Sea Ice Extent

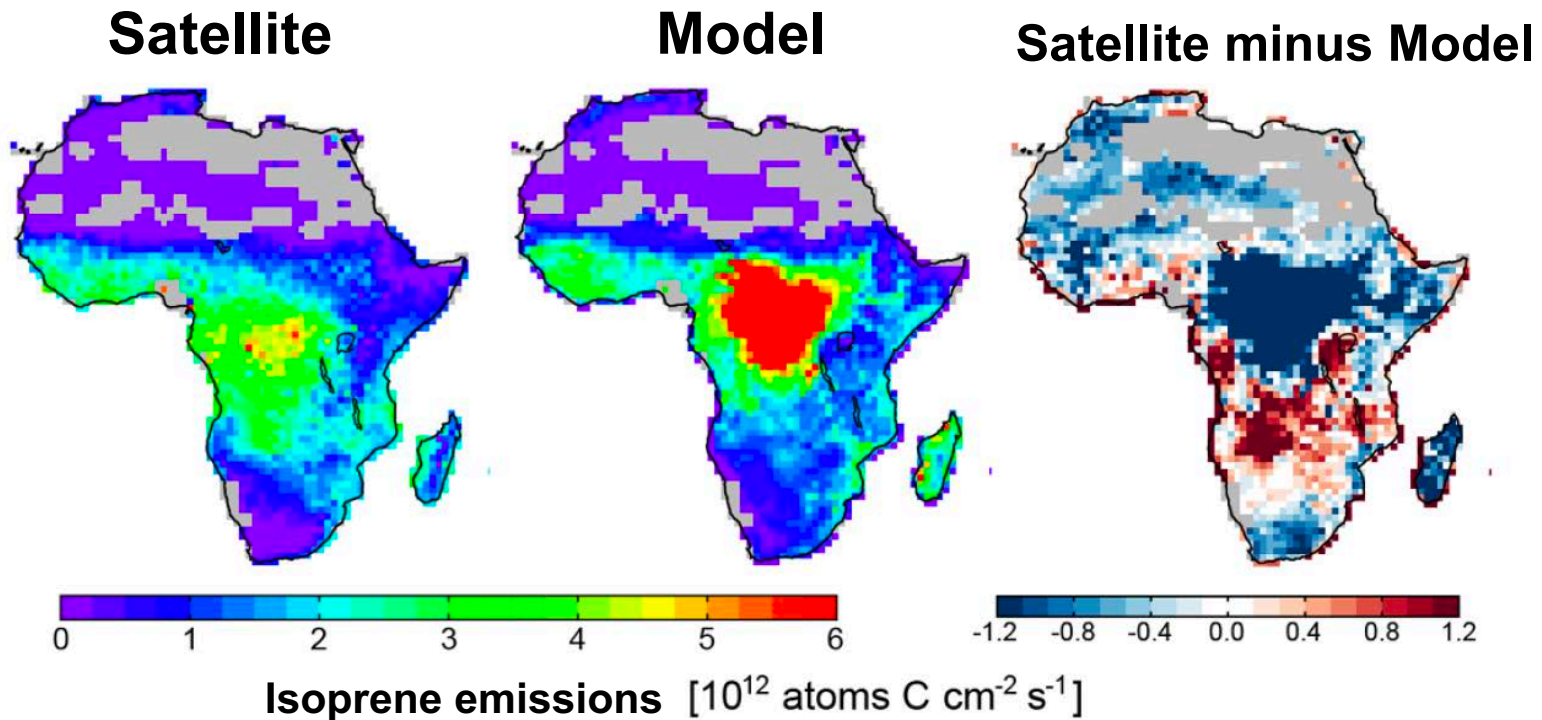


(passive microwave sensors)



