



Promoting Cooperative Solutions for Space Sustainability

**ISU-UniSA 2013**  
**White Paper**  
**COMMON HORIZONS**  
**Earth & Space Sustainability**

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# Common Horizons

White Paper



Southern Hemisphere Summer Space Program 2013



University of  
South Australia



INTERNATIONAL  
SPACE UNIVERSITY®

ISU



University of  
South Australia



# Southern Hemisphere Summer Space Program-SH-SSP

Promoting Cooperative Solutions for Space Sustainability

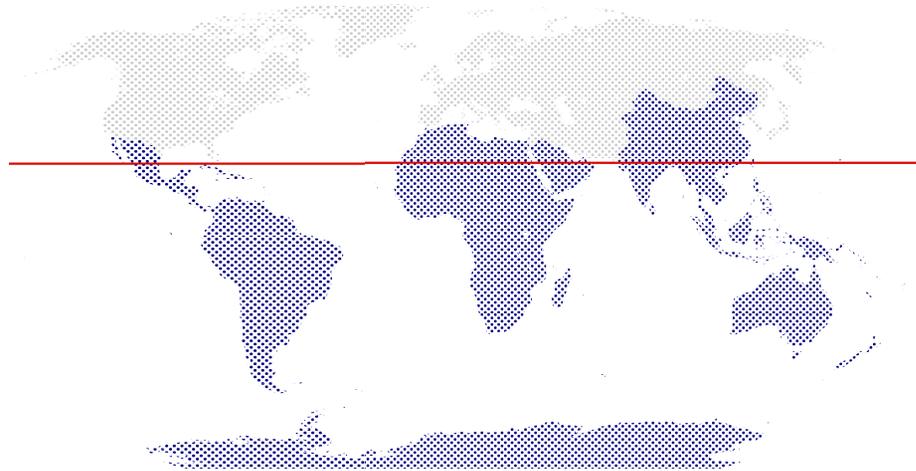
- Five week interdisciplinary, international, intercultural program focused on space issues in Global South
- Global south includes countries touching or below the Tropic of Cancer
- Classes meet 6 days a week
- Three weeks of lectures, workshops, special events, White Paper research
- Two weeks focused on production of a White Paper targeted toward countries of the Global South
- 2013: 37 students; 11 countries; age range—21-45



# 2013 White Paper Tasks

Promoting Cooperative Solutions for Space Sustainability

1. Explore and describe how space systems now contribute to sustainability on Earth
2. Examine sustainability of outer space
3. Consider sustainability and space technologies from the perspective of the 'Global South'
4. How can Global South make effective use of developing space capacity to further its own sustainable future?





# Initial Findings

Promoting Cooperative Solutions for Space Sustainability

- The benefits derived from outer space has steadily expanded and will continue to grow.
- Space systems are becoming ever more critical in the effort to ensure long term sustainability on Earth.
- Yet the continued enjoyment of the benefits of space is anything but guaranteed: space environment under threat



