A Guide to the Climate Action Hackathon Datasets

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Abstract

This document provides a brief overview of the datasets: that you will be using during the Climate Action Hackathon. It contains descriptions of each dataset, links to the dataset, and an overview of all the supporting documents that you can find in the GitHub repository. The documents will also be uploaded to the Slack site.

1 Introduction

By now you're hopefully getting into the Climate Action Hackathon spirit. You're getting to know your fellow CAH'ers, forming an idea of the challenge you'd like to address over the coming weeks, and you're starting to look at the available datasets. This short guide gives you an overview of the various datasets which we've selected for you.

You will have at your disposal a total of five data sources, each containing a number of datasets. The datasets vary from purely meteorological information at large scale, to higher level, more specialized or very location-specific datasets. The five data sources are the following:

1. Africa Weather and Climate data from the Climate Prediction Center
2. Observations and Forecasts from Earth Networks
3. aWhere Weather
4. The IRI Data Library
5. Data from the Zambia Meteorological Department

User guides and detailed information on the datasets can be found in the GitHub repository and Slack site, or via the links provided in this document. Feel free to drop us a line if anything is unclear!

During the Zambia event, we will have experts on all datasets present. So you will have ample opportunity to interact with them. If you are participating online, send any questions through Slack, and we'll make sure your question is forwarded to the relevant expert.

2 Datasets

2.1 Climate Prediction Center

This dataset contains expert assessments, forecasts, summaries, surface observations, analysis and monitoring products. It also contains satellite precipitation products. Although the website shows mostly maps, all data used to create these maps can be accessed via FTP servers. However, prior to downloading the data, we advice you to browse through the maps, to get a clear picture of the kind of information contained in each product. This is worth doing, as some of the raw data files can by quite large. The data in the CPC dataset vary from daily observations and forecasts to seasonal forecasts and anomalies. Please note that all times are in UTC.

For ease of access, we suggest you use the free ILWIS software, with the ISOD toolbox installed. Both ILWIS (version 3.7.2) and the ISOD toolbox can be downloaded from `ftp://ftp.itc.nl/pub/maathuis/ZAMBIA/`. Although the software can also be downloaded from the ILWIS website, we advice you to use this download, as it is ready for use with the CPC FTP sites. On the FTP server, you'll find the following two zip files:

1. *ILWIS_ ISOD.zip*: Complete ILWIS 372 package with the most recent ISOD Toolbox version and most of the required utilities included. Retrieve the file and unzip the file to the root of the C:/ or D:/ drive, eventually make a shortcut to ilwis.exe. For additional information open the ISOD Toolbox and under the Help option in the menu the User Guide is available.

2. *IrfanView427_ setup.zip*: For some data visualizations and animations that do not require import into an ILWIS data format, use is made of IrfanView. Download the zip file containing the set up executable and save it in a temporary directory on your hard disk.

After the download has been completed run the setup, there is no need to create shortcuts, use the option: *'For all users'* and select the default Installation folder. Click *'Next'* three times, just use the default settings, *'Dont install Google Desktop Search'*, click *'Next'* two times and after the installation has been completed, press *'Done'*. An instance of IrfanView can be started to check if the installation has been successful, the program can be stopped.

For IrfanView, make sure that the folder and executable are always correctly specified. To do so in ILWIS, open the ISOD toolbox, go to the option: *'Configuration' >'Folders' >'Special locations'* options from the ISOD Toolbox User Interface. Specify appropriate Iview directory and the Iview executable, save the settings.

With ILWIS 3.7.2 and the ISOD toolbox installed, the CPC database can easily be accessed. Please note that this is Windows software; even though ILWIS will run under Wine in Linux, the ISOD toolbox will not work. Alternatively you could use e.g. Python with GDAL (the Geospatial Data Abstraction Library) installed.

A detailed ILWIS user guide can be found on the 52^o North website. A user guide for the ISOD toolbox is included in the GitHub repository and uploaded to the Slack site.

