PA23A-1151: Leveraging the Power of SAR Observations for Forest Monitoring Systems

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Abstract

Earth observations from Synthetic Aperture Radar (SAR) can provide unique information related to forest structure and condition. Despite the many advantages of SAR, particularly where clouds impede optical observations, a knowledge gap has prevented the applied remote sensing community from harnessing its full potential. Here, we discuss the results of a collaboration between SERVIR, a joint program between NASA and the U.S. Agency for International Development (USAID), and SilvaCarbon, the United States' contribution to the Global Forest Observation Initiative, to build global capacity in using SAR for forest monitoring and biomass estimation. This includes primarily the creation of 1) The ***SAR Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation***, 2) a series of international hands-on trainings and training materials, 3) quick-reference guides illustrating SAR concepts, and 4) animated videos explaining how SAR works.

The SERVIR-Global community joined efforts to develop a hands-on guide to support decision-makers in the forestry community to leverage the power of SAR technology to better protect and manage forest resources. We worked with world-renowned SAR experts to provide targeted trainings and develop the ***SAR Handbook***. This handbook consists of approachable theoretical background and applied content that contributes to filling the knowledge gap in the applied use of SAR technology for forestry applications. We hope that forest managers and remote sensing specialists will use these materials to benefit from currently available SAR datasets, as well as prepare for future SAR missions, such as NISAR and BIOMASS. Since its release on April 11, 2019, the SAR Handbook materials have been accessed more than 320,000 times, demonstrating the remote sensing community's urgent need and interest to learn and use SAR.

Objectives

- **BUILD CAPACITY** to monitor forests and estimate biomass using freely available SAR datasets
- **PREPARE** the remote sensing community to use existing and future SAR datasets, including NISAR and BIOMASS
- **PRODUCE TRAINING MATERIALS** on standard SAR processing techniques to monitor forests and estimate biomass using open source resources
- **DETERMINE IMPROVEMENT AREAS** for future SAR capacity building initiatives

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Methodology

SERVIR network-wide needs assessment

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Partnering with six SAR subject matter experts

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Collaborating on trainings, theoretical chapters, and a suite of communication and education materials

Products

A series of one-pagers distill complex information and processes into an easy to understand format. The topics of these one-pagers range from data preprocessing to forest stand height estimation to SAR vegetation indices and more.

SAR Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation

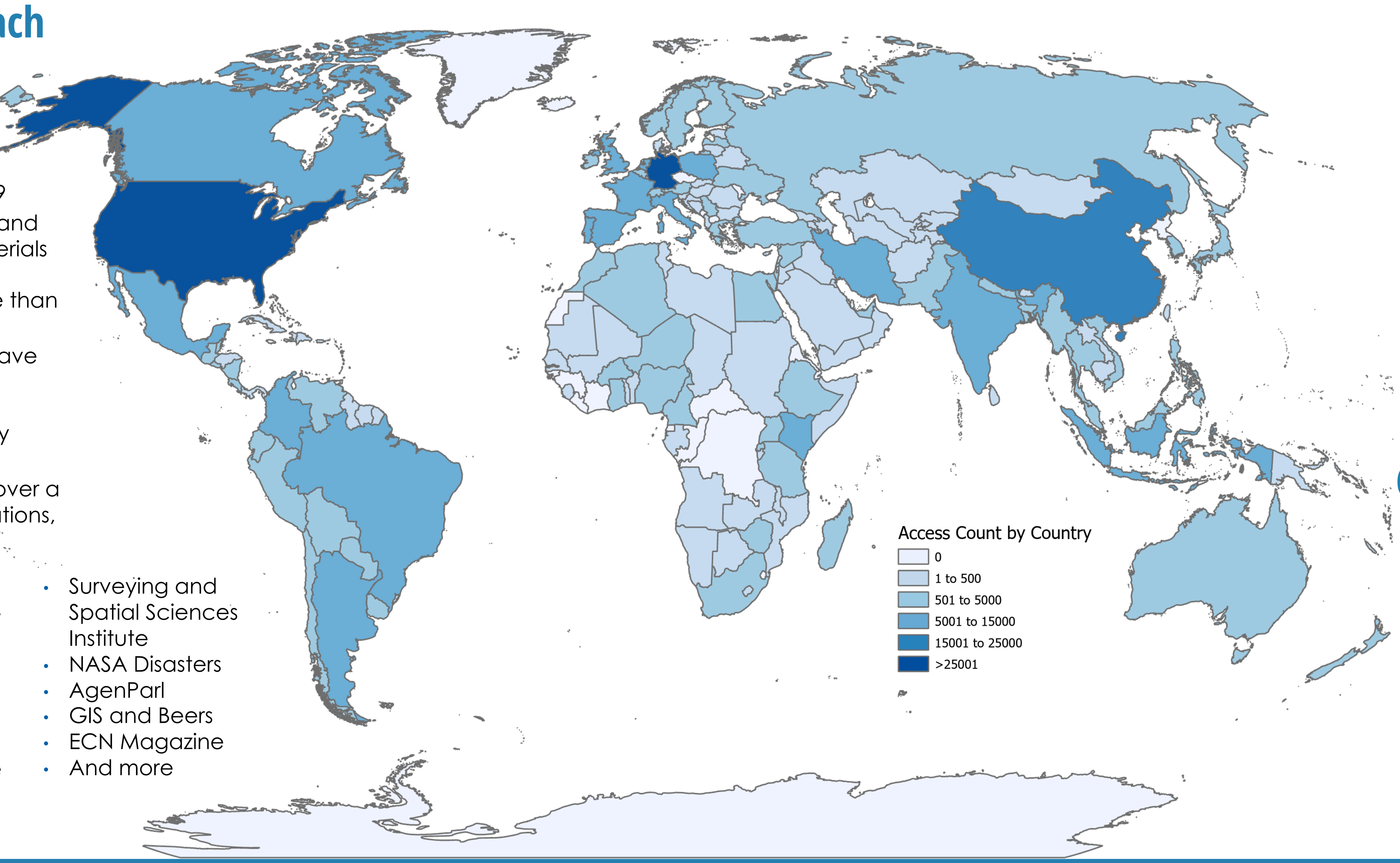
Download the Handbook from ServirGlobal.net

