



# Ethiopian Space program

Ethiopian Space Science and Technology  
Institute (ESSTI)

Workshop entitled : “NASA IDS: Seasonal  
Prediction of Hydro-Climatic Extremes in the  
Greater Horn of Africa (GHA)”

Organizers: NDMC, NASA, NMA, EAIR,  
EORC/ESSTI, NDMA and EtMS

24-25 October 2017 Addis Ababa, Ethiopia

# Introduction

- In this century natural and human made activities are incubus threats for our planet earth.
- The natural threats may be drought, flood, storm, Greenhouse effect, deforestation, Temperature increment, fluctuation of weather, land slid, earth quick, soil erosion and so on are a serious threaten phenomenon.
- All natural disaster, poor scientific investigation especially lack of prediction of climate change over the region, traditional farming styles are complimentary on overcoming of drought.

- East African countries are facing perennial extreme climate events with extensive economic and social consequences.
- In particular, persistent fluctuation of climate and rains over East Africa rain-fed agriculture, drinking water, health, generation of pasture and the very livelihood of highly vulnerable society.
- Droughts in East Africa since 2010, especially the 2015 Ethiopian severe drought in 50 years long are near bad events of drought in the region.
- Following the drought politically and socio-economically vulnerability was appeared dramatically

- These variations and extremes are related to a lack of or an excess of rainfall which often lead to severe disasters such as flooding or drought
- Therefore understanding the severity of the natural disaster threat, developing both dynamic and statistical approaches for extended range forecasting climate change is an issue of surviving and or diminishing human in our East Africa region. As a result our regional, cross-boundary and globally integration is our strength, our strength is our sustainable guarantee to live on Earth

- Hence our earth needs campaign in integration of weather and climate information as collaborations of governments, nongovernment organizations and private sector decision making can help in reduction prevention, preparedness for solution and mitigating against the risks of disasters, weather and climate variability, climate extremes and other related events that threaten vulnerable communities around the world
- A useful climate information and scientific data are processed and analyzed by meteorologists, atmospheric physicists and related field scientists

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- There is possibility to forecast our Earth planet's climate by employing the metrological, climatic, weather and atmospheric data, including the numerical modeling of climate prediction generated by software engineers and scientists.
  - Incorporating the vast climate data's and information's it is possible to overcome a collective and inclusive solution of risk management and resilience program, consequently it has a vital role to enhancing people's capacity to deal with common sense of the impacts of climate change.

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- Therefore this event may provide a breakthrough insight into “**Seasonal prediction of hydro-climatic extremes in the great horn of Africa**”.
  - Aware of the present challenges Ethiopian government had established Ethiopian Space and Technology Institute with wide range of mandates.