2.2 Earth Networks

Earth Networks operates the world's largest, most comprehensive weather observation, lightning detection and climate networks. Their weather observation network consists of over 10,000 automatic weather stations, which, combined with data from the World Meteorological Organization, is used to provide highly location specific weather conditions, forecasts and early warnings. Their lightning detection networks (which are operational in many countries in Africa) detects both in-cloud and cloud-to-ground lightning strikes in real-time. These data can be used as a proxy for weather radar, and are a very interesting source of information for severe weather early warning systems (e.g. flash flood early warnings).

Earth Networks is providing us with access to three API's and the Dangerous Thunderstorm Alert (DTA) Feed. The PulseRad API contains proxy radar imagery for most of Sub-Saharan Africa, based on data from Earth Network's lightning detection sensor networks. The Enterprise Pulse API Pro contains a comprehensive set of current weather conditions and forecasts for most of SSA. The Pulse API Map Tiles gives live lightning strikes as a layer for map based apps. And finally, in the DTA Feed, severe thunderstorm alert polygons can be found.

The GitHub repository (and Slack site) contains extensive documentation on the use of the API's and the DTA feed. All API's require a subscription key to be appended to each call. The subscription keys are as follows:

PulseRad Subscription Key:	31c7a7ad1ea54f8983bd319e34277458
DTA Alert Feed Partner ID:	0DF44C2F-F122-4DA6-A82B-D2CE652DA5A4
Pulse API Map Tiles Subscription Key:	64c760a6d7f64a4999215fe71bd75387
Enterprise Pulse API Pro Subscription Key:	d484f320c70e43528cd85eae0618c45a

More information on Earth Networks can be found at their website. On the same website, you can also find a nice example of a weather app, the WeatherBug Spark.

2.3 aWhere Weather

The data provided by aWhere Weather contains more user oriented data and information products, primarily aimed at farmers. The data products are available at a high spatio-temporal resolution, aimed at assisting farmers in their day-to-day decision making processes. Besides weather information, aWhere also offers agronomical model outputs and recommendations.

Through the aWhere Weather API's, agro-meteorological and agronomical information can be accessed. Both historical and near real-time data are available. aWhere offers the following API's: Fields & Planting, Weather, Agronomics and Models. Plus it offers the possibility to execute a large number of API calls at once through the Batch Jobs System. Detailed info on the API's can be found at the aWhere Developer's website. And you can sign up for your free trial account for use during the hackathon.

2.4 IRI Data Library

The IRI Data Library contains higher level climate data products. Rationale behind this dataset is the fact that climate variability is of increasing concern to non-climate specialists. Through tool development, data organization and transformation and data/technology transfer, climate and other data products are made accessible to a wide range of users. On the IRI Data Library website, you can find a lot of information on the products and analysis shown in the Maproom.

In the Data Library, you will have the possibility to select *Expert Mode*, which gives you the possibility to see the datasets and the analysis code that was used to create the maps in the Maproom. In *Expert Mode* you can also make changes to modify the analysis.

Links to documentation and help resources for the *Expert Mode* are available on the website. A more in-depth report on the IRI Data Library can be found in a research article by Blumenthal et al., 2014, in the open access journal Earth Perspectives.

2.5 Zambia Meteorological Department

The ZMD is operating a total of 33 automatic weather stations (AWS) in Zambia, which are storing data every 15 minutes. These data are accessible through the internet, as well as 5 years of historical data. Specific details on this data access will follow. We're hoping that the ZMD will also be able to provide access to their forecasts.

Details on how to access the ZMD data will follow shortly.

3 Links

Here's an overview of all the links to datasets and background info mentioned in this document. If you know, or come across, additional interesting data sources, do please post them on Slack. I will append them to this list.

Climate Prediction Centre:	http://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml
ILWIS, ISOD, IrfanView:	ftp://ftp.itc.nl/pub/maathuis/ZAMBIA/
52^{o} North website:	http://52north.org/communities/ilwis/ilwis-open/user-guide
GDAL:	http://www.gdal.com
Earth Networks:	https://www.earthnetworks.com/
aWhere Weather:	http://developer.awhere.com/
aWhere API reference:	http://developer.awhere.com/api/reference
IRI Data Library:	http://iridl.ldeo.columbia.edu/
Background IRI DL:	http://earth-perspectives.springeropen.com/articles/10.1186/2194-6434-1-19
IRI Expert Mode:	http://iridl.ldeo.columbia.edu/dochelp/index.html