

The NASA-Rio de Janeiro Partnership



Felipe Mandarin, Maggie Hurwitz &
Dalia Kirschbaum
C40 Cities Webinar
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NASA-Rio de Janeiro Partnership Co-Leads



Felipe Mandarino
Rio de Janeiro



Maggie Hurwitz
NASA Goddard & SSAI



Dalia Kirschbaum
NASA Goddard

NASA-Rio de Janeiro Partnership

- Better understand, anticipate, and monitor **environmental hazards** in Rio de Janeiro
- **Pioneer applications** of NASA Earth Observations at the urban scale
- Conduct **joint activities** that leverage NASA's remote sensing products and Rio de Janeiro's monitoring and crisis management capabilities
- Bring NASA Earth science to **Brazilian educators** and students



NASA-Rio Disaster Preparedness Cooperative Effort

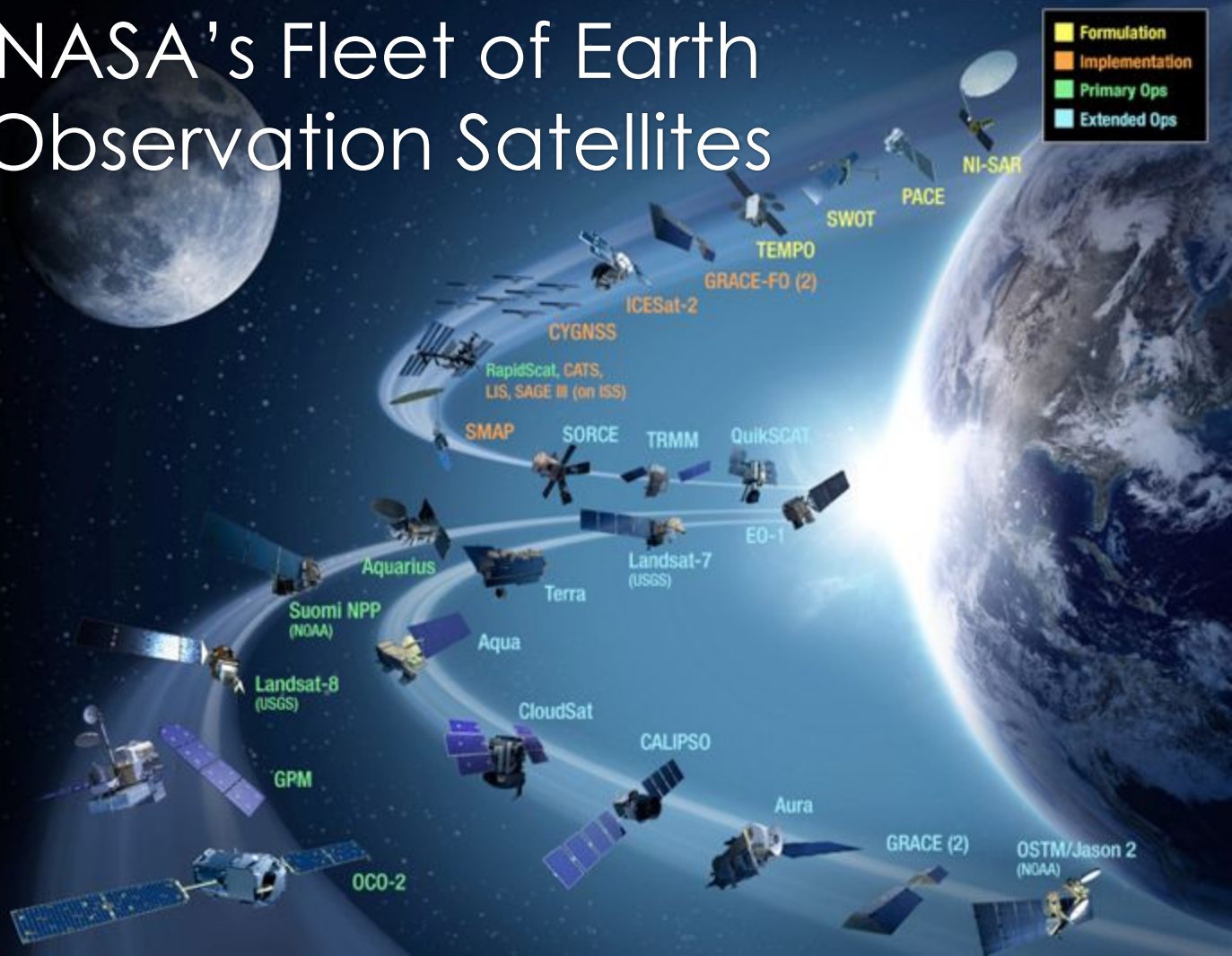


In Dec. 2015, NASA and the City of Rio de Janeiro signed an agreement to support innovative efforts to better understand, anticipate, and monitor hazards, including heavy rainfall, sea level rise, and landslides, in and around the city. This collaboration will leverage the unique attributes of NASA's satellite data and Rio de Janeiro's management and monitoring capabilities to improve awareness of how the city of Rio may be impacted by hazards and affected by climate change.

