

Creating a Program in MatLab to Classify CRISM Data

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Mentor: Dr Eric Akers

Undergraduate Research Experience CRISM Team 2009-2010

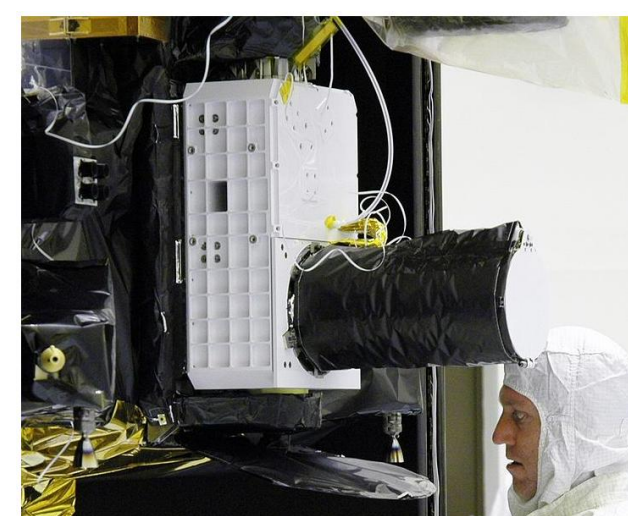
Elizabeth City State University, 1704 Weeksville Road, Elizabeth City, North Carolina 27909

ABSTRACT

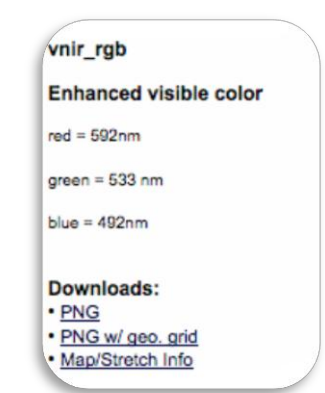
The 2009-2010 undergrad Research team primary focus was to create a program using map lab that will classify CRISM data in a shorter time frame than what it will take to classify by hand. The CRISM research consisted of manually classifying images from Mars and placing them into excel's data base, downloading images and storing them into Kitoto's server so that the program can read and return results of the overall images and mineral images. These images can be classified as excellent, fair, poor, and absent. The classification of each image will show whether there is a lot, little, or no water in each kind of mineral. The five minerals are oxidized iron minerals, mafic mineralogy, hydroxylated silicates, bound water and CO2 water. The images that show the most signs of water in certain areas on Martian will be examined more closely. Currently, the CRISM team working is on creating this program in MatLab.

CRISM

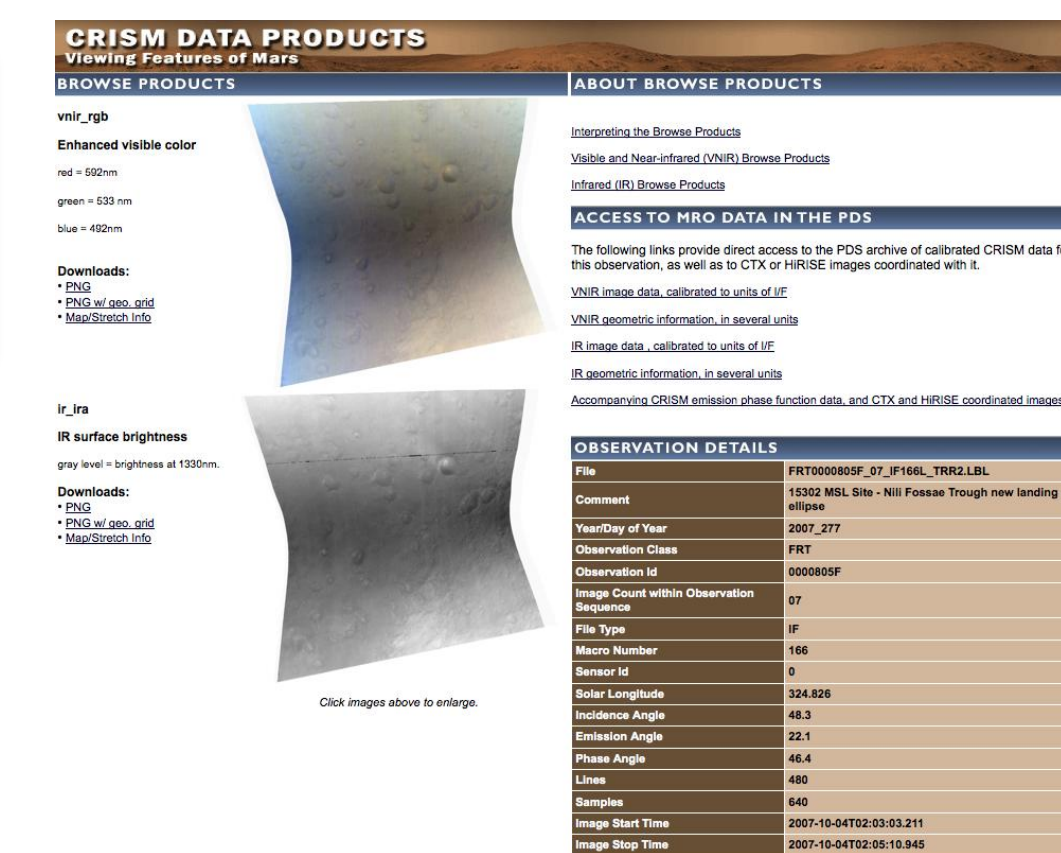
- Is a Visible-infrared imaging spectrometer with a scannable field of view.
- Covers wave lengths from 0.362 to 3.92 microns at 6.55 nanometer/channel .
- This allows CRISM team to identify a broad range of minerals on the Martian surface.



