Atmospheric Observations Working Group Report

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Primary Tasks

1) Analyze and summarize the dominant characteristics of precipitation occurring on and around the lake

2) Understand how the current observation networks are used for operational forecasting

3) Develop recommendations of new sensors to deploy to improve the nowcasting of severe weather and enhance the safety of users of the lake.

Broader Recommendations

- Issue evening forecasts
- Land-based beacon navigational system
- Websites to share observations and forecasts amongst the countries
- Lake Victoria Basin climate data archive
- Satellite communications to make rural observational data available in real-time
- Use of local observations in regional models

Optional Meteorological Sensors

- Scanning Doppler weather radars
- Lightning detection and location sensors
- Additional surface observation sites around the lake
- Fixed buoys with weather sensors
- Surface observations on islands
- GPS occultation system

Optional Meteorological Sensors

Scanning Doppler Weather Radars

Scanning Doppler Weather Radars

Benefits:

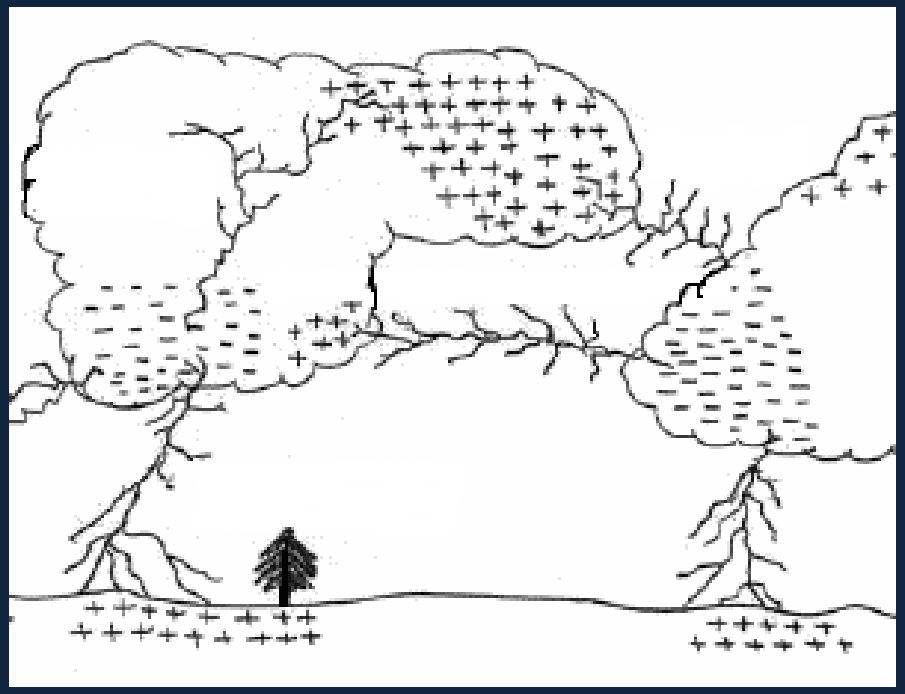
- Indicates the location, movement, and intensity of precipitating storms
- Provides uniform coverage over a large area

Limitations:

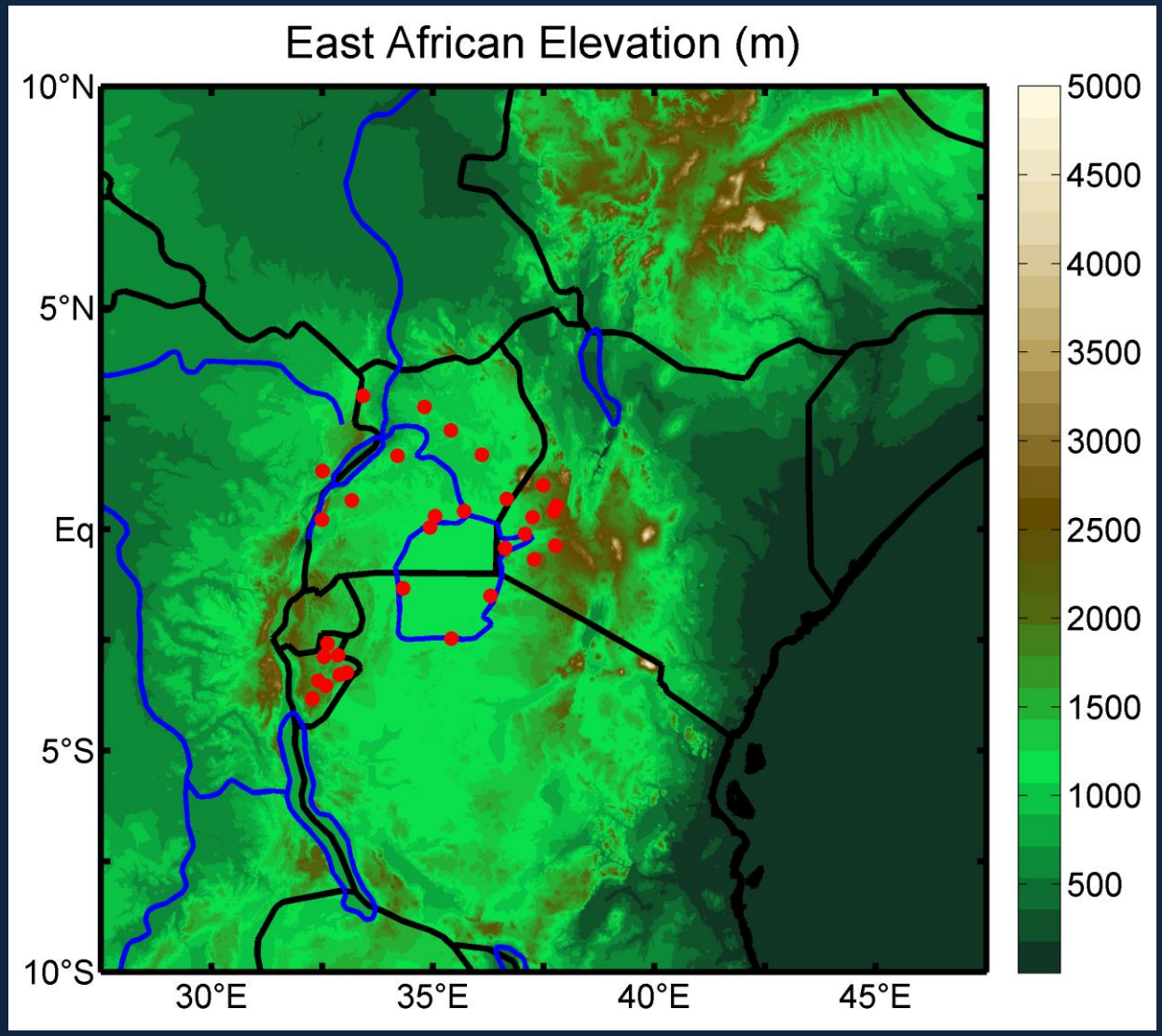
- Large commitment to supervision, maintenance, and calibration

Lightning Detection and Location Sensors

A network of lightning detection sensors could be deployed around the lake to give forecasters the location (within 2- 3 km) and frequency of lightning to aid in their forecast.



Additional Surface Observations Around the Lake



Additional Surface Observations Around the Lake

Benefits:

- Dense network is more likely to observe developing storms
- Aid in flash-flood forecasting inland by providing a more precise analysis of intense rain

Limitations:

- No additional information over the lake

Fixed Buoys with Weather Sensors

Fixed Buoys with Weather Sensors

Benefits:

- Surface meteorological data over the lake
- Provide wave height and current information

Limitations:

- Point measurement of the surface meteorology
- High cost to install and maintain the instruments