## **Space systems are becoming ever more critical for ensuring long term sustainability on Earth**

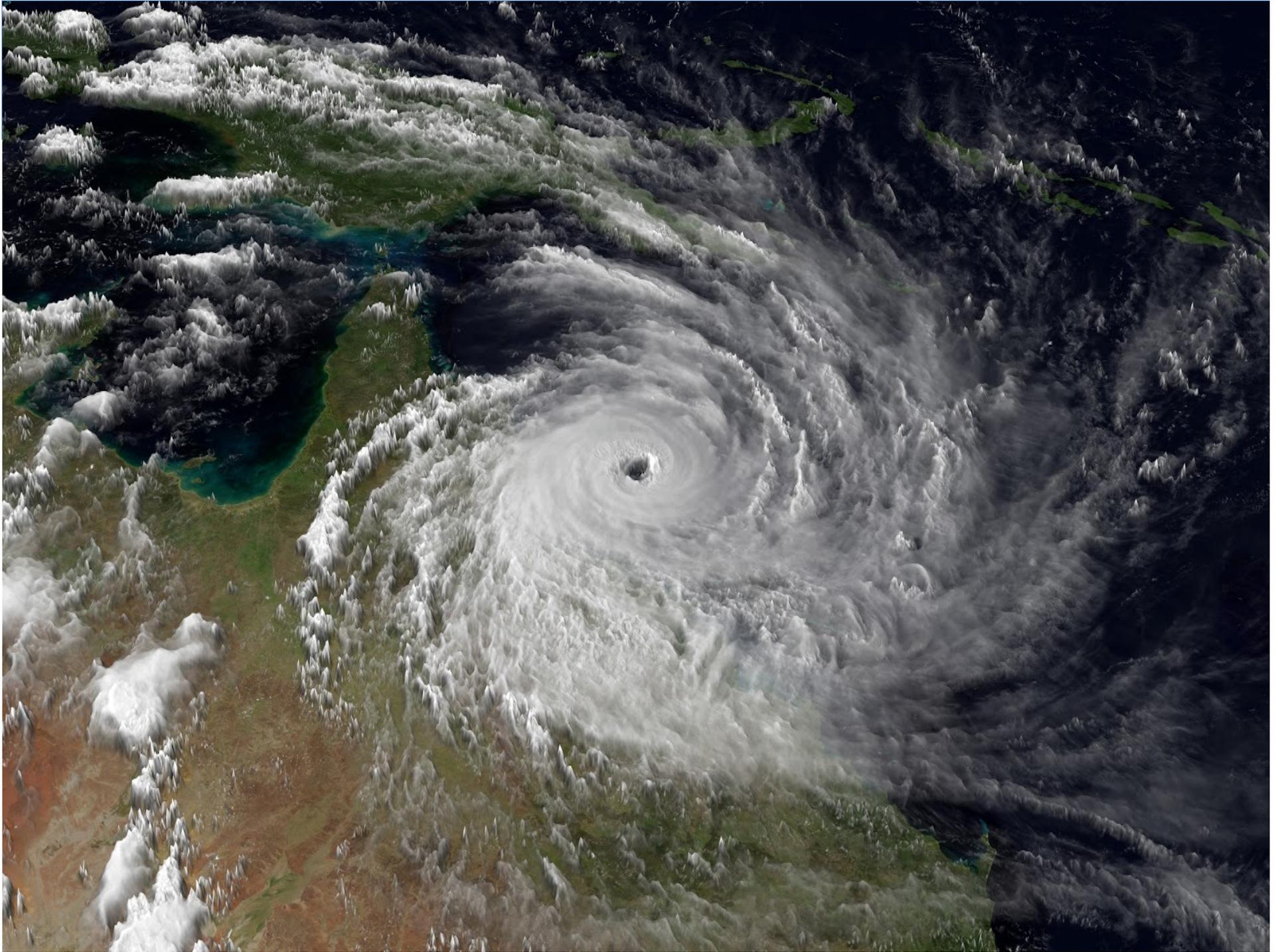
### **EXAMPLES:**

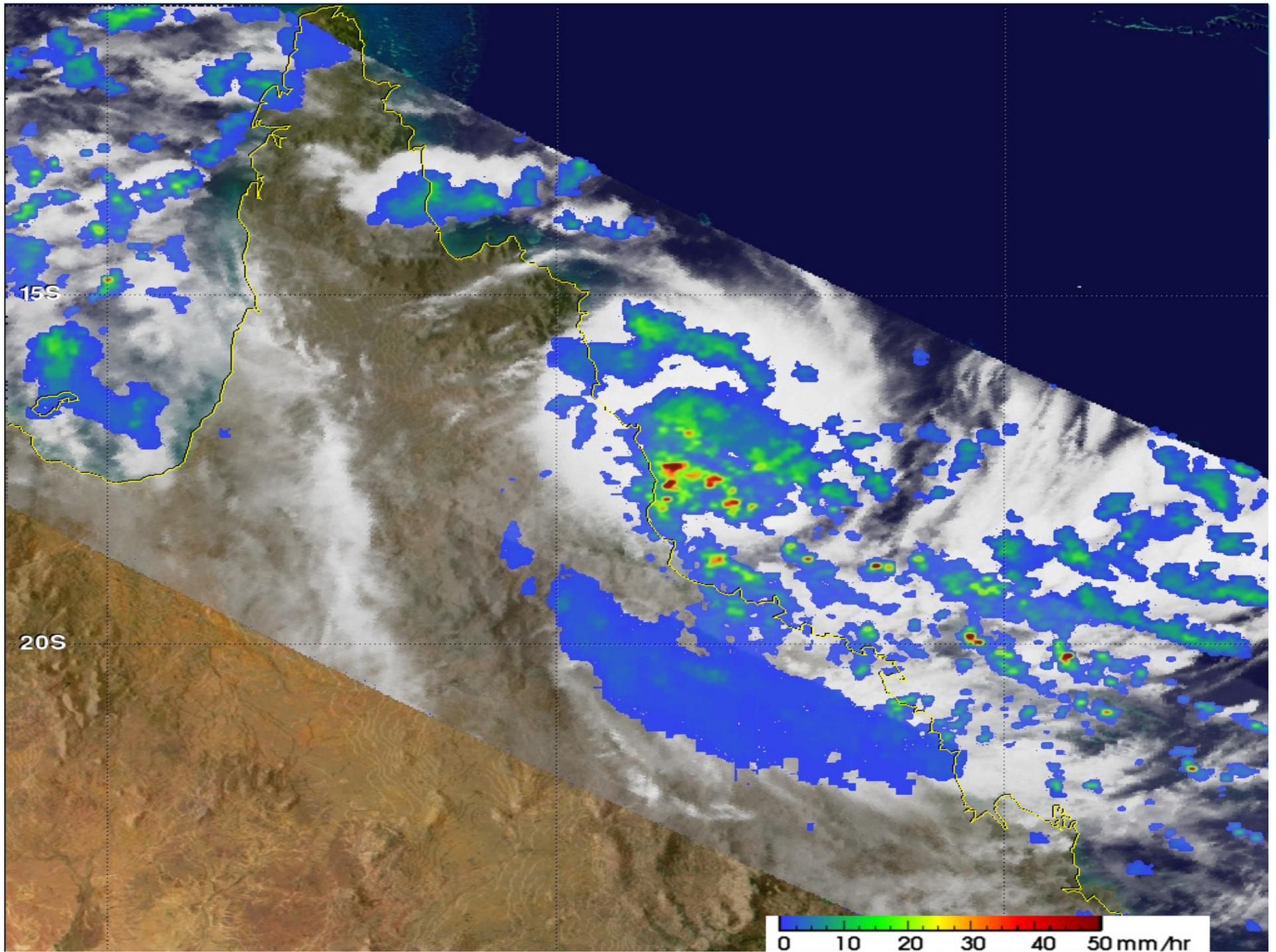
- Disaster mitigation, response & recovery
  - Case study: 2010 Queensland floods
- Urban planning & management
  - Case study: Indian informal settlements
- Agriculture and water resources
  - Case study: precision farming and ground water search
- Health & education
  - Case study: Pan-Africa e-Network
- Climate change