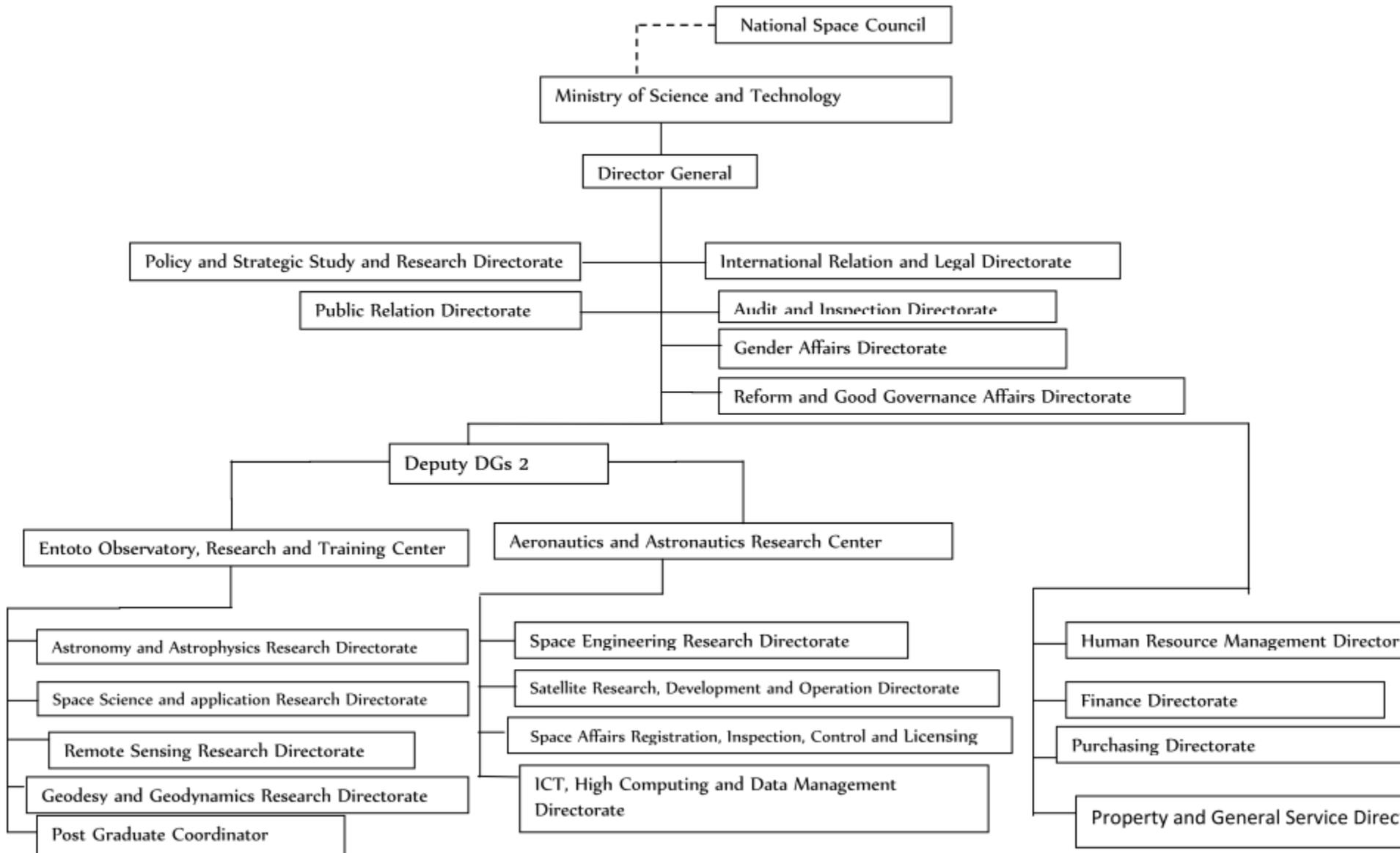
# Over View of Ethiopian Space Program

- ESSS's establishment in 2004
- Entoto Observatory and Research Center (EORC) was established by Consortium of Universities in 2013:
- **Objectives**
- Research, Graduate program training, infrastructure development and international collaboration in astronomy and astrophysics, space science, Earth Observation, satellite technology and engineering

