

INTERNATIONAL CONFERENCE ON MOUNTAINS AND CLIMATE CHANGE

Mt Kenya Ecosystem and Impact of
Black Carbon: Implication to poverty
and social economic dynamics in
Kenya.

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Acknowledgement

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- **Summit Organizers:** You have done an excellent job. Thank you.



Background

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Italy

Kenya



East Africa Region



The
KENYA

You
Know

Best



**You also
Know
The Rich
Wildlife
and/Wildb
east
Migration**

Geographical Orientation

- **Kenya is one of the 5 East Africa Community countries:**
- **Bordered by Indian Ocean (S, SE), Somalia (E, NE), Ethiopia (N), South Sudan (N), Uganda (NW, W) and Tanzania (W, SW).**

Geographical Orientation

Beautiful Terrain:

**Rises from an altitude <100 m at the
Indian Ocean Coast (Mombasa)**

to

5,200 m at Mt Kenya

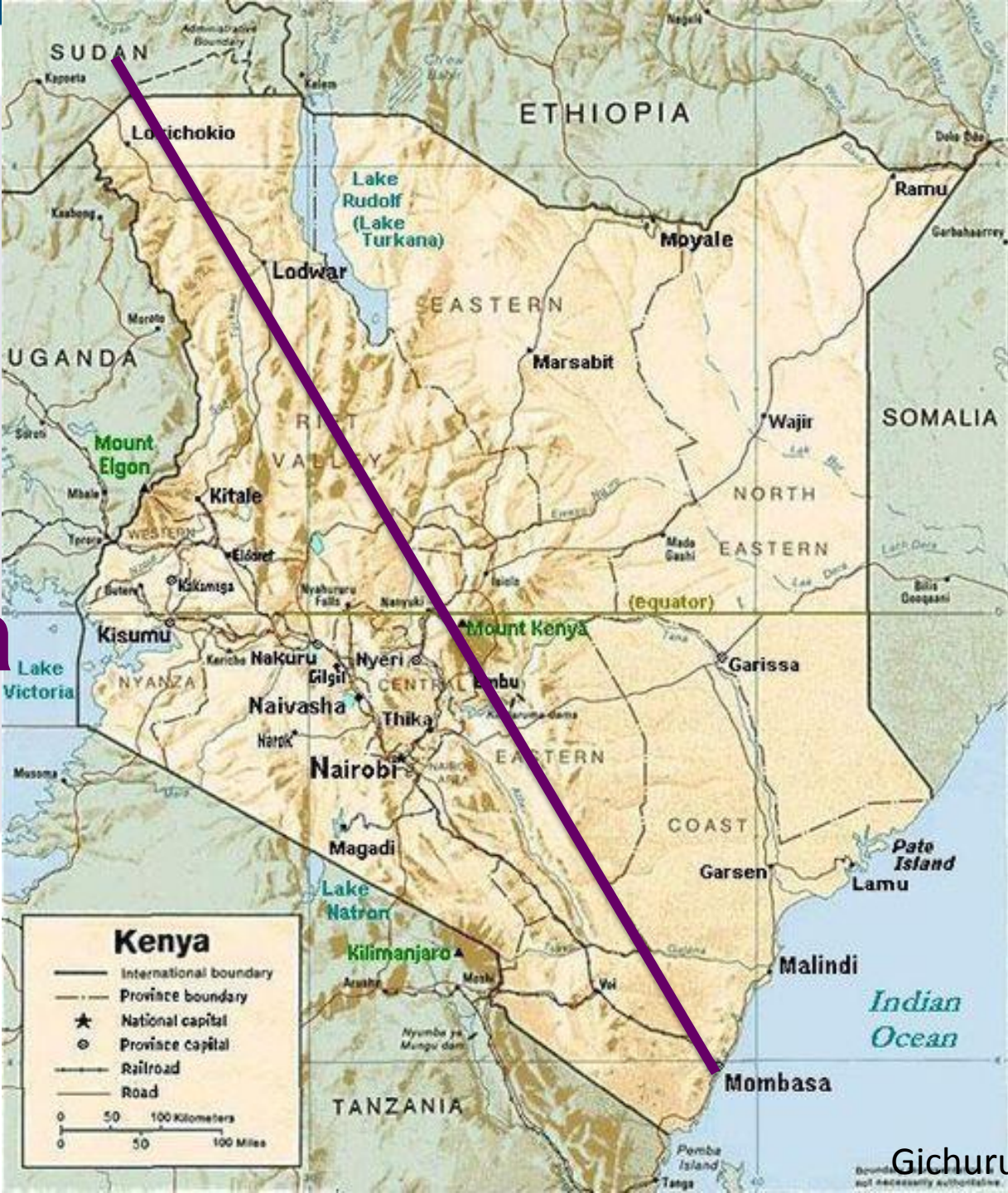
then

**varies between 900 – 800 m from
Suguta Valley to S. Sudan.**

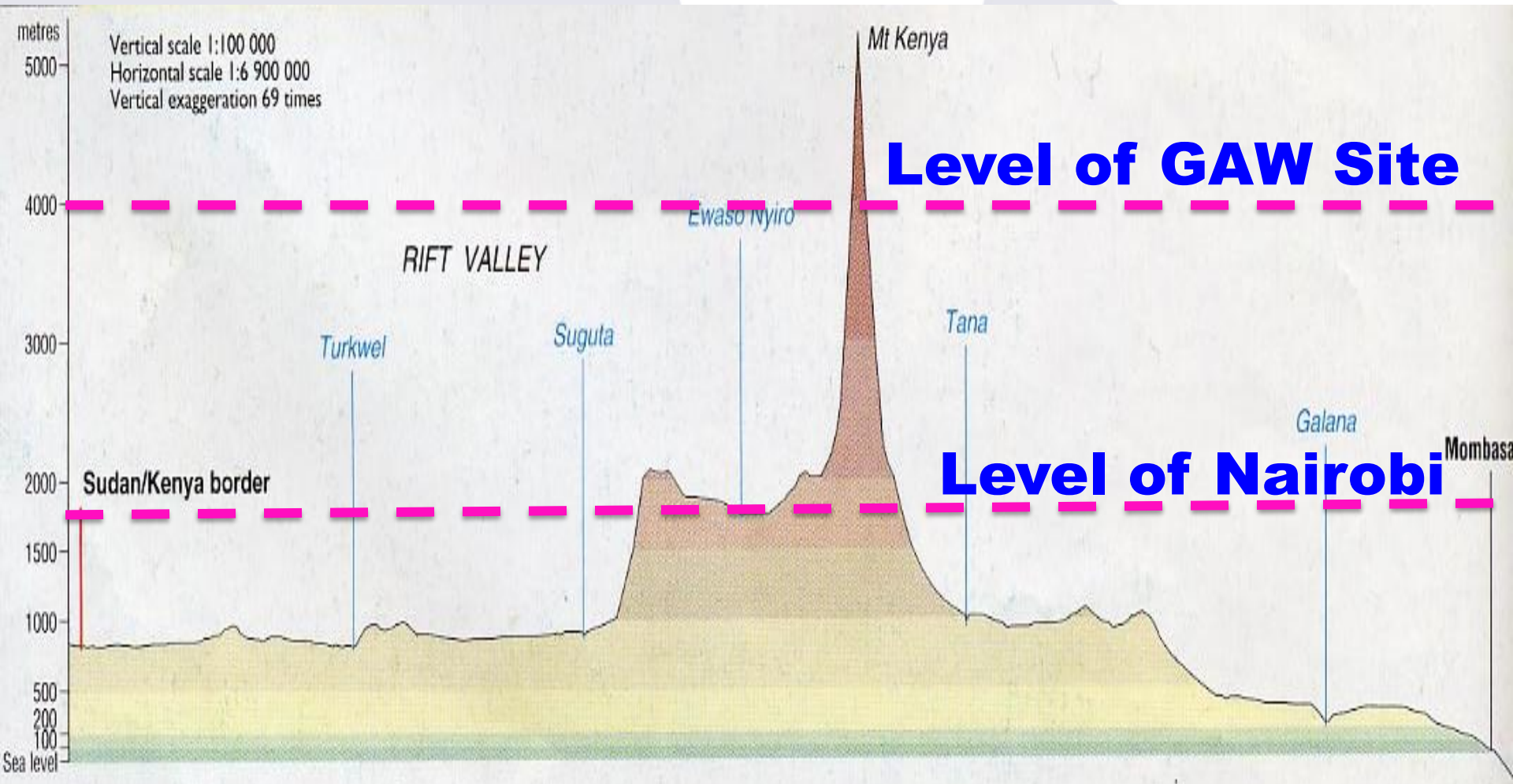


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Map of Kenya



Terrain:- Sudan to Mombasa through Mt. Kenya ($\approx 5,200$ m)





