

The Precipitable-water Model Analysis Tool

*An open-source suite for estimating
precipitable water with low-cost
instrumentation*

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Technology

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2 Apr 2022

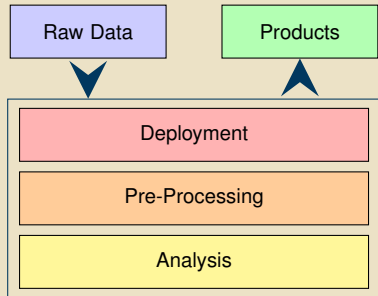


Introduction

A computational utility with the purpose of analyzing data to further understand the relationship between local atmospheric brightness temperature and regional precipitable water.

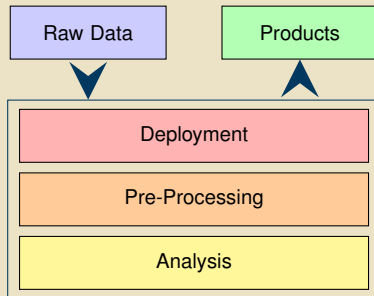


Open source



Open source

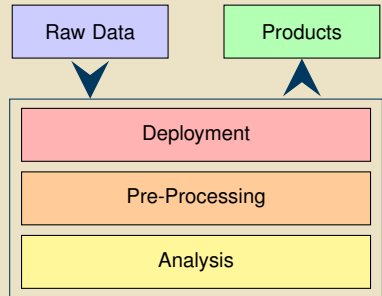
Wide compatibility across local and cloud-based systems



Open source

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The user interface is a file that stores:

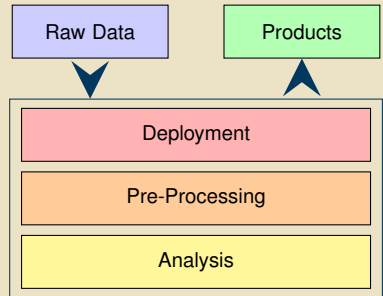


Open source

Wide compatibility across local and cloud-based systems

The user interface is a file that stores:

- ▶ Sensor information

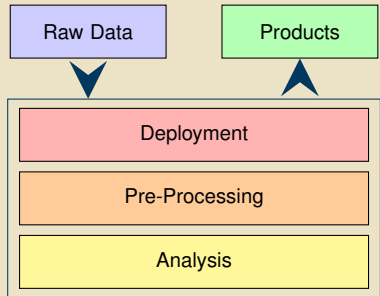


Open source

Wide compatibility across local and cloud-based systems

The user interface is a file that stores:

- ▶ Sensor information
- ▶ Data source information

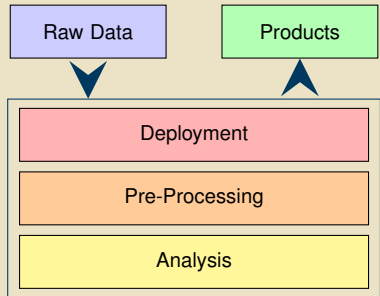


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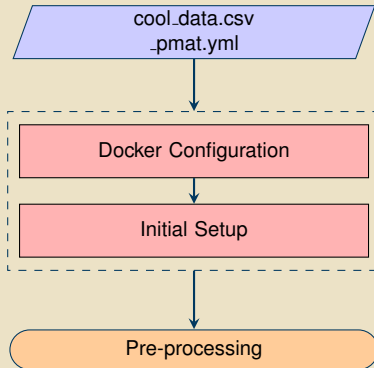
Wide compatibility across local and cloud-based systems

The user interface is a file that stores:

- ▶ Sensor information
- ▶ Data source information
- ▶ Analysis parameters

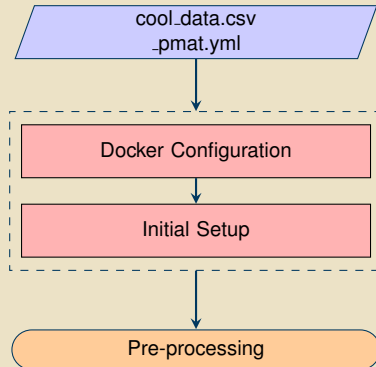


Packaged in Docker container



Packaged in Docker container

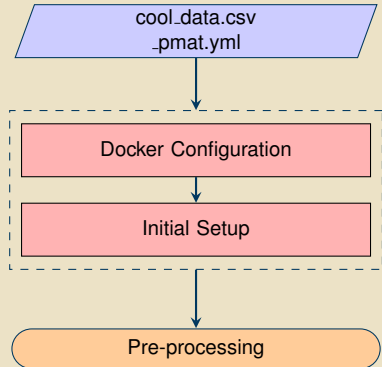
Requires raw data and the configuration file.