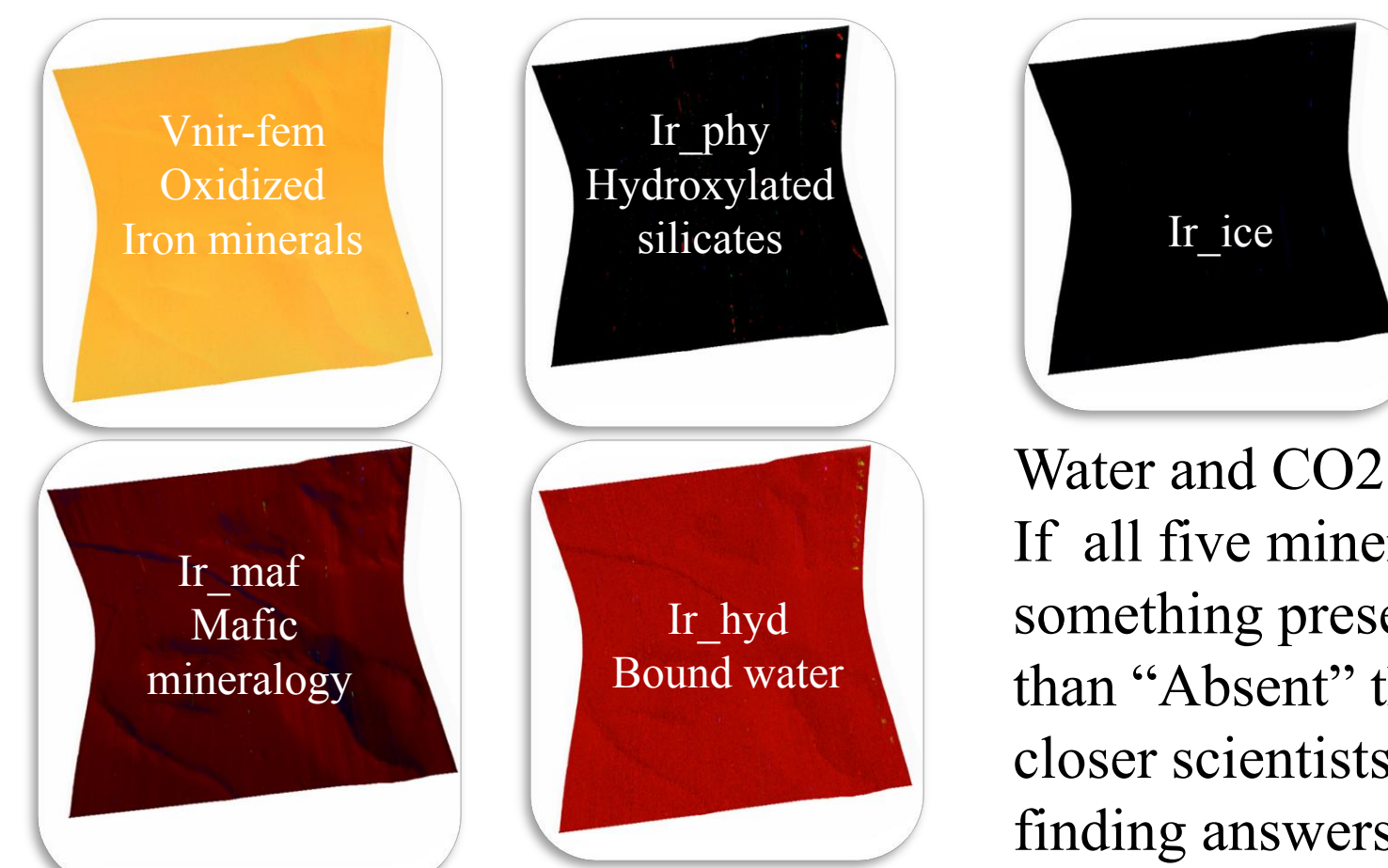
Top Image:



Bottom Image:



Classification



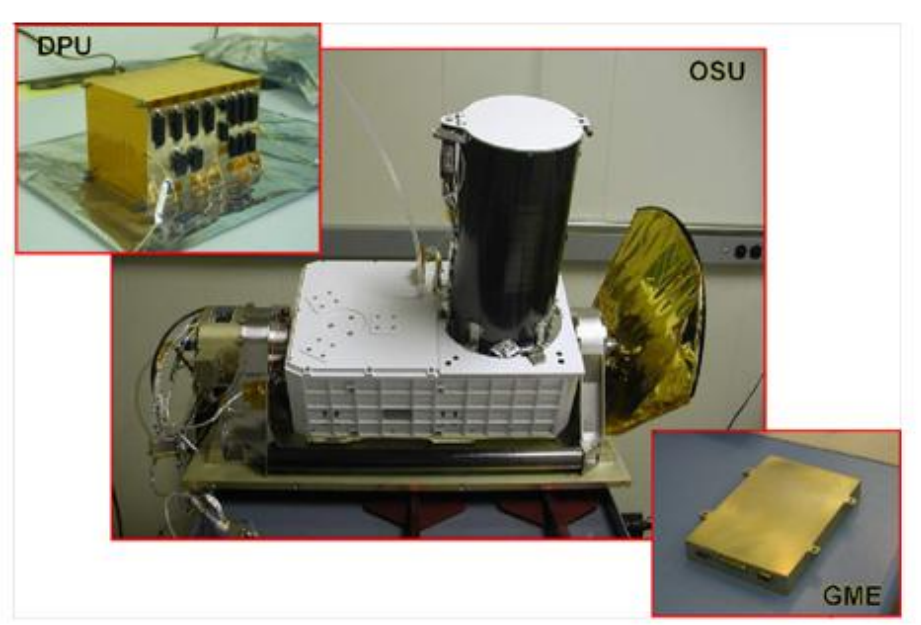
Water and CO2 Ice
If all five minerals have something present other than "Absent" then the closer scientists are to finding answers regarding Mars.

Frequently asked questions about Mars

- Is Mars environments suitable for life?
- If water was once present on Mars did it leave any clues?"
- If there was water on Mars, how did it affect Mars Surface?"
- Can there be human exploration and colonization on Mars?"
- How is Mars atmosphere different from Earths?"
- When and where did the water occur?"

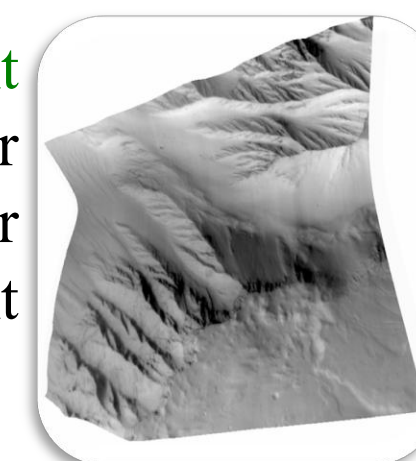
CRISM Consist of Three Boxes

- Optical Sensor Unit (OSU)
 - The optics,
 - Gimbal
 - Focal planes
 - Cryocoolers
 - Radiators
 - Focal plane electronics
- Gimbal Motor Electronics (GME)
 - Commands and powers the gimbal
 - Analyzes data from angular position encoder in a feedback loop
- Data Processing Unit (DPU)
 - Accepts and processes commands from the spacecraft
 - Accepts and processes data from the OSU and Communicates it to the spacecraft

