STATUS OF CLIMATE MONITORING IN KENYA

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LAYOUT

- ***KMD Role***
- ***Infrastructure***
- ***Climate data management***
- ***Climate monitoring products***
- ***Climate out look prediction***
- ***Activities in support of climate risk management Challenges***
- ***Needs and issues***

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- In Kenya:
  - Agriculture is the mainstay of the economy.
  - Pastoralism and Agro-pastoralism form the major livelihood activities of the country's population in the Arid and Semi-arid Lands (ASALs).
  - Hydro- energy generation for both industrial and domestic activities depends heavily on sufficient water in the hydro dams.

Note: All these activities and many others are principally rain dependent. Seasonal rainfall performance is, therefore, of great concern to all stakeholders who depend on rainfall for their social- economic activities.

Kenya Meteorological Department

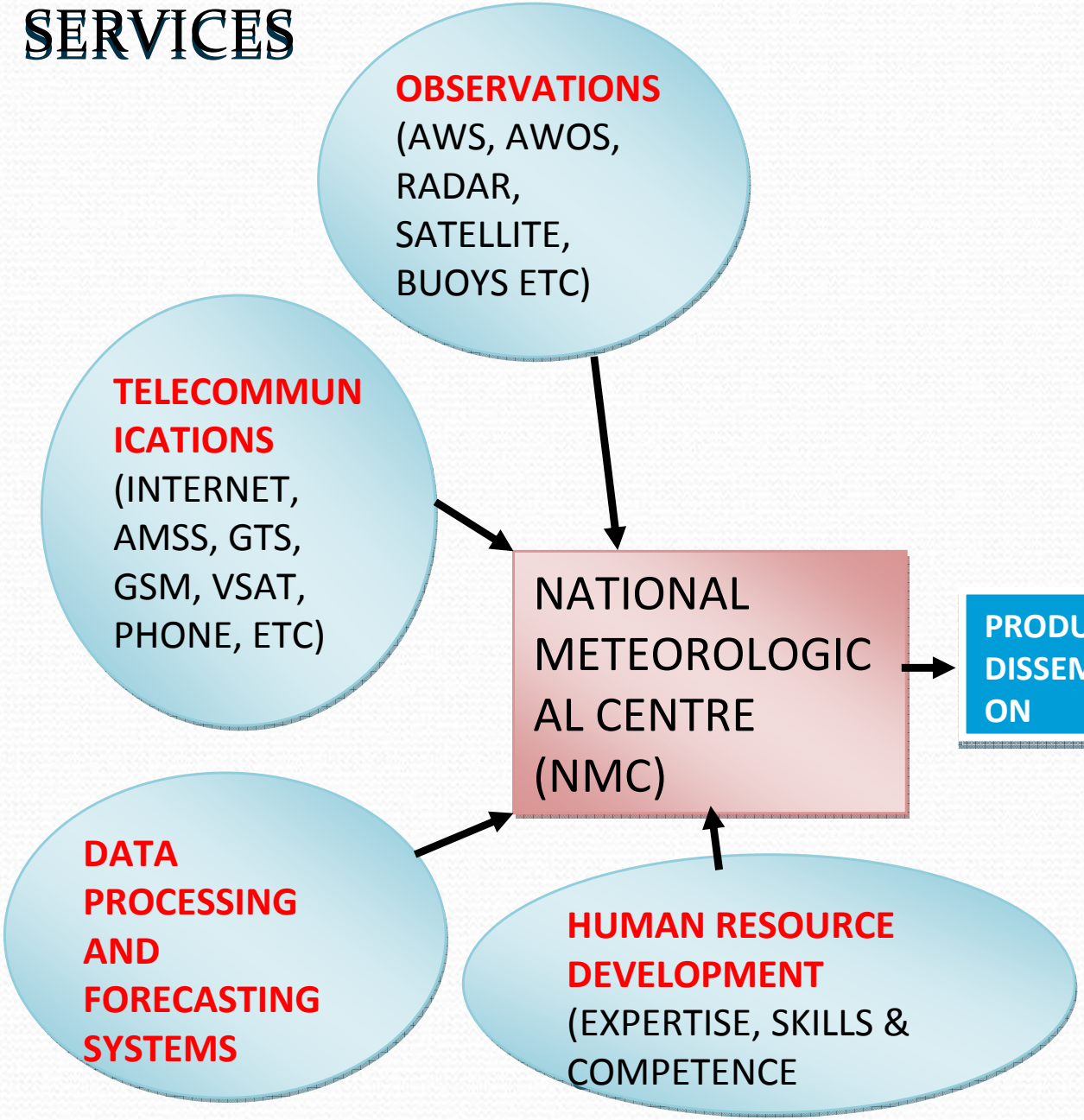
As stated in the WMO Convention, the purpose of a NMHS, like KMD, is in observing and understanding weather and climate and in providing meteorological, hydrological and related services in support of relevant national needs, which include the following areas:

a)Safety of life and protection of property;
b)Safeguarding the environment;
c)Contributing to sustainable development;
d)Promoting long-term observation and collection of meteorological, hydrological and climatological data, including related environmental data;
e)Meeting international commitments;,
f)Contributing to international cooperation.

