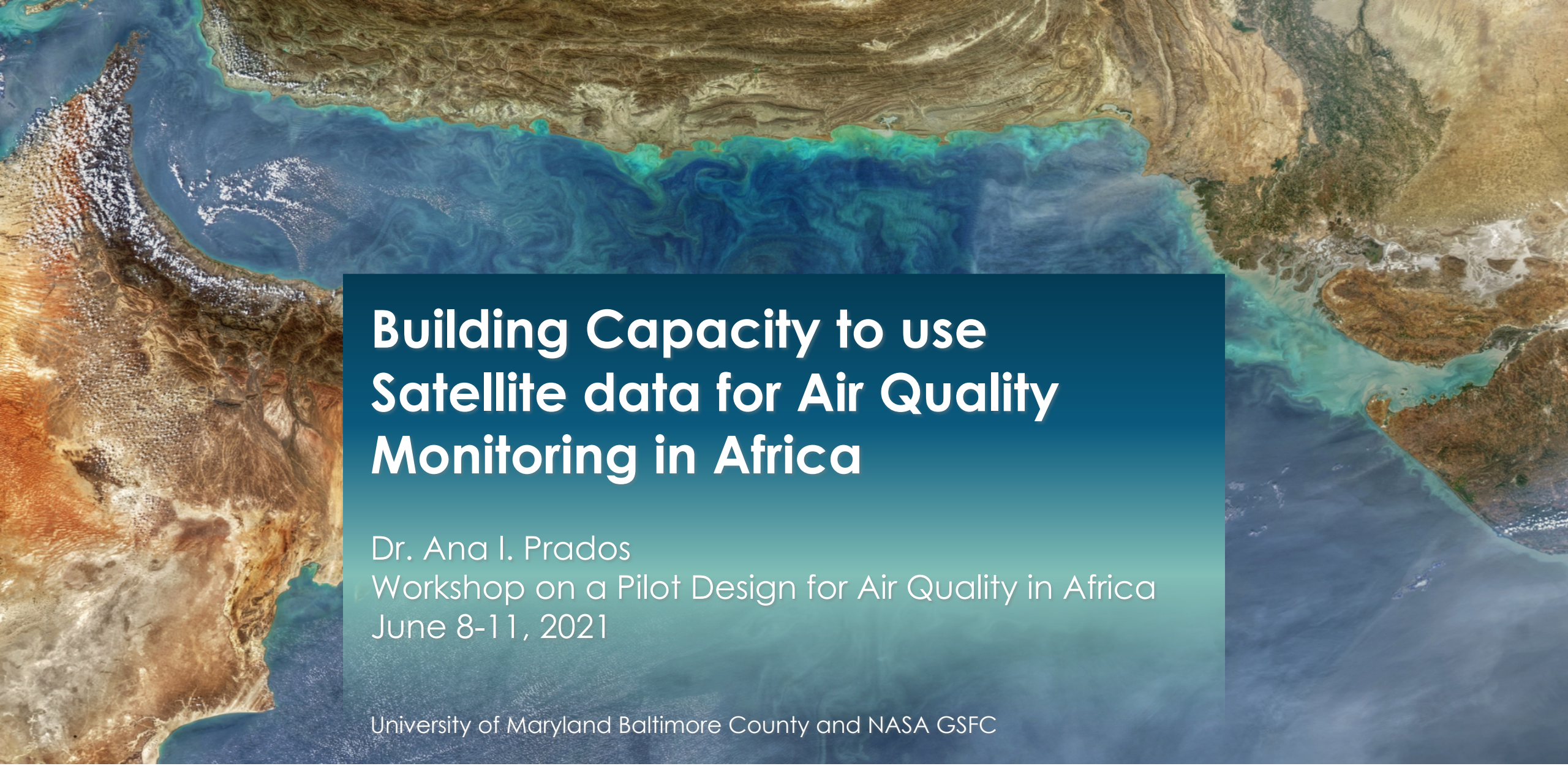


Building Capacity to use Satellite data for Air Quality Monitoring in Africa

Dr. Ana I. Prados

Workshop on a Pilot Design for Air Quality in Africa
June 8-11, 2021

University of Maryland Baltimore County and NASA GSFC

Barriers to use of Remote Sensing Data

1. **Data and Access:** spatial/temporal resolution, inability to find the data I need, difficult data formats, accuracy, working with column measurements