Kenya

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- ◆ **Export:** Tea, coffee, horticultural products, and petroleum products?
- ◆ **Imports:** Machinery and transportation equipment, petroleum products, iron and steel etc.
- ◆ **Major Problems:** Food insecurity, Energy and receding water levels (water stress)



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Tourism & Wildlife

- **Landscape combined with wildlife and ecosystem biodiversity offers tourists some of the best scenes in the world**
- **Kenya has 5 National and 1 Marine Parks, and 12 National and 5 Marine Reserves**



Mt Kenya

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**A snow
capped
Mountain
whose
glaciers have
been
receding**

Figure
Adopted from
Henne et al.,
2008



MT Kenya

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- ◆ **Approximately 0.17° S and 37.3° E in the heart of Tropical East Africa.**
- ◆ **Rises to approx. 5,200 m above mean Sea level**
- ◆ **It is a Land Mark for Republic of Kenya**
- ◆ **The believed legend seat of the God of the surrounding Communities.**



MT Kenya Ecosystem

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- ◆ **North and North-West is Leeward side**
- ◆ **The West to the Rift Valley is The central Highlands which runs into Savanna country to the south west and southern Kenya,**
- ◆ **From the settlements below the mountain; it rises through tropical forest (approximately 2000-2300 m), bamboo, and moorland above about 25000 m.**



MT Kenya Ecosystem

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- ◆ It is a major Water Catchment area in Kenya sustaining large human and animal population as well as forests and grasslands cover.
- ◆ However, It has suffered wide spread abuse and destruction since the coronial period reaching a peak over the last 4 decades due to population pressure and lack of committed protection.



MT Kenya Weather

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Weather is driven by the movement of ITCZ (a low pressure zone where N-E and S-E trade winds meet). Being at the equator the ITCZ transits over the mountain twice in the year. ITCZ is in the north in June and in the South in December.

The ITCZ movement results in two rain seasons in the region: Heavy rains in March-June and Short rains in October-November.



MT Kenya Weather

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June to early September is cool and generally dry. The overcast skies are topped by a trade wind inversion at about 3 km.

Eastward excursion of Lake Victoria trough causes heavy showers on elevated altitudes. This is clearly observable at the GAW station on Mt Kenya.



MT Kenya GAW Station

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It is Located at 0.06°S , 37.3°E and at altitude of 3678 m. At an area about 20 km above the human settlements and 3 km from a nearby mountain climbing transit-camp.

It experiences the mountain winds, upslope in daytime and downslope in nighttime. However, the impact is not fully studied and depending on the magnitude the settlement and camp site could have a traceable influence on the site aerosol.

