

A NEW EFFORT FOR ATMOSPHERICAL FORECAST: METEOROLOGICAL IMAGE PROCESSING SOFTWARE (MIPS) FOR ASTRONOMICAL OBSERVATIONS

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RESUMEN

Se describe un nuevo logicial (software) (MIPS) relacionado con el análisis y procesado de los datos meteorológicos (Meteosat) para un observatorio astronómico. Este logicial será usado para realizar algunas previsiones atmosféricas (nubes, humedad, lluvia) usando datos meteorológicos para telescopios robóticos. MIPS usa una librería en Python para datos Eumetsat que tiene como objetivo ser completamente abierto y licenciado bajo GNU (GPL). MIPS es una plataforma independiente y usa h5py, numpy, y PIL de propósito general y con lenguaje de programación en Python de alto nivel y entorno QT.

ABSTRACT

We have described a new software (MIPS) about the analysis and image processing of the meteorological satellite (Meteosat) data for an astronomical observatory. This software will be able to help to make some atmospheric forecast (cloud, humidity, rain) using meteosat data for robotic telescopes. MIPS uses a python library for Eumetsat data that aims to be completely open-source and licenced under GNU/General Public Licence (GPL). MIPS is a platform independent and uses h5py, numpy, and PIL with the general-purpose and high-level programming language Python and the QT framework.

Key Words: atmospheric effects — methods: numerical

1. INTRODUCTION

The science of astronomy based on observations and it can be directly effected by atmosphere. In this respect forecasting and nowcasting is really important. For this purpose, a meteorological instrument in an observatory site is base requirement. DAG as a professional observatory beside of using nowcasting instruments (DAVIS, AWOS etc) uses satellite based forecasting instruments (Eumetsat) to record and weather forecasting. In this paper we present our first attempt to create a nowcasting and alert system with simple interface.

2. METHOD

Eumetsat group's data is very similar to astronomical data. HDF files are like FIT/FITS files and channels are like band/filter concept in astronomical data. There is matrix and headers for each data file. Products such as snow density, cloud density, column humidity etc can be obtained with processing each channel in file. Software produced till now

are platform dependent. MIPS uses python script language and QT application framework. Platform independency of Python, QT and Python libraries make MIPS a platform Independent and can run under GNU/Linux, MS-Windows or Mac OS.

3. METEOSAT

Today, weather satellites scan the whole Earth, meaning not a single tropical storm or severe weather system goes undetected. The early detection and warnings they provide can be used for nowcasting of high impact weather in support of observatories and observations.

Fig. 1 presents our elliptical, 1.3 m in diameter satellite dish to get data from Eumetsat's meteorological satellite dish.

4. MIPS

MIPS has two parts. MIPS (The library) and MIPS-GUI which uses MIPS to display, animate and create products from HDF files. MIPS as a library can be used in python to extract data from HDF files as matrices, do calculations between matrices (Subtract,sum etc two matrices) create visual images and animations, etc.

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Fig. 1. The Satellite Dish Used by DAG

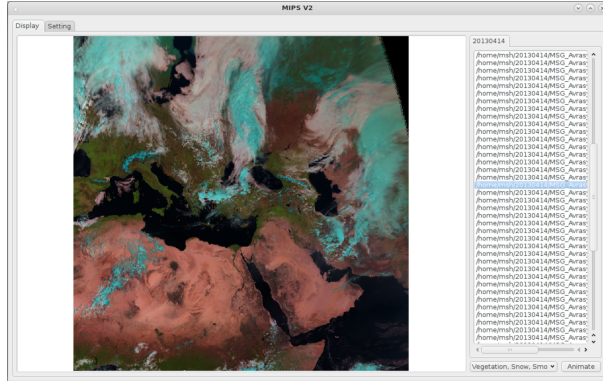


Fig. 2. A Screenshot of MIPS-GUI

Figure 2 shows MIPS-GUI created using QT Framework and has basic features such as obtain local and remote files(HDF files as Meteosat data) and displaying products.

5. DEPENDENCIES

MIPS uses some Python modules as dependencies. For having MIPS run properly in all platforms user must have these modules installed.

TABLE 1
DEPENDENCIES OF MIPS

Module	Version	Platforms	Default	Used by
h5py	2.2.1	All	No	MIPS
numpy	1.8.2	All	No	MIPS
os	-	All	Yes	MIPS
Image	1.1.7	All	No	MIPS
ftplib	2.6	All	No	MIPS-GUI
glob	-	All	Yes	MIPS-GUI
tempfile	-	All	Yes	MIPS-GUI
PyQt4	4.8.6	All	No	MIPS-GUI

MIPS and MIPS-GUI have different dependencies. Table 1 shows all modules, versions, platform availability, if module came by default and the reason for dependency.

6. CONCLUSIONS

We have created a library which will be the base element for a pipeline to obtain weather conditions for a desired location using Meteosat data. With such pipeline the base element of an automated observation method will be created. As a result of GNU/General Public License which MIPS is included this library can be freely used by everyone.

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