METEOROLOGICAL INFRASTRUCTURE

- Data Observational systems;
- Data telecommunication systems;
- Data procession, analysis and forecasting systems;
- Product and information dissemination systems;
- Human resource capital

METEOROLOGICAL INFRASTRUCTURE AND SERVICES



CURRENT OBSERVATIONAL NETWORK

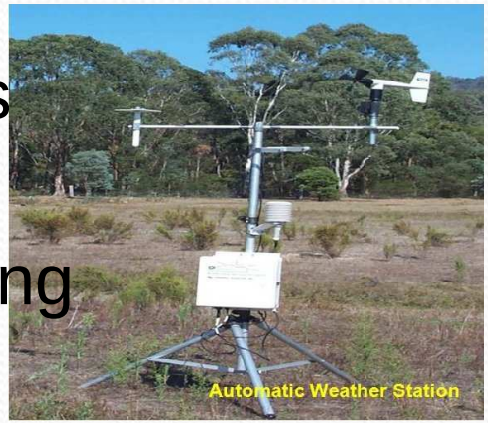
The Department's Current Observational Network consists of:

Synoptic Stations:

- 39 manned 24-hr Synoptic Stations,
- 14 agro-meteorological stations,

Automatic Weather Observing systems:

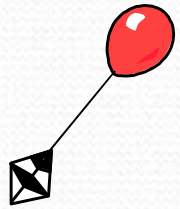
- 72 Automatic Weather Stations (AWSs)
- 3 Airport Weather Observation Systems (AWOSs) at JKIA, Wilson & MIA
- 17 Hydromet AWSs for Flood Forecasting



Rainfall Stations:

- About 1000 rainfall stations most of which are operated by Voluntary Observers

CURRENT OBSERVATIONAL NETWORK Contd….

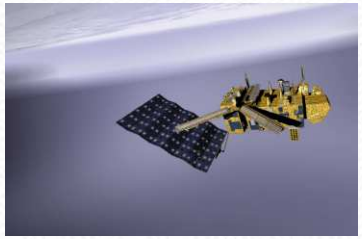


Upper Air Station

- 1 Upper Air Station at Dagoretti
- Acquired two other stations for Garissa and Lodwar that are awaiting installation.

Remote Sensing

- 3 Satellite ground receiving stations (2 for MSG and 1 for NOAA satellite data);



CURRENT OBSERVATIONAL NETWORK Contd....

Pollution Monitoring

- 1 Global Atmosphere Watch station on Mt. Kenya
- Two stations Nairobi –(ozone, so_2 ,co,co_2 etc)

CURRENT OBSERVATIONAL NETWORK Contd….

Tsunami Early Warning

- Four tidal gauge stations at *Lamu, Mailindi, Kilifi and Shimoni* for multi-hazard detection, ocean waves, sea level rise, salinity, sea surface temperature and water quality, including tsunami related at the Coast.