NASA's Earth-observing satellites provide valuable information to diagnose how our environment and climate is around the world. The City of Rio de Janeiro collects important data from the ground to connect with what can be viewed from space for improving the monitoring of hazards and climate impacts, making decisions, and taking action.

This collaboration will focus on integrating, visualizing, and sharing relevant data, as well as providing detailed information about the hazards and how they are being studied with the general public. NASA seeks to develop a scientific understanding of Earth's water and energy systems and how they

NASA's Fleet of Earth Observation Satellites

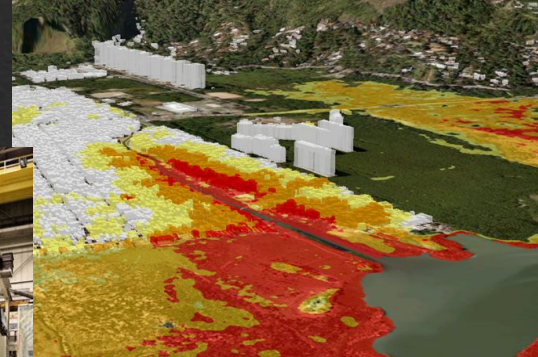


Areas of Joint Work

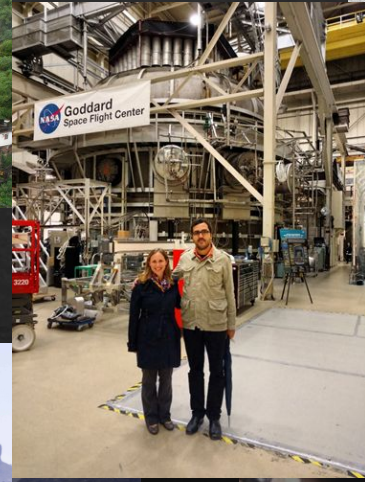
Natural Disasters



Climate Change



Scientific



Engagement



Environmental Monitoring



Education & Outreach

Scientific Engagement



NASA-Rio+UCCRN Training Partnership Workshop

New York City

November 14-17, 2016



Workshop Goals

- Share knowledge and best practices
- Conduct in-depth training sessions to identify opportunities and challenges
- Define process to share data and joint activities

Thematic Areas

- Sea Level Rise
- Urban Heat Islands
- Water Quality
- Extreme events and landslides

Natural Disasters



The City of Rio is **integrating a landslide system developed at NASA GSFC into the Alerta Rio system** to improve the identification of potential landslide activity and issue warnings to most vulnerable areas.