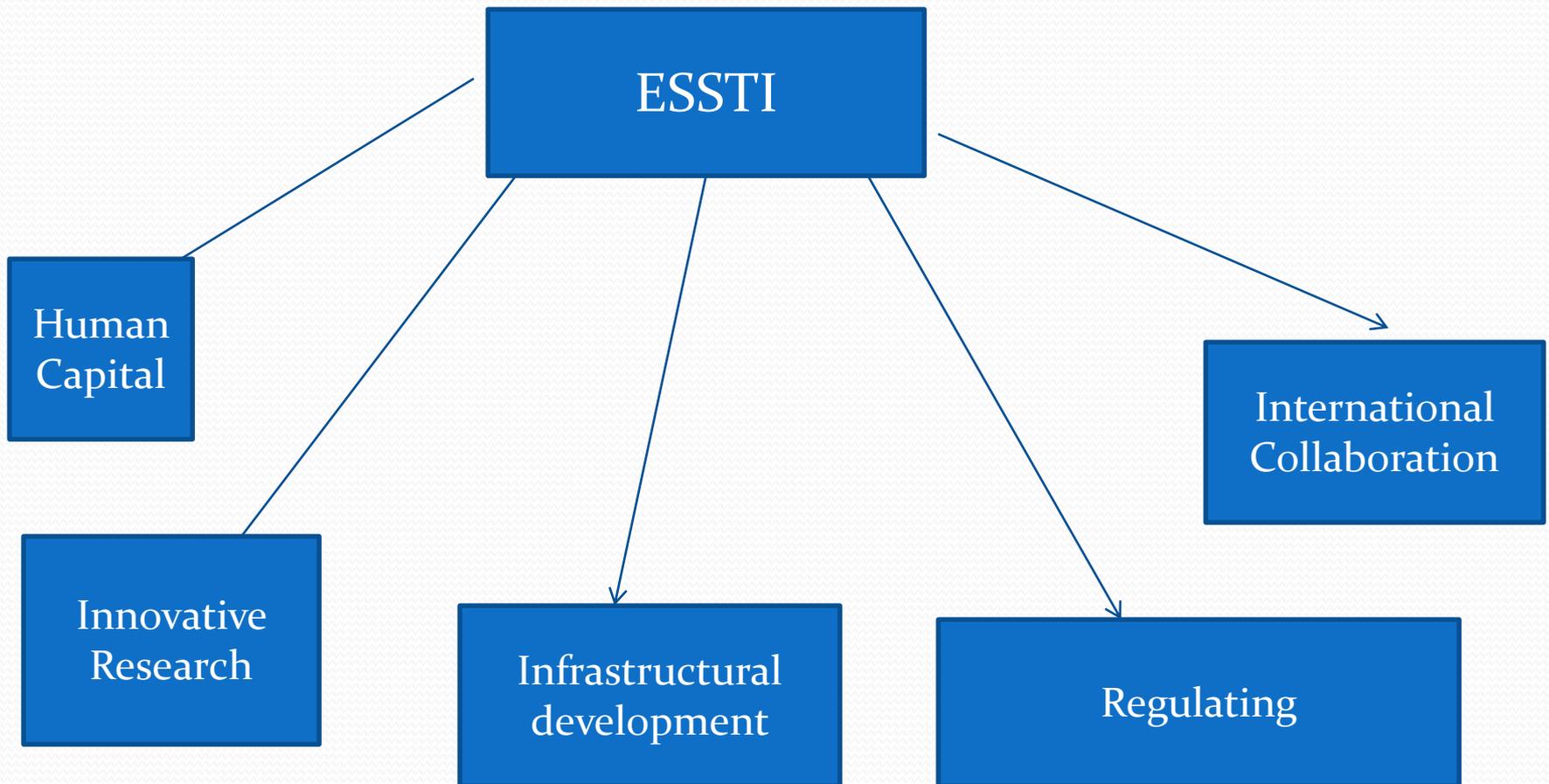
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- PhD students including from Rwanda in four programme
  - MSc students in four programmes
  - Two one meter optical telescopes
  - large Infrared and optical telescope is underway in collaboration international expertise from SAAO, USA, Russia, Europe, etc
  - Different projects in space science and technology sector

