

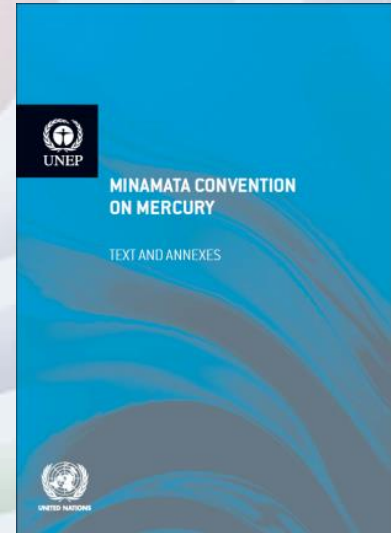


Mercury Monitoring in South Africa

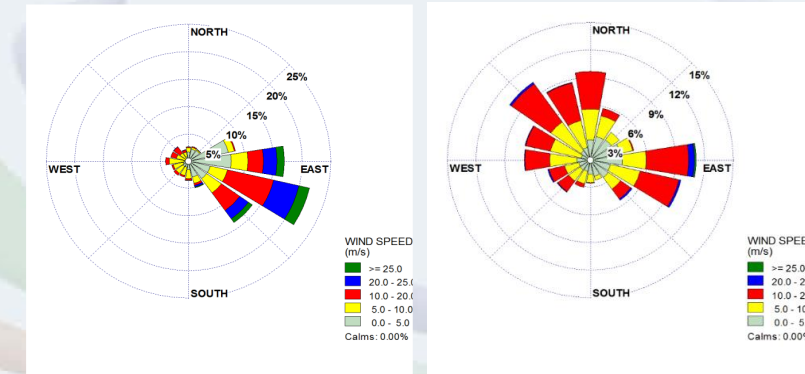
Lynwill G Martin Ph.D

Senior Scientist

**Cape Point
Global Atmosphere Watch
SA Weather Service (SAWS)**



What is Global Atmosphere Watch (GAW)



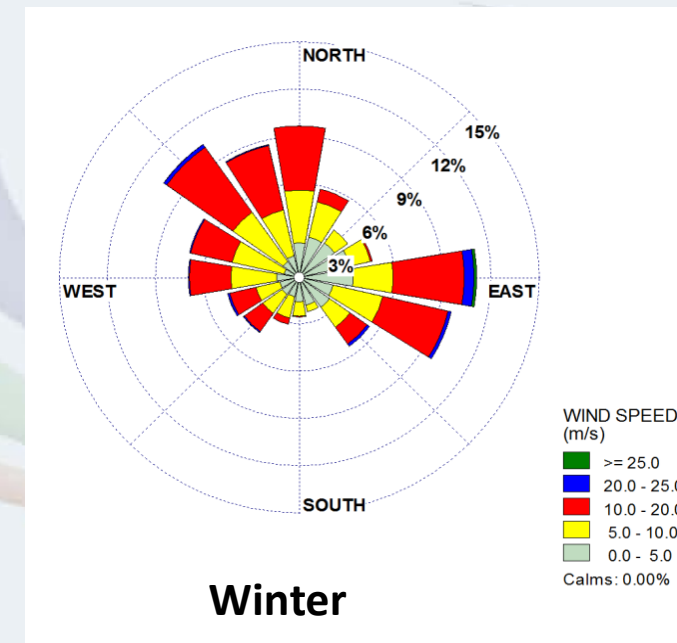
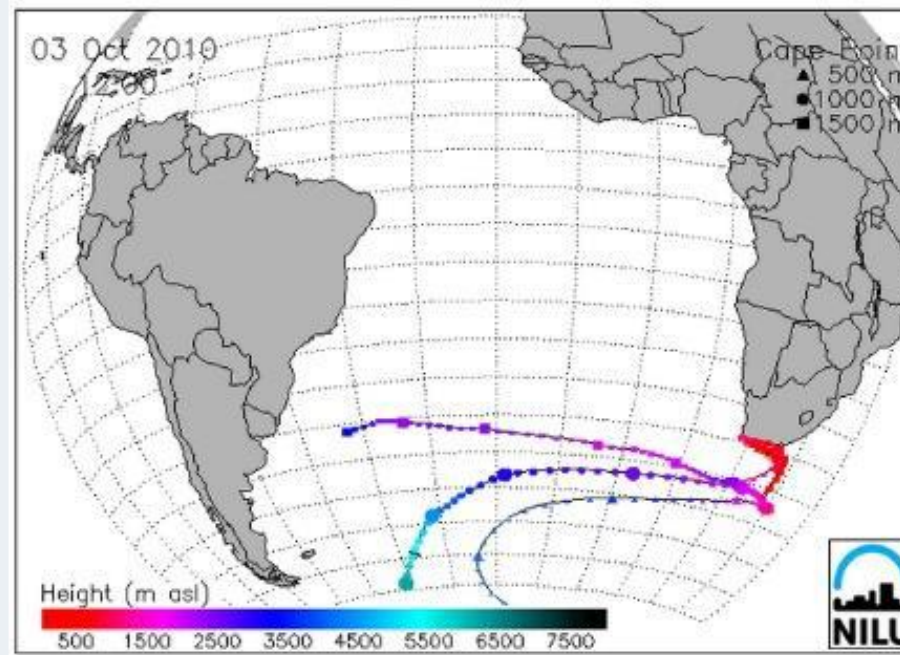
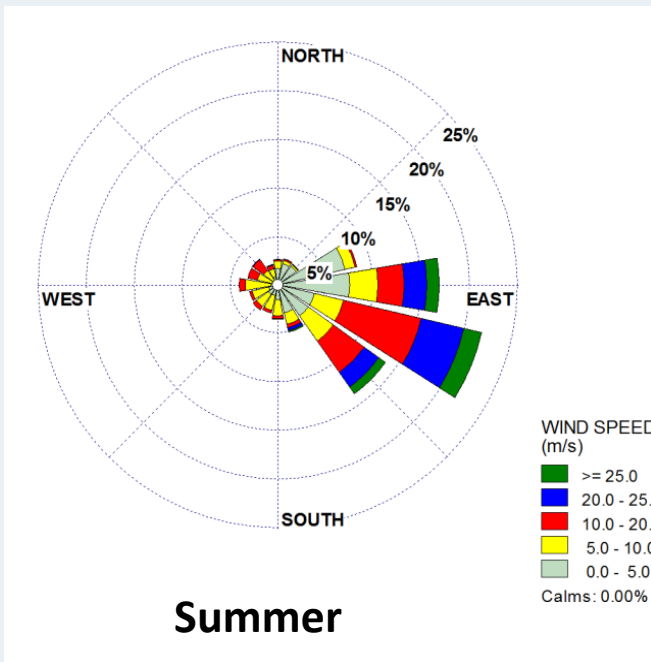
summer

winter



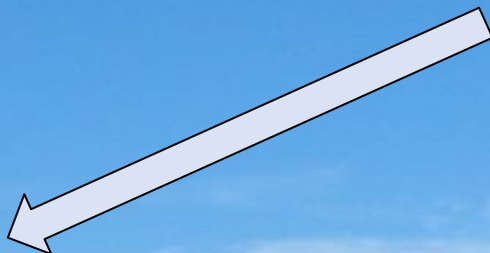
South African
Weather Service

- Cape Point station started in 1978
- First measurement were CO and CFC's
- Reached GAW status in 1995 with WMO
- Only 31 GAW stations globally, 3 on African continent