2. **Confidence:** uncertainty in long term data continuity, limited ground truthing

3. **Knowledge Gaps:** understand data strengths & limitations, how to use it for research and decision-making, conduct the analysis and interpret the results

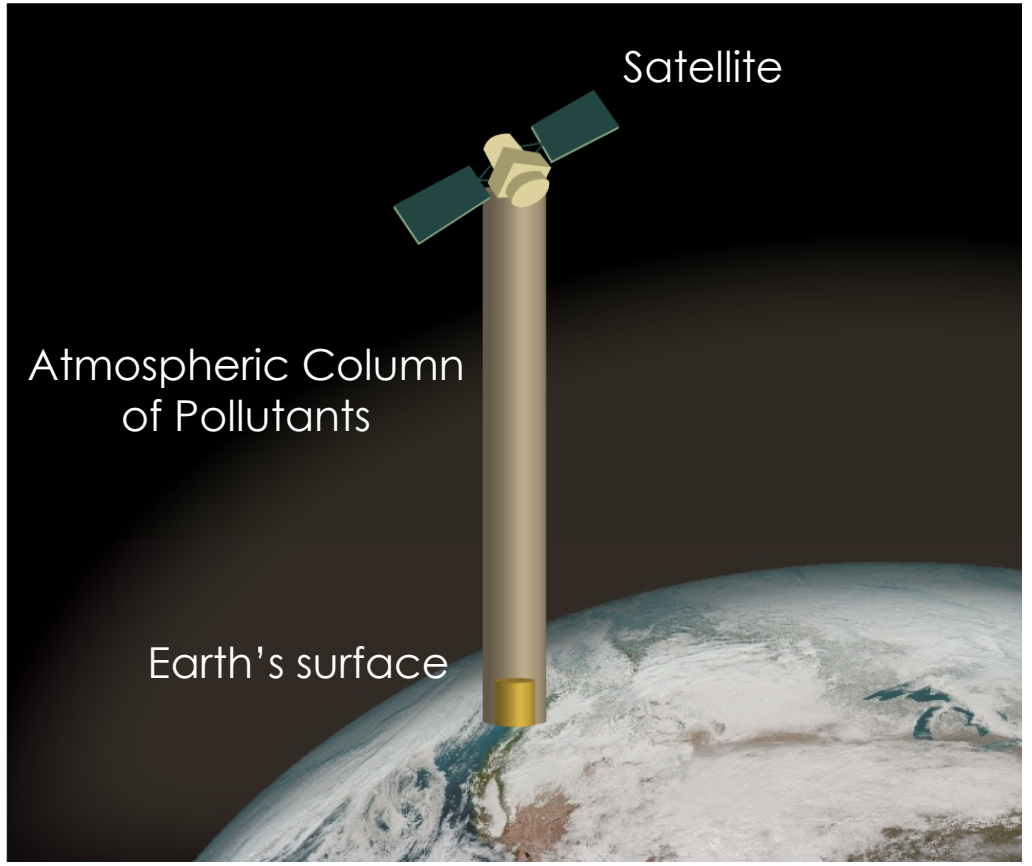
4. **Technical:** computationally intensive, download of large data files, capacity limitations

Working with Satellite 'Column' Data

- Data users need information on current and future air quality conditions *at ground level, and specifically the concentration of pollutants* (fine particles, trace gases)

- *But* ground level pollution is not measured directly by the satellites: satellite instrumentation measures the total amount of pollution between the surface of the earth and the satellite (atmospheric column)