**Queensland**

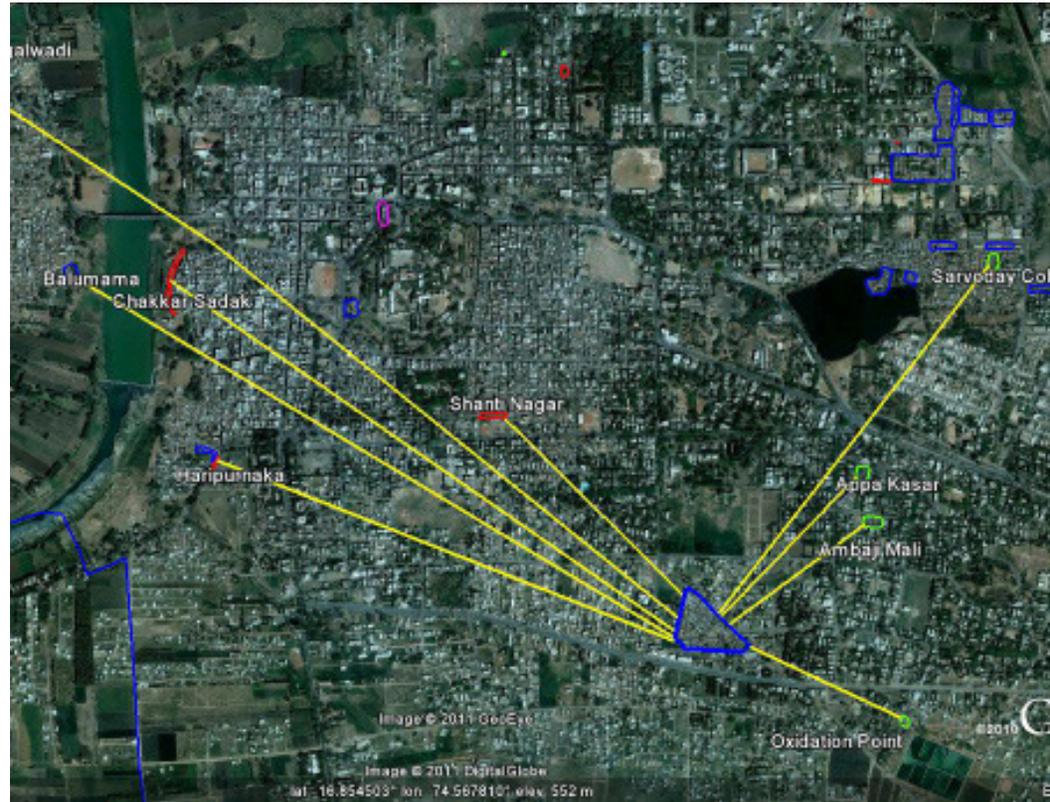
**Adelaide**







- Focus on role of satellite data in analyzing needs of informal settlements
- Google Earth an important tool for analysis and visualization
- The Indian NGO, Shelter Associates, used Google Earth to work with local residents to relocate slum residents to housing in central neighborhood



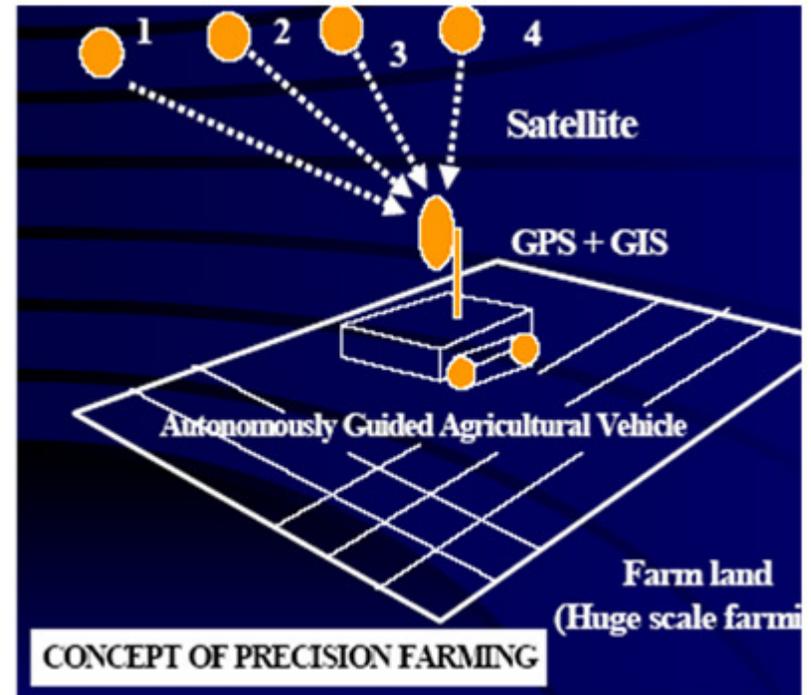
Shelter Associates Google Map of city slums, Sangli, India