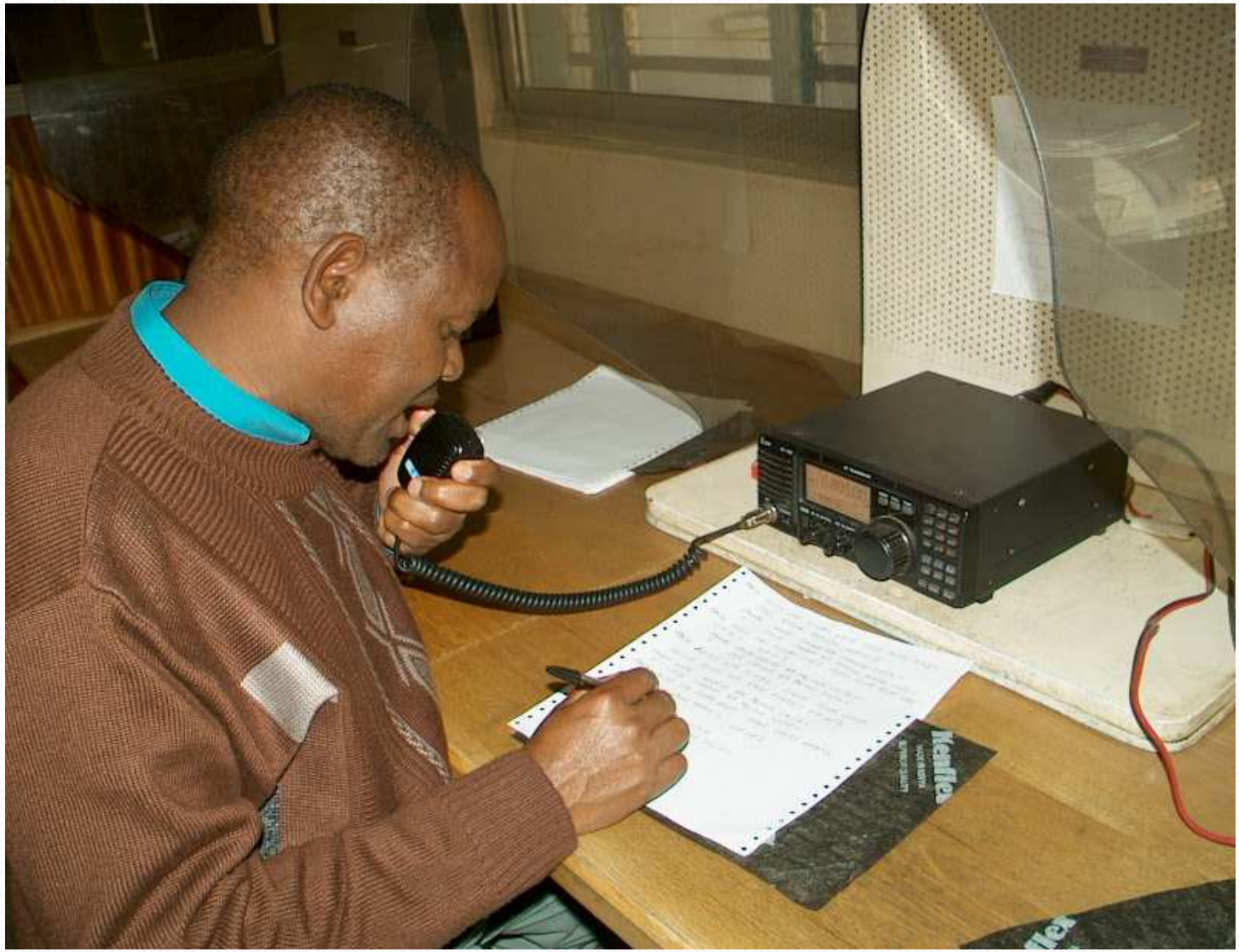
CLIMATE DATA TRANSIMISSION ROLE

- Exchange and transmission of climate data nationally, regionally and internationally;

Current Telecommunications Facilities

- ***National Telecommunications Network:***
  - GSM technology is being used for data transmission from most of the outstations to the HQs.
  - The HF-SSB and telephones are used as back-ups to collect data from the synoptic weather observation stations.
  - Computer Terminal units (internet links)
  - Very Small Aperture Terminal (VSAT) satellite-based communication systems,
  - Automatic Message Switching Systems (AMSS) as well as other modern technological means available.

SSB RADIOS



Telecommunications Facilities

- *Regional Telecommunications Hub (GTS node)*:
  - KMD has a regional responsibility and hosts the WMO Regional Telecommunications Hub (RTH) for:
    - ✓ Receiving and disseminating of weather data from neighboring countries to the rest of the world; and countries

Climate Data Management

Climsoft Database Management System

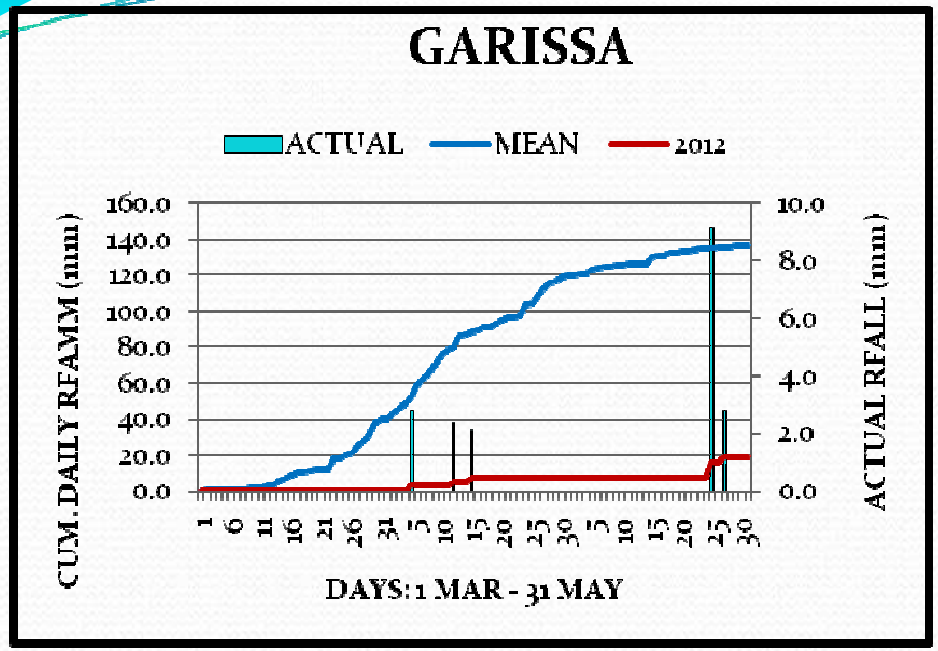
- Data key entry
- Basic quality checks will be performed automatically
- Encoding
- Archival
- Products