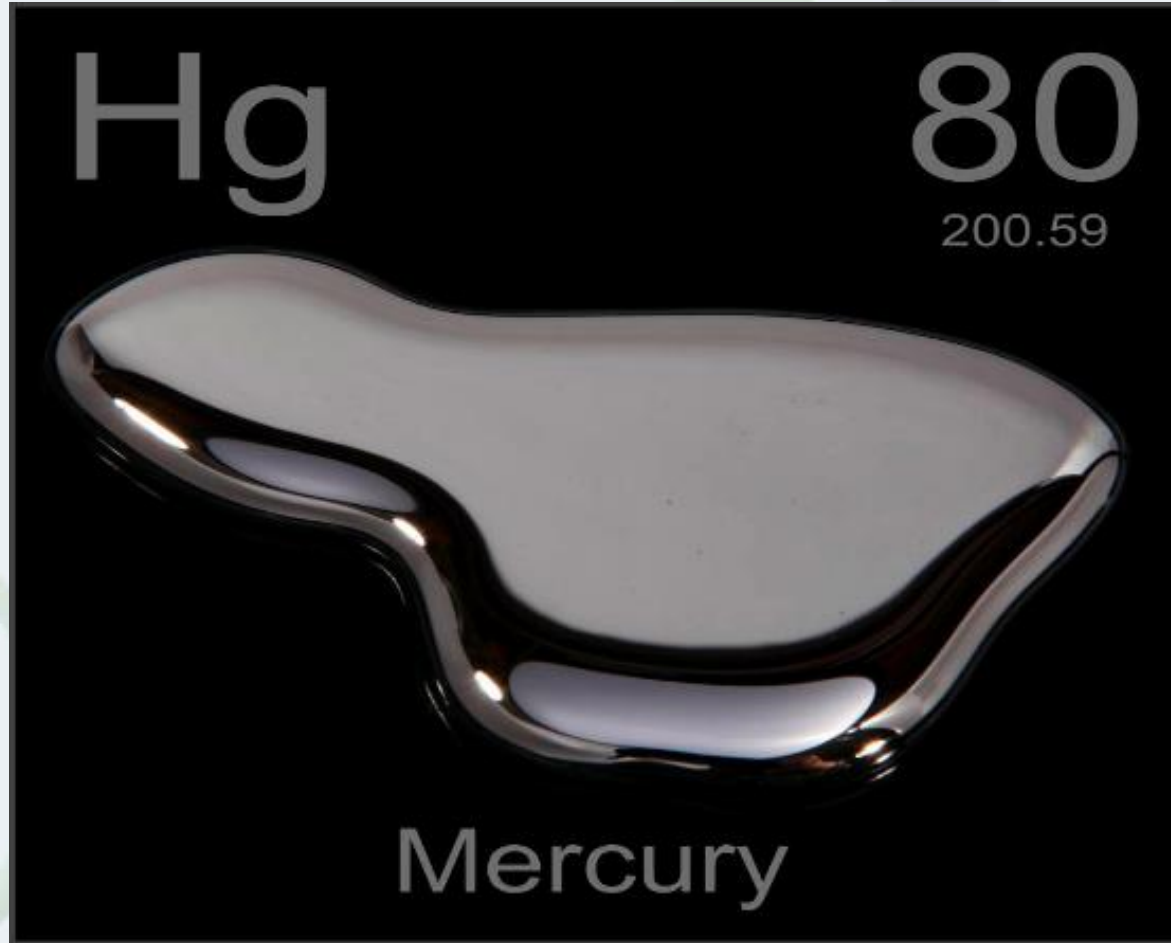


- GAW Stations monitor **BACKGROUND** concentrations of greenhouse and reactive gases therefore location is very important.
- Not interested in local city pollution sources just **BACKGROUND**.
- 40% of the air masses that reach CPT is classified as Clean AIR ²²²Radon < 250mBq/m³
- Back Trajectories is a tool to identify the Origin of Air Masses moving over the Station.
- Easily identify from where and for how long it's been in contact with ocean/land ect.

Cape Point GAW Station



WHY MERCURY???



**South African
Weather Service**



- Mercury and its compounds are very toxic and hazardous for human health and the environment
- Along the food chain it is enriched in organisms mainly as methyl mercury (CH_3Hg^+)
- Coal and oil combustion for the production of energy the main anthropogenic input pathways, followed by artisanal gold mining (**ASGM**), non-ferrous metal production
- Anthropogenic sources make up around 40% of total emissions into the atmosphere

Cape Point Mercury Air Monitoring Programme

- CPT GAW started with manual mercury monitoring in Sep 1995 till Dec 2004
- First station in Southern Hemisphere to do **Continuous Mercury Monitoring**
- High Resolution Monitoring started in March 2007 (every 15 min a reading Tekran 2537 A)
- Only station in SA doing **Continuous Mercury Monitoring** which data is available to the public (SAAQIS)
- Cape Point data used in latest UNEP Mercury Report 2018

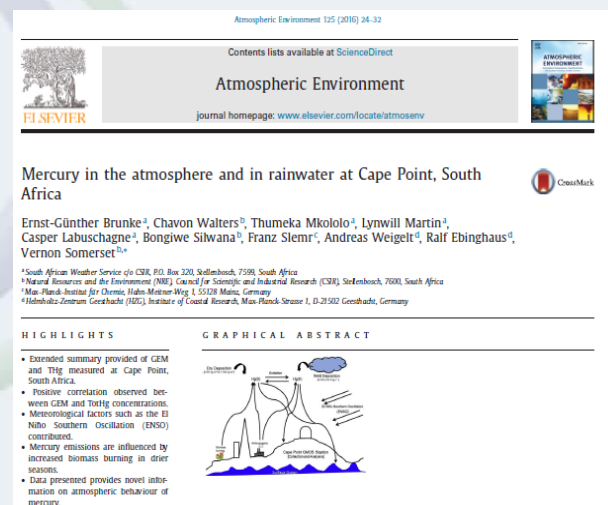
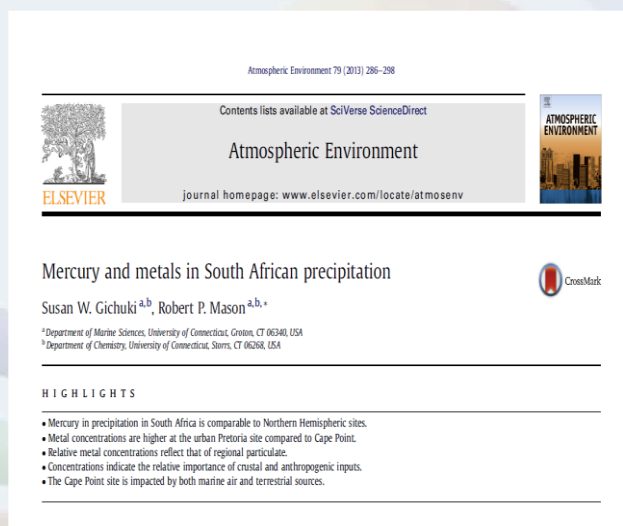