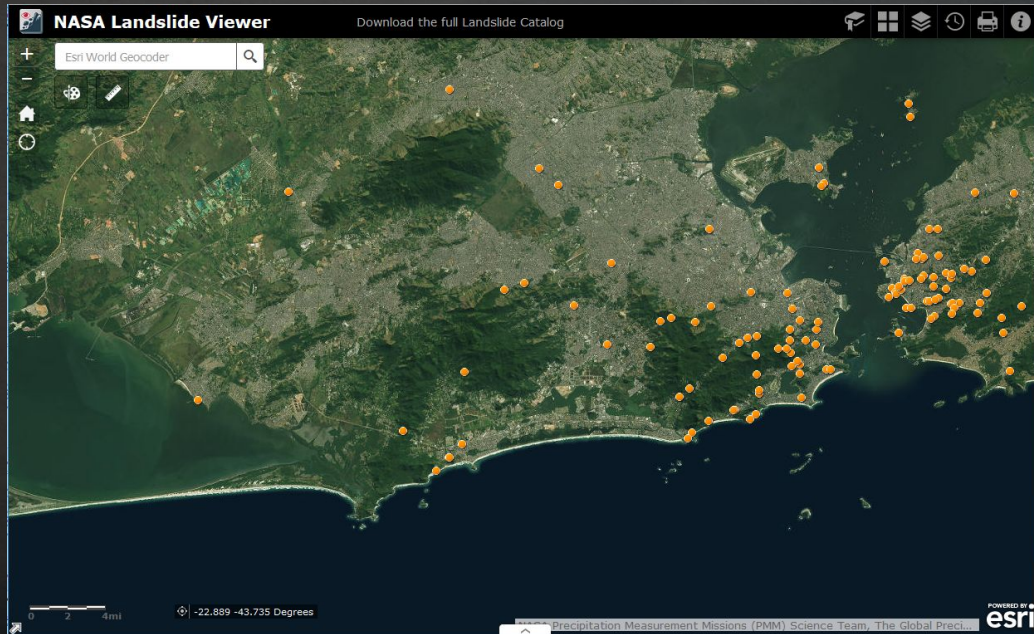
LHASA Rio 1.0

NASA landslide nowcast model (LHASA) has been integrated into Alerta Rio and Rio Operations Center by including the city's 33 weather gauges and a local susceptibility map to refine the model resolution for routine monitoring of heavy rainfall and landslides across the city.

The screenshot displays the LHASA Rio web application interface. The main title is "LHASA Rio - Nowcast de perigo de deslizamento". The interface includes a search bar with the text "Encontrar endereço ou lugar" and a search icon. Below the search bar are several navigation icons. A modal window titled "Análise histórica - Perigo desliz..." is open, featuring two tabs: "Entrada" and "Saída". The "Entrada" tab is active. The modal contains a "Data da pesquisa*" field with the value "06/04/2010" and an "Executar" button. A link for "Ajuda" is also present. The background is a satellite map of Rio de Janeiro with landslide risk areas highlighted in orange and red. The bottom of the interface shows the coordinates "-43,704 -23,095 Graus" and logos for "Earthstar Geographics" and "esri".

Landslides: New Collaboration Opportunities

- Leverage new Citizen Science project developed at NASA: <https://landslides.nasa.gov> by contributing data
- Integrating a custom version of Landslide Reporter at the city scale