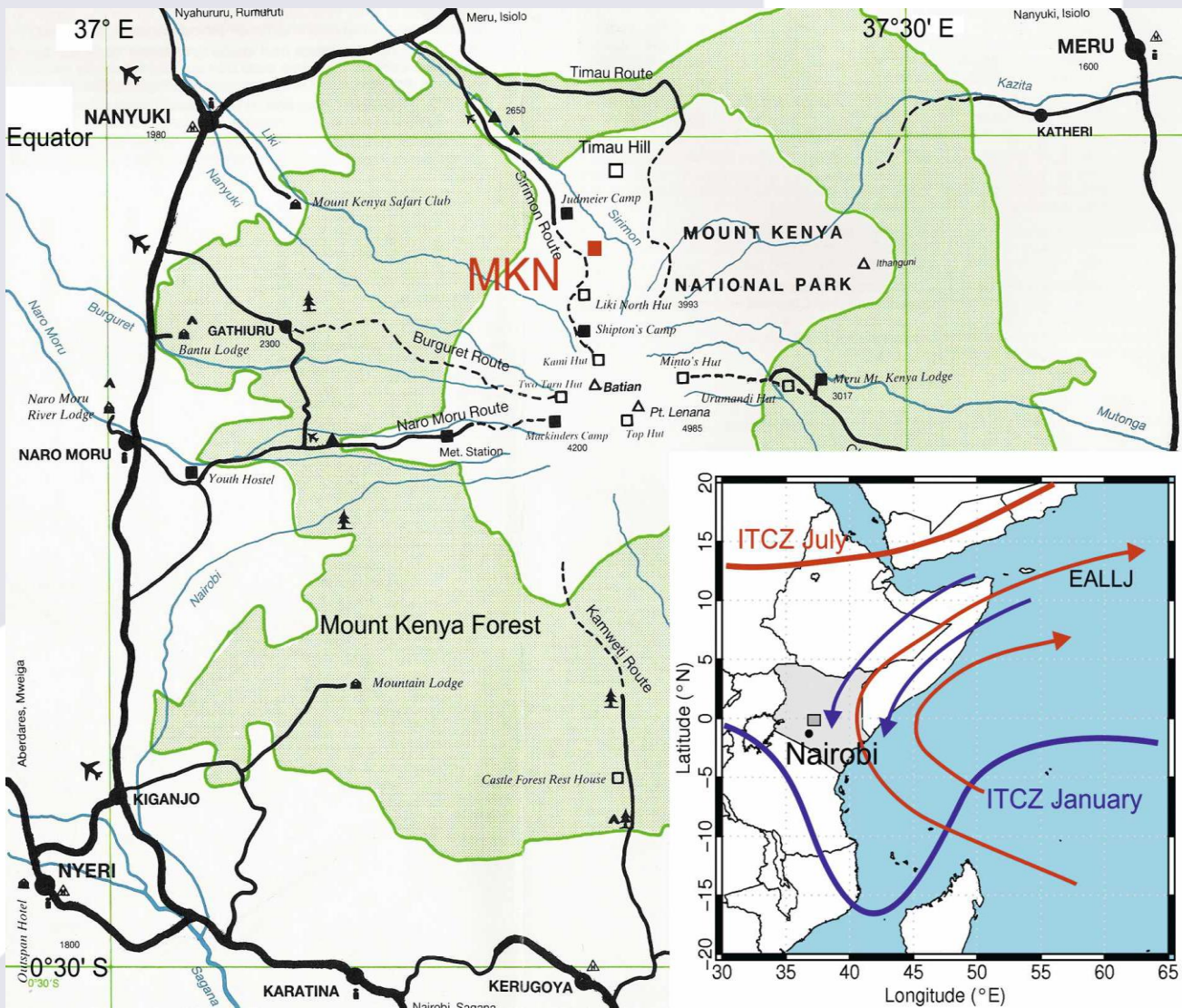


MT Kenya GAW Station

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Mt. Kenya GAW Site Location and Air mass Flow Regime with Respect to ITCZ.

Figure Adopted from Henne et al., 2008





MT Kenya GAW Station

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June to early September is cool and generally dry. The overcast skies are topped by a trade wind inversion at about 3 km.

Over the period an Eastward excursion of Lake Victoria trough causes heavy showers on elevated altitudes and it is observable at the station.



Black Carbon at the GAW Station

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BC and Mineral Dust measurement in 2001.

Gatari et al.
2009 in X-Ray
Spectrometry
Journal.