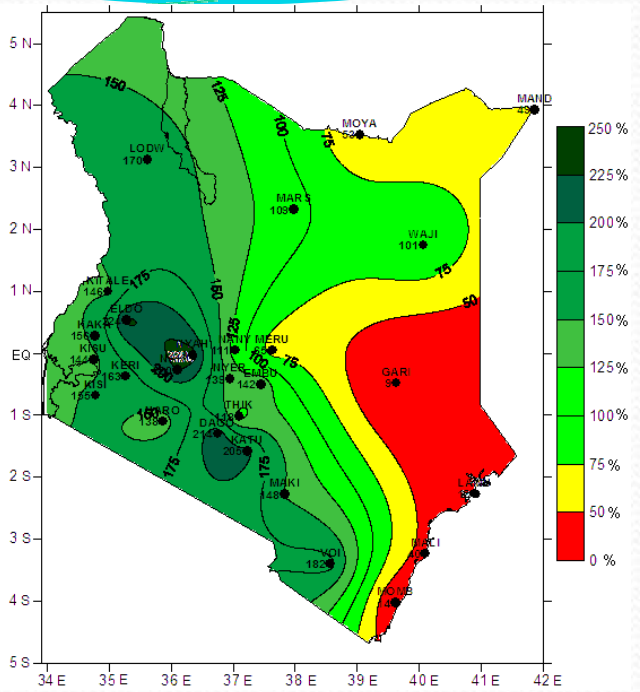
Current initiative

- *Data rescue -Convert paper forms to digital images by photograph, Computer data entry(Climsoft) - (poor hand writing -challenge) about 10 % data rescued*
- integrate data and products from all the observational systems(*WIGOS Project)-status compilation of metadata and headers for computing, IMIS platform installed*
- *Data policy on exchange of climate data in line the International standards and best practices of the World Meteorological Organization (WMO)*
- *Development of climate diagnostic laboratory* -Have acquired cluster system for generating climate scenarios

Climate monitoring products

- Seasonal climate out look
- Anomalies (monthly, seasonal and annual)
- extreme temperatures and rainfall
- Monthly Highest and lowest temps (monthly bulletin)
- Rainfall and temperature trends, (simple trends based on daily and values-regional)
- dry-spell analysis (done by agro met section as part of drought monitoring for agriculture- dekadal, monthly, seasonal bulletin
- onsets and cessation of rainfalls (issued in seasonal bulletins)
- Severe weather predictions and advisory