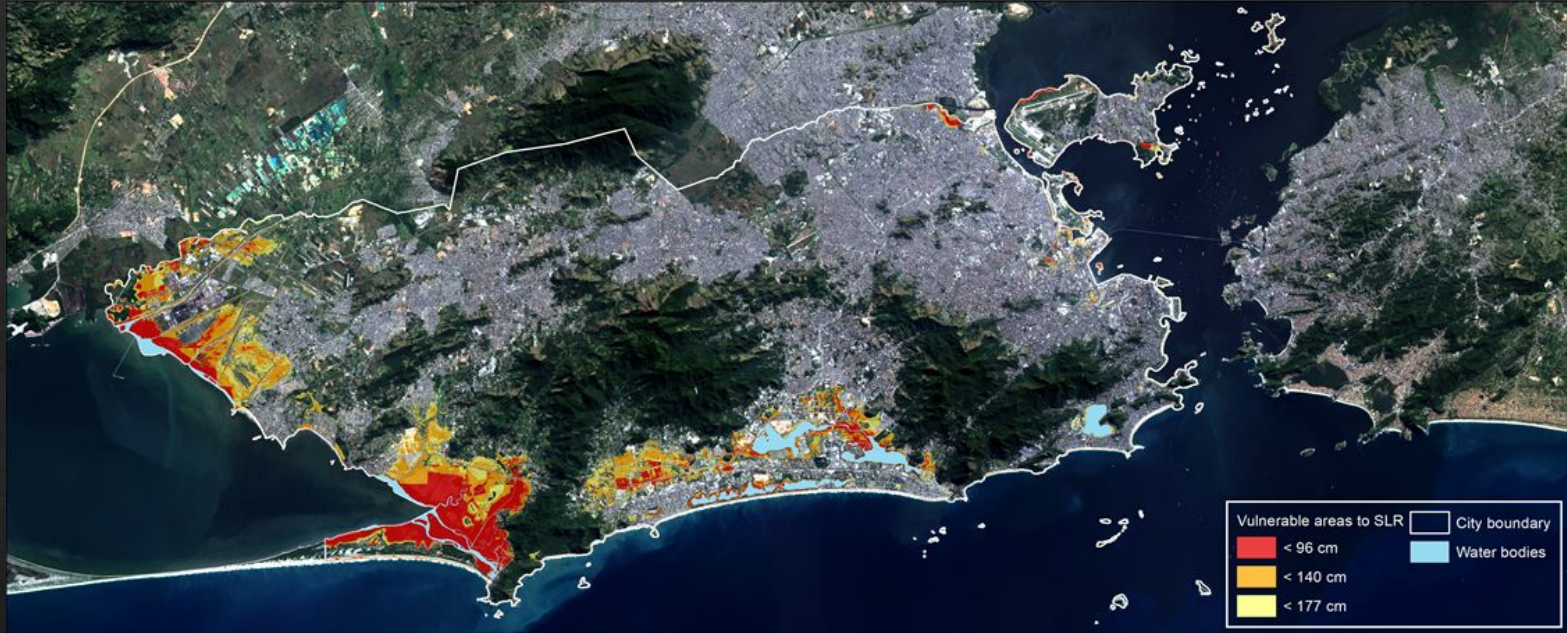


LANDSLIDES COVER ALL COUNTRIES, BUT WE NEED YOU TO COVER THE HOLES IN OUR DATA

While NASA tracks landslides from space, you can help NASA track landslides from the ground. Use Landslide Reporter to submit to our growing landslide repository.



Identifying Areas Vulnerable to Sea Level Rise



A joint NASA-Rio de Janeiro study used local measurements, a Lidar survey of city topography, satellite altimetry data from TOPEX/Poseidon and the Jason missions, and CMIP5 climate projections to identify the areas of the city most vulnerable to sea level rise. *[Photo credit: F. Mandarino, IPP, Rio de Janeiro]*

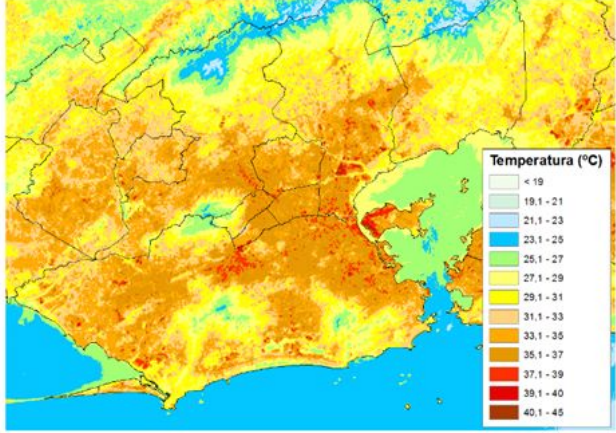
Identifying Rio's Urban Heat Island

Armazém de Dados

A CIDADE DO RIO DE JANEIRO VISTA DO ESPAÇO: 1. Mudanças Climáticas e as Ilhas de Calor.