- While it is possible to obtain information about ground level pollution from satellites*, it is a complex process that is beyond the capability of most users*



Applied Remote Sensing Training Program (ARSET)

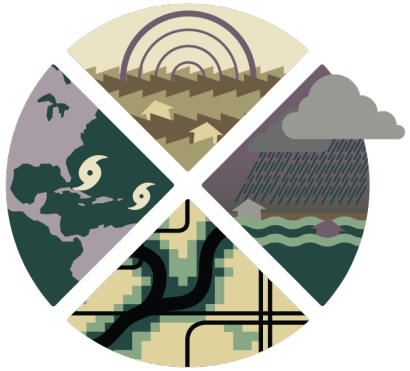
http://appliedsciences.nasa.gov/arset @NASAARSET

- Cutting edge remote sensing education through online and in-person trainings since 2009
- Basic, intermediate, and advanced levels
- Free access to live sessions, recordings, and training modules
- English and Spanish (working on French and Portuguese....)

Next Air Quality Training:
Global Air Quality Forecasting, September 2021

Air Quality

Disasters

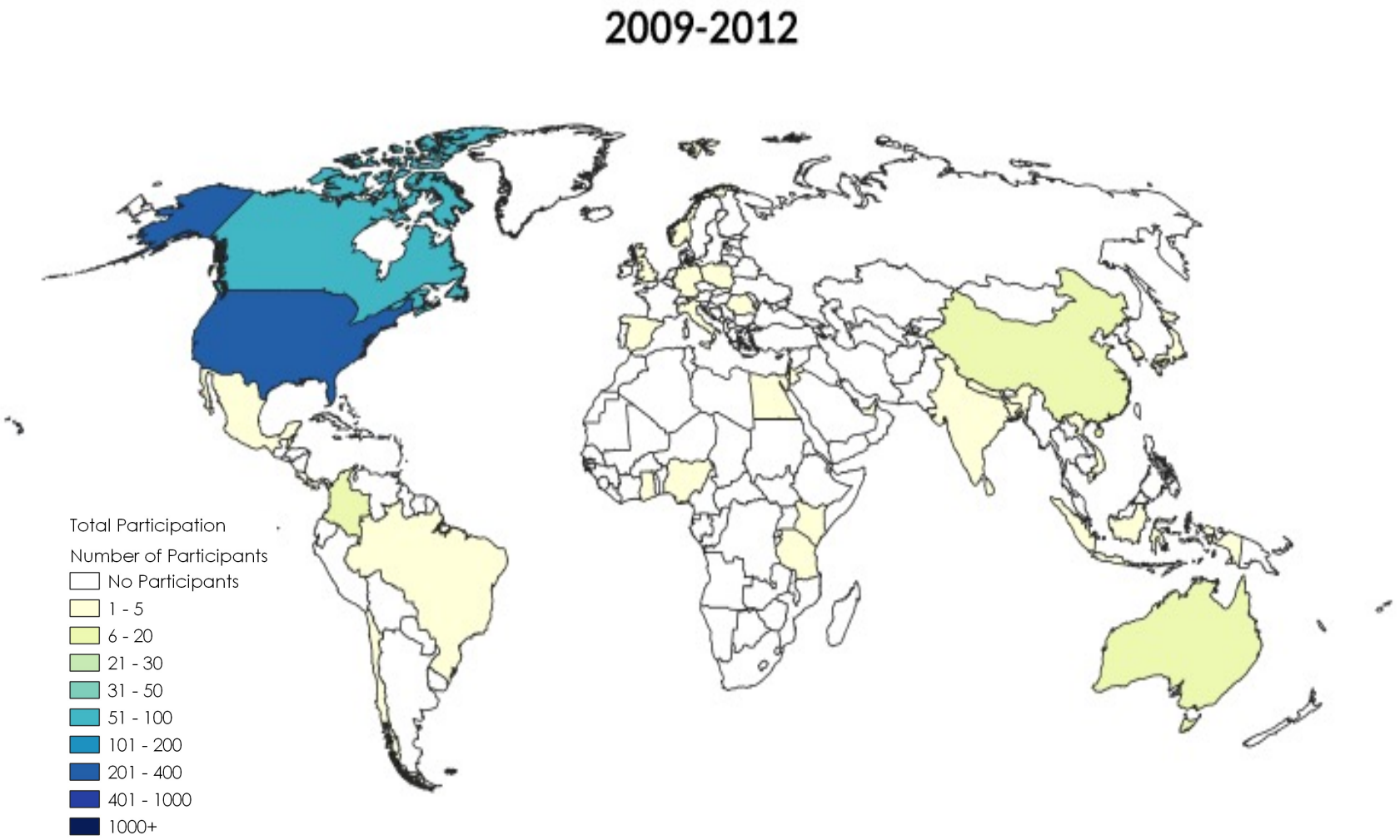


Land and Fires