OBSERVED APRIL 2012 RAINFALL

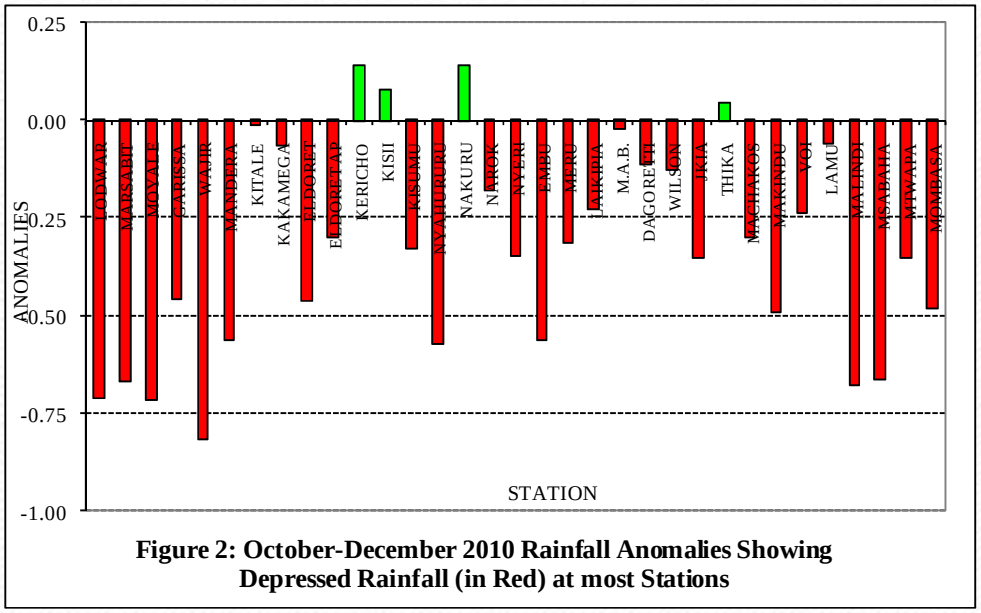
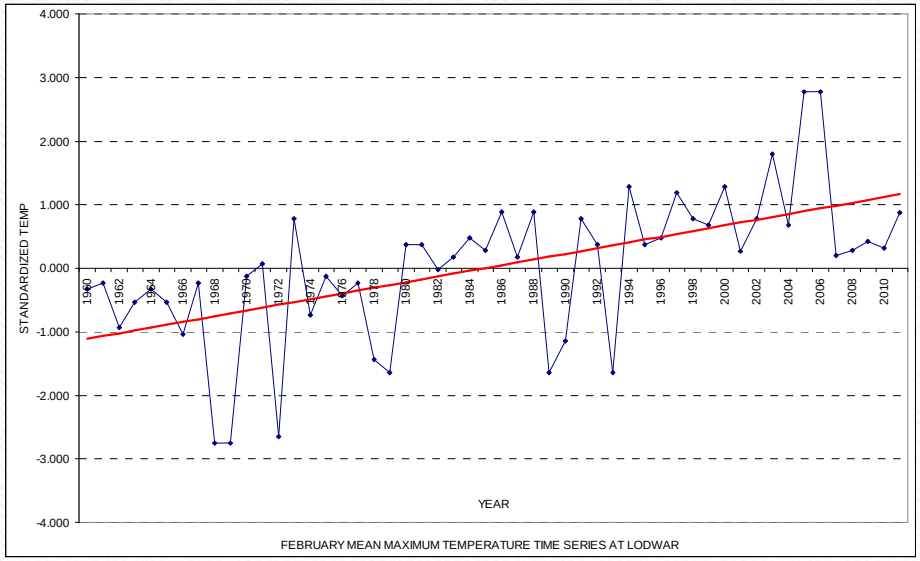


Figure 2: October-December 2010 Rainfall Anomalies Showing Depressed Rainfall (in Red) at most Stations

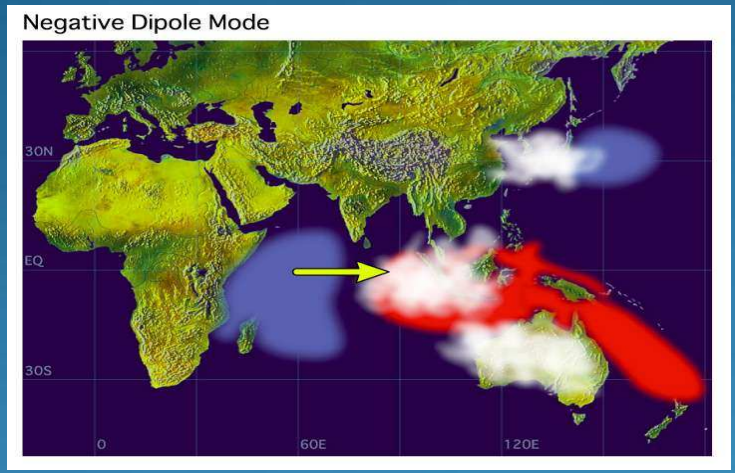


Long-range forecasting methods

- Empirical Statistical

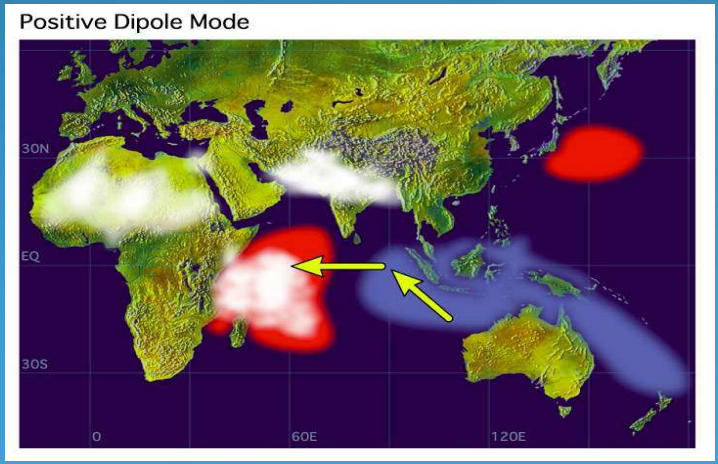
  regression of sea surface temperatures (SSTs), Sea Surface Temperature (SST) gradients and the expected evolution of global SST patterns as well as upper air circulations patterns
  - (ENSO events, IOD etc)
  - Tropical cyclones
- Dynamical models from global producing center
- Drivers of weather/climate in Kenya
- ICPAC- products ,capacity building , consensus forum