IMAGENS DO SATÉLITE LANDSAT 8 DE 12 DE JANEIRO DE 2015 E MAPA DE TEMPERATURA.

CLIQUE NO MAPA E VISUALIZE O MUNICÍPIO OU SEU BAIRRO.



Temperatura (°C)

| |
|-----------|
| < 19 |
| 19,1 - 21 |
| 21,1 - 23 |
| 23,1 - 25 |
| 25,1 - 27 |
| 27,1 - 29 |
| 29,1 - 31 |
| 31,1 - 33 |
| 33,1 - 35 |
| 35,1 - 37 |
| 37,1 - 39 |
| 39,1 - 40 |
| 40,1 - 45 |

CLIQUE AQUI PARA AMPLIAR O MAPA DE TEMPERATURA.

Facebook Twitter

IMAGENS DO SATÉLITE LANDSAT 8 DE 13 DE FEVEREIRO DE 2015 E MAPA DE TEMPERATURA.



Landsat data is being used to generate surface temperature maps for the greater Rio area. Data for 26 different days are available now, supporting heat mitigation policies.

An open data web tool serves to demonstrate how remote sensing can be used at the local scale in planning and monitoring public policies.

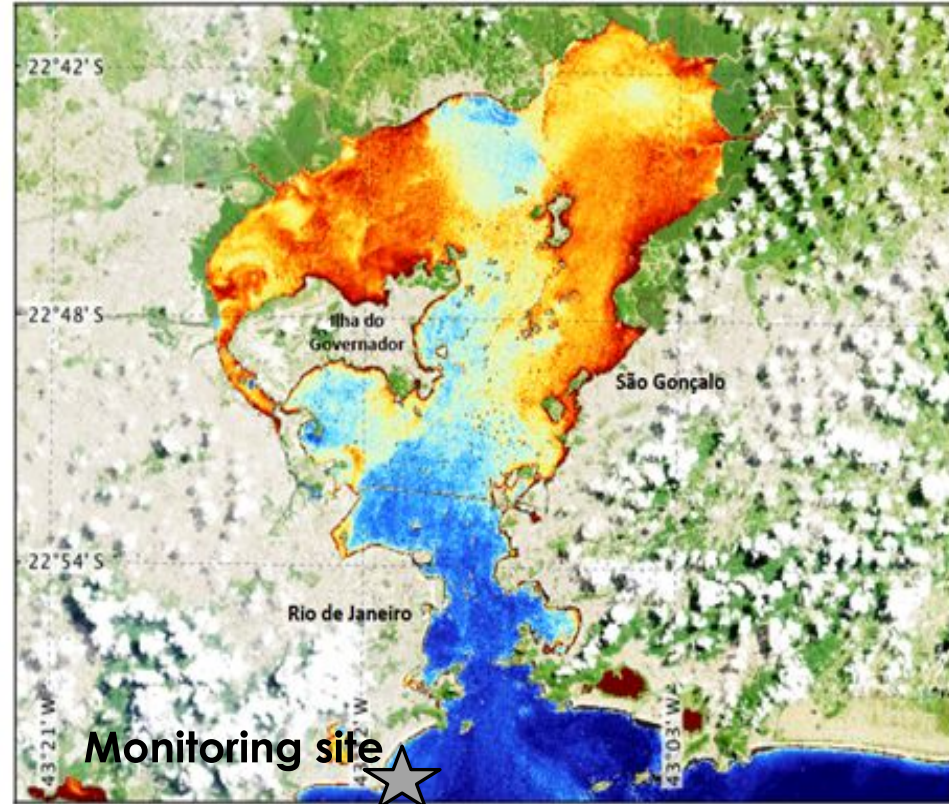
The next steps planned for this research are aiming to focus on the relationship between extreme heat and public health.

esri

Water Quality Monitoring in Rio

Satellite maps of water quality indicators such as chlorophyll and total suspended solids **provide a much broader view of water quality** compared to in situ monitoring site at Rodrigo de Freitas Lagoon.