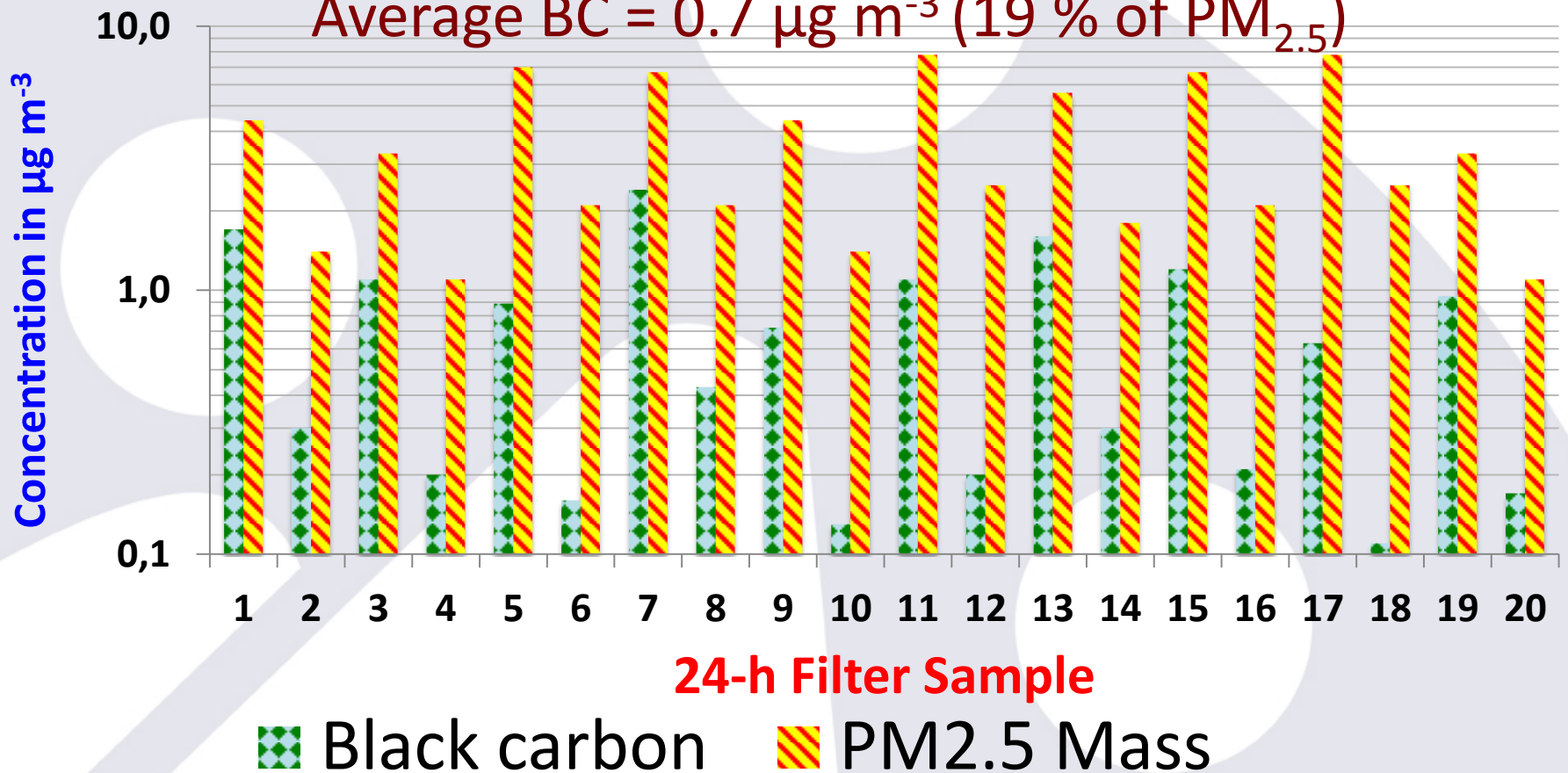
Efforts of
International
Science
Program,
Gothenburg
University
(Sweden) and
University of
Nairobi.



Black Carbon at the GAW Station

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Average BC = $0.7 \mu\text{g m}^{-3}$ (19 % of $\text{PM}_{2.5}$)