Selected pages from Chp 6: Radar Remote Sensing of Mangrove Forests (by Dr. Marc Simard, Sr. Scientist & mangrove specialist, NASA Jet Propulsion Laboratory)

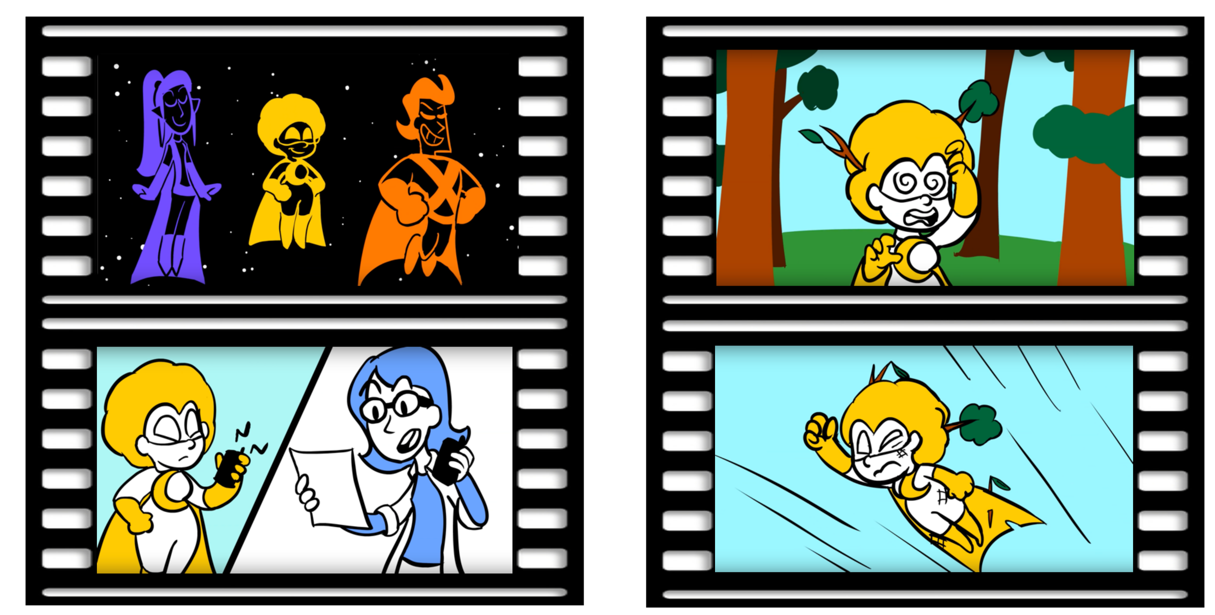
Global Reach

From April 10 – October 31, 2019

- Full Handbook and additional materials have been accessed more than **320,000** times
- **172** countries have accessed SAR Handbook and complementary materials
- Shared across over a **dozen** organizations, including:
  - JAXA
  - EO College
  - UN SPIDER
  - GeoSpatial World
  - ECN Magazine
  - GIS Lounge
  - NASA NTRS
  - Surveying and Spatial Sciences Institute
  - NASA Disasters
  - AgenParl
  - GIS and Beers
  - ECN Magazine
  - And more



Animated Videos



Three animated videos are currently in production. Topics include SAR basics, SAR and biomass, and forest stand height.

Conclusions

- The Handbook is a **living document**; there will be continual development of applied content and trainings
- There is a need for follow-on refresher courses and improved skills transfer processes to **move from trainings to operational use**
- Identified need to **develop allometric equations** to improve localized biomass estimation
- Focus on using **open-source software** is the right solution but brings additional challenges in terms of capacity building

QUESTIONS? Contact kelsey.e.herndon@nasa.gov

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