Abstract # 0000

Analyzing the South Africa Water Crisis Through SMAP

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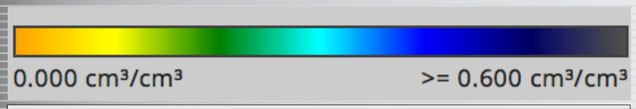


Soil moisture legend

Background About SMAP

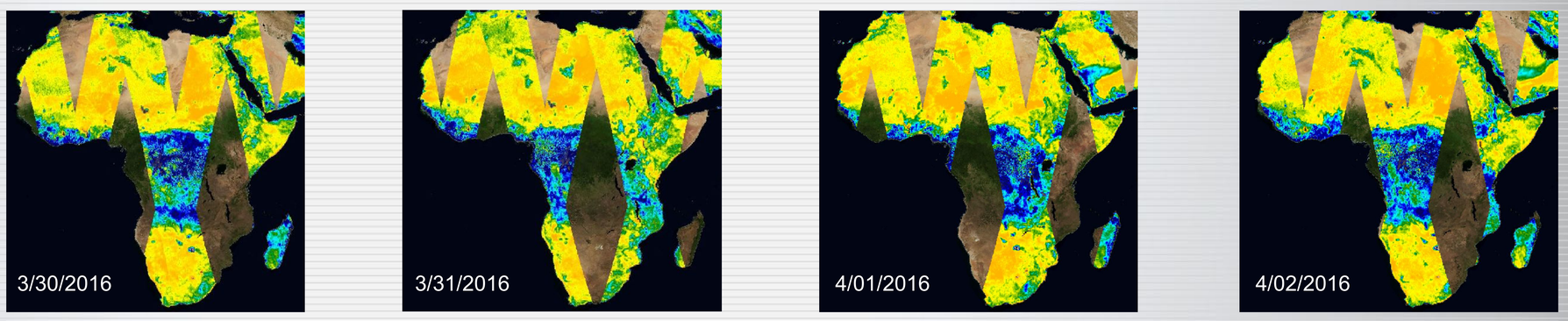
- Soil Moisture Active Passive
- Launched in 2015
- Made of two major parts — radar and radiometer
- Combines radar data and radiometer data for higher resolution maps
- Analyzes soil moisture (cm^3/cm^3) in top 10 cm of soil and gives back data every 2-3 days
- Helps predict droughts, floods, and improves weather forecasting

Background About The Water Crisis

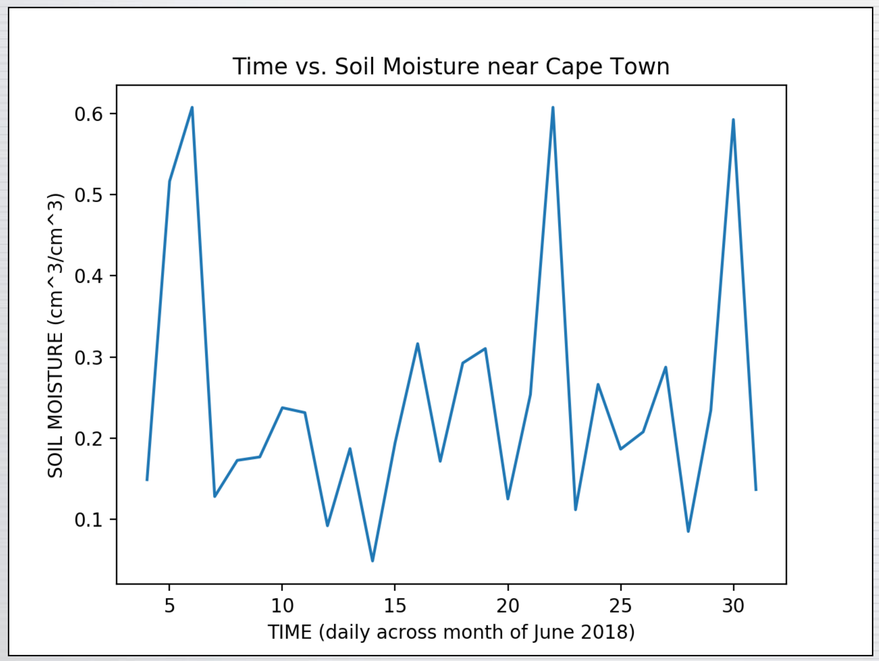
- Was triggered by El Niño in 2015
- Has taken a toll on civilians, who are limited to use only 50 liters of water per day
- Occurs mainly in the metro city of Cape Town
- Crisis stems from poor management, lack of information, and population growth
- Day Zero has been delayed for now
- There are some current plans to drag an iceberg from Antarctica

