Space Capability in Ethiopia

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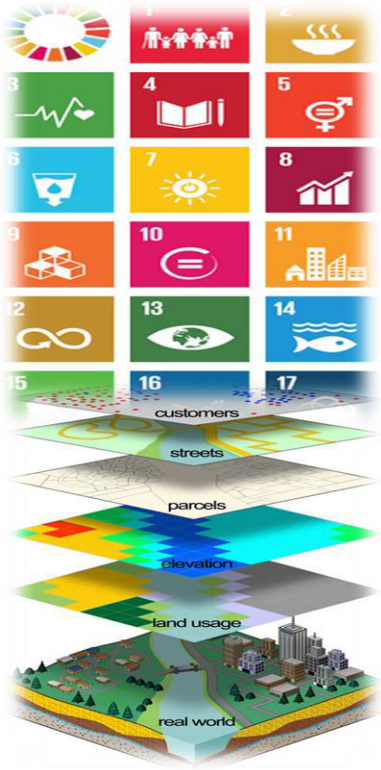
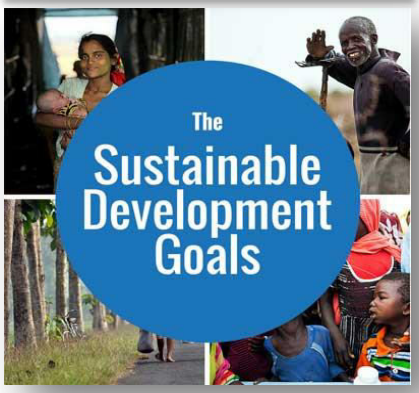
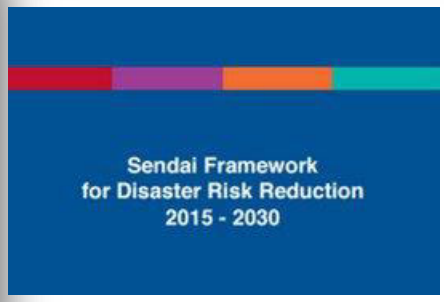
Background/ Space Technology for SDGs

Global Need for Space based Information



Agenda
2063
The Africa
We Want





National Development Plan

- Monitoring global targets, regional, and national plans, requires up-to-date information.
- Space-based information is identified as crucial for monitoring SDG goals.

Background/ Space Technology for SDGs

* Geospatial and space-based technology (Earth Observations) is valuable in addressing Africa's challenges and advancing Africa's ability to meet the aspirations of agenda 2030 as well as agenda 2063
* Use of geospatial and space-based technology will greatly help in addressing and monitoring the sustainable development goals
* The contributions of space technology and its applications for sustainable development well recognized
* African Countries need to develop their capability in space science and technology
* The relevance of space science for developing country, led by the agricultural and industrial economy:
  * Utilizing space-based technology and pursue space research - to expand the economy, improve agriculture, fight climate change, disaster risk management, and create jobs

Space capability in Ethiopia

* Space capability: the establishment of geophysical observatory dates back in 1957
* Addis Ababa Geophysical Observatory was established in 1957, by Addis Ababa University (AAU), then "University College of Addis Ababa (UCAA)" to conduct research and scientific operations, hosted by Science Faculty
* In 2005, the Geophysical Observatory celebrated its 50th anniversary and a statute that transformed the observatory into an **Institute of Geophysics, Space Science and Astronomy (IGSSA)** was approved by the University's senate.
* IGSSA is a national seismological, geomagnetic and geodetic observatory and its primary duties are conducting permanent monitoring of the earth systems.
* Delivers selected graduate courses at related degree-offering departments of the University.
* In Ethiopia earthquake monitoring started in 1959 and currently there are 9 station managed by IGSSA
* Geodetic work was started soon after the establishment of the Geophysical observatory.

Space capability in Ethiopia

* 2007 to 2012 geodetic activities were also carried out in the Afar Region through the Afar Consortium Project
* In collaboration with the Technical University of Darmstadt and the Federal Agency for Cartography and Geodesy (BKG) of Germany, in 2007 IGSSA established the first permanent GPS station that provides real-time data.
* 24 continuously operating GPS reference stations (CORS) in collaboration with local universities (Haramaya, Adama, Arba-Minch, Mekele as well as metrological centers in Bahirdar and Robe) and international partners, such as the Universities of Purdue (PU) and Massachusetts Institute of Technology (USA).
* Conducts research, utilizing satellite and other space-borne data
  * In collaboration with the Bristol University (UK) deformation patterns in the country are studied using Interferometric Synthetic Aperture Radar (InSAR)
  * In partnership with AA Institute of Technology, Ardhi University (Tanzania) and the University of Edinburgh (UK), IGSSA has recently launched a new MSc program in Geodesy for East Africa

Space capability in Ethiopia

* The Ethiopian Space Science Society (ESSS) initiated in 2004, the establishment of Astronomy and Space Science research centers at Entoto mountain (Addis Ababa) and other Highlands of Ethiopia
* The construction of the center has been started in 2008/2009.
* In 2013 the center has been established, an independent research center "Entoto Observatory and Research Center" by ESSS, 32 public universities, and one private university.
* Hosts two domes: 1 m telescopes installed early 2014
* The observatory was established as a multi-purpose facility to support teaching, research training, science research in astronomy and space science, and for public outreach.