Published March 2019

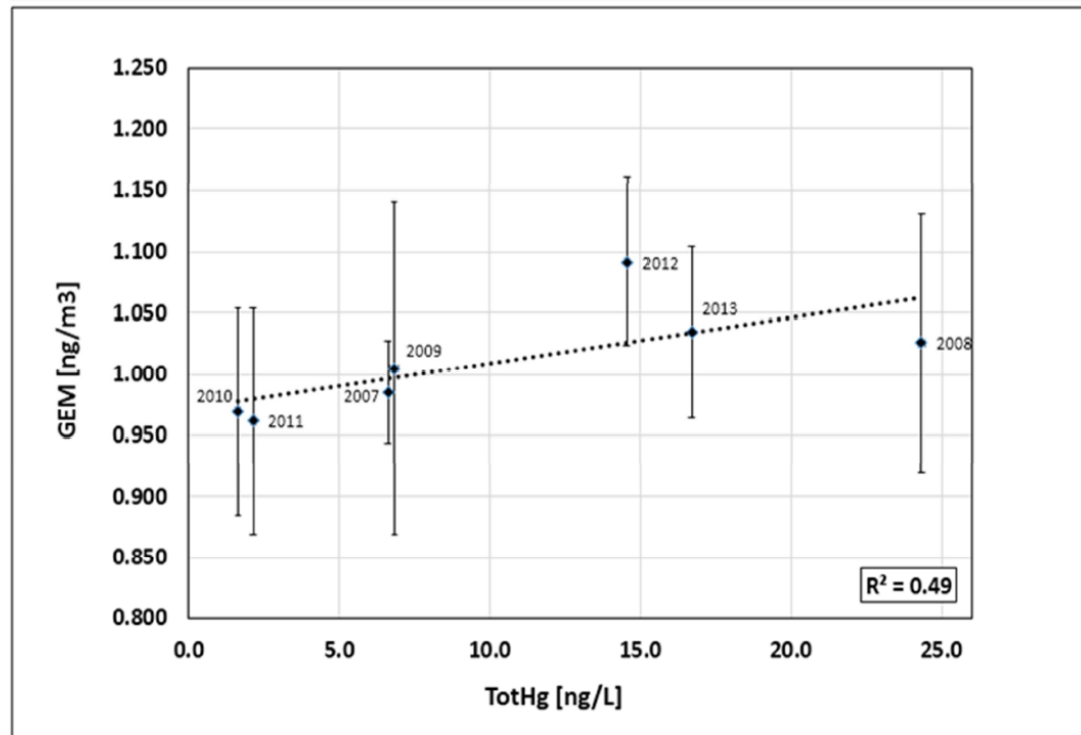
Mercury in Rainwater 2007 – 2009 data CPT and PTA



- Hg in rainwater SA is comparable to NH-Sites.
- Hg concentrations higher in urban PTA than CPT.
- VWM for Hg CPT 10.6 ng/L PTA 15.8 ng/L
- CPT impacted by both marine air and local course



Mercury in Rainwater (2007-2013) at CPT



- Observed a positive correlation between GEM vs TotHg.
- Positive correlation between GEM vs TotHg indicates that both are a function of Hg emissions.

Clear Influence of El Nino Southern Oscillation (ENSO) on GEM

Outputs of CPT Hg Monitoring Programme

- **MSc**- PGL Baker 1999 (paper cited over 100 times published in 2002)
- **Hons** Project 2005 LG Martin, Stellenbosch University
- **MSc**- LG Martin 2007, Mercury in Coal (Funded by ESKOM)
- 1x **PhD** A Venter 2016 North West University (Funded by SASOL)
- **± 25 Hg Publications since 2002.**
- GMOS Partner since 2010 now under GEO Flagship **GOS⁴M**
- **Nature Geoscience** April 2018, Martin, Mkololo, Labuschagne co-authors
- Several Oral and Poster presentations at SASAS, NACA, **ICMGP** and ICHMET
- **Longest Hg data set in the SH** and **2nd longest** in the World.

SAWS involvement in UNEP and GEF Projects (2016-2018) that reported to Minamata Convention on Mercury at COP2, 18 - 23 Nov 2018



Report by UN Environment, the World Health Organization and Italian National Research Council - Institute of Atmospheric Pollution Research regarding the activities of the Global Environment Facility Project: Development of a Plan for Global Monitoring of Human Exposure to and Environmental Concentrations of Mercury

Document prepared by:

UN Environment, Economy Division
Chemicals and Health Branch, Science and Knowledge Unit
International Environment House 1
11-13 Chemin des Anémones
CH-1219 Châtelaine, Geneva
Switzerland
Email: science.chemicals@unep.org

World Health Organization (WHO)
European Centre for Environmental and Health
Platz der Vereinten Nationen 1, 53113
Bonn, Germany

Italian National Research Council - Institute of Atmospheric Pollution Research (CNR-IRIA)
Via Salaria km 29,300
00016 Monterotondo (RM), Italy

ELEMENTS TO CONSIDER WHEN DESIGNING A GLOBAL MONITORING PLAN FOR MERCURY

GEF Project ID: 5409



Objectives:

- To harmonize approaches for monitoring and to strengthen the capacity for mercury analysis, in humans and the environment.



Implementing partners of the GEF project are:



- UN Environment, Chemicals and Health Branch;



- Italian National Research Council - Institute of Atmospheric Pollution Research (CNR-IRIA); and



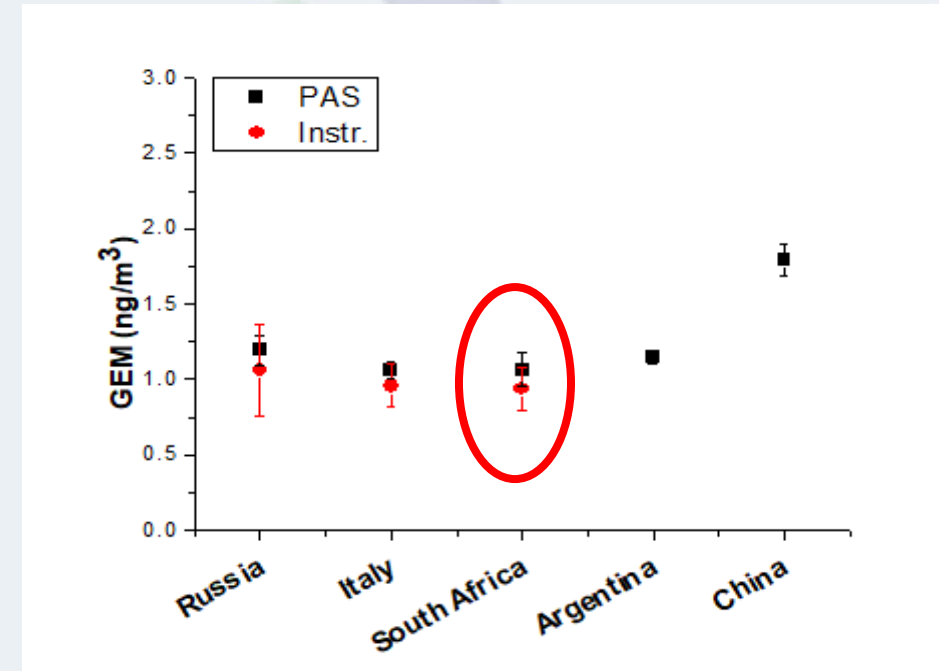
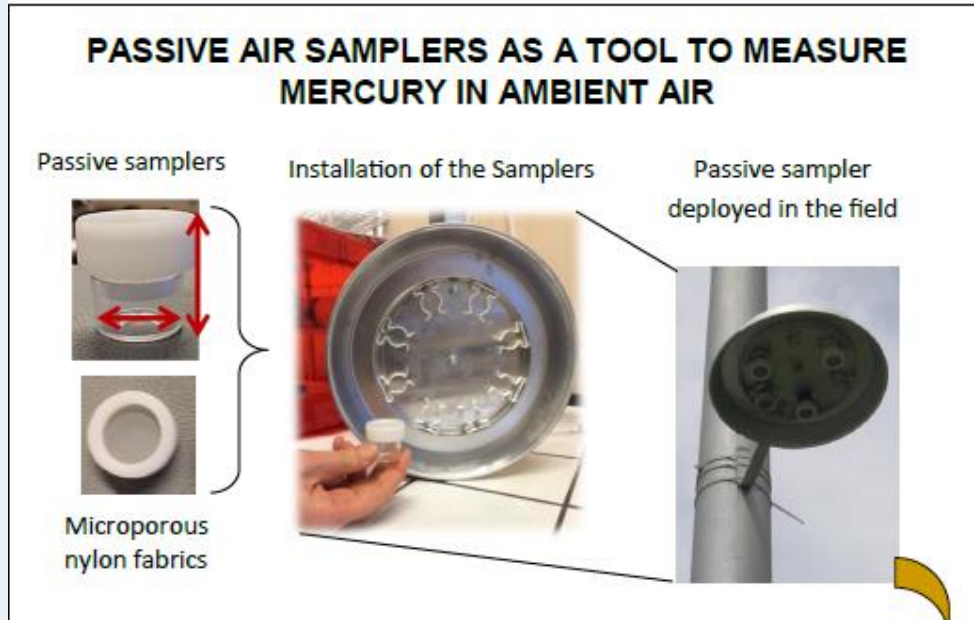
- World Health Organization, Regional Office for Europe - European Centre for Environment and Health (WHO ECEH).