- “Ethiopian Space Council and Ethiopian Space Science and Technology Institute (ESSTI) was Established by Council of Ministers Regulations No. 393/2016”.
- National Space Council is chaired by Prime Minister
- Key Cabinet Members are members of the Council

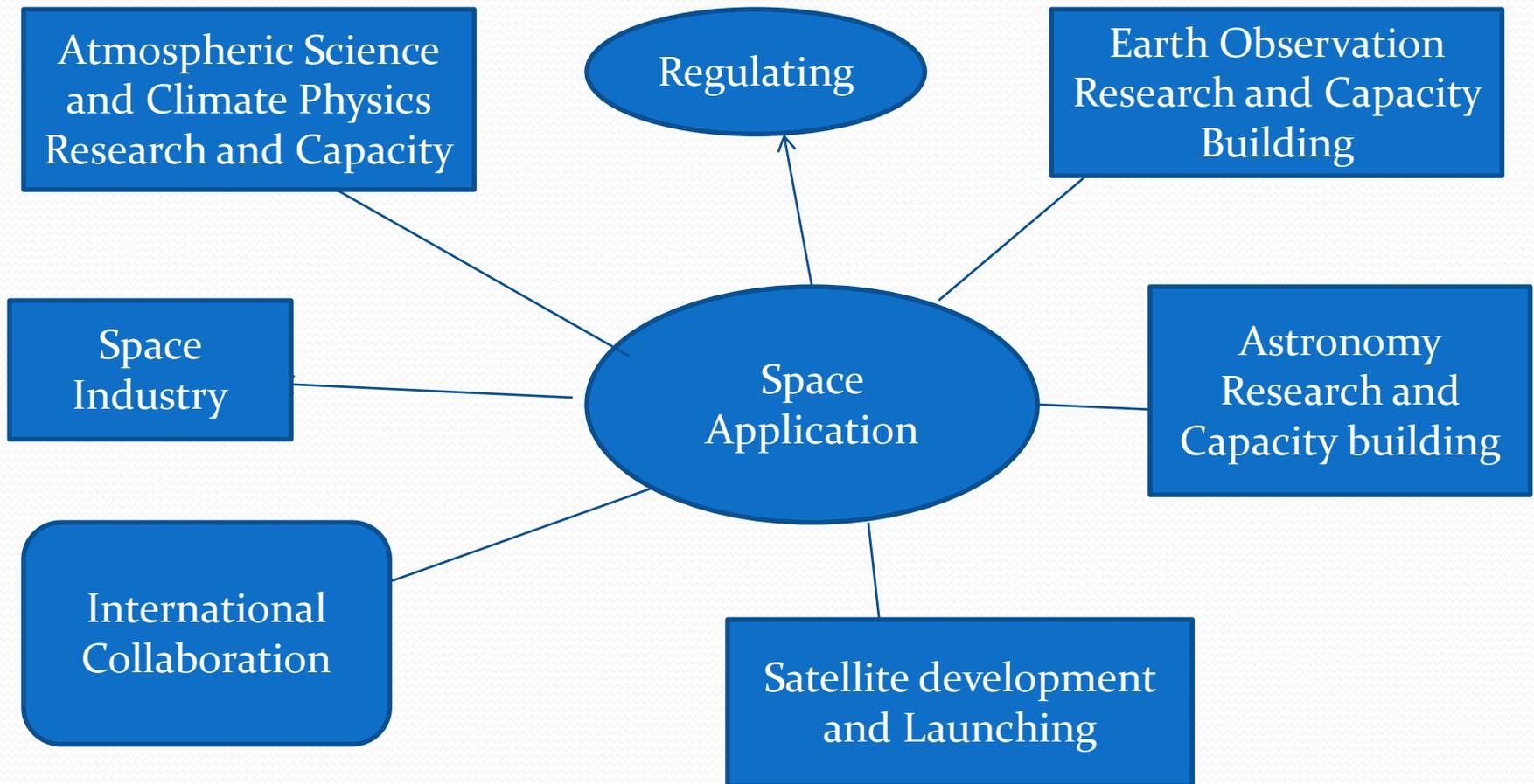
### Ethiopian Space Science and Technology Institute (ESSTI) Organizational Structure



