Capacity Building in Africa to Improve Cyberinfrastructure

Science and Cyberinfrastructure in Africa
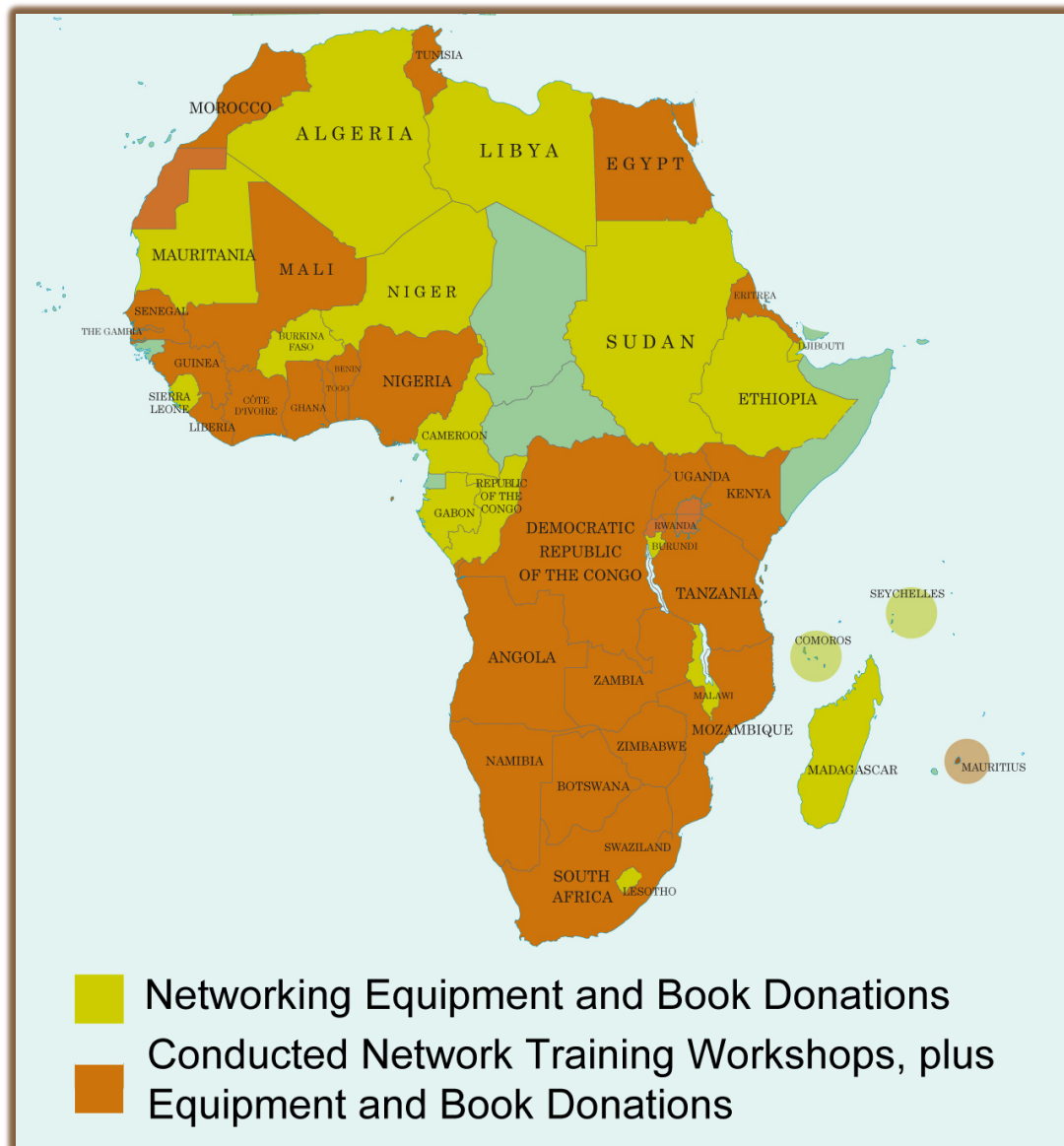AFREN 2012
Serrekunda, The Gambia

NSRC capacity building in Africa

Through capacity building, help cultivate the international research and education network fabric, which is an essential underpinning of cyberinfrastructure

- This is part of our core funding from the National Science Foundation

- NSRC provides

    – technical information,

    – direct engineering assistance,

    – training,

    – equipment to universities, research institutions and networking organizations in developing areas.