Water

Global Participation

Live Training in English and Spanish since 2009



153 trainings

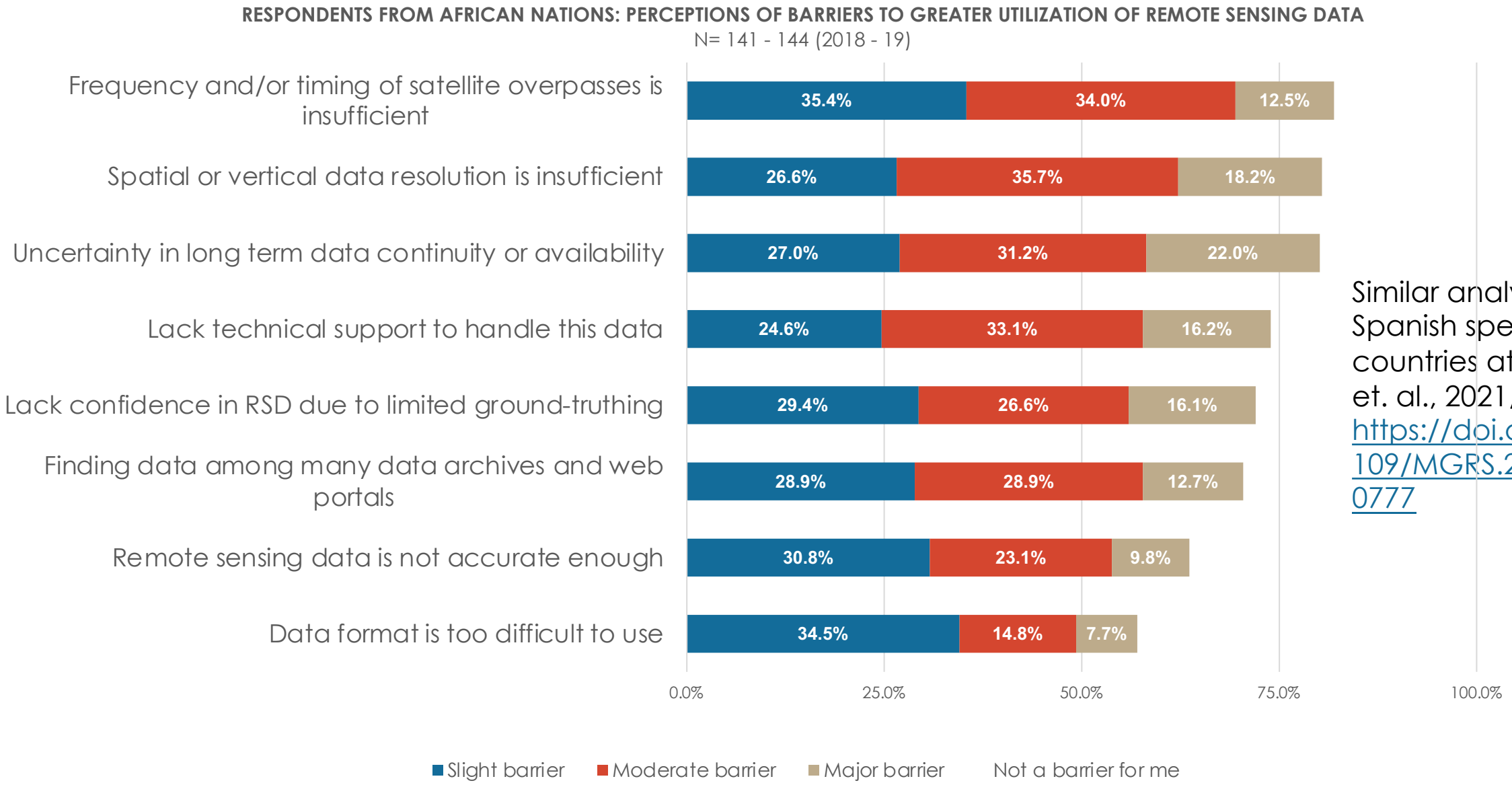
62000+ participants

176 countries

11000+ organizations

Academia (40-50%)
Government (35%)
NGOs, Private Sector (20%)

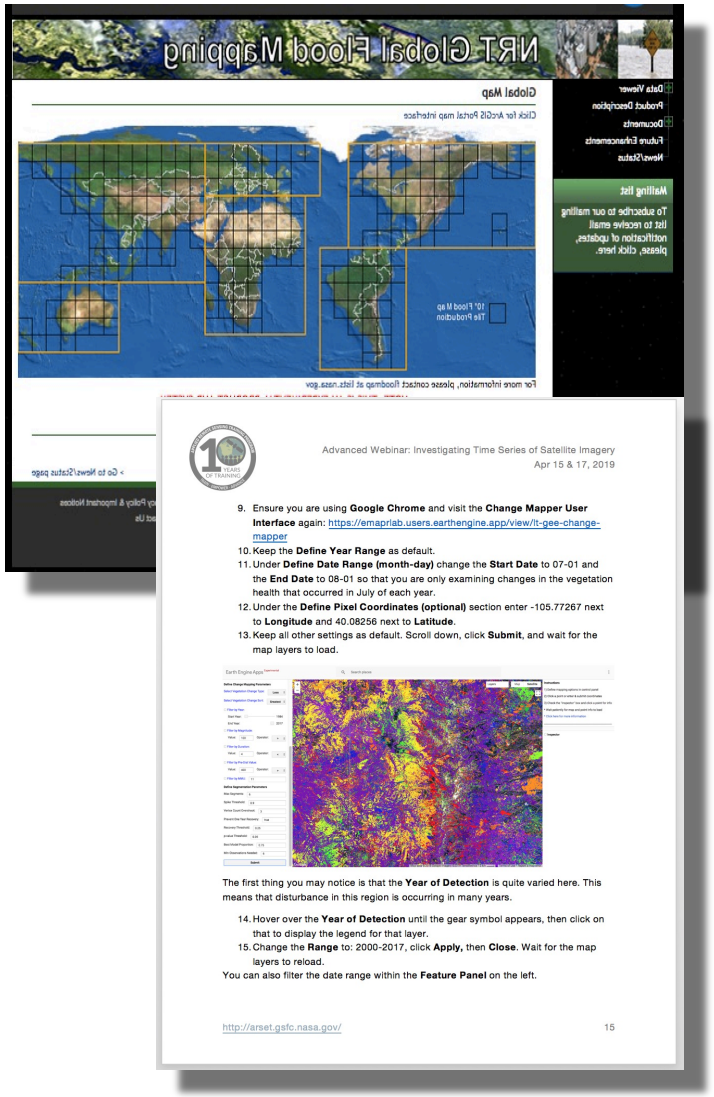
Barriers: Survey data from ARSET participants in Africa