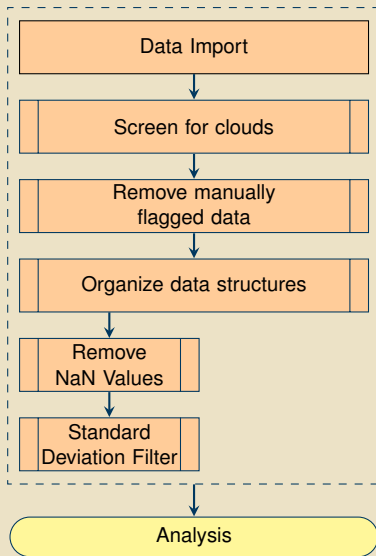
Packaged in Docker container

Requires raw data and the configuration file.

Deployment template is available at `template.pmat.app`

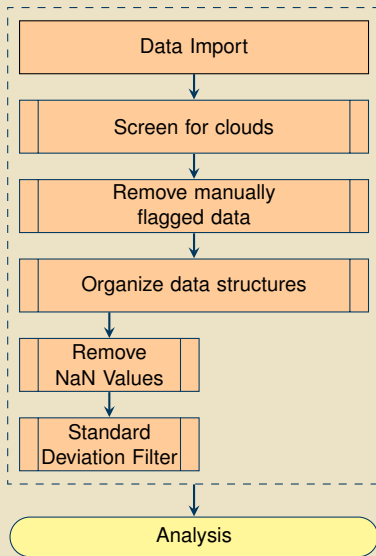


Collects regional atmospheric data from NWS radiosondes and ground stations



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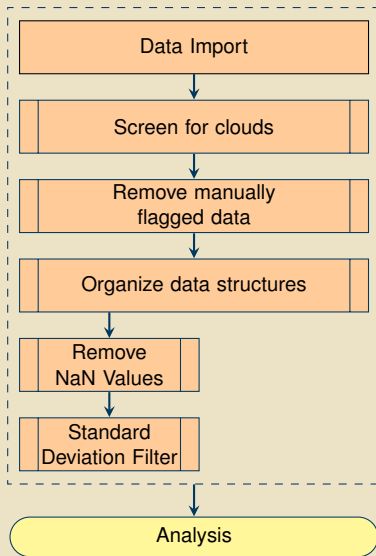
Organizes, filters, and computes averages for analysis



Collects regional atmospheric data from NWS radiosondes and ground stations

Organizes, filters, and computes averages for analysis

Standard Deviation Filter

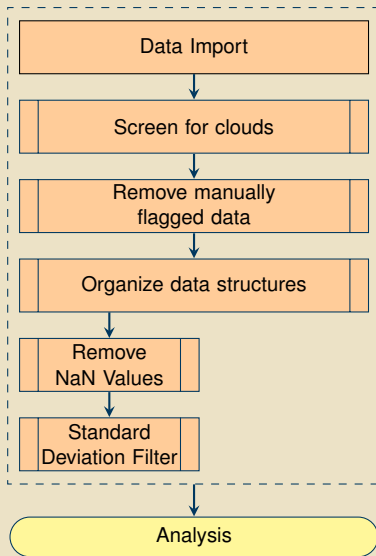


Collects regional atmospheric data from NWS radiosondes and ground stations

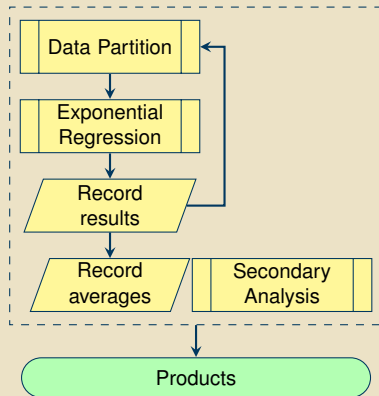
Organizes, filters, and computes averages for analysis