For more information please refer to: Report to Minamata Convention of the Global Monitoring Plan for Mercury. To download go to our website or use the following QR-code:



<https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/mercury/mercury-monitoring>

Pilot Project Results of Passive Air Samplers (PAS) CNR-Italy



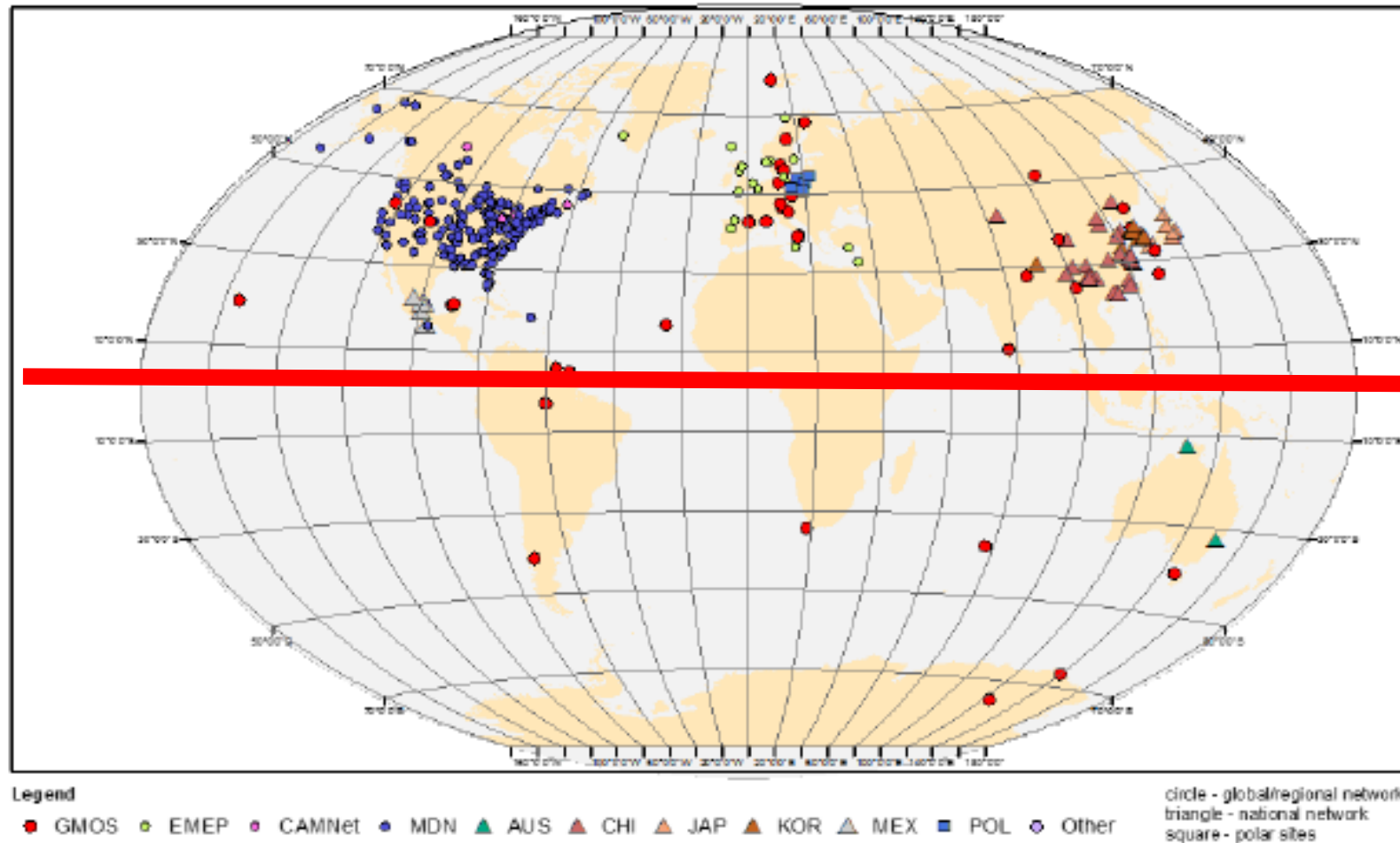
Comparison between analytical instruments at Cape Point and PAS's:

- PAS values result within STD Deviation of Cape Point instrumental data
- PAS could give info when electrical troubles happened on the equipment
- PAS cheap and reliable to monitor Hg in Air
- Can easily be deployed in remote locations

MerPas Exposure in De Aar (SA) started July 2019, in collaboration with Environment Canada

