Q1

@Wits RHI:

* CHEAQI MNCH project- leverage HEAT Center
* HEAT Center through Pilot projects have increased  foot print in Africa
* Pilot Projects have been awarded to four investigators and four organisations in Cameroon, Nigeria, Zimbabwe, Cote Ivoire which has expanded the Center’s collaborations and capacity-building efforts in Africa(increasing African footprint)
* Development and mapping  of the data harmonisation tool

@IBM:

* Completed initial implementation of AI-based Urban Heat Island high resolution temperature mapping that leverages a recently developed Geospatial/Earth Observation Foundation Model (GFM/EOFM) from IBM to predict daily maximum near-surface air temperature at 1km resolution for Johannesburg.  Because of the requirement from the HE2AT Center to have high-resolution heat hazard maps, this project has become an important application and use-case to demonstrate the capability of GFMs and has gained interest from other IBM partners also.  This project will be a key focus for IBM in 2024.  A paper on initial results produced from this project has been submitted to IGARSS 2024 and awaiting feedback.
* Completed development of an initial socio-economic and extreme heat vulnerability framework that focuses on Johannesburg and leverages Gauteng City Region Observatory (GCRO) survey data.  This workstream directly addresses a key aim of the HE2AT Center, which is to map and quantify intra-urban vulnerability.  This work was presented at the 2023 DS-I conference, as well as at ENBEL 2023 and AGU 2023.  It also formed part of a demo that featured the IBM GeoDN geospatial interface that was generated and showcased at various events and meetings, including the 2023 Abidjan workshop.
* In IBM Research the HE2AT Center helped a number of interns to advance their careers over recent years.  Tamara Govindasamy started at IBM as an intern and transitioned to a full-time research scientist because of her contributions to the HE2AT Center and her involvement in the CHEAQI-MNCH supplementary grant.  Similarly, Craig Mahlasi transitioned from a research intern to a full-time research scientist recently because of his contributions to the vulnerability workstream.  Another intern that assisted with work related to the HE2AT Center was subsequently hired as a senior climate researcher at the Council for Scientific & Industrial Research (CSIR) of South Africa.  Overall, the HE2AT Center and the work-streams associated with the research projects provide a platform for interns to do meaningful and impactful work.

@CSAG:

* Implementation of a health data recoding platform/application that enables the collaborative recoding of health datasets against a common codebook.  Interest in this application from others in the health research community has been strong as the recoding challenge is a persistent obstacle to comprehensive big data health studies.  The tool is web based enabling partners across the continent or beyond to contribute coding activities.
* Data harmonizing pipeline continues to be developed building on the outputs of the data recoding tool.  Many complexities remain to be overcome, mostly around the diversity of data structures and standards that have been applied in past data collections.
* Extensive training and engagement around stakeholder engagement across the project highlighting the importance of rigorous and equitable stakeholder engagement in research applying trans-disciplinary approaches.  This is training is critical to students and early career researchers as there an increasing demand and expectation that researchers operate within trans-disciplinary research contexts.
* Initial very high resolution (3km horizontal) dynamical model (Weather Research Forecasting) model simulations of Gauteng to produce high resolution atmospheric datasets for ML based downscaling of heat stress variables across the city region.  These simulations are extremely computationally demanding and so are being used to develop sufficient training data to train much more compute efficient hazard downscaling methods.  Additionally they are being used to develop and validate generalized approaches to deriving near surface air temperature from combinations of satellite observed surface temperature (LST) and land use/land cover data which can then be applied to other cities/context.