- **Assisting those who take ownership of the problems or challenges they are trying to solve – i.e., "*Local hands cultivating local expertise*"**

Activities in Africa

Networking Equipment and Book Donations

Conducted Network Training Workshops, plus Equipment and Book Donations

RENs: serving the scientific community

NSRC involvement

Capacity building

Planning

Equipment and books

Direct Engineering Assistance

Including

Kenya (KENET)

Morocco (MARWAN)

South Africa (TENET)

Tanzania (TERNET)

Senegal (SnRER)

Ghana (GARNET)

Nigeria (ngREN)

UbuntuNet (West/Southern Africa)

WACREN (West/Central Africa)

NSF-NCAR CI Workshop

August 5-6, 2011- Boulder, Colorado

http://nsrc.org/Science-CI-Africa/

In coordination with:

- NCAR (National Center for Atmospheric Research)

- NSF (National Science Foundation)

- NSRC (Network Startup Resource Center)

  - Sponsorship from Google

  - Supported by University of Oregon

NSF-NCAR CI Workshop

Bringing together Network Engineers and Scientists from Africa and the United States

- Focus areas included atmospheric research, sensor networks and health.

- Part of NCAR Integrated Science Program on African Weather and Climate:
  http://www.mmm.ucar.edu/events/ISP/agenda/agenda.php

- Present were medical and climate scientists, researchers and network engineers from universities and associated organizations in Africa and the United States:

  1. Scientists presented on their work and needs...

  2. Network engineers presented on connectivity challenges in Africa and...

  3. We helped bridge the gap in understanding between the two sides.

NSF supports hard sciences and on-the-ground climate research in Africa. We facilitate this through building the physical and human networks.

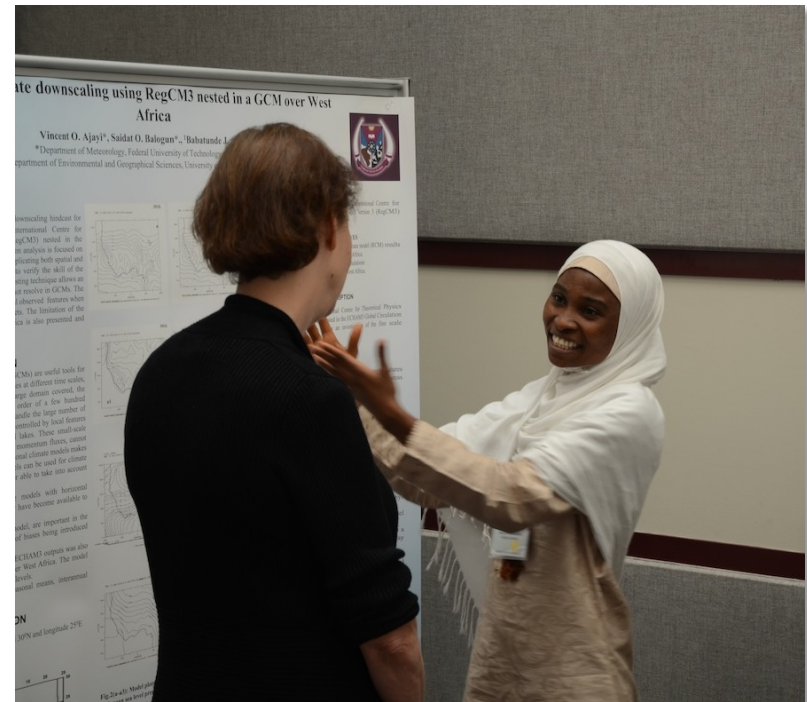# NSF-NCAR CI Workshop

Network engineers visit the UCAR Mesa Lab High Performance Computing center outside Boulder, Colorado.