Surface Observations on Islands

Surface Observations on Islands

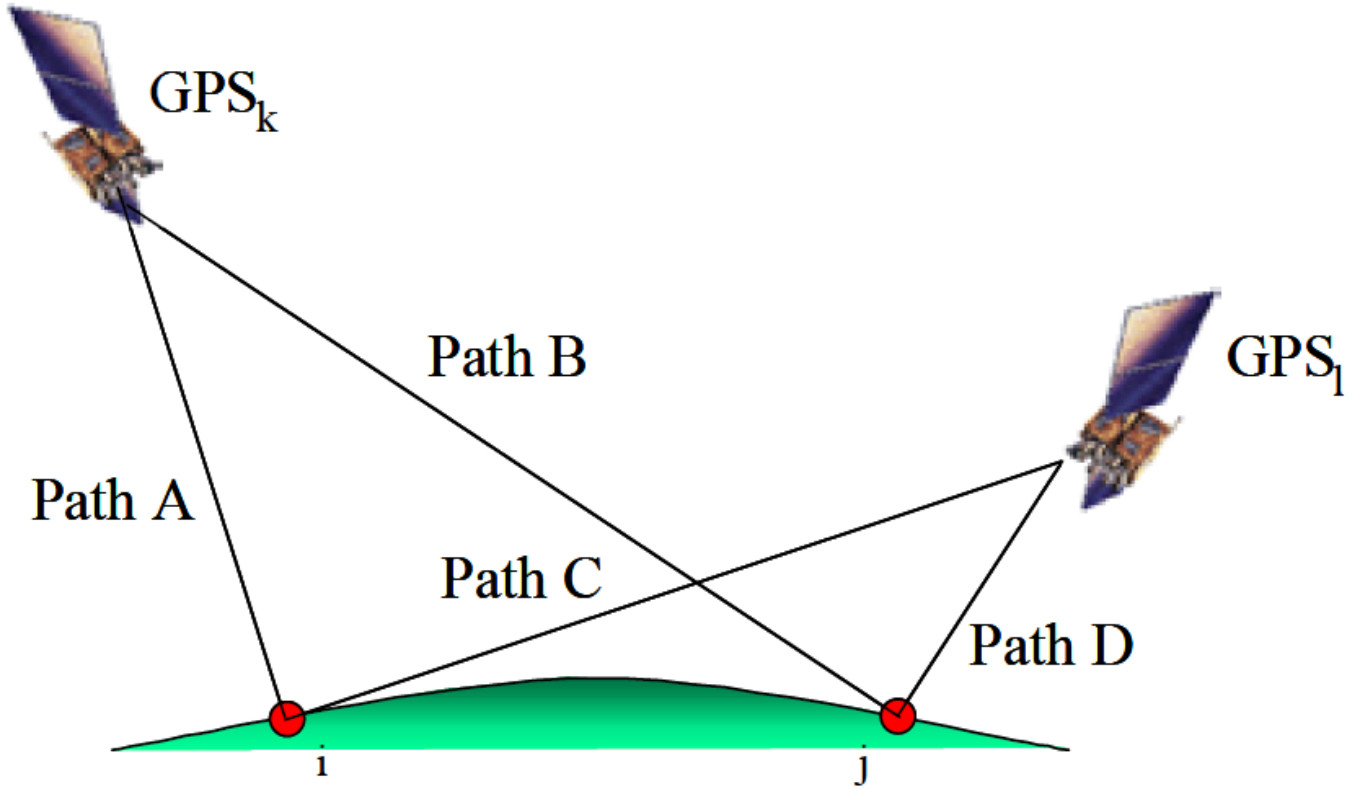
Benefits:

- Atmospheric observations in data sparse regions over the lake
- Much cheaper than installing buoys

Limitations:

- Require a technician to visit when maintenance or calibration is required

GPS Occultation System



$$DD = (\text{Path A} - \text{Path B}) - (\text{Path C} - \text{Path D})$$

Figure 1. Forming a double difference from ionospheric free carrier phase GPS observations.

GPS Occultation System

Benefits:

- Provides location and depth of atmospheric moisture (much like the information gathered from upper-air soundings)

Limitations:

- Systems are still in development and testing and are not yet available commercially

Suggestions for Additional Measures

- Mobile phone weather alert program to warn lake users in real-time about severe weather threats

- More stream gauges would improve understanding of how much water is flowing into and out of the lake

Optional Meteorological Sensors

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Optional New Meteorological Sensors

Lightning Prediction by Radar

Benefits:

- Can provide general area in which a lightning strike is likely to occur in the next 15-20 minutes within a range of 250-300 km for a typical severe storm

Optional New Meteorological Sensors

Lightning Prediction by Radar

Limitations:

- Requires a radar
- Prediction ability is dependent on the radar scan strategy