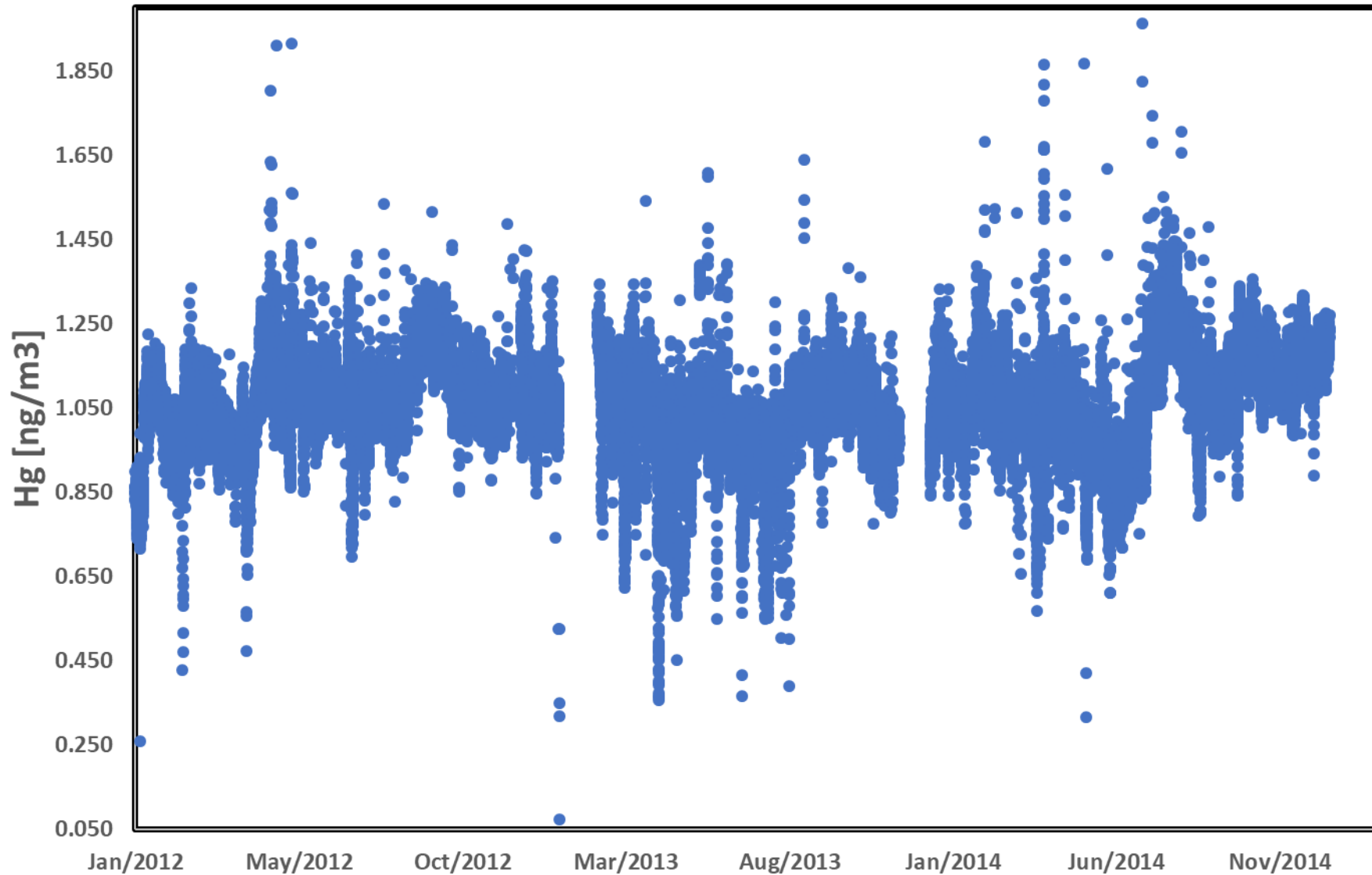


Global Mercury Monitoring Networks

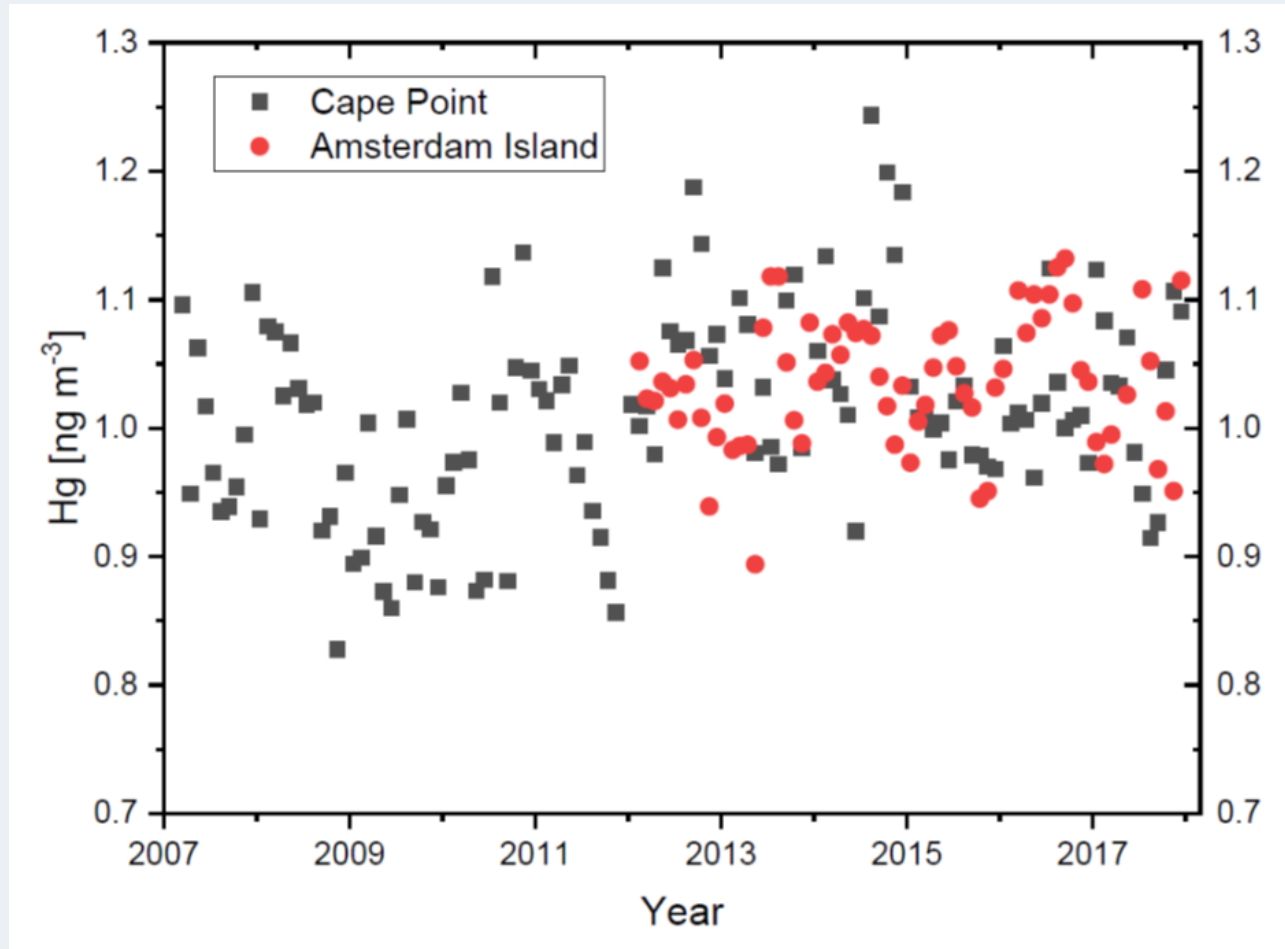


Current global long-term atmospheric mercury monitoring sites. Africa **still lacking** yet Africa has the most countries that ratified the Minamata Convention 29 countries.

