

# Detection and Characterization of Magnetic Active Regions on the Sun

Juan Pablo Vargas.

Under the supervision of Andres Muñoz Jaramillo Ph.D.

In Collaboration With Mike DeLuca (REU 2014), Zach Werginz  
(REU 2015)

Montana State University

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## So.... Sunspots

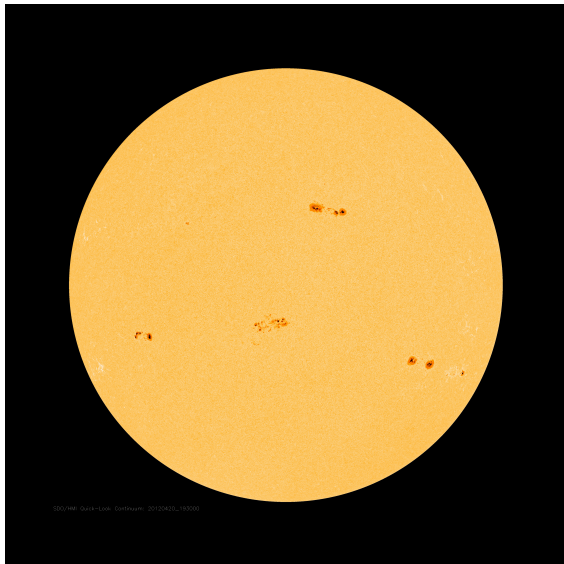


Figura: Picture Of The Sun



So.... Sunspots

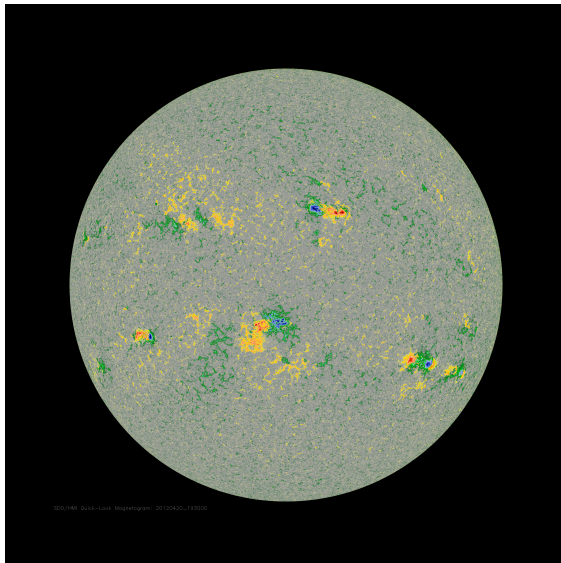


Figura: LOS-Magnetogram

