

# Drought related data and tools: development and integration

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## Introduction

DRINET is an NSF funded project to build a web-based collaborative research environment for collecting and disseminating local to regional scale drought information while interoperating with other resources and tools. The purpose of this project is to develop additional capabilities for DRINET portal.

## Issues

- Datasets are scattered all across the Internet, it is time-consuming for the researchers to look for the data themselves by hand.
- Datasets are stored in different formats, it is not very easy for the users to read and to understand.
- Datasets are updated regularly, all of the data are supposed to be up-to-date.
- Large amount and different kinds of datasets need to be managed accordingly, correctly and effectively.

## Datasets Sources

- Indiana Drought Monitor from NOAA
- Precipitation data from Indiana State Climate Office
- Multi-sensor Precipitation data from MRCC
- Soil Moisture estimates data from MRCC
- AMSR-E Soil Moisture data measured by NASA AMSR-E sensor on Aqua satellite
- Air Temperature data from Indiana State Climate Office
- Surface Temperature data measured by the MODIS sensors on the NASA Terra and Aqua satellite
- Stream Flow data from USGS
- Crop Moisture Index from NOAA
- Greenness data derived from the NOAA AVHRR developed by the USFS-WFAS
- Seasonal Drought Outlook and Precipitation Outlook produced by NOAA
- CMORPH Precipitation Estimates data
- Monthly Surface Precipitation Accumulation data from TRMM satellite