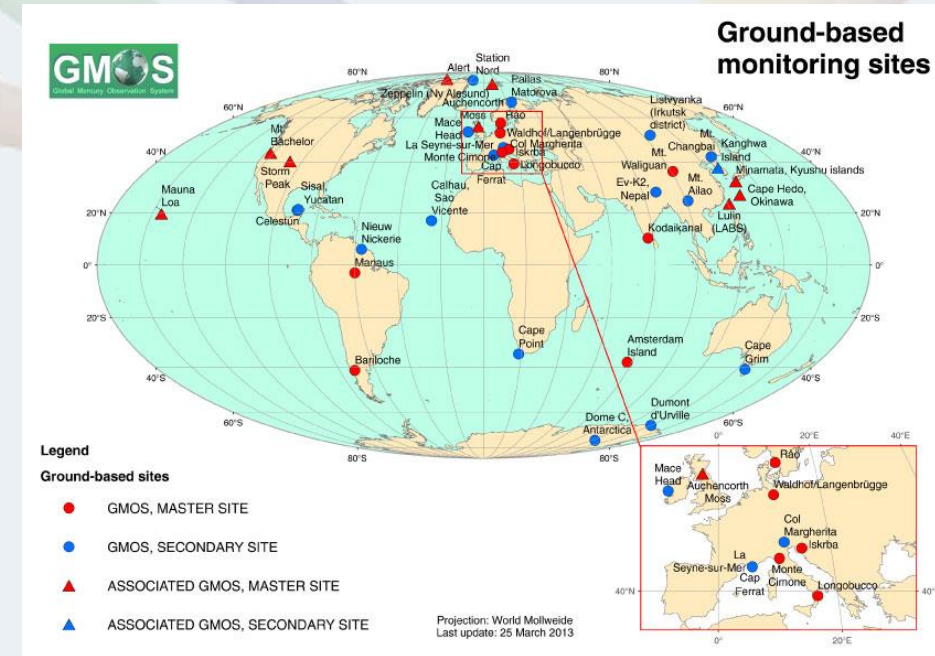
Cape Point 15 min GEM Data 2012-2014

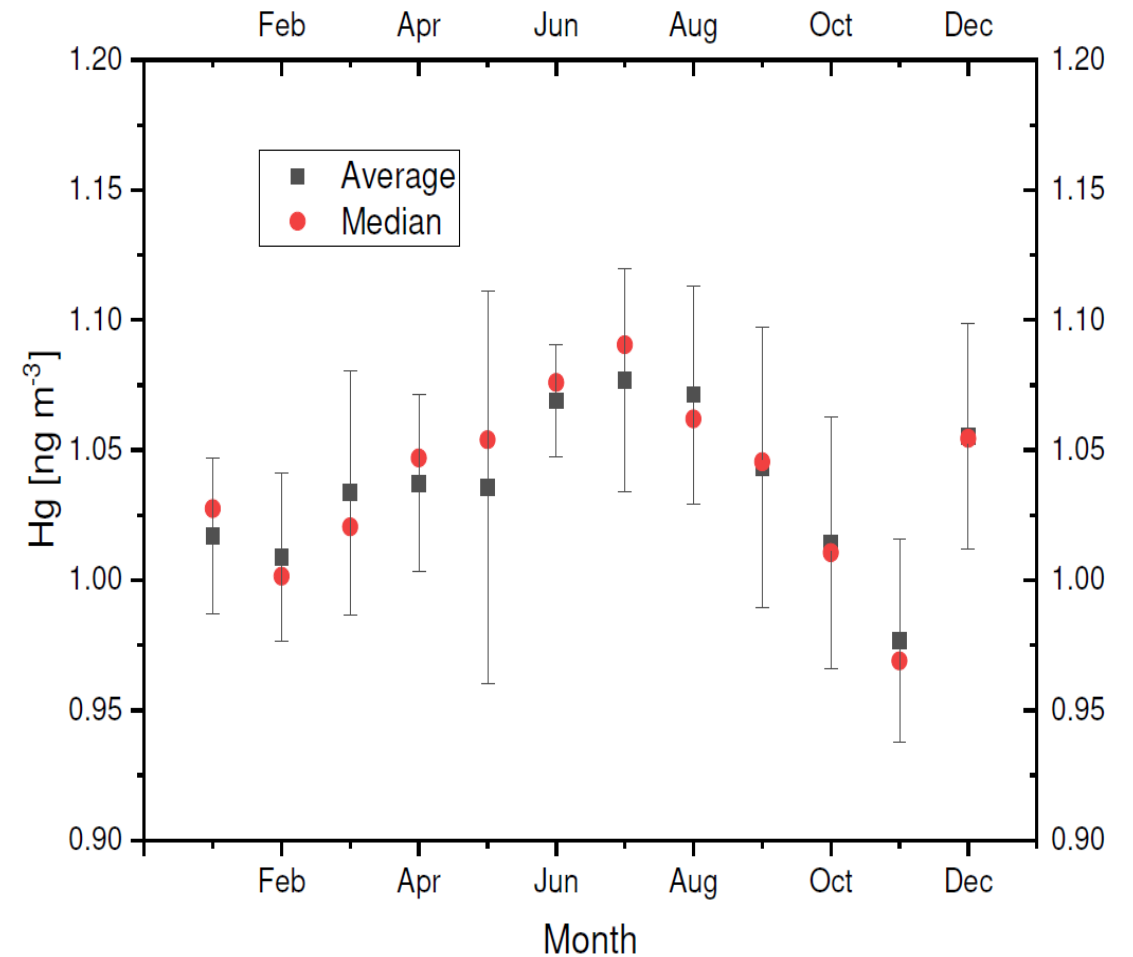
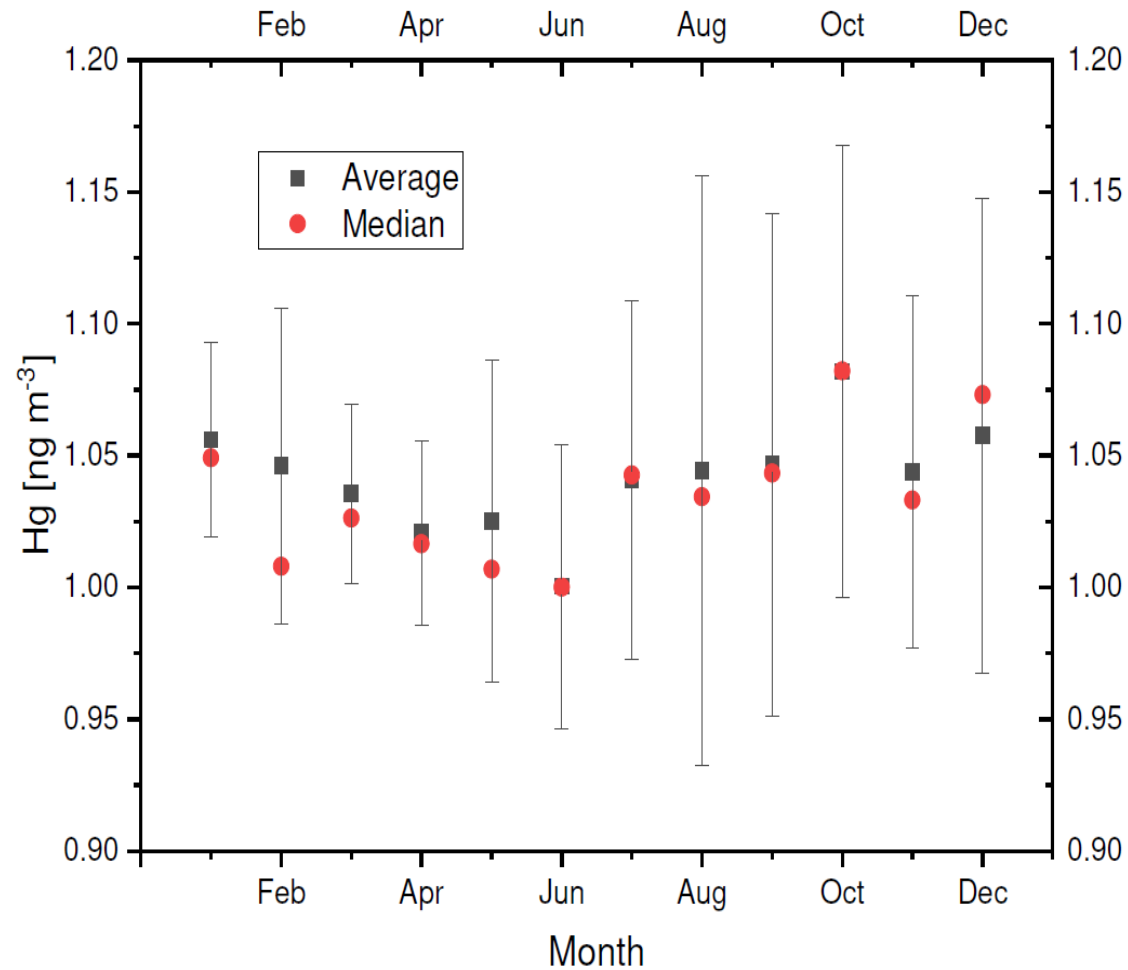


Latest Results on Hg Trend work in progress.....