## So.... Sunspots

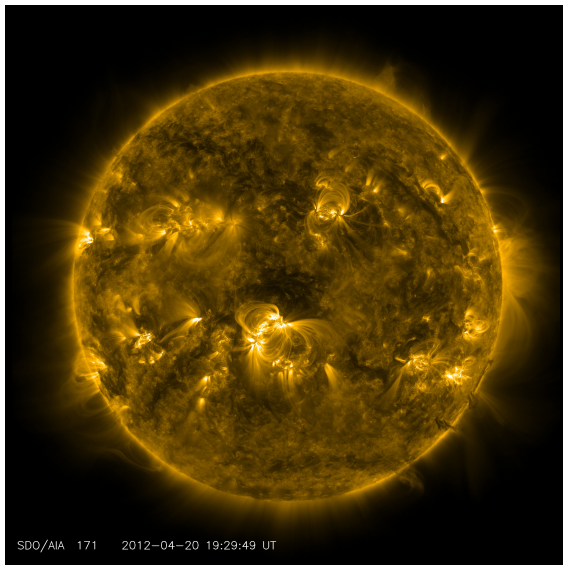


Figura: Picture Of The Sun in UV

# What is the Sunspot Cycle

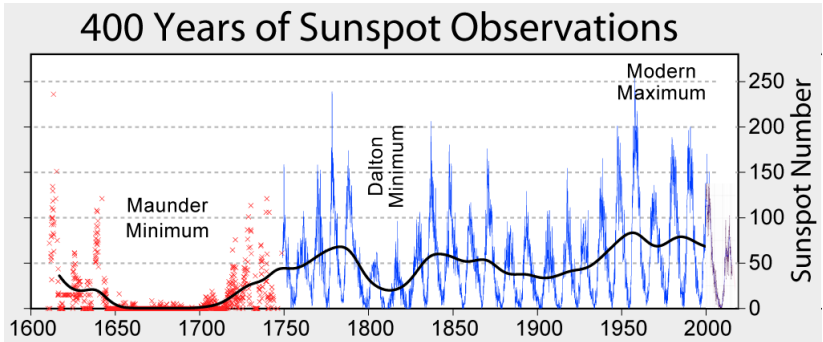


Figura: Number Of Sunspots Throughout 400 Years

# Systematic Properties of Active Regions

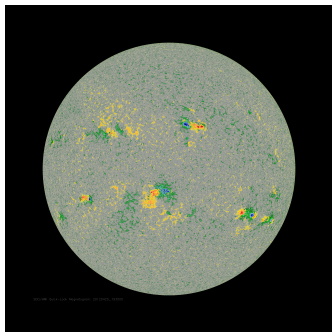


Figura: Hale's Law (East-West Orientation)

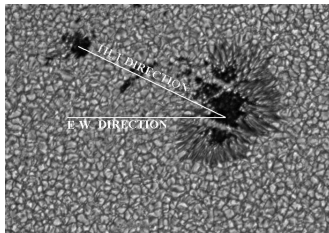
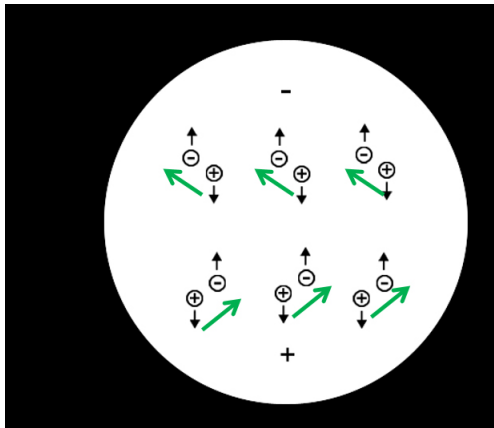


Figura: Joy's Law (North-South Orientation)