# ESSTI's Mandate



# National Space program Focus Map

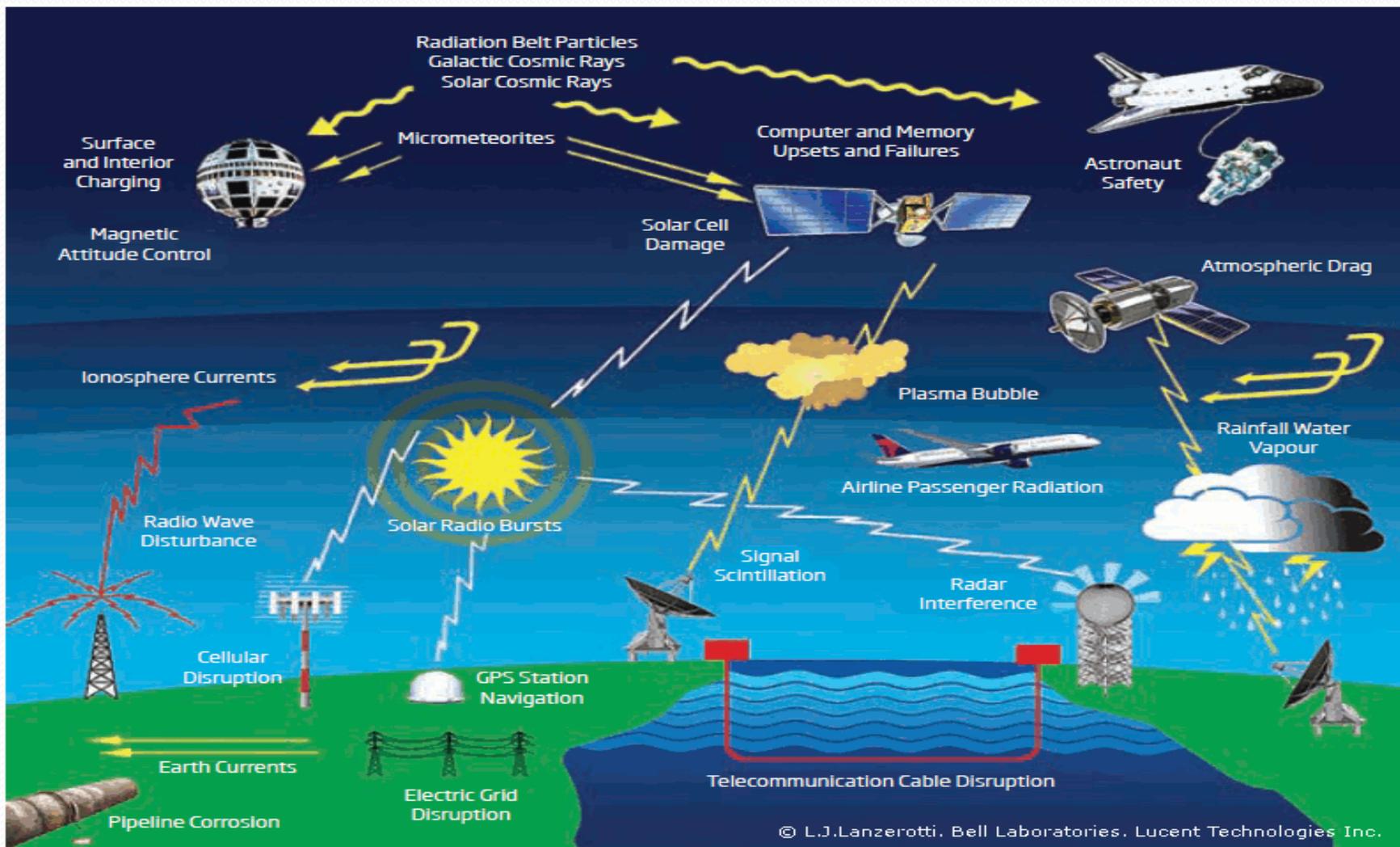


# ESSTI – Space Science and Application departments

- One of the department in EORC-ESSTI

Research Focus on:

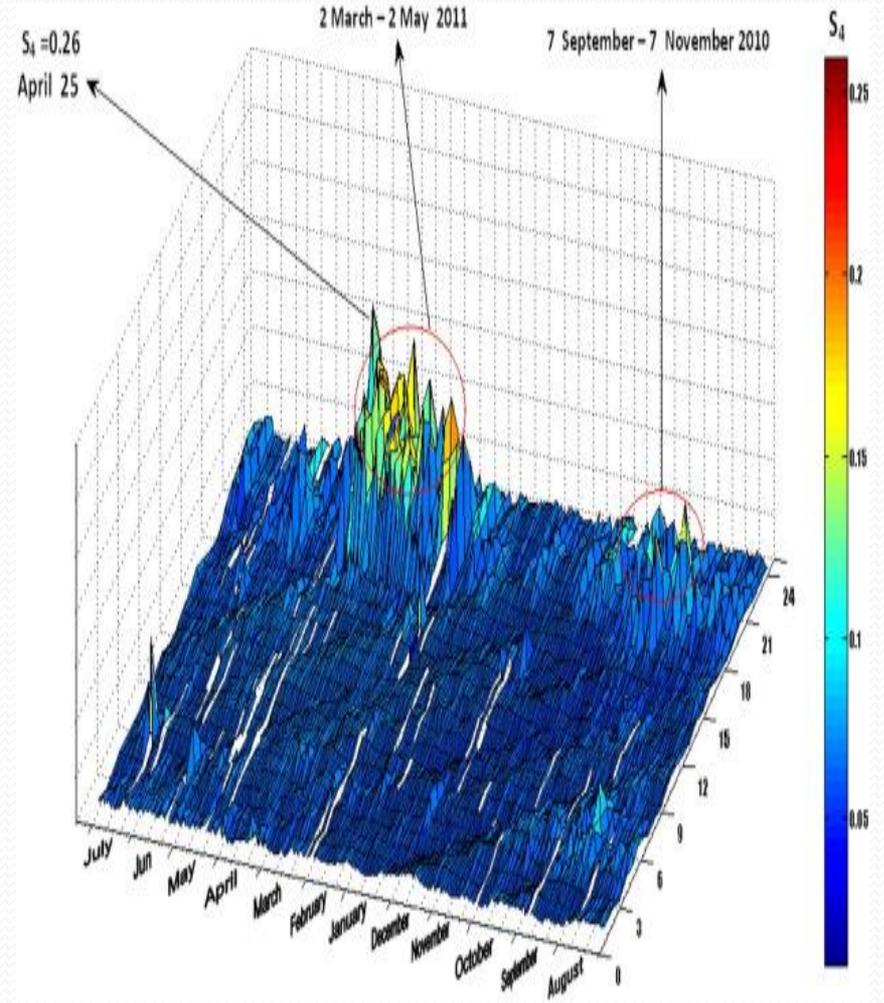
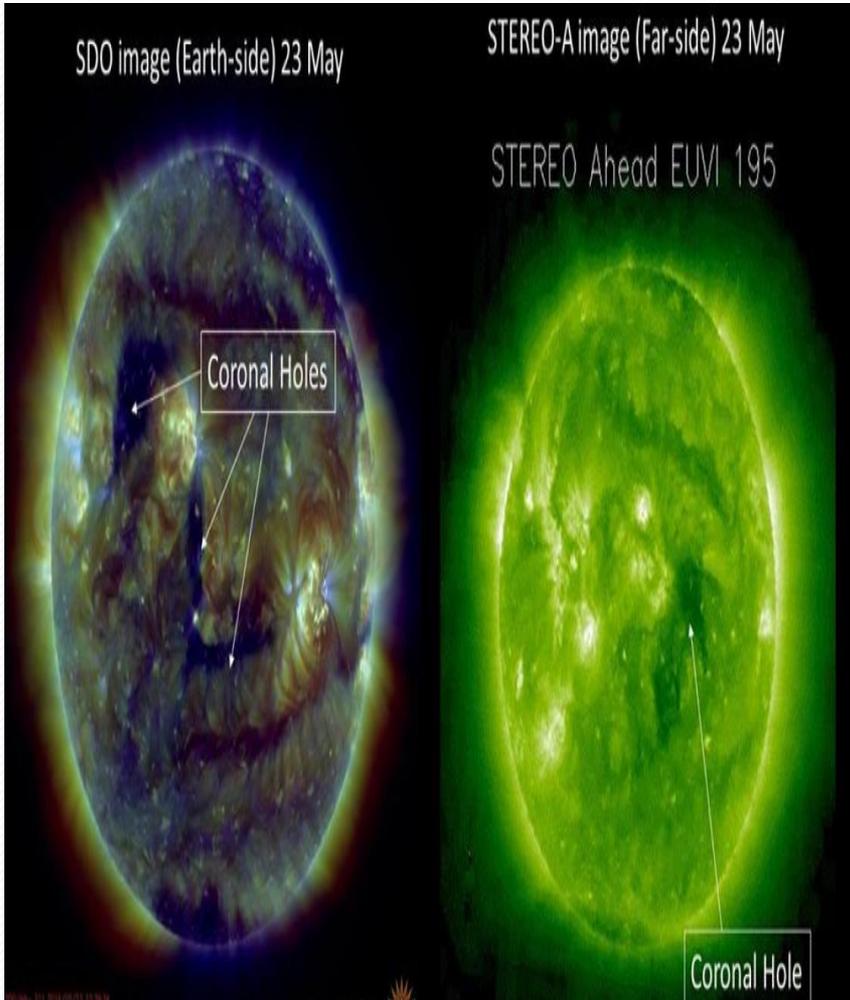
- Geomagnetic Storm impact
- Modeling and characterization of space weather elements
- Ionospheric Scintillation, irregularities, its impact in civil and defense technologies
- Tomography of ionosphere over east Africa
- TEC over East Africa