NSF-NCAR CI Workshop

Attendees presenting and participating during the Science and CI Workshop and NSF Summer Colloquium in Boulder, Colorado

African collaborators

Delegates from Africa:

- Burkina Faso
- Cote D'Ivoire
- Ethiopia
- Ghana
- Kenya
- Nigeria
- Senegal
- South Africa
- Tanzania
- Zimbabwe

Scientists and Engineers from:

- Addis Ababa University
- Association of African Universities
- Atmospheric Research & Info Analysis Lab, OAU, Nigeria
- Council for Scientific and Industrial Research, South Africa
- Direction de la Météorologie, Burkina Faso
- Federal U. of Technology, Akure, Nigeria
- Jamo Kenyatta University, Kenya
- Kenya Education Network (KENET)
- Kenya Medical Research Institute
- Université Cheikh Anta Diop de Dakar
- Laboratory for Atmospheric and Oceanic Physics (LPAO-SF), Senegal
- Maritime University, Ghana
- Tertiary Education and Research Network (TENET), South Africa
- University of Cocody, Cote D'Ivoire
- University of Ghana
- University of Zululand

Collaborators: Italy and the USA

Collaborators from:

Universities of:
- Colorado State
- Colorado-Boulder
- Connecticut
- Indiana
- Miami
- Missouri
- North Carolina State
- Oregon
- Texas

- ICTP
- Internet2
- NCAR Education & Outreach
- NCAR
- NOAA
- NSF
- NSRC
- UCAR Africa Initiative / COMET CISL / MMM / RAL
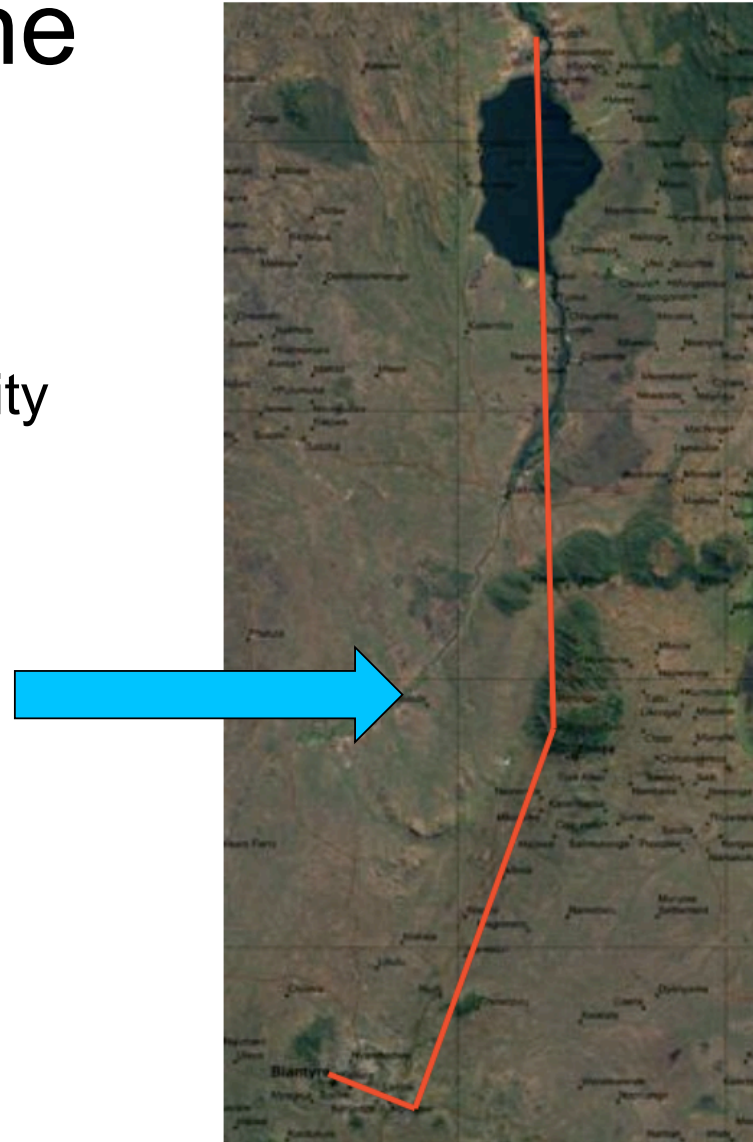- UNAVCO
- Unidata