Indian Ocean Dipole as a driver of weather/climate



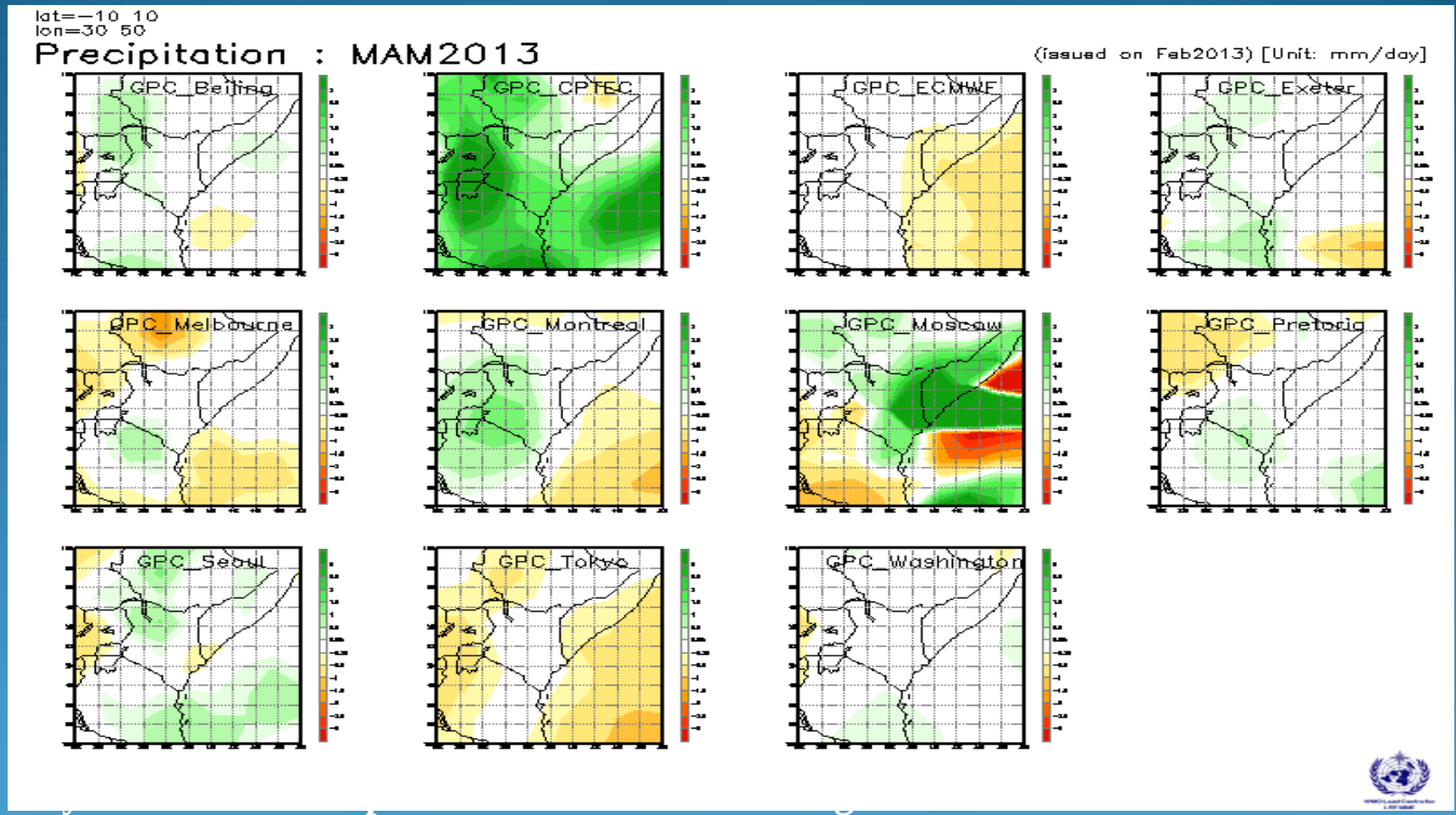
Indian Ocean Dipole

-ve IOD: – Normally associated with depressed rainfall in the country. Most of the winds are off-shore of the EA Coastline