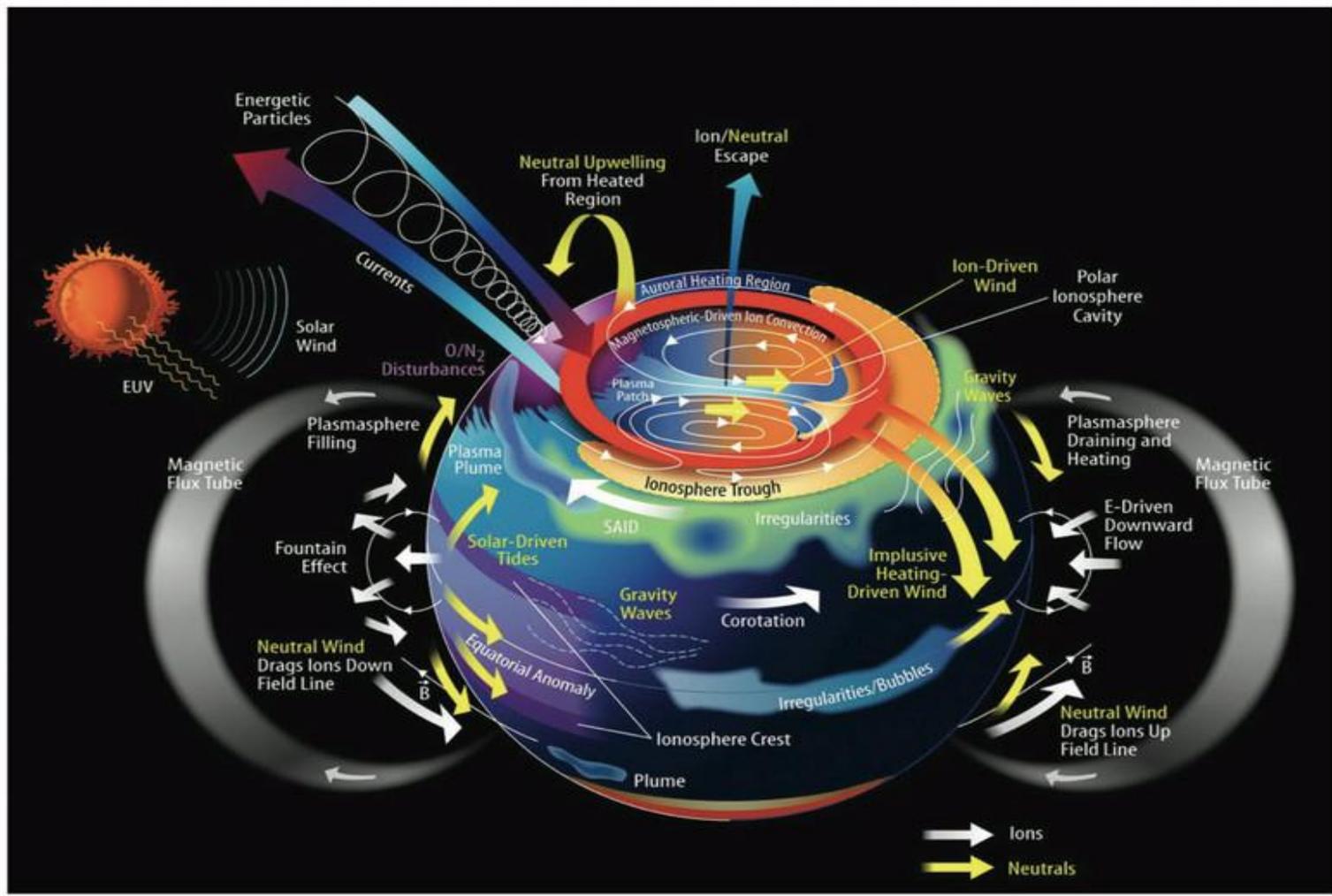


SDO image (Earth-side) 23 May

STEREO-A image (Far-side) 23 May

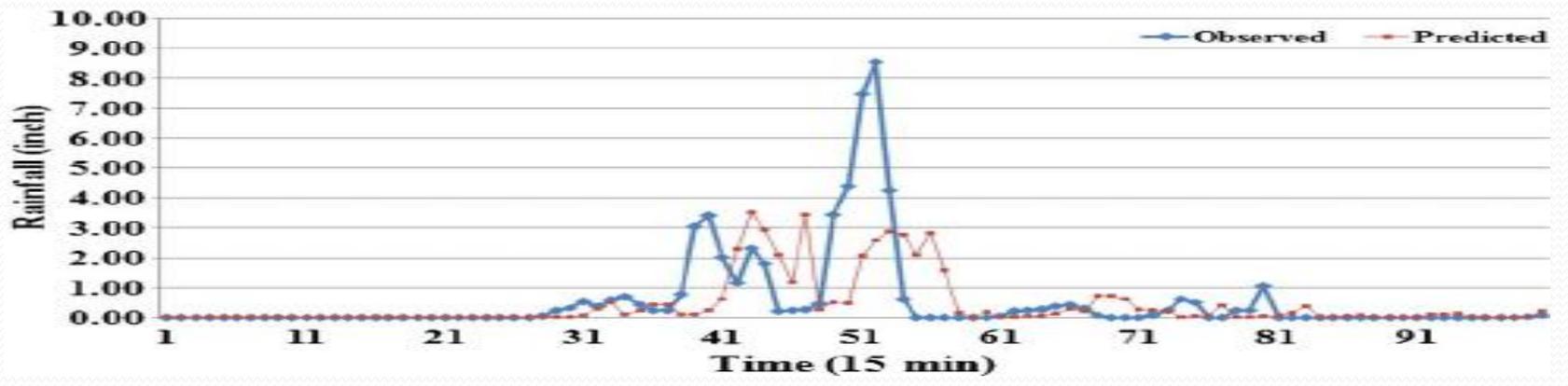
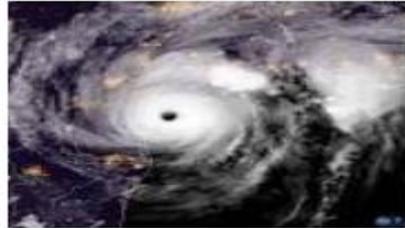
STEREO Ahead EUVI 195