Standard Deviation Filter

$$\sigma_i > n \overline{\sigma_i}$$

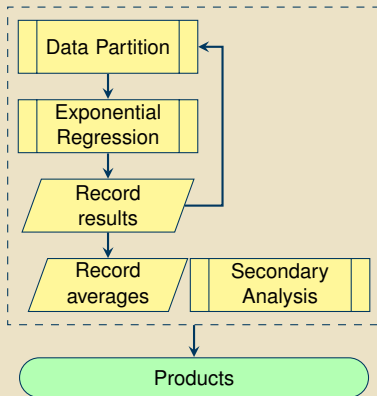


Primary Analysis



Primary Analysis

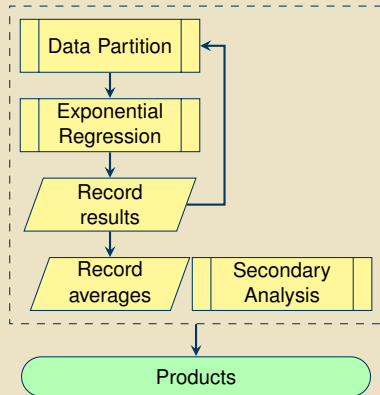
- Iterative Regression Algorithm



Primary Analysis

- Iterative Regression Algorithm

$$\text{PWAT} = Ae^{BT_b}$$

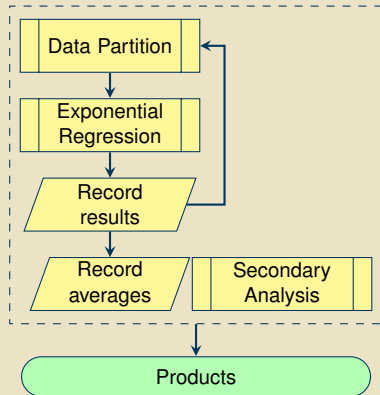


Primary Analysis

- Iterative Regression Algorithm

$$\text{PWAT} = Ae^{BT_b}$$

Secondary Analysis



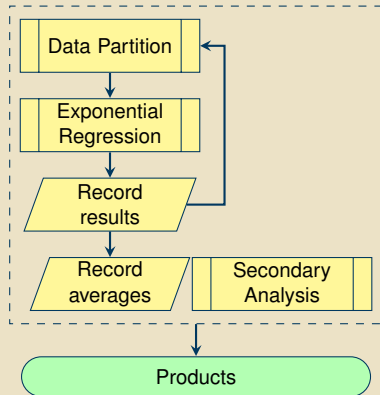
Primary Analysis

- Iterative Regression Algorithm

$$\text{PWAT} = Ae^{BT_b}$$

Secondary Analysis

- Support Vector Machine



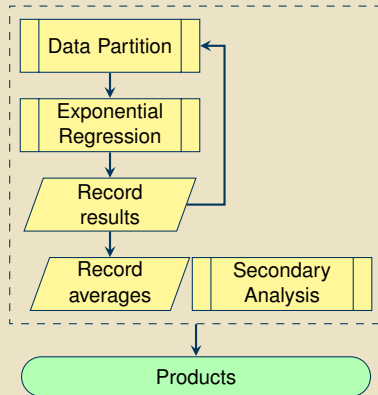
Primary Analysis

- Iterative Regression Algorithm

$$\text{PWAT} = Ae^{BT_b}$$

Secondary Analysis

- Support Vector Machine
- Climatology



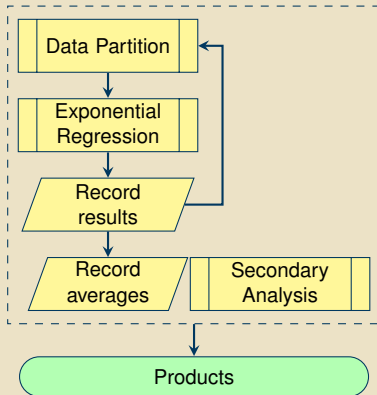
Primary Analysis

- ▶ Iterative Regression Algorithm

$$\text{PWAT} = Ae^{BT_b}$$

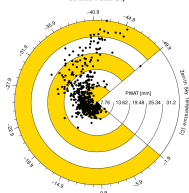
Secondary Analysis

- ▶ Support Vector Machine
- ▶ Climatology
- ▶ Time Series

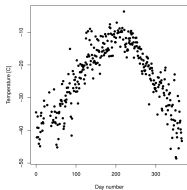


PMAT Suite Products

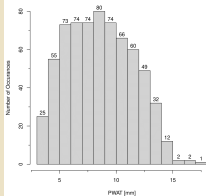
Correlation between Spatiotemporal Mean PWAT and Temperature
Condition: Clear Sky



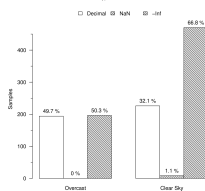
Multyear mean sky temperature time series
Condition: Clear Sky



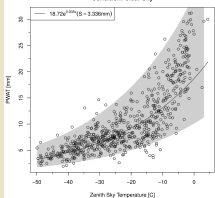
Distribution of Predicted clear sky PWAT from IR Product



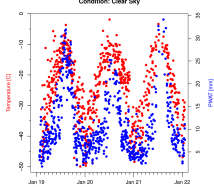
Data Type Distribution: AMES 3



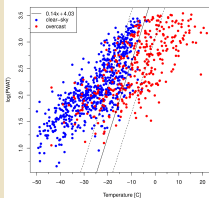
Regression between Weighted PWAT and Temperature
Condition: Clear Sky



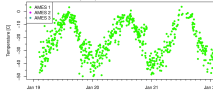
Mean Sky Temperature and PWAT Time Series
Condition: Clear Sky



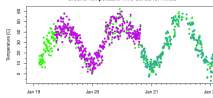
SVM Analysis between Sky Temperature and PWAT



Condition: Clear Sky
Sky Temperature Time Series for AMES



Ground Temperature Time Series for AMES



Roadmap

V3.0

- ▶ Docker rollout
- ▶ Climatology analysis
- ▶ Support Vector Machine
- ▶ Module organization
- ▶ Full documentation

V4.0

- ▶ Monsoon prediction
- ▶ Automated system support
- ▶ Fourier Transform analysis
- ▶ Replace MesoWest database pull

Questions?

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Project Page

`pmat.app`

Official Manual

`docs.pmat.app`