## Methods

- Implement scripts to collect and update related datasets automatically

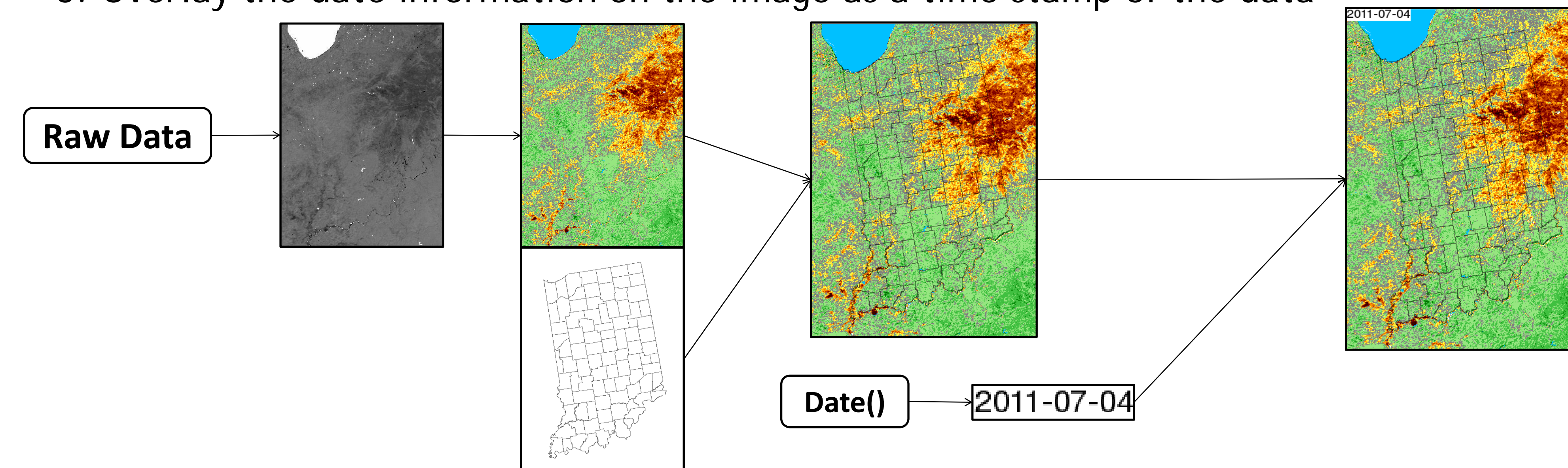
track the links to desired datasets

Analysis naming mechanism  
Develop Hash functions to generate URL

Recursively retrieve and extract latest datasets

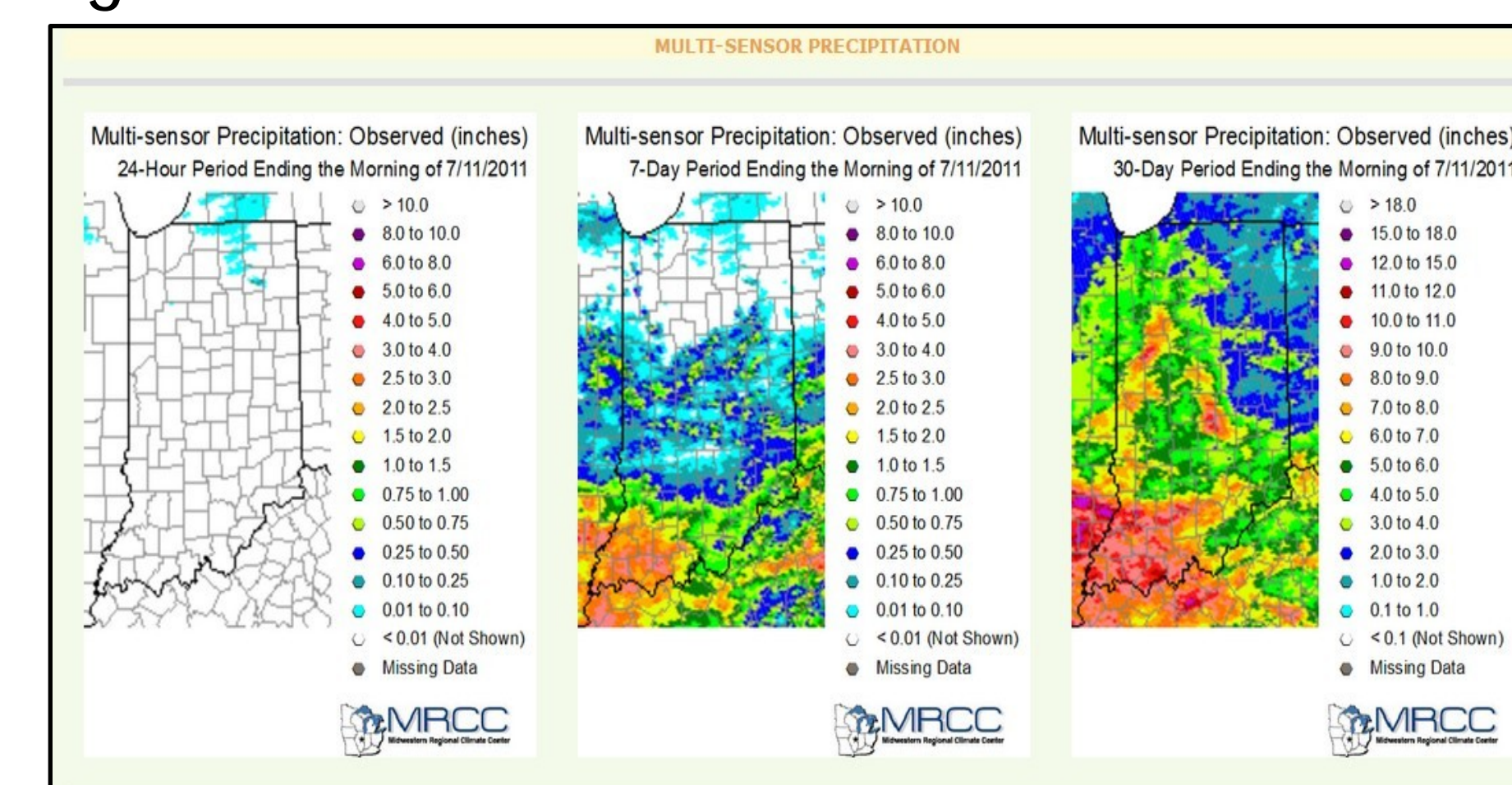
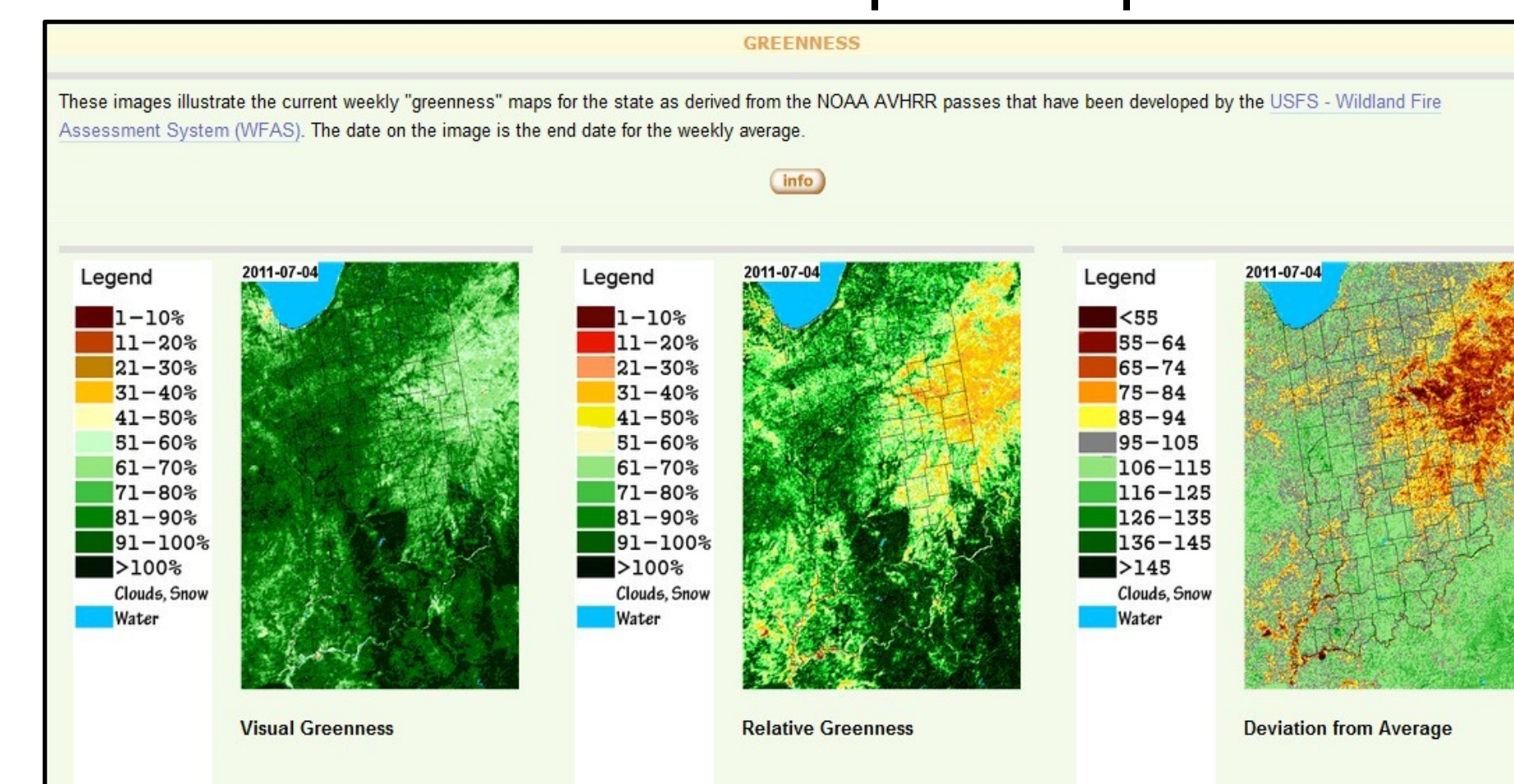
Use *crontab* to manage execution schedule