# Atmospheric and Climate Science:

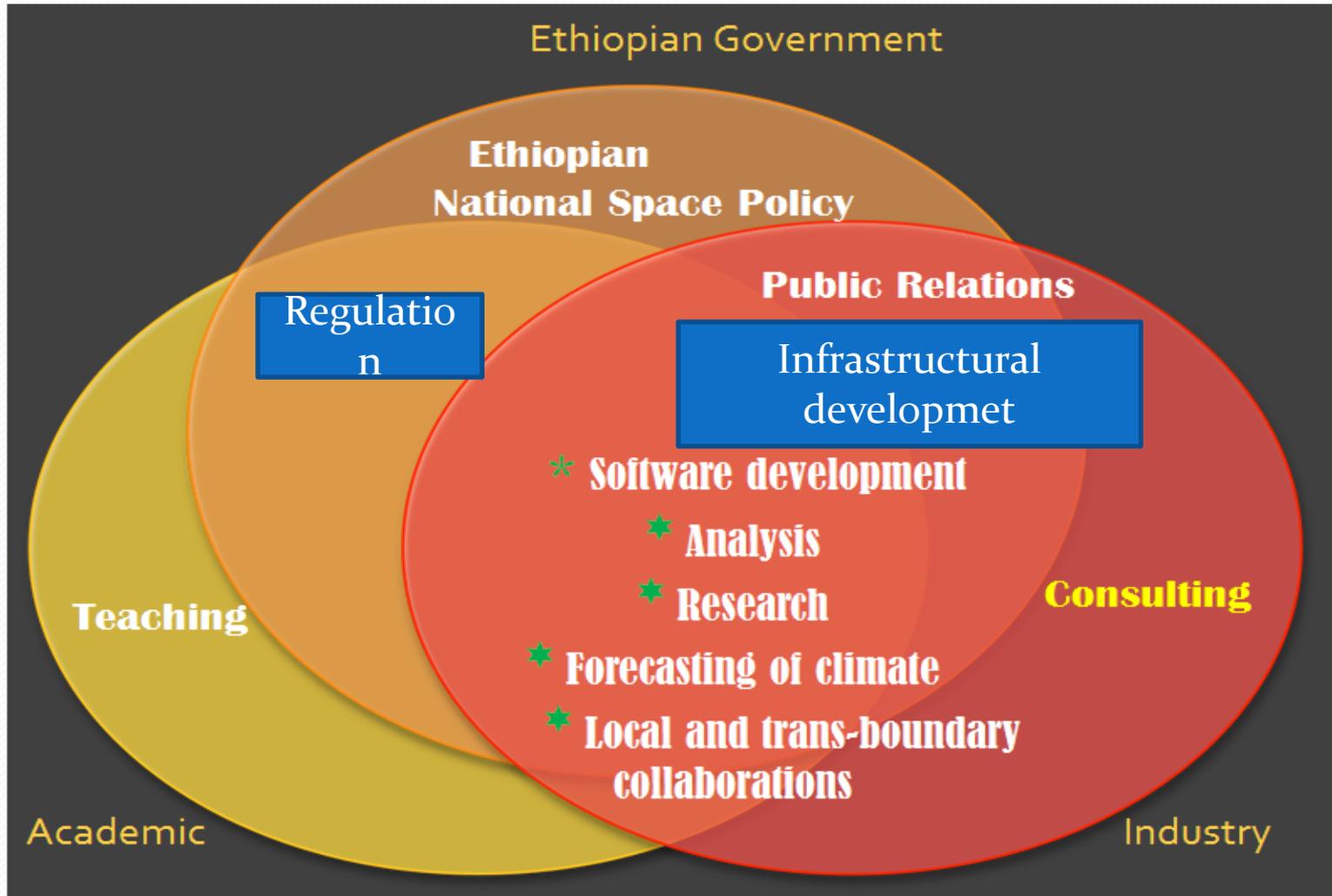
- Coupling of ionosphere and troposphere.
- Numerical modeling of East African climate elements
- Assessment spatial and temporal drought variability and its mitigation solution over East Africa region
- Prediction of rain fall and drought reveals
- Variability and patterns of climate
- Air quality (air pollution)
- Weather forecasting



- **Our regional, national and institutional natural threat issues are identified within sorted as follows which are vulnerable to climate change are:**
- **Agriculture (crops, livestock and fisheries) and food Security;**
- **Water Security;**
- **Energy Security;**
- **Green economy (greenhouse effect)**
- **Ecosystems Services and Biodiversity;**
- **Tourism;**
- **Infrastructure (buildings, roads, railways, waterways and airways);**

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- **Human Health, Sanitation and Settlements;**
  - **Trade and Industry;**
  - **Education, Science and Technology**

# ESSTI 's attention in atmospheric Science



# ESSTI's Objectives in line with Climate Change

- The overall objective of ESSTI is to strengthen regional (GHA) cooperation to address climate change issues that concern regionally shared resources. The ESSTI's specific objectives are:
- To enhance the perception of natural disaster threats pointed on forecasting drought and floods of GHA
- To foster collaborative, multidisciplinary climate and atmospheric based research
- To manipulate a collocation research of space and climate science

- To disseminate remote sensing data and information throughout the nation and GHA region
- To train post-graduate research students for careers in Space Science, Remote Sense, Atmospheric Physics and other related sciences and engineering.
- To streamline and harmonize existing and on-going trans-boundary mitigation and adaptation projects or activities by employing space technologies;
- To proceed post graduate students allocate in projects align with national and regional climate changes.

# Collaboration

- ESSTI is open for regional and international collaboration for mutual benefit
- ❖ Space Science and application
- ❖ Atmospheric and climate science
- ❖ Remote sensing
- ❖ Astronomy
- ❖ Instrumentation
- ❖ Expertise and student exchange
- ❖ Joint research
- ❖ International and Continental matters



Thank you for your attention !