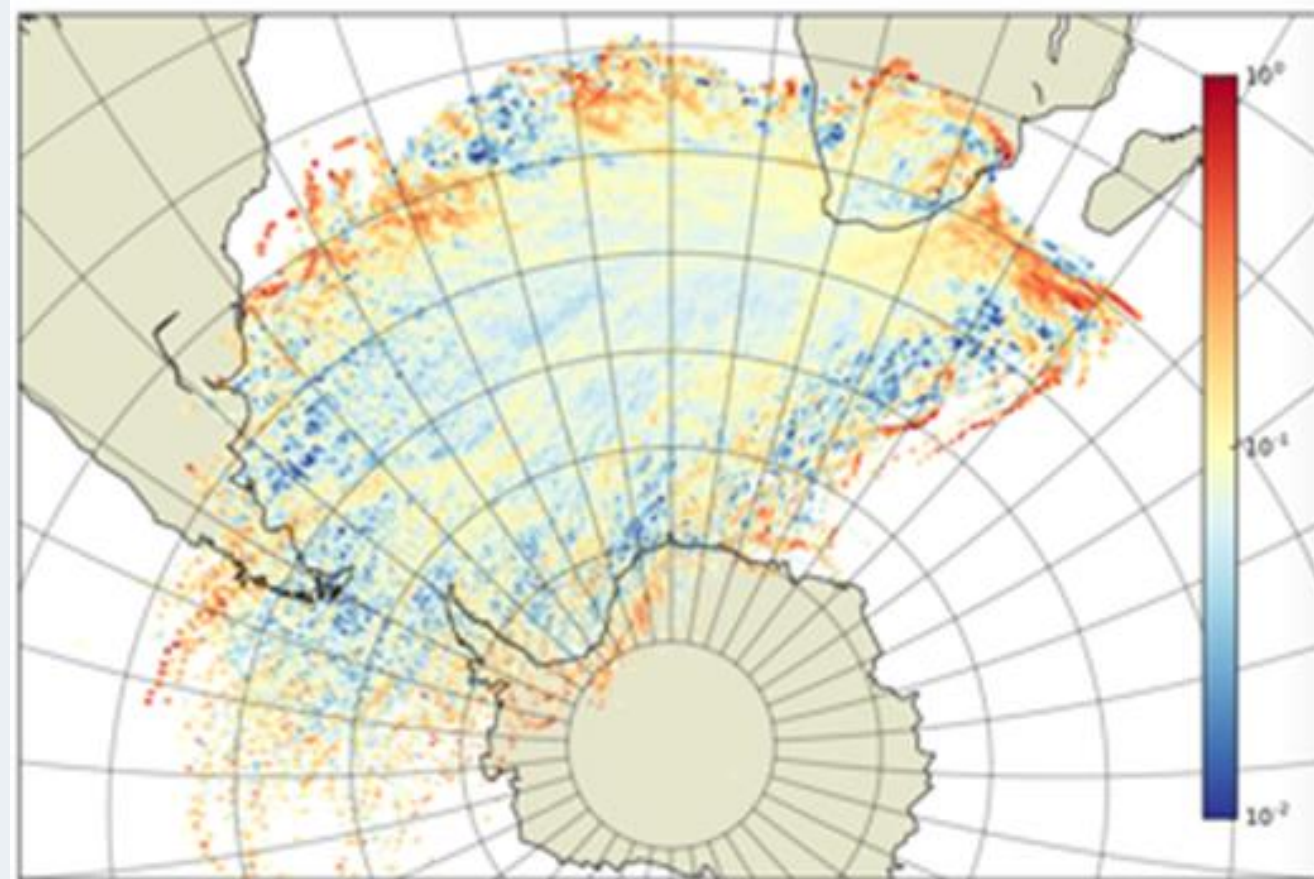
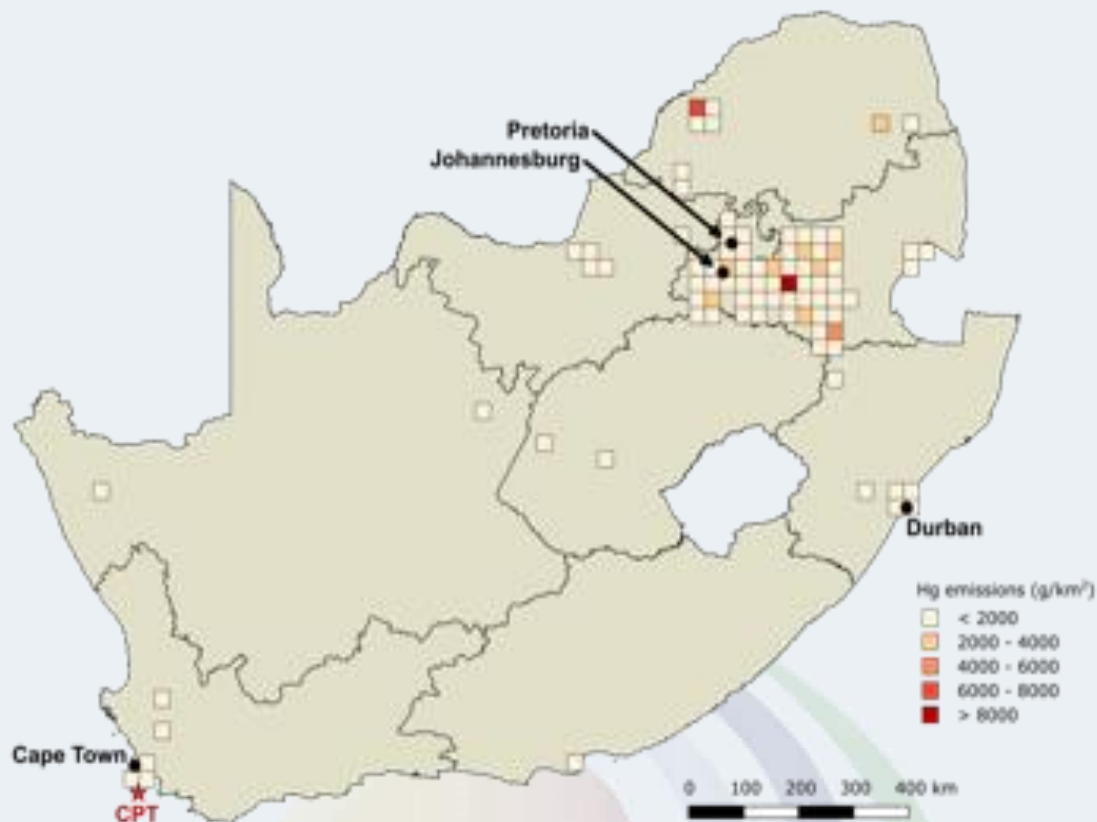


Monthly median Hg concentrations March 2007 until December 2017.



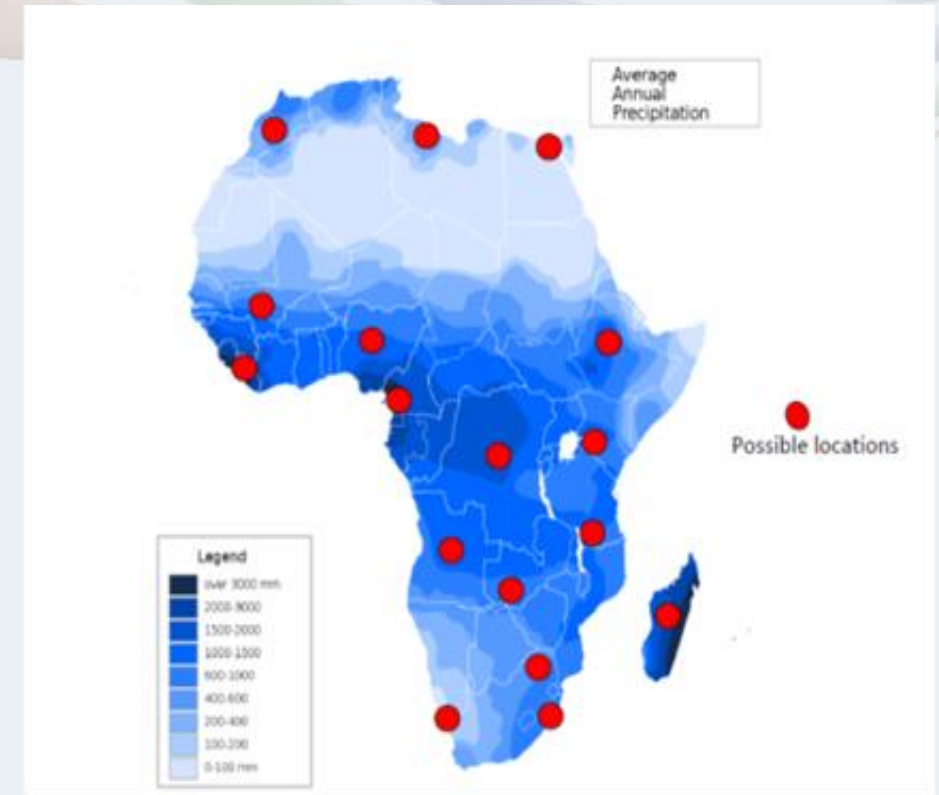


Seasonal variation of GEM in 2012 – 2017 at AMS (left) and CPT (right). The points represent averages and medians of monthly medians over the 2012 – 2017 period. The bars the standard deviations of the monthly averages.



