



The Trans-African Hydro-Meteorological Observatory project; an overview

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With the TAHMO project we are “designing” / “building” / “proof of concepting” a \$100 weather station for the tropics.

The main goal of the TAHMO project is to understand better Africa’s environment through participatory sensing, scientific modeling and education.

We believe that the quality of measurement data is directly related to the value the measurement itself has to the one doing the measurement. Ideally, measurements are done by the farmers, watermanagers, etc that have a need for this data as well. For local stakeholders in Africa though, acquiring good modern measurement equipment is virtually impossible. Furthermore, local stakeholders not only need local (point) measurements: they also need spatial information: is it raining at my neighbor? Is this drizzle the start of the rainy season, or is it a small cloud passing over? Representing whole nations with just one weather station does not help answer these questions. Multiple, spatially distributed weather stations are needed to supply local stakeholders with the information needed to make vital decisions based on solid data.

Both global circulation models and regional climate models need measured data. Firstly to calibrate parameters in the model and to validate the model structure. Secondly, in a data assimilation scheme, to update predictions with measurements to decrease the uncertainty in future predictions. For Africa the amount of measured data is so scarce that both the uncertainty in the calibrated parameters, as well as the uncertainty in future predictions is quite large. Because of the “motor of the climate” that Africa is, this has a large impact on the total uncertainty in climate models. Having more (ground truth) measurements with which to confront our models would decrease the uncertainty in current models and forecasts tremendously.

Doing measurements is not a part of the standard curriculum in any African country, whilst it is, in our opinion, a vital part of any scientific education. This is not because a lack of interest, nor intelligence, but simply because the materials to conduct experiments are not available. Whilst any American or European primary school has a supply of thermometers, barometers, etc. this (relative) expensive equipment is not available in an African setting. This way Africans (future) scientist, but also its (future) politicians, watermanagers, farmers, etc. don’t learn the importance (and not to forget: fun) of doing measurements.

The \$100 weather station is our answer to the issues mentioned above. The basic idea is to have 20.000 weather stations across Africa, at local schools. With the weather station we intend to:

- give local people access to climate data on their own region, relevant to their daily lives.
- provide climate scientists with a huge new amount of data: 20.000 new measuring station in Africa, recording real time data for them to incorporate in their models
- train a new generation on how to do measurements and on the benefits those measurements have.

As a first step, students at Delft university showed that it is possible to build an acoustic disdrometer that costs less than 20 dollar to produce.

To move this project into the next gear, we are following two parallel tracks:

First, we are developing the weather station, together with a commercial partner.

Secondly, we are going to do a pilot project in Africa: We want to have a student in education go to a specific region (probably Ghana, because of contacts we have from previous projects) armed with a weather station and give him/her the assignment to develop a curriculum around the station, to be used in local schools. The follow up of this is to send a group of students with weather stations (10-20) to a region and have them place the stations at all schools in the region.

Timewise, we hope to have this first pilot project done within the next two years. Somewhere in the year after that, the extended pilot can take place. Since we hope to send this group out with a first prototype of the station, we would also like to finish a first prototype in the next two years. Five years from now, we hope that the majority of the 20.000 stations have been installed.