An experimental water quality tool could provide Rio with **early indications of potentially hazardous conditions** in the area.



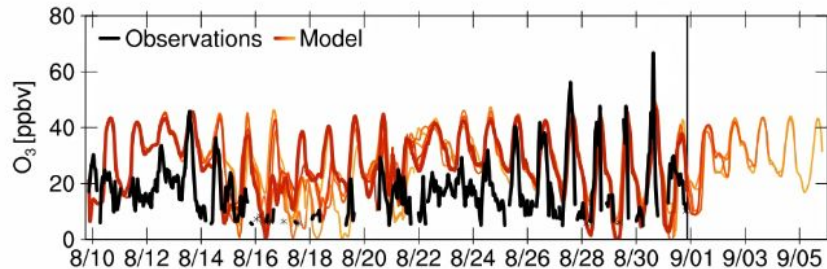
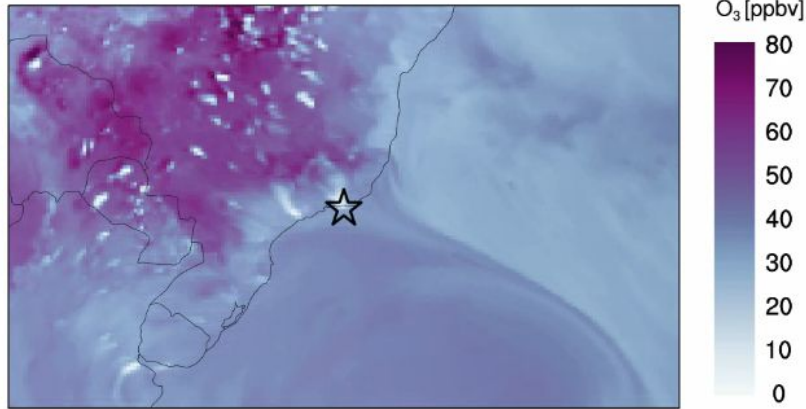
Guanabara Bay, Brazil, 19 March 2016

Fonte: NASA

Air Quality Monitoring & Forecasting



Rio de Janeiro, 2017-08-31 23:45 UTC



Air quality measurements taken in Rio are being compared with output from NASA's new air quality forecast system.


The initial comparison showed **limitations in the model** emissions when evaluated over Rio. The City of Rio provided a local emissions inventory to improve model performance.



Educational Webinars



Parceria_Rio_NASA_Webinar_opening_Oct19th.pptx

LuizArueira.jpeg



Parceria Rio de Janeiro – NASA
Abertura do 2º Webinar – 19/10/2016

Luiz Roberto Arueira
Diretor de Informações da Cidade
Instituto Pereira Passos
Prefeitura da Cidade do Rio de Janeiro

Participantes (14)

- Luiz Roberto Arueira
- Hosts (3)
 - Dorian Janney
 - INÊS MALUAD
 - Maria Cristina Zamith Cunha
- Presenters (7)
 - Alexandre
 - Bruno
 - douglas morton
 - Felipe Manderino
 - Luiz Roberto Arueira
 - Pawan Gupta
 - Sergio Almeida
- Participants (4)
 - luizaberttrand@biociencias.ufj
 - Robert Levy
 - Rodrigo

Iniciativa Educacional da Parceria RIO- NASA



Dorian Janney
Especialista em educação e divulgação do GPM

Webinar Rio #1
9/08/2017

NASA conducted two series of educational webinars in partnership with Rio de Janeiro. The webinars provided a broad introduction to NASA's Earth science satellite missions and ongoing activities related to climate change impacts, extreme weather, and water and air quality.