Prevalence of high (90th percentile) GEM concentrations using all hourly trajectories over ten years

Future Plans with funding from DST through GOS4M Flagship Program of GEO



**WE CAN'T MANAGE
what we
DON'T MEASURE/MONITOR/REGULATE**



Minamata Convention on Mercury



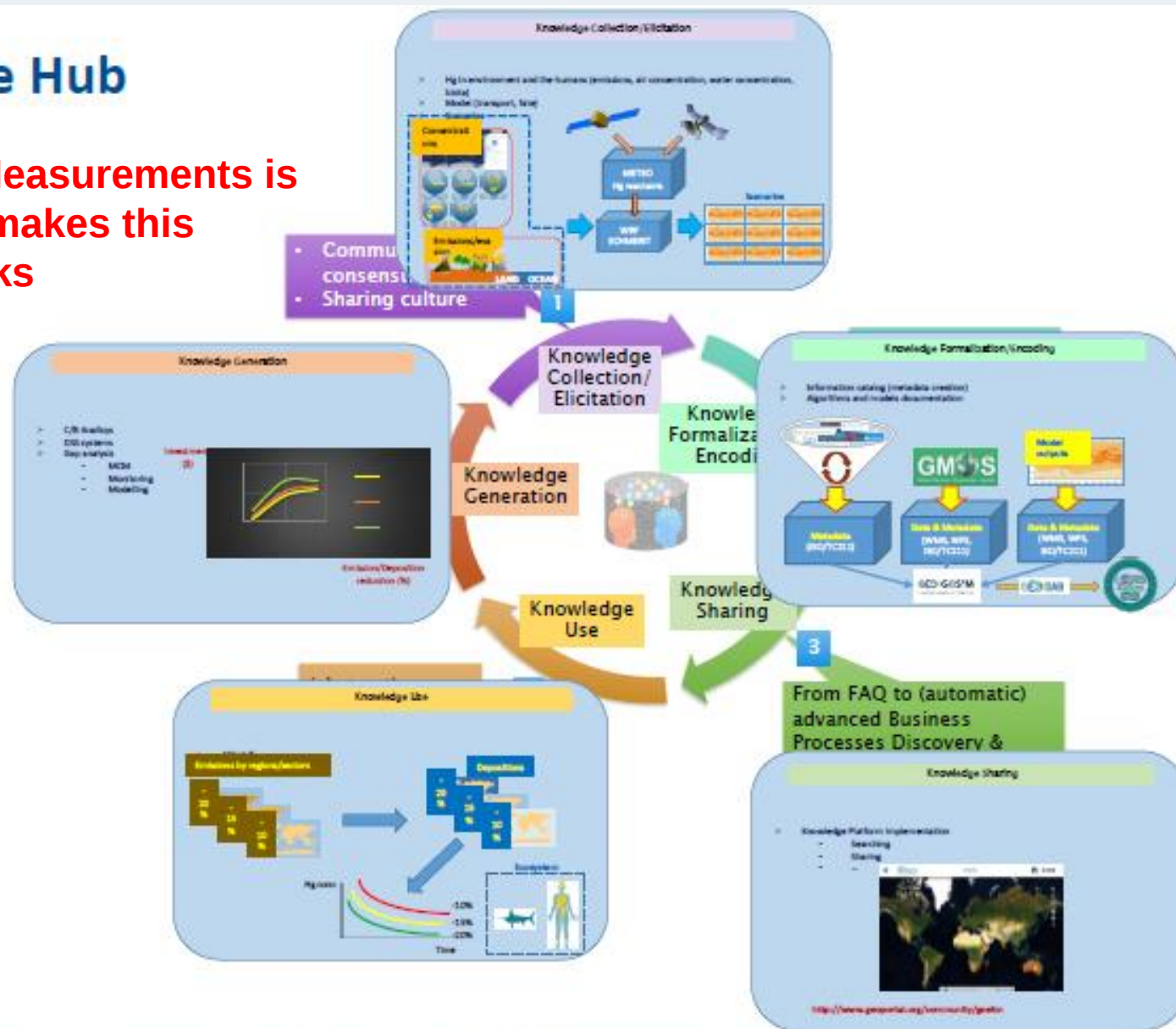
Objectives of the convention

To protect the human health and environment from anthropogenic emissions and release of mercury and mercury compounds

- ✓ October 2013, the Minamata Convention on Mercury opened for signature and was signed by 128 governments
- ✓ SA signed the convention in 2013 Oct, **SA ratified on 29 April 2019.**
- ✓ **Convention come into force August 16, 2017**
- ✓ First Conference of the Parties (COP1) September 2017
- ✓ Convention comprises of 35 articles
- ✓ 112 Countries Ratified Aug 2019
- ✓ COP3 23 -29 November 2019, Geneva

Knowledge Hub

Monitoring/Measurements is the key that makes this pictures works



African
Weather Service

**Bridging knowledge on global mercury with environmental responsibility,
human welfare and policy response.**

ICMGP 2019

SAVE THE DATE!



ICMGP 2019
8-13 September 2019 Krakow, Poland



www.mercury2019krakow.com

From Minamata to Africa and Beyond

"From Minamata to Africa and Beyond: Addressing Mercury Challenges in Global Environmental Change"



15th INTERNATIONAL CONFERENCE ON MERCURY AS A GLOBAL POLLUTANT

CAPE TOWN | SOUTH AFRICA | 11-16 JULY 2021

Discover the wonders of South Africa...
while addressing Mercury Challenges in Global Environmental Change.

Conference sessions include:

- Addressing global Hg challenges in a changing world.
- The impacts of climate change on global Hg cycling.
- How are we doing in implementing the Minamata Convention?
- Progress in understanding Hg and human health impacts.
- Atmospheric Hg cycling: Source & Emissions.
- Mercury in the Terrestrial Ecosystems.
- Mercury in Marine Ecosystems.
- Mercury in Contaminated Sites.
- Mercury Emissions: Monitoring and Analysis.
- Predicting the Impacts of Climate Change on Hg Cycling.
- Mercury in Polar Ecosystems.
- Analytical methods for Hg speciation to assess impacts of Climate Change.
- Communities, Hg and Climate Change.
- Risk Assessment of Hg exposure to wildlife, birds and fish.
- Human Exposure and Risk Assessment of Hg.
- Mercury in Artisanal Gold Mining.
- Mercury Regulatory and Policy Matters.
- Case studies on implementing the Minamata Convention.
- Mercury Regulatory and Policy Matters.

Organisations supporting this event include:



www.ICMGP2021.com

follow us on Twitter @ICMGP2021 or www.facebook.com/ICMGP2021

THANK YOU FOR YOUR ATTENTION!

The End

Enkosi!