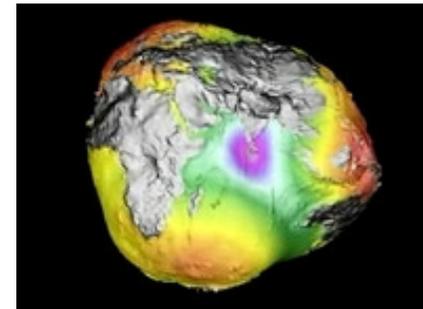
# Agriculture and Water Resources

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- Focus on precision farming
  - PNT-guided farm vehicles
  - Satellite data to assess need for fertilizer or water
  - Satellite data to assess spread of crop disease
- Water resources
  - NASA's GRACE Mission
    - Ground water
  - Thermal imaging from satellites and aircraft

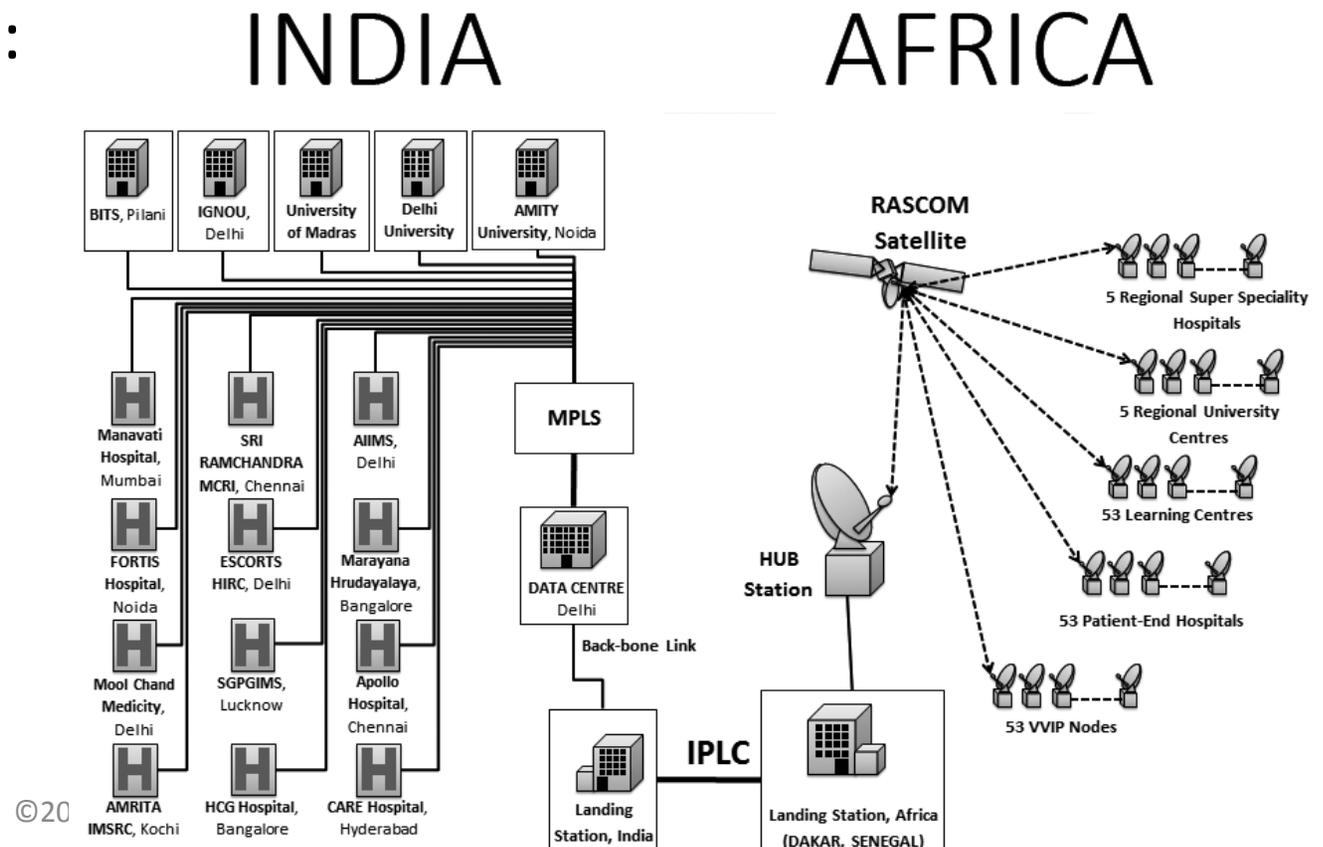


[Courtesy www.gisdevelopment.net](http://www.gisdevelopment.net)



## Focus on Pan-African e-Network:

- Satellite and fibre optic links to deliver health care and education to African States
- Links > 149 sites:
  - Universities
  - Hospitals
  - Learning centers



- Changes in sea ice
- Measurements of sea level, temperature
  - Argos satellite system
- Greenhouse gas measurements
  - JAXA GOSAT project—  
carbon dioxide in  
atmosphere