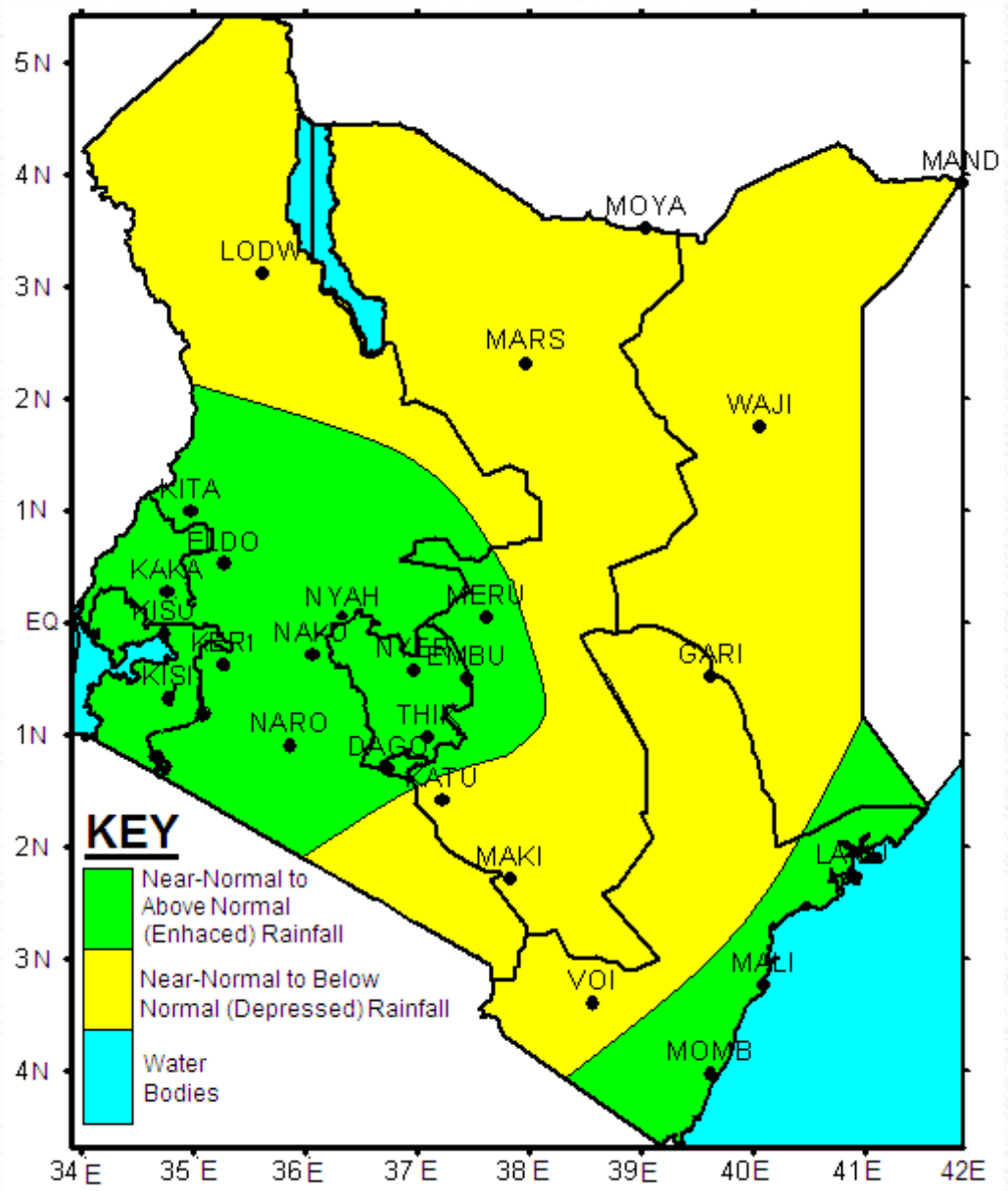


+ve IOD: - Normally associated with enhanced rainfall in the country.. Most winds are on-shore to the EA coastline

OUTPUTS FROM GPC



Seasonal forecast for the country



Onsets and Cessations

- Determine the ANALOGUE YEAR (i.e. Scan through past records to isolate a year(years)) with almost similar climate drivers as the current year.
  - An analogue year is defined as that year in the recent or distant past that exhibits similar characteristics as the current year.
  - The analogue year helps us to infer the characteristics of the season under investigation(i.e. Onset and Cessation dates as well as the likely rainfall distribution)