# Air Quality in Africa

Map pollution sources from satellites and compare to state-of-art models



# Air Quality in Africa

Identify sources that contribute to severe ozone pollution in Nigeria

## Seasonal open fires

CO + fires

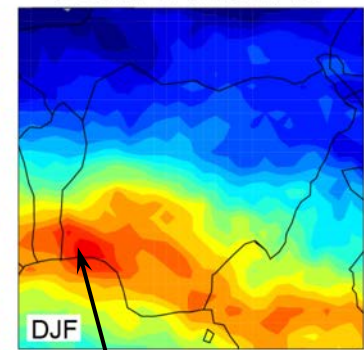
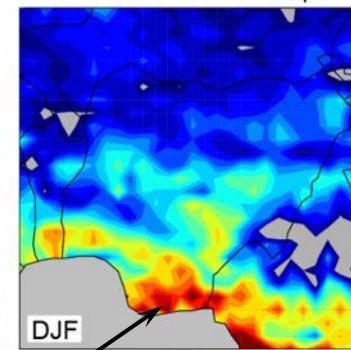
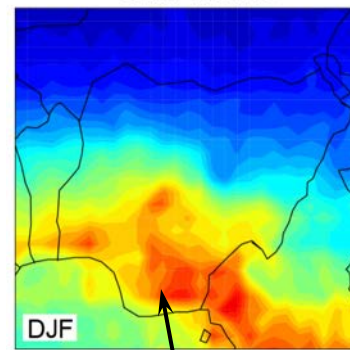
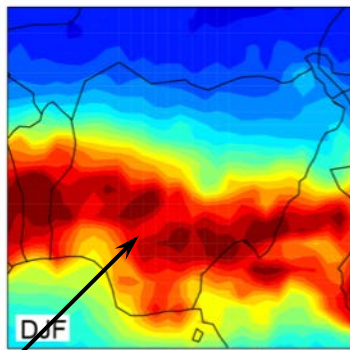
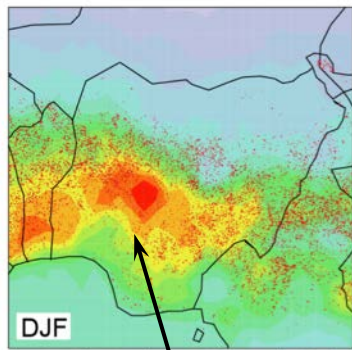
NO<sub>2</sub>

## Anthropogenic Volatile Organic Compounds

HCHO

Methane (CH<sub>4</sub>)

Glyoxal



Open fires



Oil and Gas Industry



Ad-hoc oil refining



Gas Flares

Traffic congestion

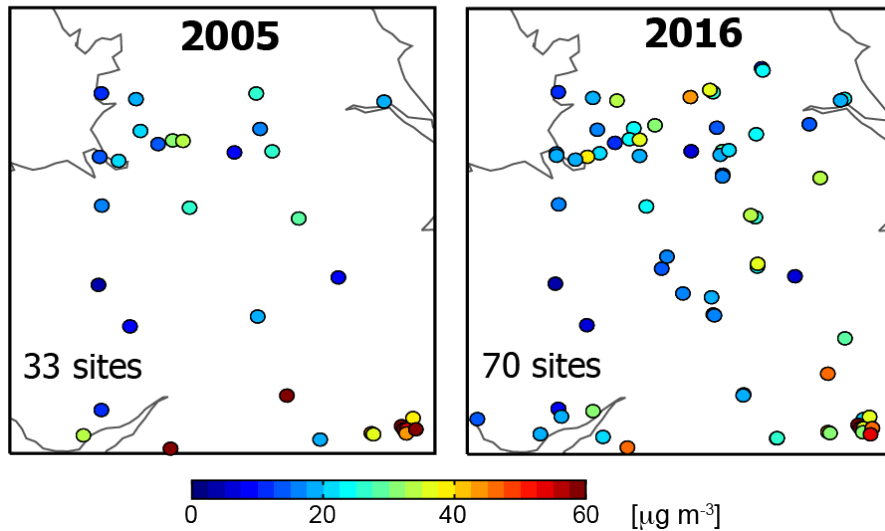




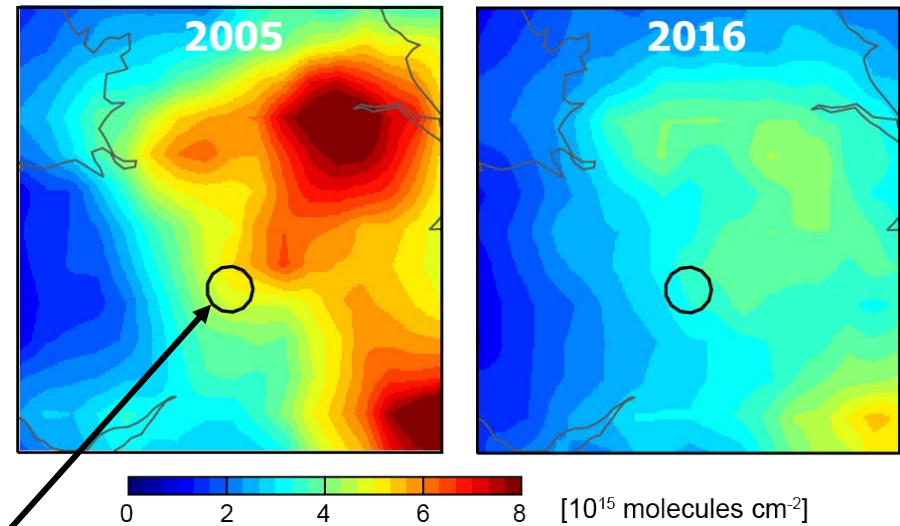
# Tools to Monitor Air Quality

**NO<sub>2</sub> is hazardous to health**

**DEFRA (surface) NO<sub>2</sub>**



**Aura OMI (EO) NO<sub>2</sub>**



**Birmingham: 3% per year decline in NO<sub>2</sub>**

# Politicizing Earth Observations

News

## Trump administration proposes 'privatising' International Space Station



Nasa is currently considering whether life of the International Space Station can be extended to 2028 CREDIT: NASA