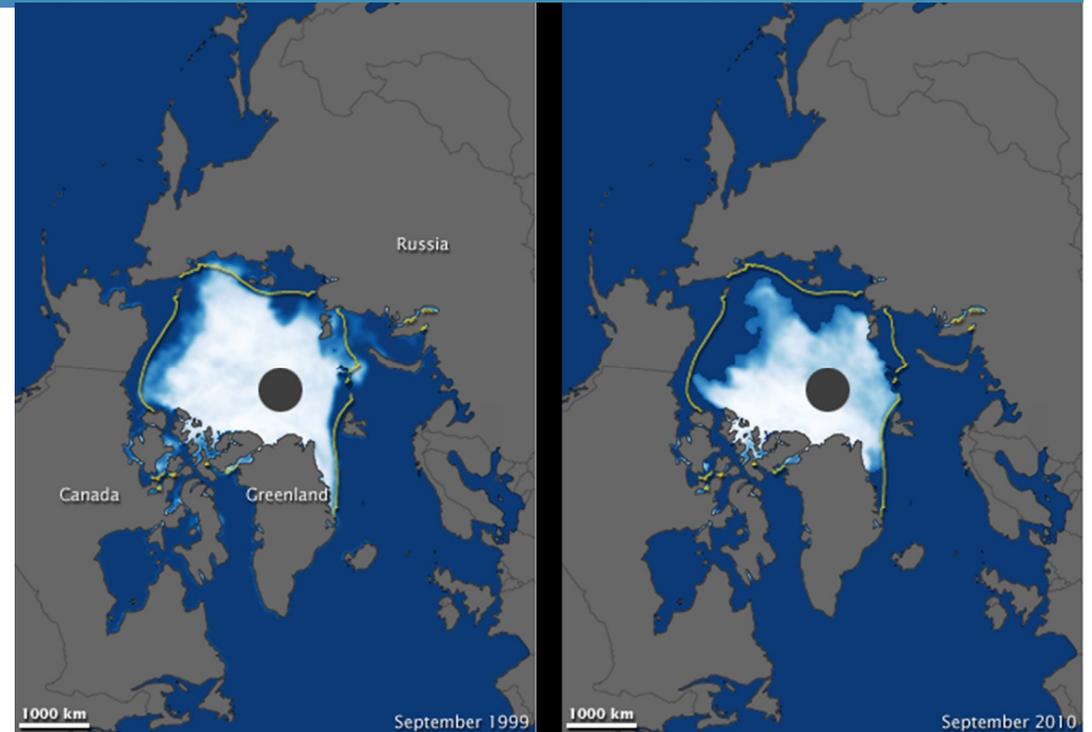
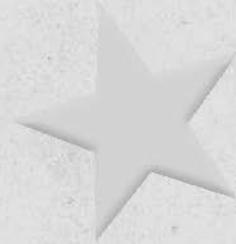


Image Credit: NASA

SPACE SUSTAINABILITY



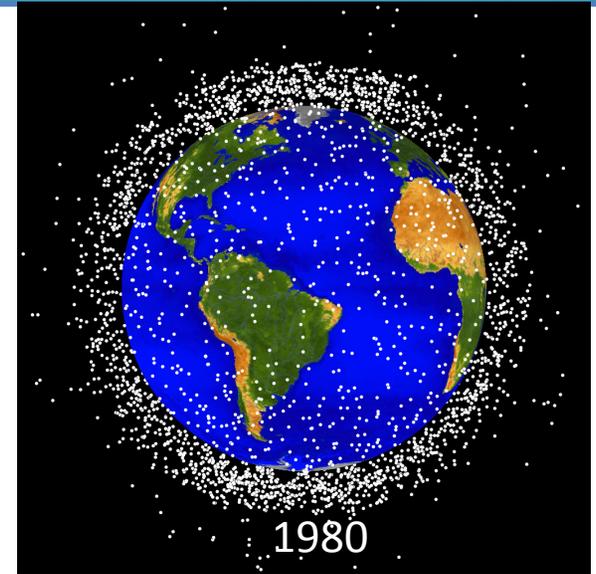
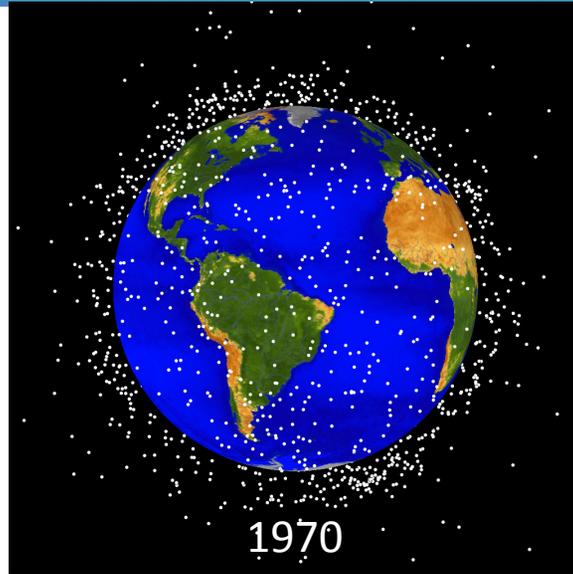
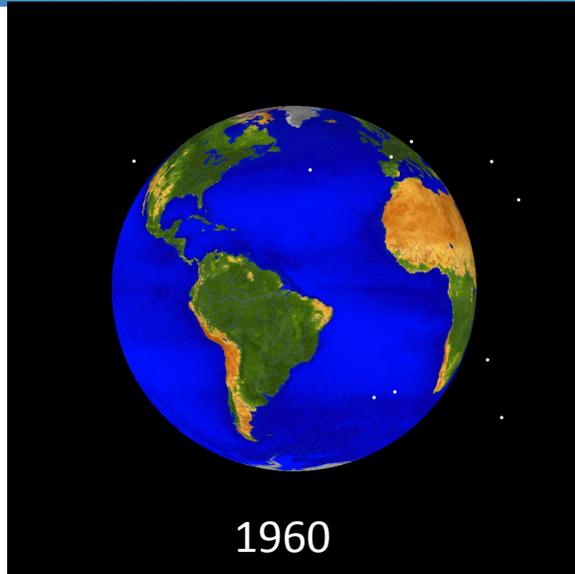
EARTH SUSTAINABILITY