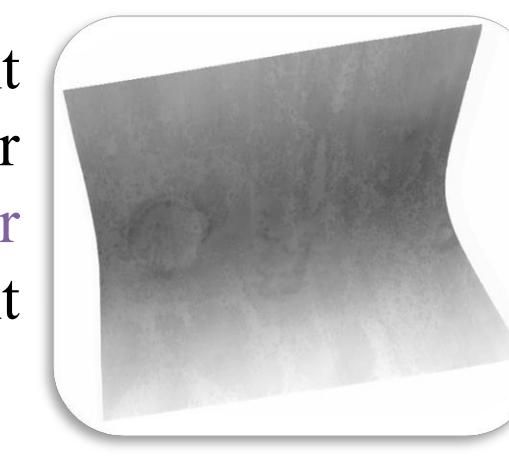


Classification

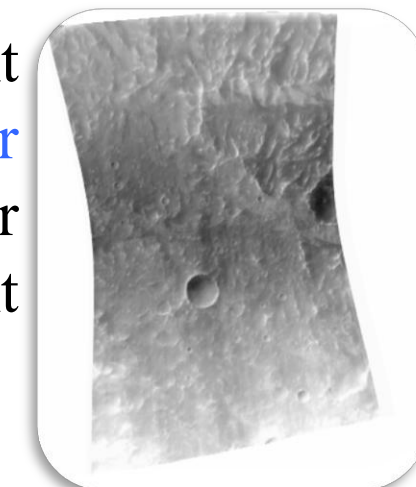
Excellent
Fair
Poor
Absent