Similar analysis for Spanish speaking countries at Prados et. al., 2021, https://doi.org/10.1109/MGRS.2021.3060777

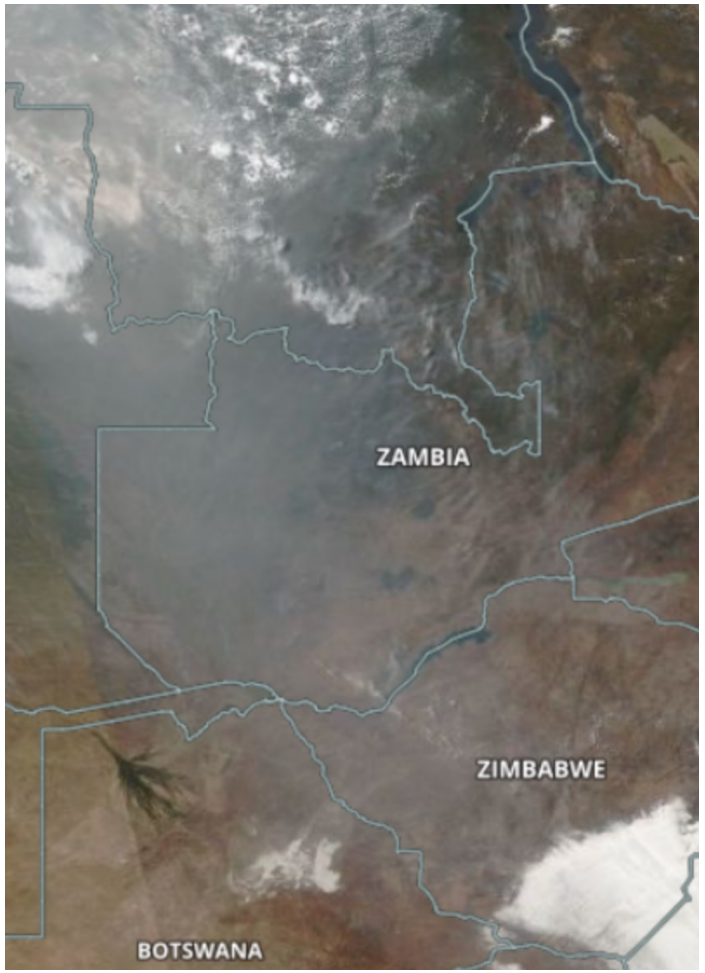
Training Best Practices

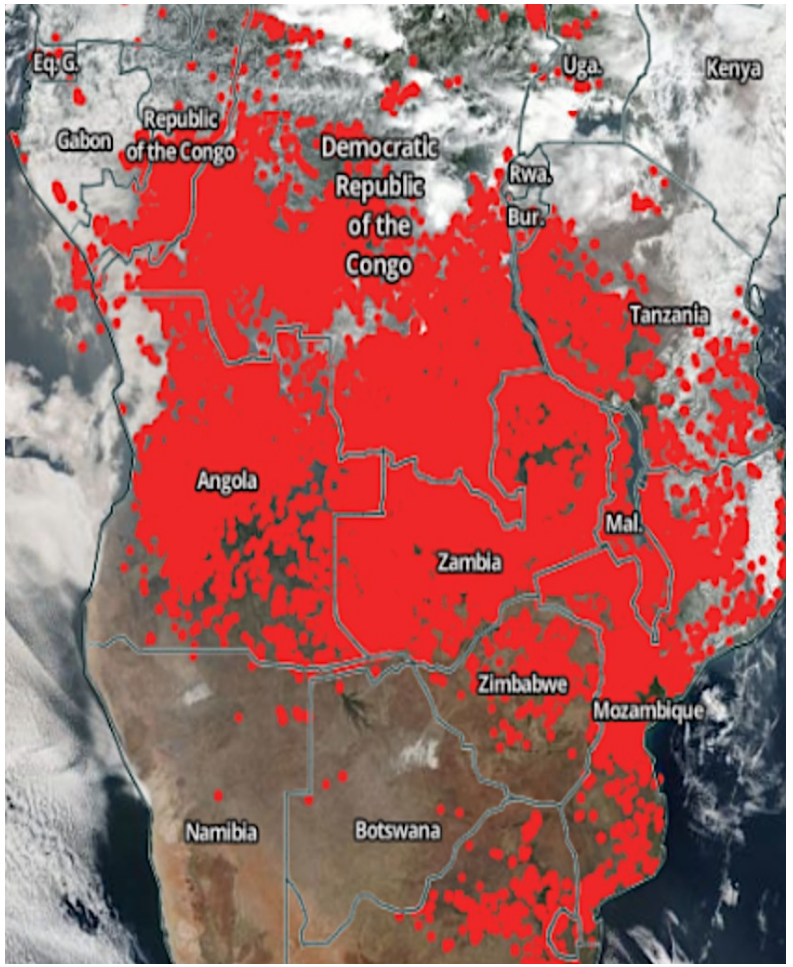
- Provide a roadmap on the use of data for environmental monitoring, management, and communications
- Identify *barriers and user needs*
- Identify a regional focus and collaborators
- Provide guidance on relevant data; how to obtain and interpret it
- Present tools for data access and analysis:
    - Web based (Worldview)
    - Desktop (QGIS, Google Earth Engine)
    - Scripting (python, R)



Training Best Practices

Case Studies and Hands-on exercises tailored to regional needs





Access and interpretation of satellite imagery:

FIRMS

Worldview

and many others

From ARSET Training on Fire Monitoring, May 2021
http://appliedsciences.nasa.gov/arset

“Expanded” CityAQ Initiative Pilot Study

A NASA Health and Air Quality Applied Sciences Team (HAQAST) Project

Goal: enhance air quality decision making in world cities

Will tentatively include Kigali, Rwanda

Other cities in Mexico, Ecuador, Brazil, Colombia

PI: Bryan Duncan
Co-Is: Ana Prados, Kevin Cromar, Christoph Keller, Emma Knowland

Current CityAQ:

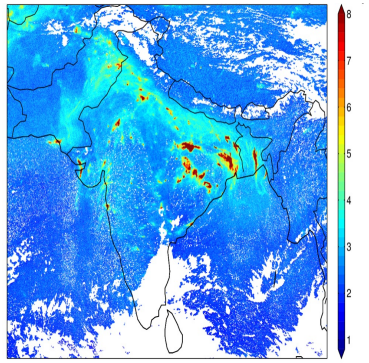
NASA Forecast System (tailored forecasts)

Machine Learning

Ground Monitoring

→ **“Expanded” CityAQ**

Satellite Data



Low Cost Sensors

Interested in finding out more about Expanded City AQ or becoming a part of if?