Educational Webinars

The first series focused on providing scientific background information. The second series included local examples of how to **integrate NASA Earth Observations and programs into Rio's educational programs.**

Series 2016

- #1- **Climate Change Basics** and the Use of Earth Observations, Urban Heat Islands

- #2- **Impact of Precipitation and Sea-level Rise** in Rio and Air Quality and Fires

- #3- **Water Quality, Ocean Color, and Sea-Level Rise**

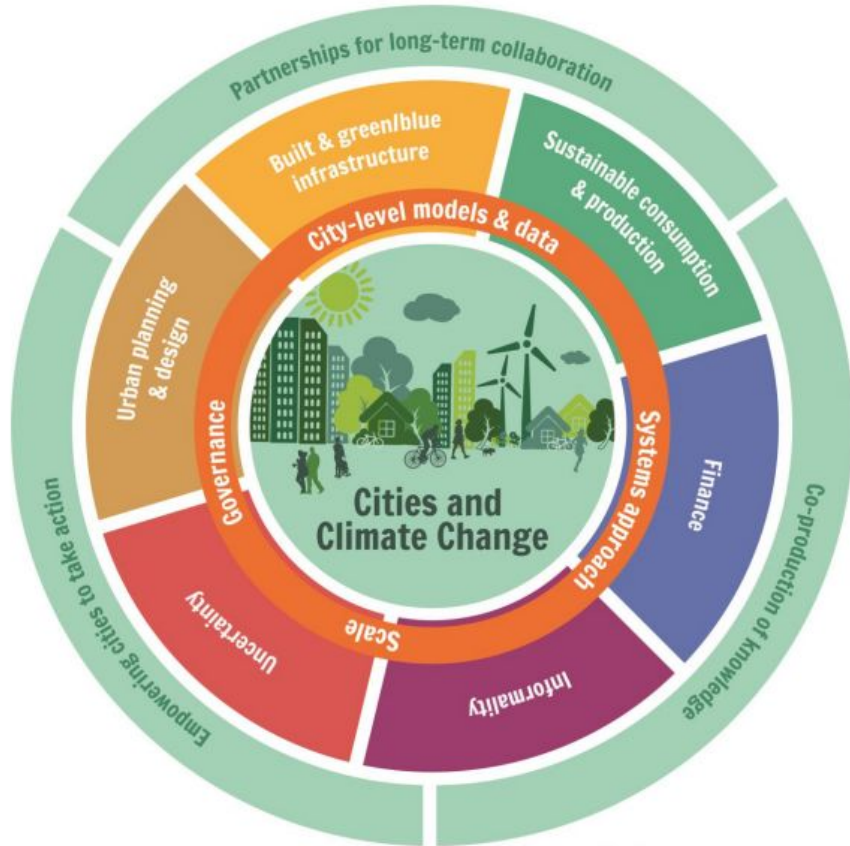
Series 2017

- #1- **Using NASA EO to Understand Climate Change**, Using GLOBE Program protocols at the Minas Geras School to Study Climate Change

- #2- **Climate Change examples in Brazil**, Urban Heat Islands in Rio, Using GLOBE protocols to Study Urban Heat Islands in Rio

- #3- **The GPM mission**, Alert Systems in Rio for Intense Precipitation and Landslide Risk, Urban Rain Drainage

- #4- **Disaster Risk Reduction and Response** from NASA's Perspective, Civil Defense Program in Rio Schools



Global Research and Action Agenda on Cities and Climate Change Science

- Main takeaway from the Cities IPCC Cities and Climate Change Science Conference
- NASA-Rio participants at the Conference:
 - Felipe Mandarin, IPP, Rio de Janeiro
 - Maggie Hurwitz, NASA Goddard & SSAI
- Presentation on sea level rise projections for Rio, including maps identifying vulnerable areas
- The partnership between Rio and NASA is already delivering in key topics of the agenda, e.g. city-level models & data, scale (issues/gaps) co-production of knowledge and partnerships for long-term collaboration (approaches)

View Forward

- ◆ Continuing to advance our mutual interests in discovering new ways to use Earth observations for advancing Rio de Janeiro's capabilities to monitor, predict and make decisions on environmental issues
- ◆ Sharing data, information and experiences
- ◆ Rio de Janeiro can serve as a model for other cities to couple Earth observation data and models with local measurements for informed decision-making on environmental and climate issues

Thank you!

Rio de Janeiro

São Paulo

Belo Horizonte