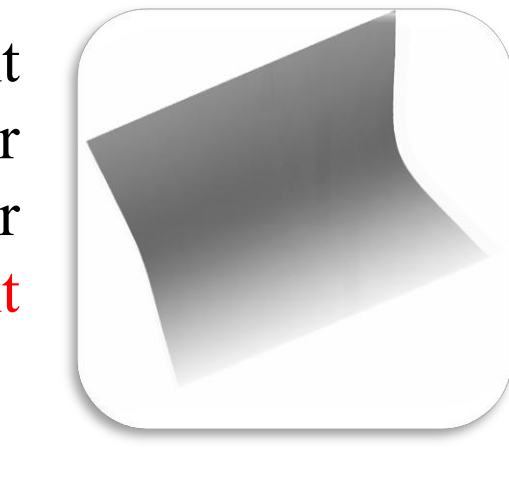
Excellent
Fair
Poor
Absent



Excellent
Fair
Poor
Absent



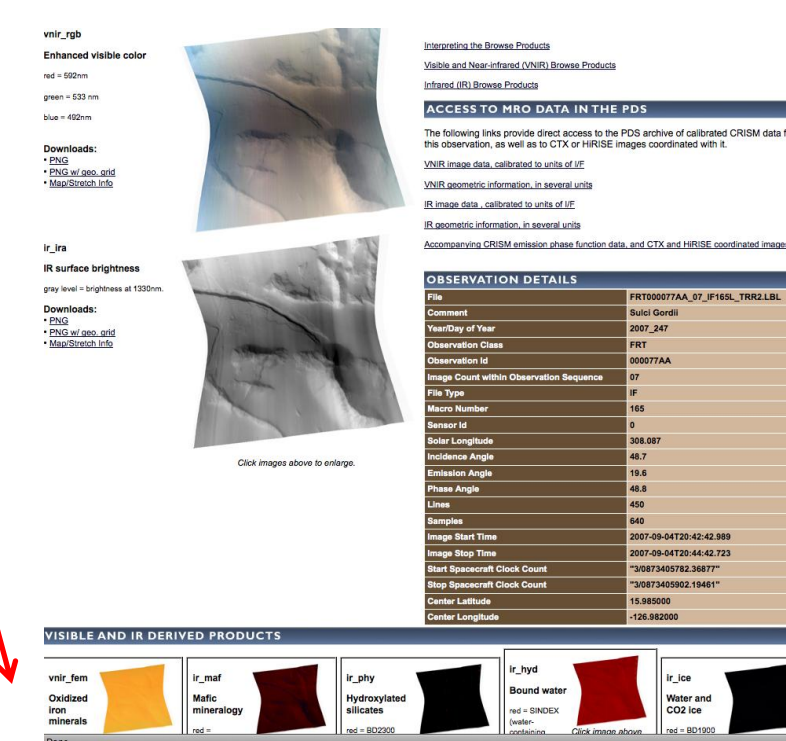