Black Carbon at the GAW Station

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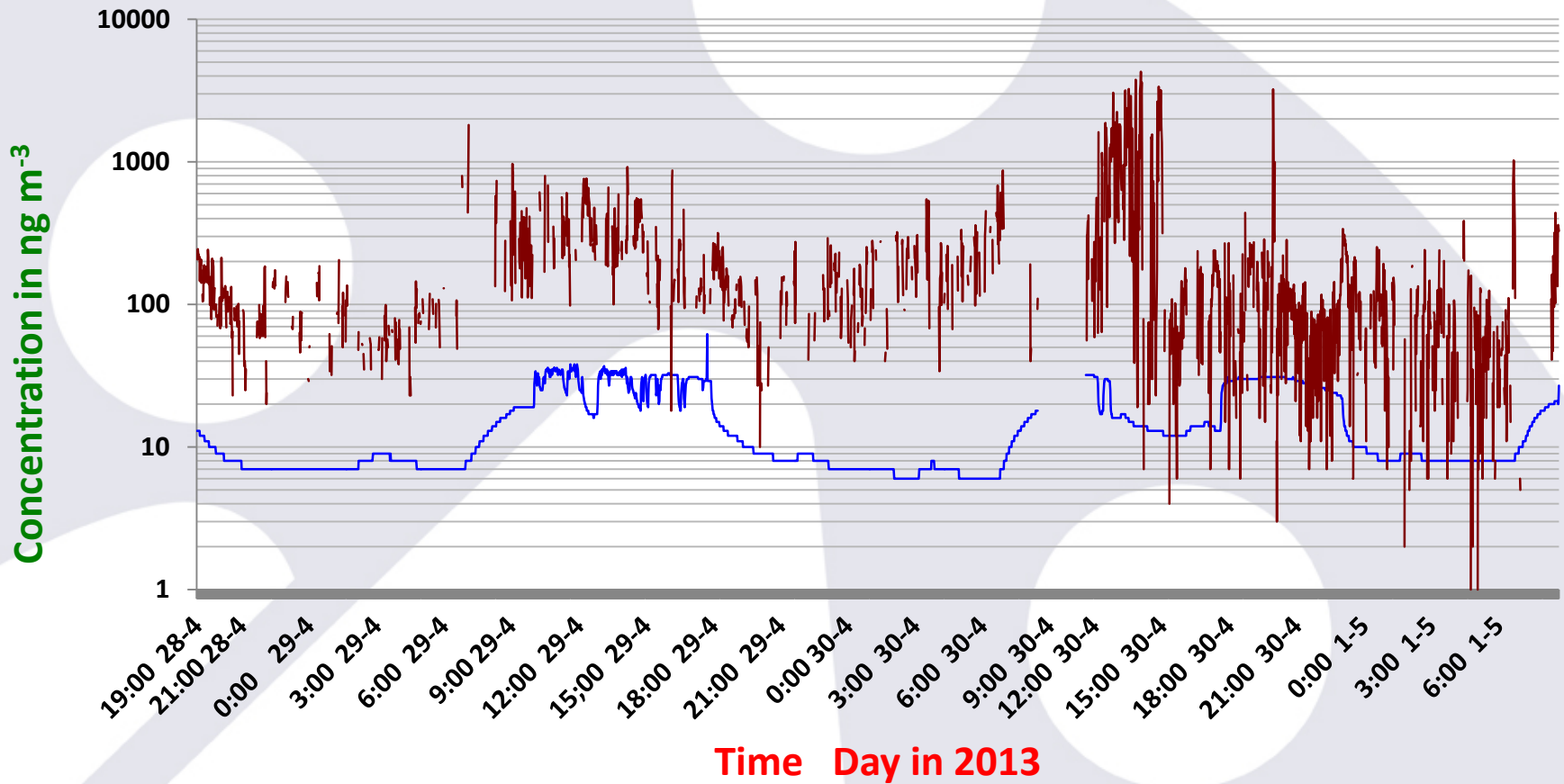
A recent joint efforts of ABC-Africa (in the interim stage of formation) under UNEP in Collaboration with University of Nairobi and Kenya Department of Meteorology commissioned a preliminary study for BC and $PM_{2.5}$ at the GAW station.

The results are yet to be published and they are as follows:



BC & Temperature in Late April and Early May

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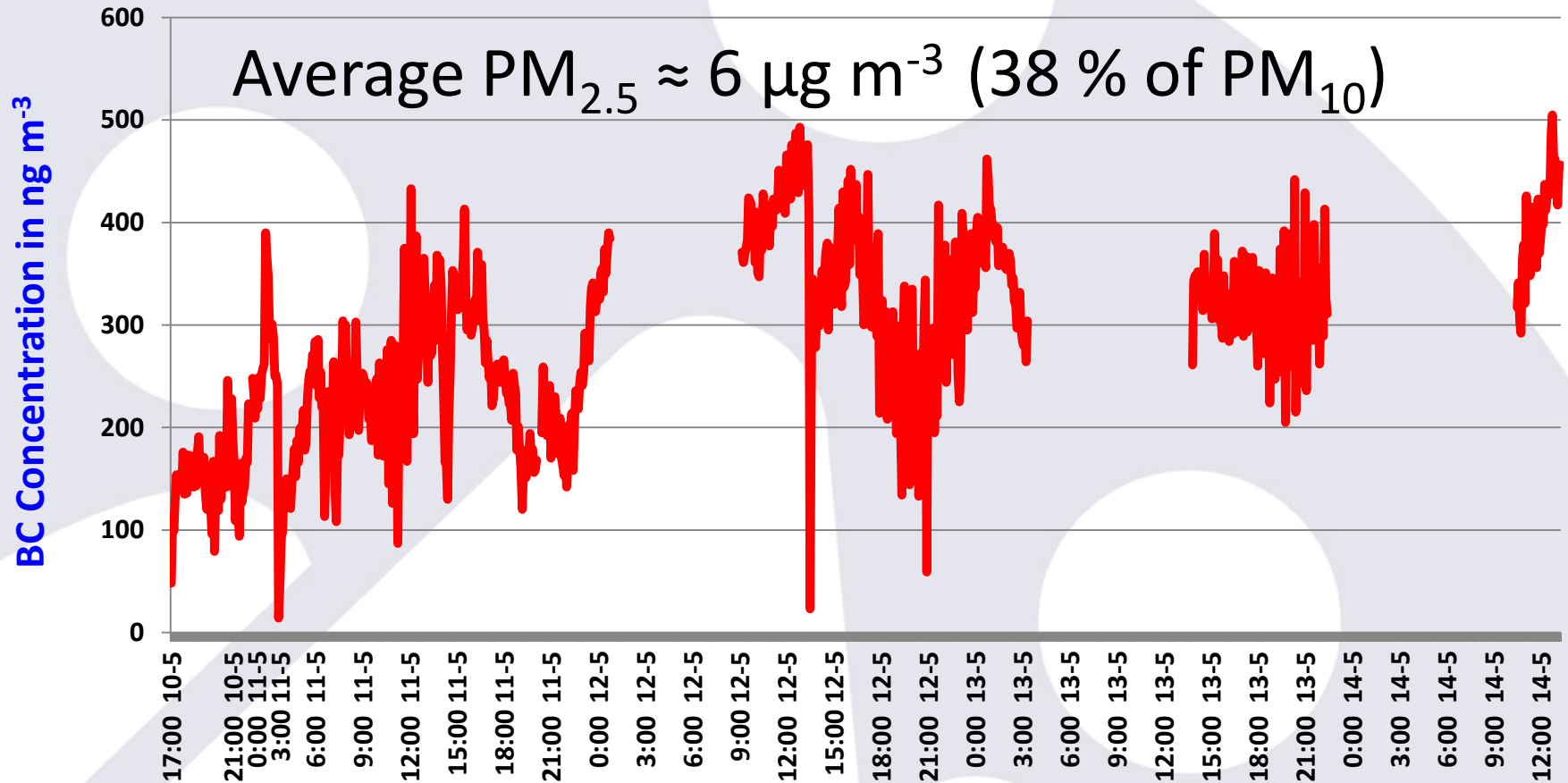
— Temperature