Acronym translator

- **ICTP:** Abdus Salam International Centre for Theoretical Physics

- **NCAR*:** National Center for Atmospheric Research

- **NOAA:** National Oceanic and Atmospheric Administration

- **NSF:** National Science Foundation

- **UCAR*:** University Corporation for Atmospheric Research

  - Africa Initiative – UCAR and Africa research and applications program

  - CISL: Computational and Information Systems Laboratory

  - COMET: Environmental Sciences Education and Training

  - MMM: Mesoscale and Microscale Meterorology Division

  - RAL: Research Application Laboratory

- **UNAVCO*:** University Navstar Consortium

- **Unidata*:** University Data (UCAR)

Outcomes from the Workshop

UNAVCO AfricaArray Sensor site for climate research connectivity in Malawi

UNAVCO climate sensor to to use network connectivity from wireless tower near Zomba Peak, Malawi.

ICTP wireless network backbone link from from Blantyre to Mangochi via Zomba Peak, Malawi

Outcomes from the workshop

First West African Workshop on Wireless Sensor Networks

- AAU, University of Ghana Legon, ICTP, UCT and NSRC

- December 5-8, 2011

- Held in Acrra at the UCT Directorate, U of Ghana, Legon

- Instructors from ICTP and NSRC

- This led to...

Wireless service provisioning at U of Ghana, Legon (Dec)

- Marco Zennaro, ICTP

- Sebastian Buettrich, NSRC

- Emmanuel Togo, U of Ghana Legon

Outcomes from the workshop

Wireless service provisioning at U of Ghana is leading to...

- In the field, testing of lower-cost wireless infrastructure for campus networks using Ubiquiti hardware

- Sharing the knowledge gained with other universities in Africa

- An organic and dynamic process

Outcomes from the workshop

Rain sensor deployment project at UCAD Senegal

- Working on low-cost, rain sensor options with professor Amadou Gaye, member of Faculty of Science and Technology Training at UCAD

- Alternate hardware solutions discussed

- UCAR and ICTP working on prototype sensor to deploy with Professor Gaye and as a pilot UCAR project (dozens of sensors are planned in the initial phase).

Outcomes from the workshop

High speed network connectivity discussions

- Discussions of America Connects Europe (ACE) ⇔ UbuntuNet peering

Continued collaborations...

- Dr Ousmane MOUSSA TESSA (WACREN board member) attended and presented about progress towards an NREN in Niger at the Internet2 meeting in Washington, D.C. this past April.

- UCAR visits in Kenya, Niger

- News of a new website by the Ethiopia National Meteorological Agency (NMA) sharing historical weather data ⇔ Sharing of information among new colleagues in the US and Africa

- New bridges formed – UCAR / NCAR with local Network Engineers, ICANN Africa, ISOC and Government agencies in Niger and Kenya

Looking forward

The program in Boulder, Colorado (USA) was a success, but...

… shall we not take this one step further, and bring together scientists, researchers and network engineers from Africa and other countries around the globe?

A proposal: Science and Cyberinfrastructure in Africa workshops…

NSF
NATIONAL · SCIENCE · FOUNDATION

Google

google.org

Richard M. Karp Charitable Foundation

Internet Society

The Andrew W. Mellon Foundation

THE KRESGE FOUNDATION

MacArthur Foundation

FORDFOUNDATION

CISCO SYSTEMS

UNIVERSITY OF OREGON

intel

Partnership for Higher Education in Africa

TIDES
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Joel Jaeggli
Randy Neals
Jim Williams
Suzanne Woolf

Rockefeller Foundation
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ICANN

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advancing nutrition, improving lives.

Pan Asia Networking

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