Excellent
Fair
Poor
Absent



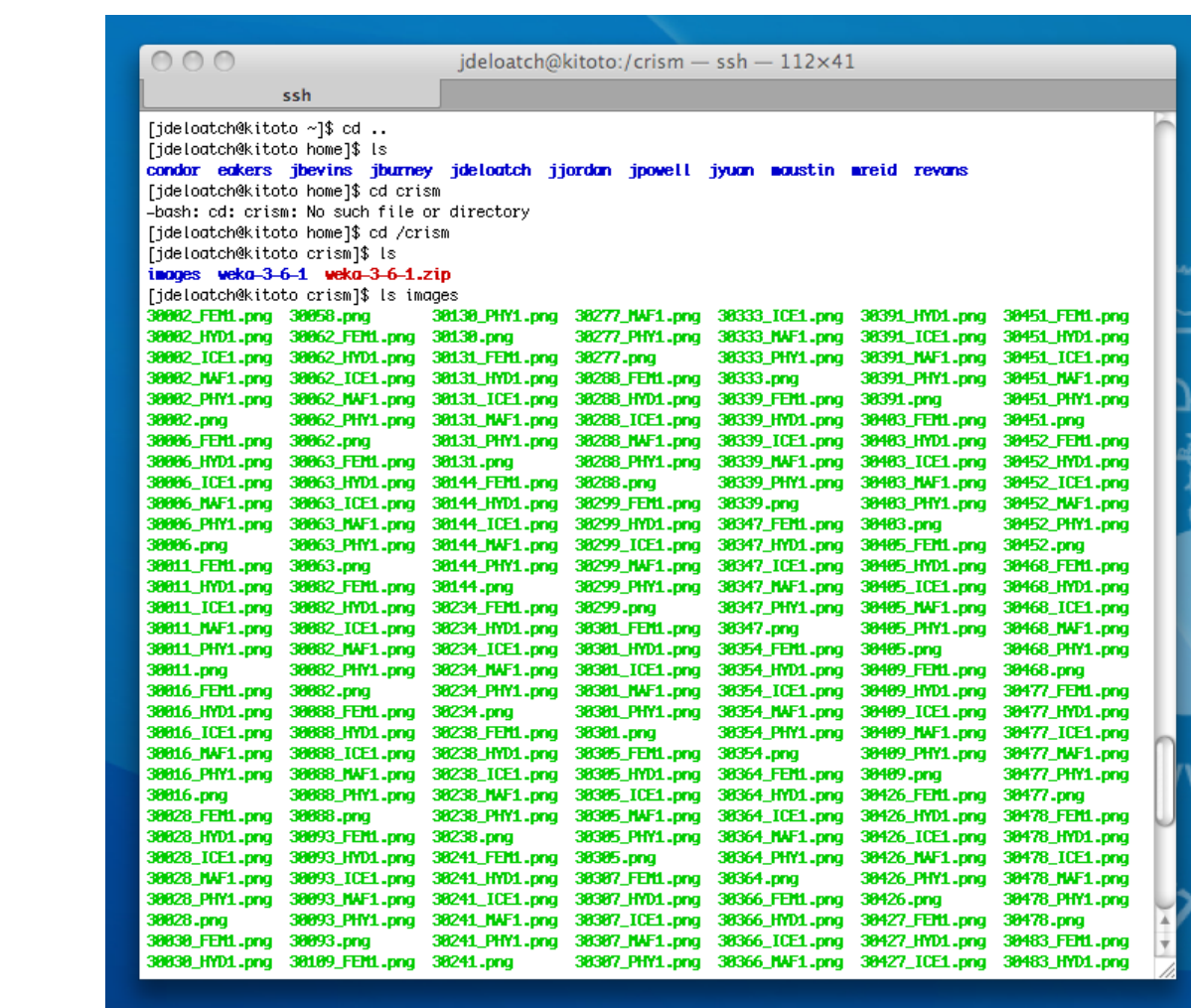
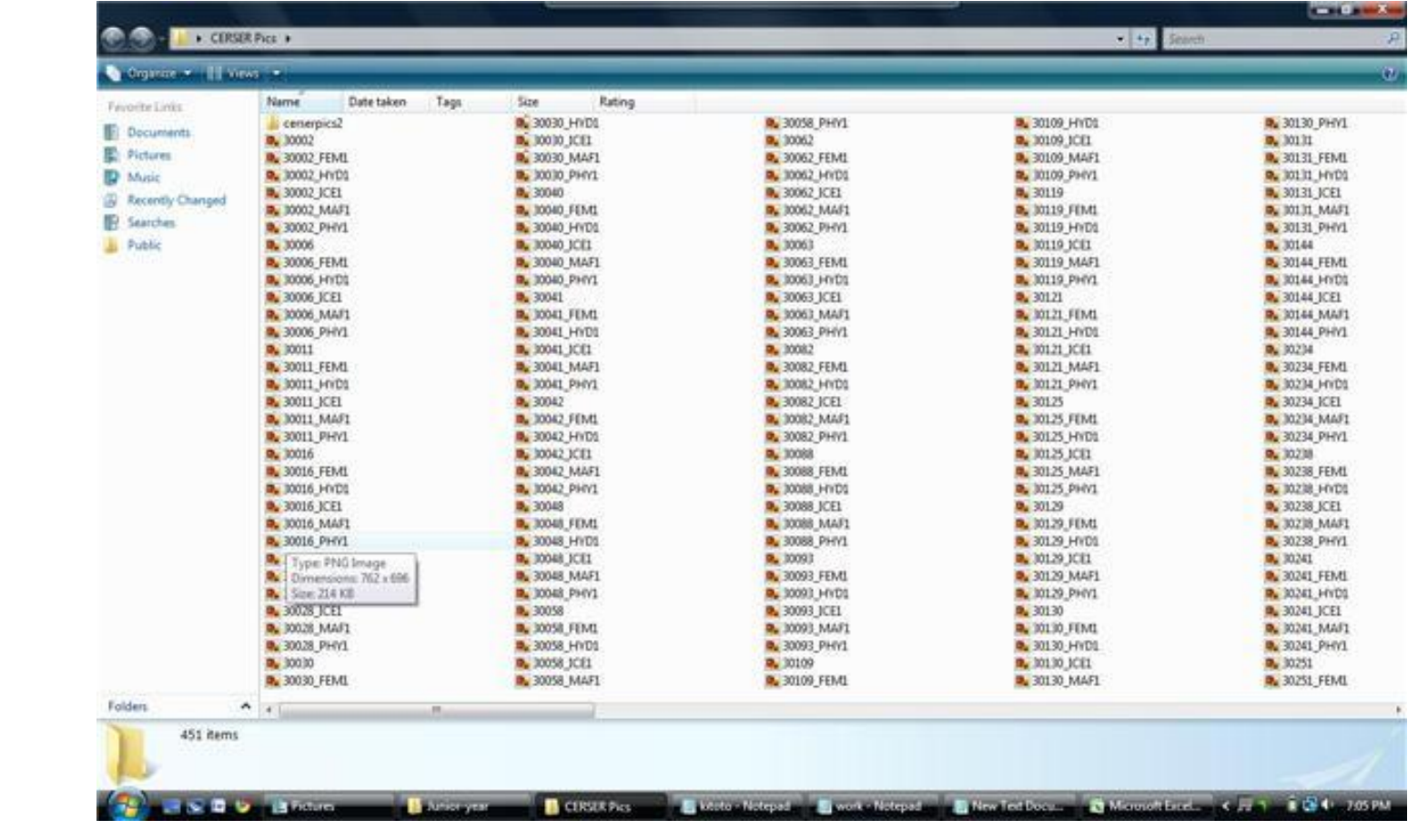
Classifying Images (Minerals)