— BC



BC in Mid-May 2013

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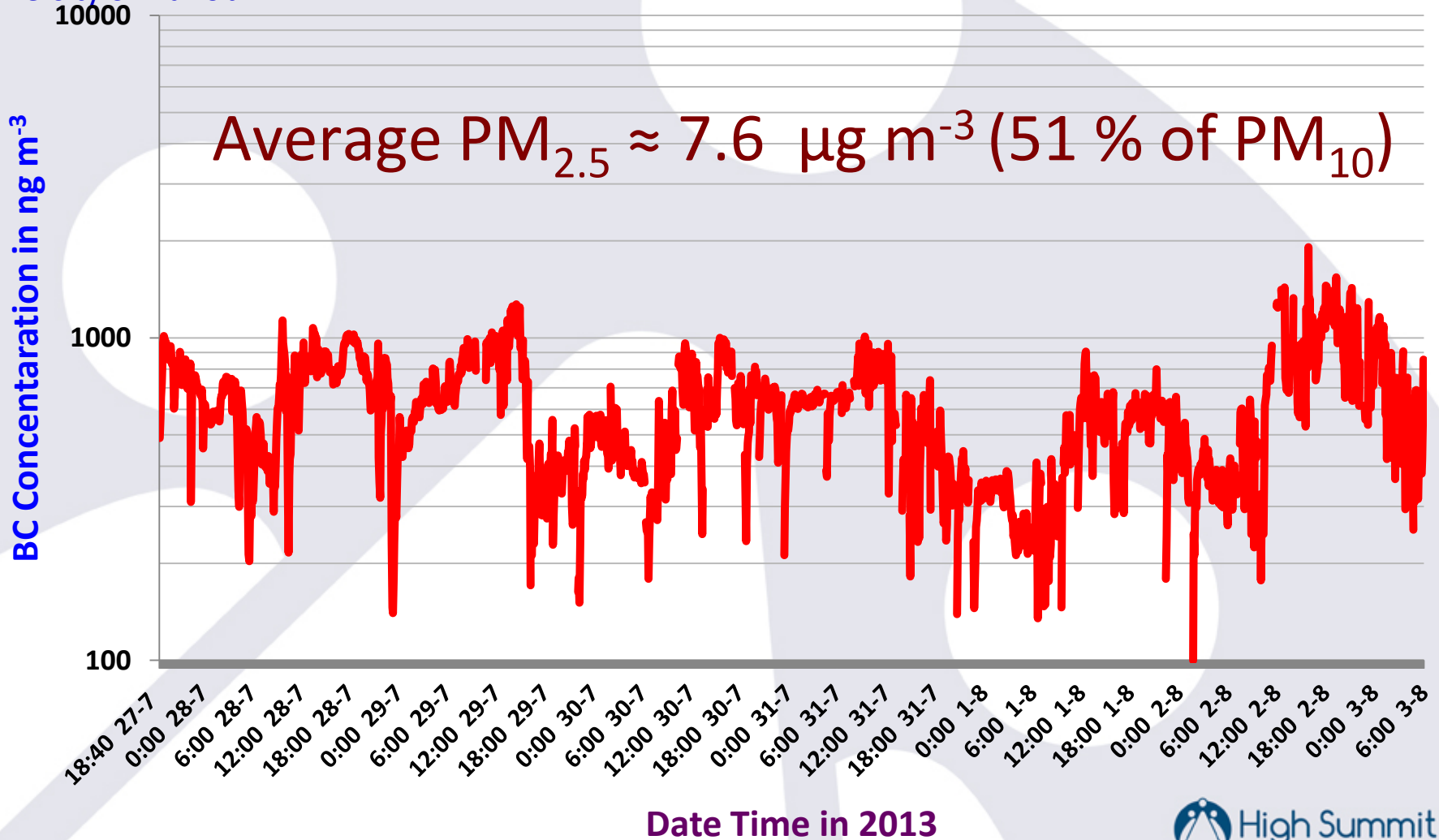


Time Day in 2013



BC in Late July Early August 2013

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Summary

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The East African Region is prone to prolonged draughts and its underground water is reported to be receding. An additional threat is high rate of population growth

Mt Kenya is an important water source and reservoir in Kenya. Its ecosystem has been abused, degraded and scientific and historical observations report degrading glaciers.



Summary

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Kenya's main Foreign Exchange earners are Coffee, Tea and Tourism.

Small scale farming feeds over 60 % of Kenyans leaving below a US\$ income per day. Population growth demands more arable land and energy in a country where arable land is less than 10 % and has a high energy deficiency.



Summary

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Therefore the health of Mt Kenya ecosystem is of critical important in social and sustainable economic development in Kenya.

The environmental impact on Mt Kenya are observable on Mt Kilimajaro, a sign of a regional problem.

Atmospheric and general Environmental studies in the perspective of climate change in the region is a social commitment, which the global community cannot afford to ignore.



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Thank You !!!

Molte Grazie!