@CESHHAR:

* Engaged stakeholders from WHO Geneva,WHO Zimbabwe, Zimbabwe Meterological department ,Ministry of Health to determine heat health indicators andpriorities for analysis within HEAT Center duringthe EU High horizons heat health indicator workshop, Harare, February 2024.
* CHEAQI-MNCH NIH grant award and Pilot project on which Midlands State University entered as new partner in the consortium(CeSHHAR-MSU MOU signed February 2024).
* Extensive stakeholder engagement through organised conferences and the data aquisition process. During the CeSHHAR Early career research symposium held October 2023 stakeholder engagement with the Zimbabwe Ministry of health,  Liverpool School of Tropical Medicine representatives, Nature Science editor, Ministry of Environment among other stakeholders. The conference was covered by the national broadcaster increasing visibilty of CeSHHAR in the climate research field. Through the data aquisition process links have been established with the WASHA-Takwimu DSI Africa research hub. A PhD student  secured a tuition scholarship for the course Climate and Foodsystems training (10 to 22 July 2023) to advance training in the climate area.
* Reason Mlambo was successful in obtaining the DSI Africa travel award scholarship to attend DSI Africa meeting in Rwanda to present his work *Exploring variability in heat exposure characterisation: A comparative analysis of different exposure assignment methods.*
* Contributed to curriculum reform in tertiary institutions in Zimbabwe, highlighting the need for climate change content to be included in most programs.

@UPGC:

* Completed the enrolment of a good pack of young scientists (3 postdocs and 6 PhD students), from a francophone country, in an important project (HEAT Centre) and an international network (DS-I Africa). Giving them the opportunity to improve their English and to participate, for two of them, to the two successive DS-I Africa network annual meetings in Cape Town (2022) and in Kigali (2023), including contributions with posters and oral presentations.
* Completed protocols development for important RP2-related ground level studies on the heat impact on health in the city of Abidjan, around which two successive stakeholder annual workshops (2022, 2023) gave good bases for discussing challenges for an Urban Heat-Health Early Warning System, and engaging in a fruitful scientific collaboration with the colleagues in South Africa (Wits, UCT, IBM)

Q2

@IBM:

* Bhamjee, M., Debary, H., Gaffoor, Z., Govindasamy, T., *et al.*, “Detection and characterization of urban heat islands with machine learning”, IEEE International Geoscience and Remote Sensing Symposium 2024, *submitted.*
* Mahlasi, C., Govindasamy, T., Makhanya, S., Vos, E., *et al.*, “Quantifying intra-urban socio-economic and environmental vulnerability to extreme heat events in middle-income African countries”, AGU 2023, *poster,* [*https://agu23.ipostersessions.com/Default.aspx?s=10-F3-30-6F-E3-0D-6C-41-70-4C-B3-7B-E3-C8-69-E7*](https://agu23.ipostersessions.com/Default.aspx?s=10-F3-30-6F-E3-0D-6C-41-70-4C-B3-7B-E3-C8-69-E7)
* Mahlasi, C., Govindasamy, T., Makhanya, S., Vos, E., *et al.*, “Spatial Patterns of Heat Vulnerability: Preliminary Findings from African Urban Centers”, ENBEL 2023, *poster,* <https://static1.squarespace.com/static/60478529fe54df702f7f5d97/t/6516a53e7a4da30db9994cc6/1695982925264/ENBEL_Sept3_2023.pdf>

@CSAG:

@CESSHAR:

* RP1 and RP2 protocol paper
* Mapping paper, submitted
* *Assembling an Individual participant level dataset from 222 studies from 33 countries in sub-Saharan Africa progress, lessons and challenges, , CeSHHAR Zimbabwe,* CeSHHAR Annual Early career symposium, Harare, October 2023*,poster.*
* *Reason Mlambo, Are we accurately assigning heat exposures to participants in climate change studies?: A Comparative analysis of different exposure assignment methods,* CeSHHAR Annual Early career symposium, Harare, October 2023,poster.
* CHaracterizing Effects of Air Quality In Maternal, Newborn and Child Health: The CHEAQI-MNCH Research Project, CeSHHAR Annual Early career symposium, Harare, October 2023,poster.
* CHaracterizing Effects of Air Quality In Maternal, Newborn and Child Health: The CHEAQI-MNCH Research Project, DSI Africa 3rd consortium meeting, Kigali Rwanda, poster.

@UPGC:None