Each Image has a IR Derived Product:

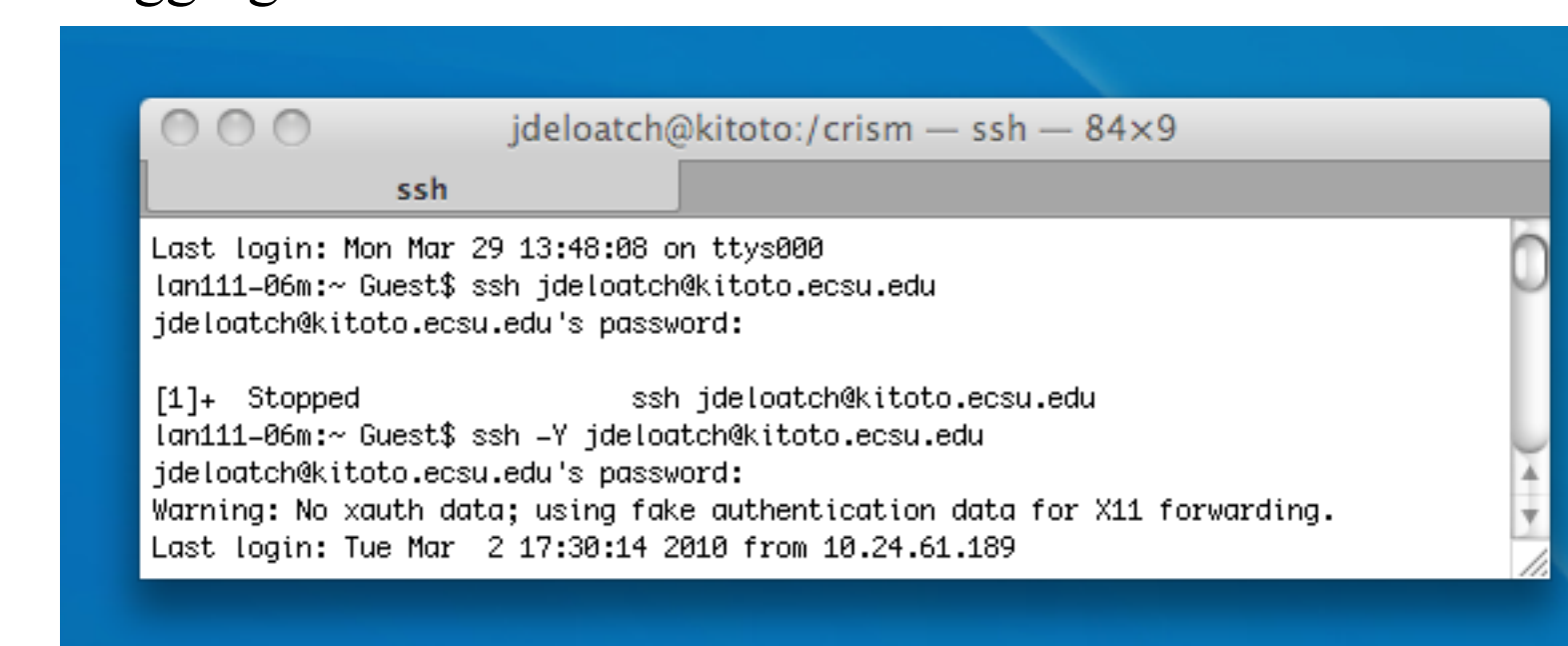
- Vnir-fem Oxidized Iron minerals
- Ir_maf Mafic mineralogy
- Ir_phy Hydroxylated Silicates
- Ir_hyd Bound water
- Ir_ice Water and CO2 Ice



Moving Images Into Kitoto Directory of saved pictures



Logging into Kitoto



- Change directory to home
- List all files in that directory
- Change directory to crism
- List files in crism
- List files in images

References

- [1] JHU.APL Webmaster. CRISM Compact Reconnaissance Imaging Spectrometer for Mars. March 15 2010 from <http://crism.jhuapl.edu/>
- [2] Jim Wilson. NASA <http://www.nasa.gov>



Database

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