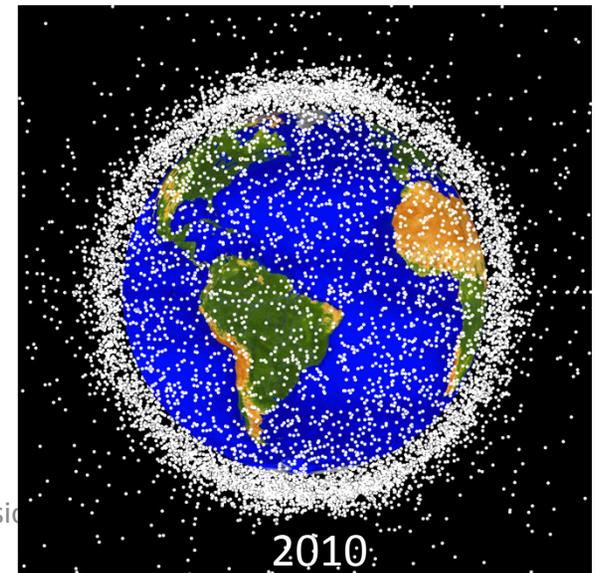
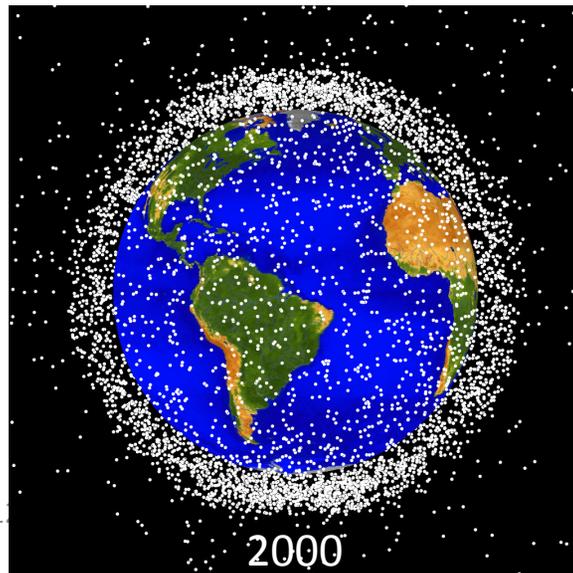
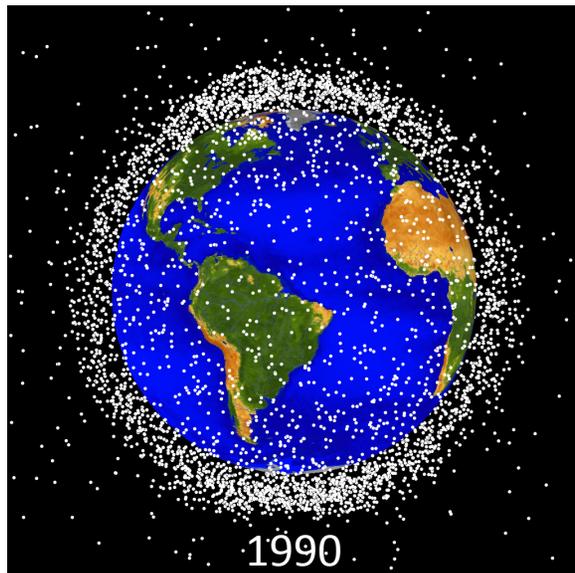