- Develop scripts to transform special datasets(described by special files and text files) into easily understandable images and process the images accordingly
  1. Convert raw data into black white image, extract the area of Indiana state out from the image and color it according to the color table
  2. Overlay the state boundary on the image
  3. Overlay the date information on the image as a time stamp of the data



## Result

A website had been developed to present and manage all visualized datasets:



- Providing up-to-date weather, climate and satellite data visualizations online to researchers and others interested in the data
- Visualization of weather, climate and satellite data are available online at DRINET web site (<http://drinet.hubzero.org/INDrought>)
- Visualization is automatically updated on a regular basis to illustrate the most recent data
- Data is visualized in several ways, including 2D plots, images, and maps
- Multiple datasets are aggregated and presented on a single page, making it easier for users to compare the data

## Discussion

Personal Experience:

- Worked in a team environment and participated in a full cycle of software development
- Learned several useful tools such as GDAL and ImageMagick

Future Work:

- Find a better way to convert TRMM datasets
- Adding new components is not very convenient, tools can be developed to edit the components effectively
- Changes can be made to the layout to present more information in limited space

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## References

- The DRINET website: <http://drinet.hubzero.org>
- The Purdue Terrestrial Observatory: <http://www.itap.purdue.edu/pto/>
- The Midwestern Regional Climate Center: <http://mrcc.isws.illinois.edu>
- NOAA: <http://www.cpc.ncep.noaa.gov/prducts.janowiak/global.html>
- NASA Goddard: <http://trmm.gsfc.nasa.gov/>
- GDAL: <http://www.gdal.org>
- ImageMagick: <http://www.imagemagick.org>