# Large Scale Magnetic Field On The Sun



**Figura:** Large Scale Magnetic Field On The Sun

# Large Scale Magnetic Field On The Sun

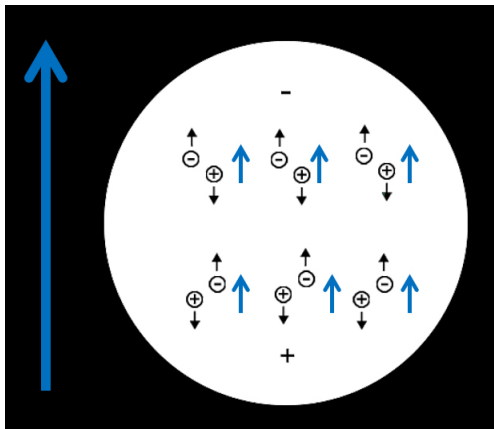


Figura: Large Scale Magnetic Field On The Sun

## Our Goal

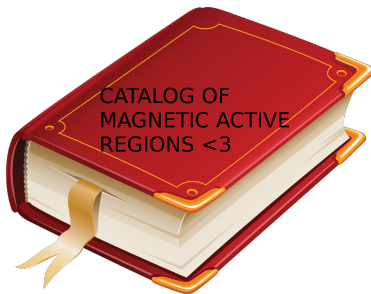
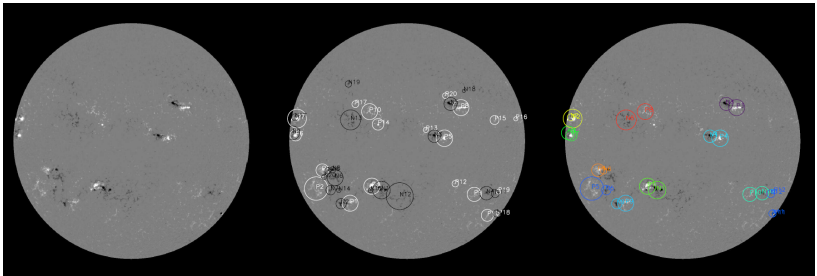


Figura: A facebook for sunspots

# How we're going to do it?

## The Bipolar Active Region Detection (BARD) Code



**Figura:** Find Them, Mach Them , Track Them !!



## Even the best make mistakes

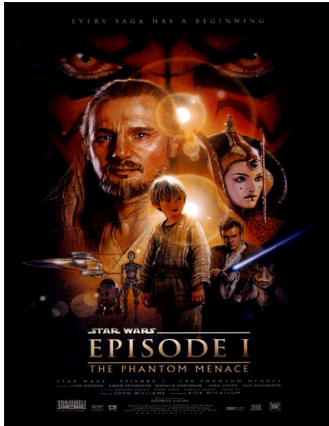


Figura: At least the code is not responsible of the episode one



Figura: Or for the Kingdom of the Crystal Skull

# This Is How We Fix Those Mistakes

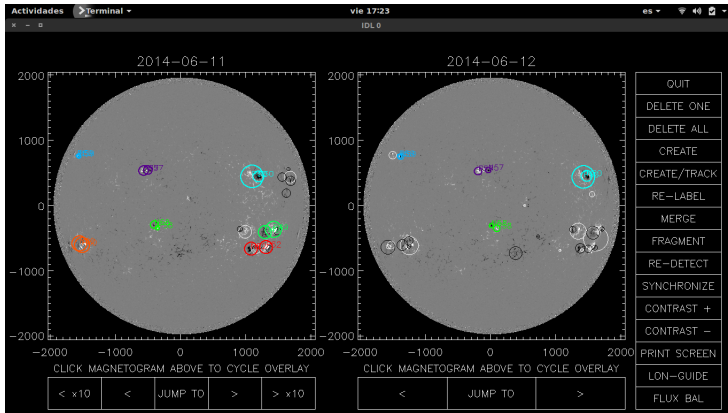
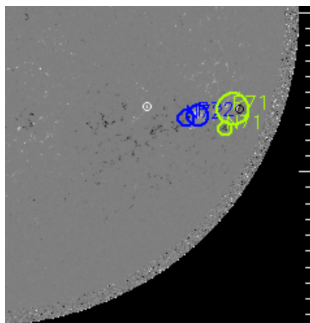
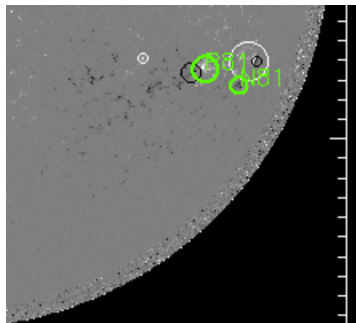
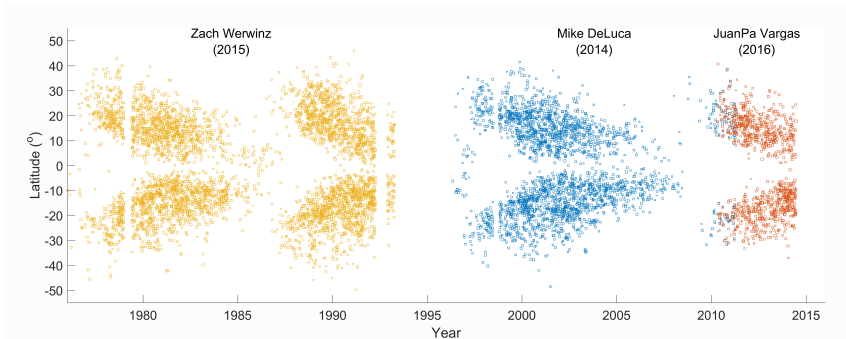