## Sustainability of space activities under threat

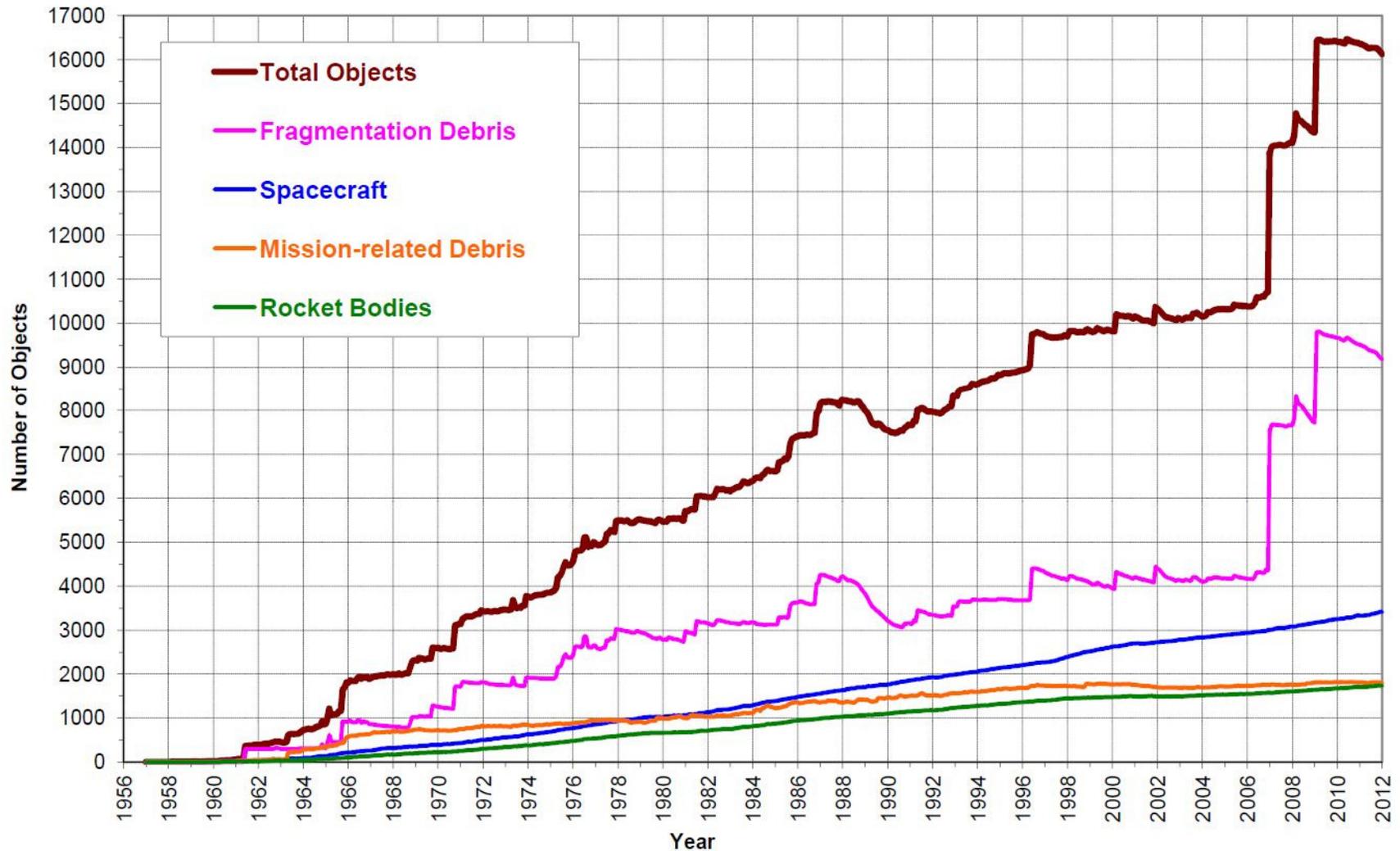
- Increasing debris in orbit may in time make activities in regions of near-Earth space difficult and extremely expensive
  - U.S. now tracks about 22,000 objects in Earth orbit
    - ~ 1,000 working satellites
    - ~ 21,000 debris pieces > 10 cm
  - U.S. catalogs only those debris for which provenance is known (a smaller number)
  - Mitigation efforts to reduce the amount of new operational debris are not sufficient to prevent the continued growth of orbital debris
  - Even if no new satellites were launched into orbit, the debris population would continue to increase from collisions and breakups of non-functional satellites and rocket bodies left in orbit