Contact me or Bryan Duncan

aprados@umbc.edu

bryan.n.duncan@nasa.gov

Contact:
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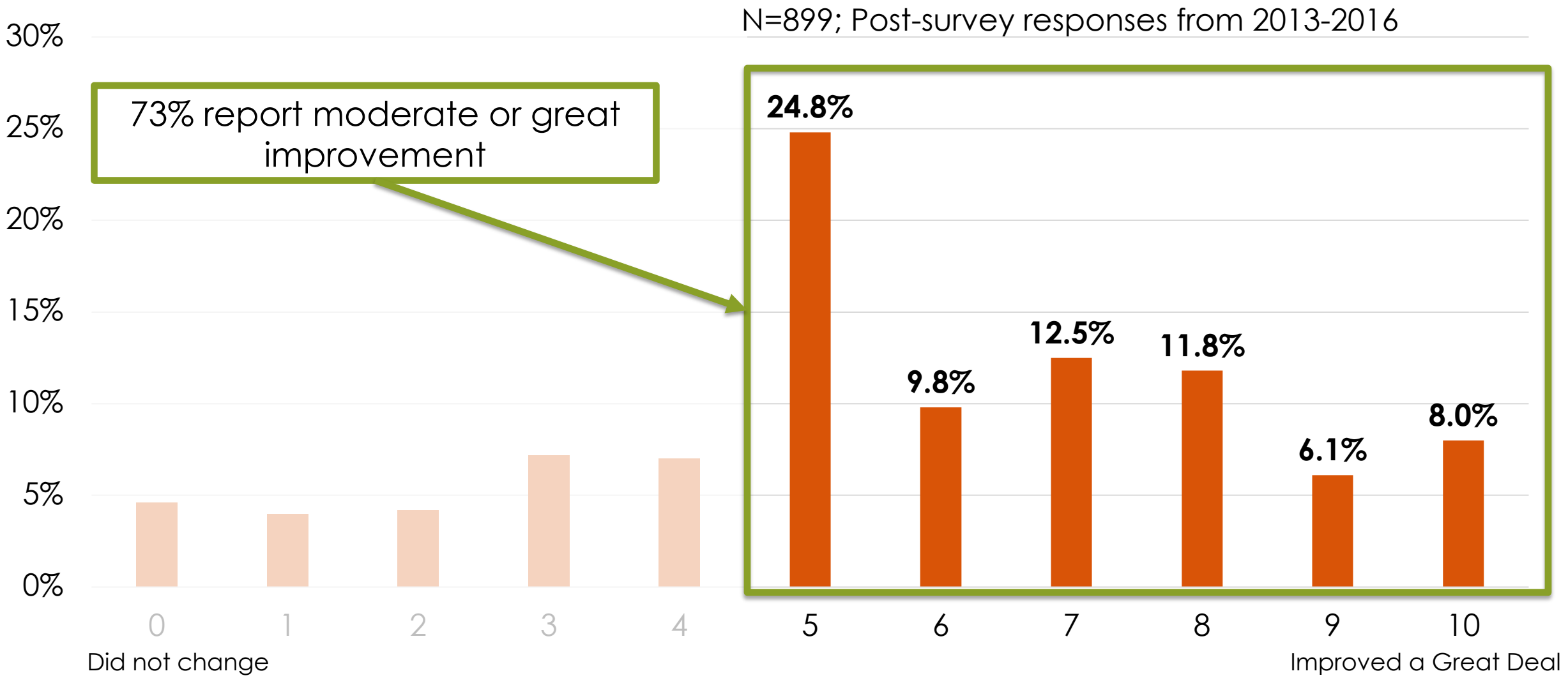
@aprados1
linkedin.com/in/anaprados

Extra slides

Improvements in Decision Making



Prados et. al., 2019, https://doi.org/10.3390/ijgi8060261

2021 ARSET Trainings: Air Quality

Pre, During and Post Fire Monitoring with NASA satellite and model data:
May 2021

- 6 sessions (two each for pre, during and post fire monitoring, 2 hour each), live in English and Spanish
- Satellites/Sensors: MODIS, VIIRS, GOES, OMI, OMPS, Landsat, GPM IMERG, SMAP, Merra, GEOS-5, LDAS
- Content: access and analysis of satellite data for 3 case studies: California fires 2020, Mexico - May 2019 (tentative), Africa (TBD)
- Motivation: increased frequency of fires and associated impacts due to climate change,

Global Air Quality Forecasting
September 2021

- 3 Sessions, 1.5 hours each
- In collaboration with GMAO
- Content: Currently available global air quality forecasts and how they use satellite and ground observations to improve and evaluate their forecasts
- Motivation: In ARSET surveys conducted post-training, global and regional air quality forecasting is consistently one of the most selected topics among AQ training attendees. In addition, the NASA GMAO has a newly available global composition forecast.