Extremes in Kenya

Housing

Transport

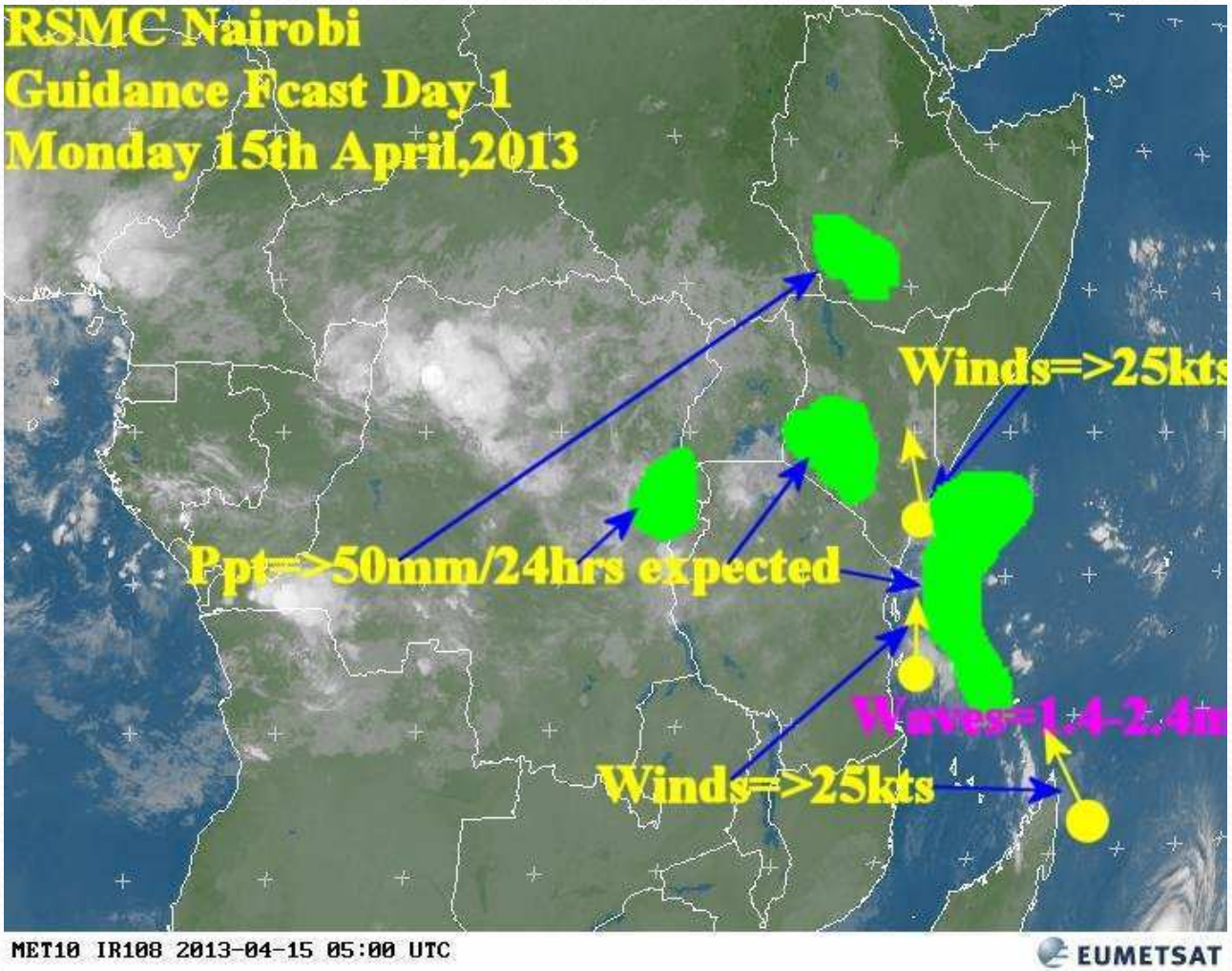
Roads and Infrastructure Destruction

Landslides after heavy rains

Activities in support of Climate Risk management and early warning systems

- Issue 24 hr ,5 days, monthly and seasonal forecast contain advisory for any expected extreme event
- Established community radio broadcasting RANET
- Established regional weather offices- downscale national outlook to county level and engage users directly
- Established flood risk warning system along known rivers
- Regional obligation swfdp products issued by RSMC-NAIROBI
- Frequent seminars and workshops with stake holders including journalists, red cross, national disaster units among others
- Work with farmers groups for dissemination and feedback

Severe weather product by RSMC for the Region



Needs/issues

- Climate data rescue
- Capacity building in climate data analysis -regional based analysis methods
- Observational network expansions
- large gaps in available data
- Short historical data
- Lack/or non consistent metadata

Thank You

For

Your Kind Attention