Images courtesy NASA Debris Office



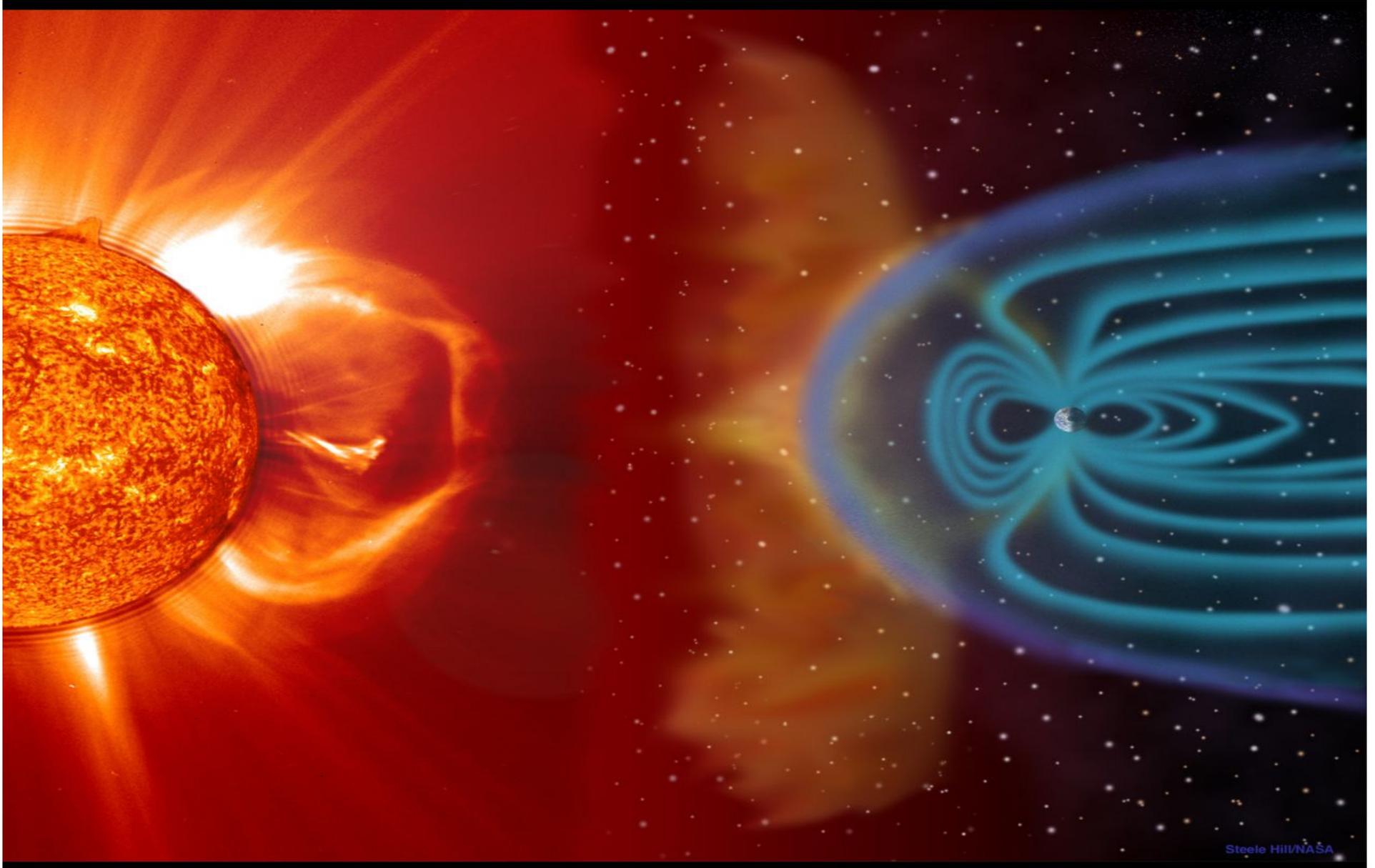
Monthly Number of Objects in Earth Orbit by Object Type





# Space Weather

Promoting Cooperative Solutions for Space Sustainability





# Recommendation 1

Promoting Cooperative Solutions for Space Sustainability

- 1. Emerging space States of Global South should become involved in discussions of international organizations focused on aspects of space sustainability, e.g.,**
  - UN COPUOS
  - IADC

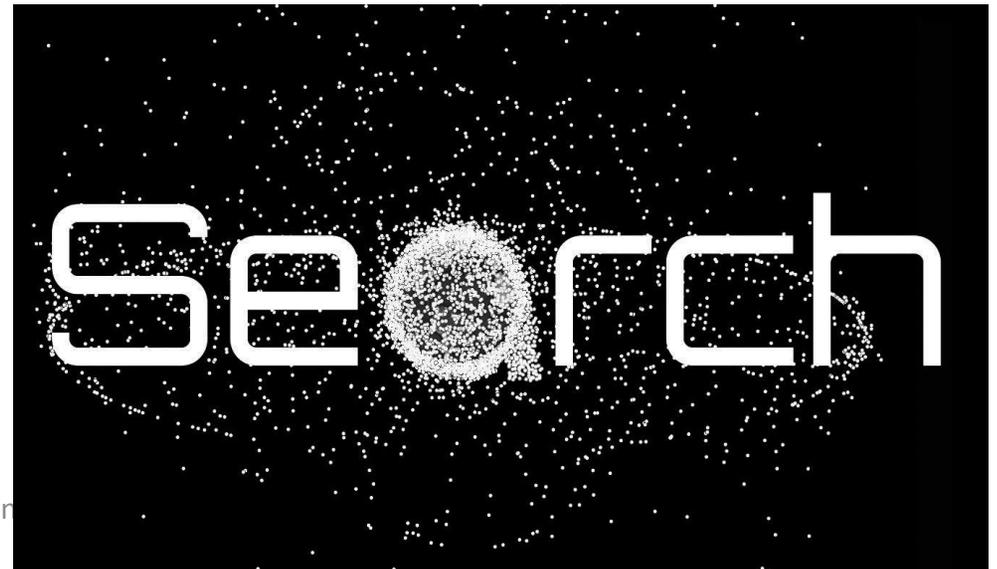


# Recommendation 2

Promoting Cooperative Solutions for Space Sustainability

## 1. Raise Public Awareness of Space Sustainability via:

- Social media outlets: Facebook, Twitter, YouTube
- School and university space clubs, etc.
- Internet sites and media coverage
  - Day Without Space
- Specific suggestion: Google Doodle
  - With animations, interactive features
  - Hyperlink to information





# Recommendation 3:

Promoting Cooperative Solutions for Space Sustainability

- **Establish series of prizes to act as incentives to encourage innovation, collaboration, and investment in space and Earth sustainability in Global South**





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<http://www.commonhorizons.wordpress.com>

***Thank you!***