Figura: This is How it Looks

## This is One Example of the Errors



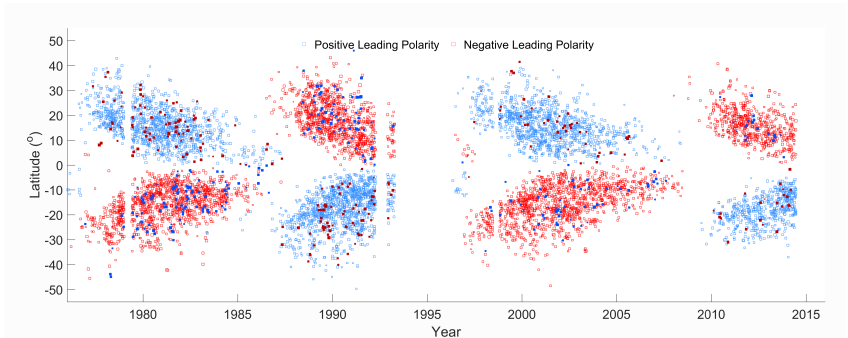
# Our Results So Far



**Figura:** The resulting Butterfly Diagram From my friends's job and mine

- Mike DeLuca : SOHO/MDI
- Zach Werginz : KPVT-512
- Juan Pablo Vargas : SDO/HMI

# Our Results So Far



**Figura:** A Butterfly Diagram Showing Hale's Law

- Mike DeLuca : SOHO/MDI
- Zach Werginz : KPVT-512
- Juan Pablo Vargas : SDO/HMI

## Future Plans

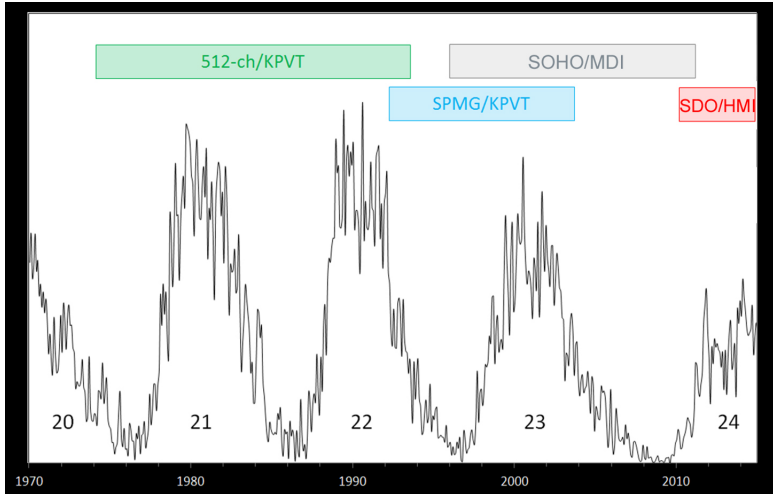


Figura: Solar Cycle

That's All Folks

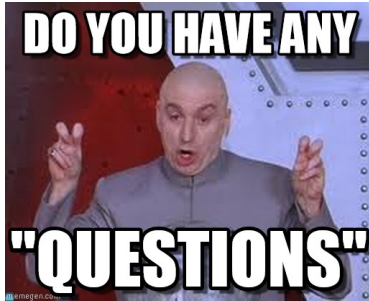


Figura: I hope you don't