Space capability in Ethiopia

Entoto Observatory and Research Center is engaged in:

* Taking observations (two identical 1 m telescopes)
* Site-testing projects in the highlands of northern part of Ethiopia (close to Lalibela) to put bigger-size telescopes
* ESSS and Entoto observatory to realize International Astronomical Observatory in the highland of Lalibela.
* Launch MSc and Ph.D. programs: in collaboration with AAU; study programs in the fields of astronomy and astrophysics, space science, remote sensing and geodesy

Space capability in Ethiopia

* Government seeks to develop and build satellites for the purposes of national security, disaster management and response, and land management.
* October 14, 2016, the Council of Ministers approved the Establishment of Ethiopian Space Science and Technology Institute and Council both chaired by the Ethiopian Prime Minister
* Ethiopian Space Science and Technology Institute established under the Ministry of Science and Technology (MoST)
* The Space Science Council held its first ordinary meeting in July 2017
* The Ethiopian government (MoST) announced on January 2017 that it intends to build its own medium-sized space launch vehicle (SLV) and develop the capabilities to domestically build satellites.

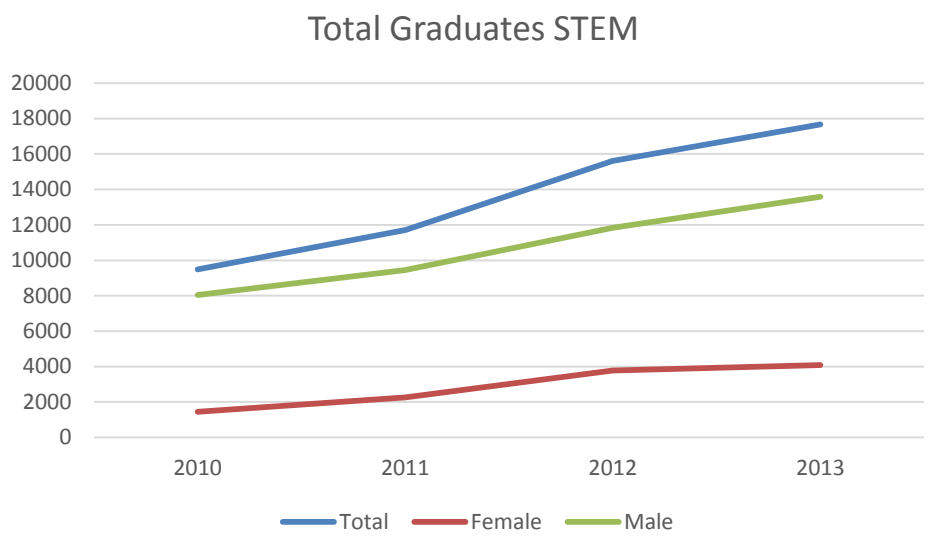
The role of ECA

* Promote the use of geospatial and space-based information and technology
* Promote the contributions of space technology and its applications for sustainable development
* Works with the AU in the African Space Policy
* Work with the regional centers for capacity building in the area of geospatial and space-based technology
* Collaborates with the UNOOSA/UN-SPIDER to assess the capacity of countries in the area of space technology:
  * *Participated in the Technical Advisory Missions*
  * *Participated in the data collection for the "Space for Development Profile"*

Space for Development Profile / Ethiopia

People:

Public Universities:



Total Graduates STEM (Undergraduate)				
	2010	2011	2012	2013
Total	9485	11713	15609	17677
Female	1438	2254	3770	4084
Male	8047	9459	11839	13593

Total enrollment STEM in post-graduate studies (Masters and PhD)				
	2010	2011	2012	2013
Total	2751	2872	4284	6840
Female	261	219	627	3711
Male	2490	2653	3657	3129

Total PhD graduates all post-graduate studies				
	2010	2011	2012	2013
Total	149	21	70	71
Female	18	1	7	7
Male	131	20	63	64

Space for Development Profile / Ethiopia

People:

* Number of Universities offering STEM degrees: 44 public universities and 20 private universities
* Number of STEM teachers/professors: N/A
* Researchers:
  * IGGSA – 10
  * Entoto Observatory – 8
  * Universities – N/A

Space for Development Profile / Ethiopia

Infrastructure:

* Entoto Observatory and Research Center
  * 2 dome telescopes (1 m Alt Az scientific Telescopes form ASTELCO, a professional Astronomical Telescopes manufacturing company based in Germany)
* Institute for Geophysics, Space Science and Astronomy (IGSSA)
  * Telescope as old as, the emperor time, 1957
  * GNSS Stations by IGGSA (24 CORS stations)

Space for Development Profile / Ethiopia

Space Industry

* The space industry is not yet developed, however, plans for development exist
* Government promised to support the space science research and development.
* University and industry to work together, all stakeholders to collaborate with the industry

Space Policy/Funding:

* Space policy is to be developed by the Ethiopian Space Science institute
* Funding: data is not available
  * the government and the private sector are undertaking big investments to promote science and technology in the country.
  * private funding for building Entoto Observatory
  * Billions for the satellite capability by Government (MoST)

Future Collaboration

* ECA to work with countries in their effort to develop space policies and strengthening capabilities in the space science industry
* Contribute to develop a space capacity index and a space solutions compendium
* Capacity building in African countries, work with UN-SPIDER and regional centers

Sources:

* Scientific and Technological Human Resources Supply and Demand in Ethiopia for 2015-2025 G.C, Federal Democratic Republic of Ethiopia, Ministry of Science and Technology, June 2015
* Institute of Geophysics, Space Science and Astronomy (IGSSA), http://www.aau.edu.et/igssa/
* Entoto Observatory and Research Center, Ministry of Science and Technology website: http://www.eo.org.et/

THANK YOU!