By **Rob Crilly**, NEW YORK

11 FEBRUARY 2018 • 7:02PM

IN DEPTH | CLIMATE CHANGE

## NASA cancels carbon monitoring research program

Paul Voosen

★ See all authors and affiliations

Science 11 May 2018:  
Vol. 360, Issue 6389, pp. 586-587  
DOI: 10.1126/science.360.6389.586

Article

Figures & Data

Info & Metrics

eLetters

PDF

## Europe's space agency braces for Brexit fallout

January 17, 2018 by Mariëtte Le Roux



## Eyes in the sky: Cutting NASA Earth observations would be a costly mistake

The European Space Agency's Earth's changing land

December 1, 2016 1.56am GMT



NASA Earth Science Division operating missions, including systems managed by NOAA and USGS. NASA Earth Observing System



# Europe Takes the Lead

## Op-ed | The golden age of European Earth observation

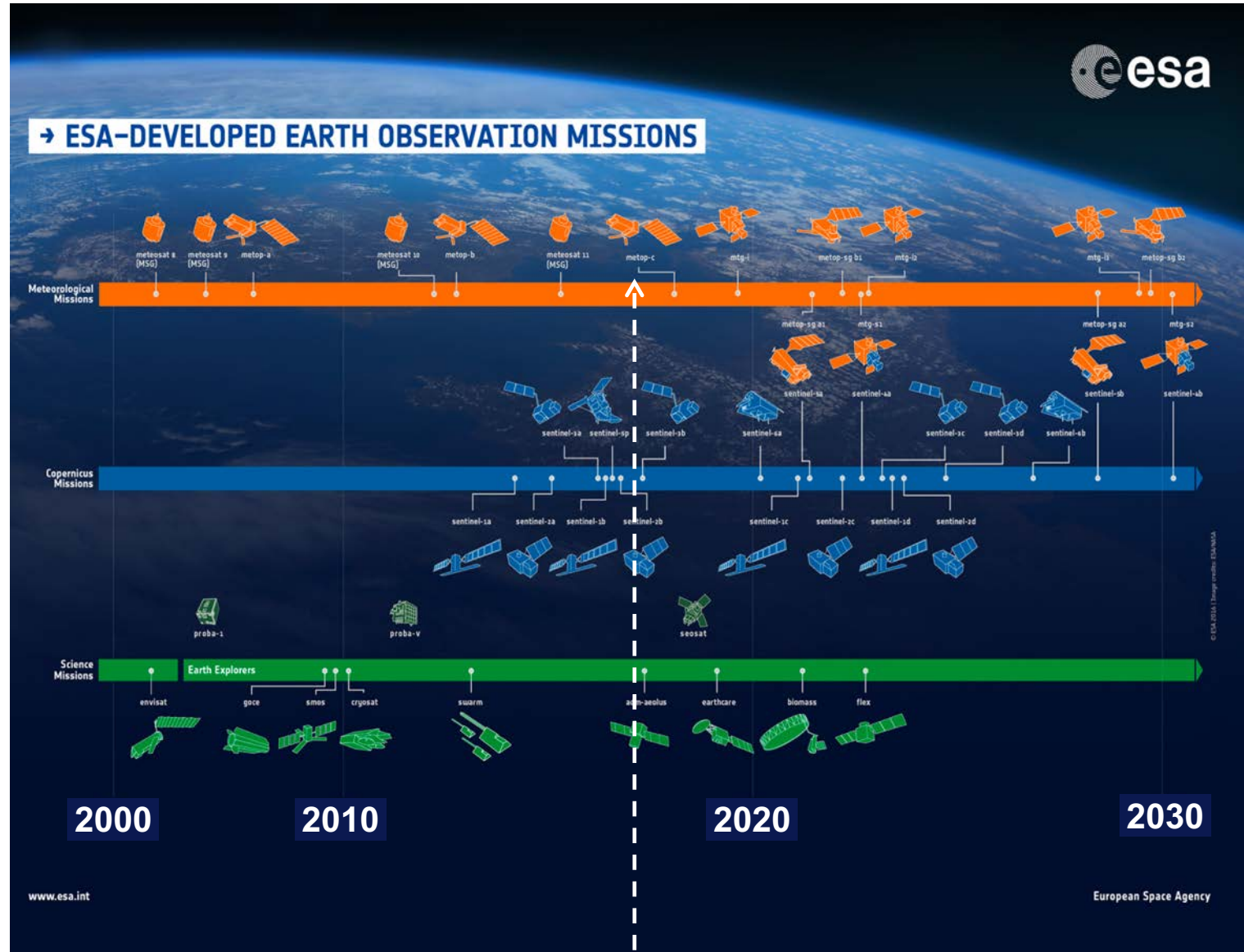
by Robbie Schingler and Agnieszka Łukaszczyk — November 6, 2017



An image of Paris taken by a SkySat satellite, operated by Planet, in August 2017. Credit: Planet



# Europe Takes the Lead



2018