Details About SMAP's Mission

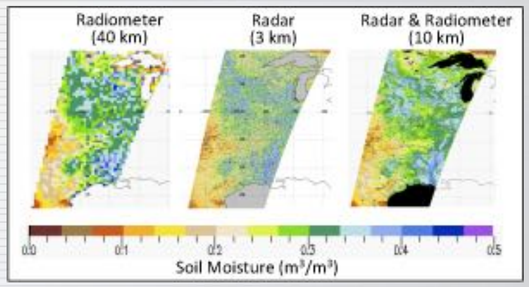
- Radar sends radiation pulses actively down to a spot on the Earth and shape is interpreted
- Radiometer measures the radiation being omitted from spot on earth passively
- Antenna spins 14.6 revolutions per min
- Because Earth spins while SMAP orbits, swaths are repeated every 8 days
- Determines freeze/thaw state of area as well
- All data is public
- Composite maps can be made every 2-3 days
- Data is organized into an HDF5 file



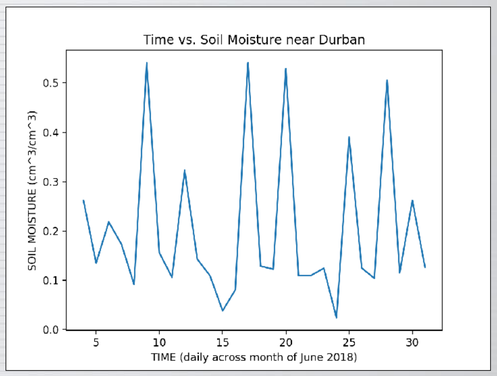
Soil moisture levels mapped out daily from 3/30/16 to 4/02/16



Soil moisture levels peak when there are rainfall events, as seen near June 6th, June 22nd, and June 30th in the city of Cape Town



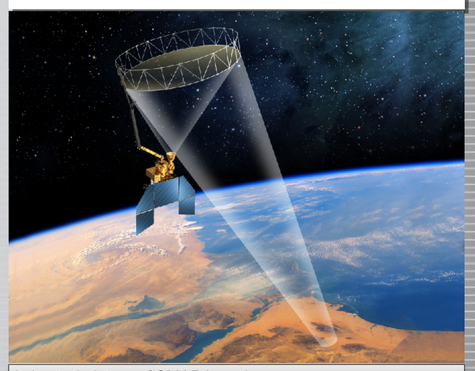
Lower resolution radiometer data is combined with higher resolution radar data to produce a more accurate map with a resolution of 9 km



Soil moisture levels of Durban in the month of June

Conclusion

- Through analysis of complete SMAP data from 2015-present, it seems that soil moisture levels took a hit near end of 2015, becoming very dry
- Middle region of Africa remained fairly 'blue', with good soil moisture levels possibly due to rain
- In 2018 data, there are some rainfall events, possibly indicating that the crisis is slightly improving
- Some farming and irrigation techniques were used to help the crisis as well



Animated picture of SMAP in action

References

O'Neill, P. E., S. Chan, E. G. Njoku, T. Jackson, and R. Bindlish. 2018. *SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture, Version 5.* Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: https://doi.org/10.5067/ZX7YX2Y2LHEB. 8/8/18.

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