



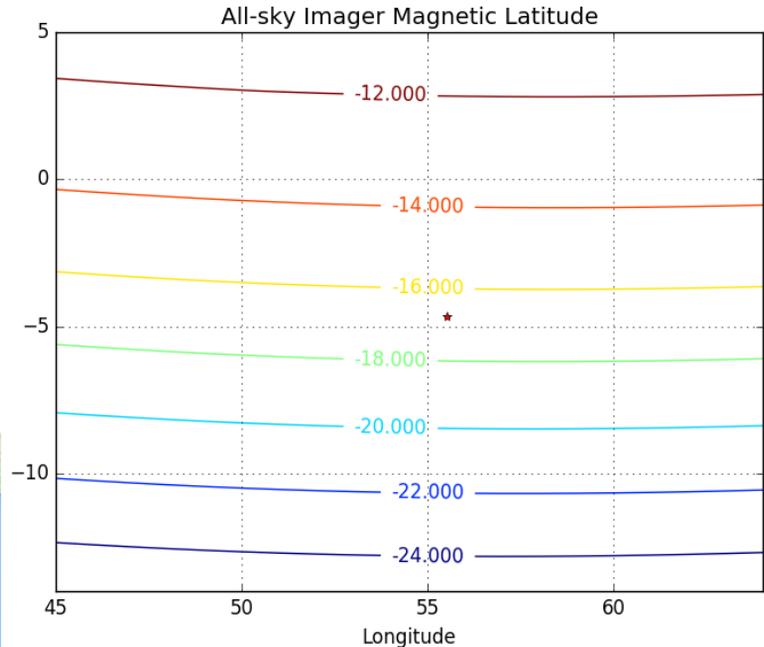
# Characterization of the Ionosphere in the Seychelles

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- Location
- Equipment
- Analysis
- Data:
  - Typical Night
  - Collection
  - Monthly
  - Seasonal
  - Depletion
- Events
  - March 17<sup>th</sup>, 2015
  - April 2<sup>nd</sup>, 2016
  - March 30<sup>th</sup>, 2017
- Summary

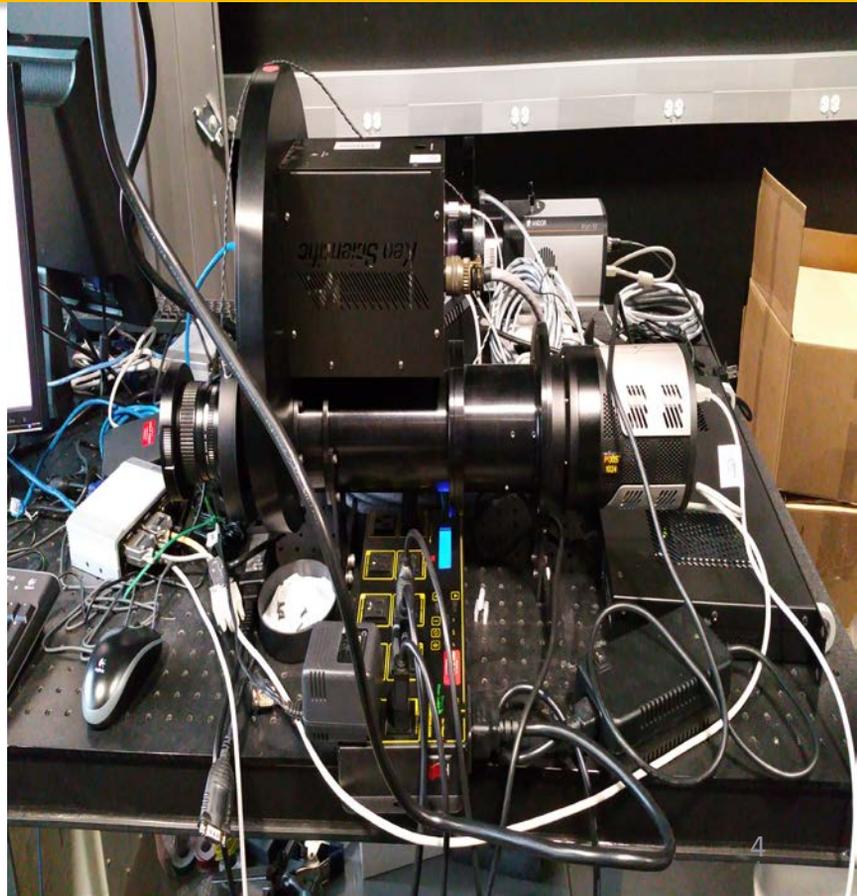
# The Seychelles

- Island chain in Indian Ocean
- Low Latitude Station
- Southern Hemisphere
- Near southern EIA Crest



# All-Sky Imager

- Keo Scientific
- PIXIS 1024 CCD
- 50mm Lens
- 5 Filters
  - 5577
  - 6200
  - 6300
  - 7650
  - 7774
- Ubuntu (Linux) OS



Verify a typical Ionosphere:

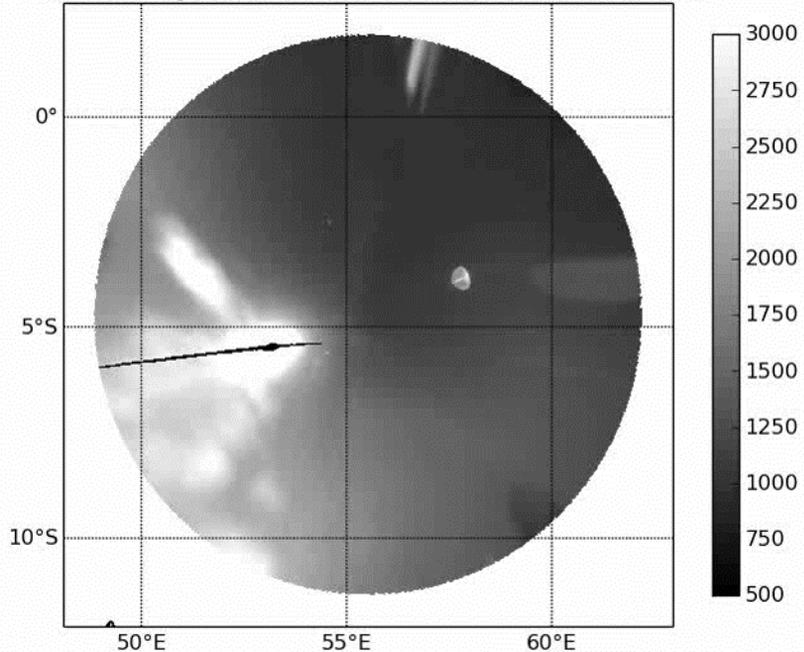
- Pre-reversal enhancement (PRE)
- Ionosphere decay post PRE
- Eastward flow of depletions
- Depletion decay along with Ionosphere
- Seasonal trends
  - How does Ionosphere visibility change
  - How does depletion frequency/extent change
- Downward trend in Ionosphere visibility and depletions synonymous with solar cycle

Events:

- What's atypical
- Are events correlated by Dst behavior

- Imager starts shortly after sunset
- Occasional view impacts:
  - Stars
  - Clouds (ITCZ)
  - Moon
  - Rain
  - Planes
  - Lizards
- Ionosphere decays/Brightness decreases through time
- Imager stops shortly before sunrise

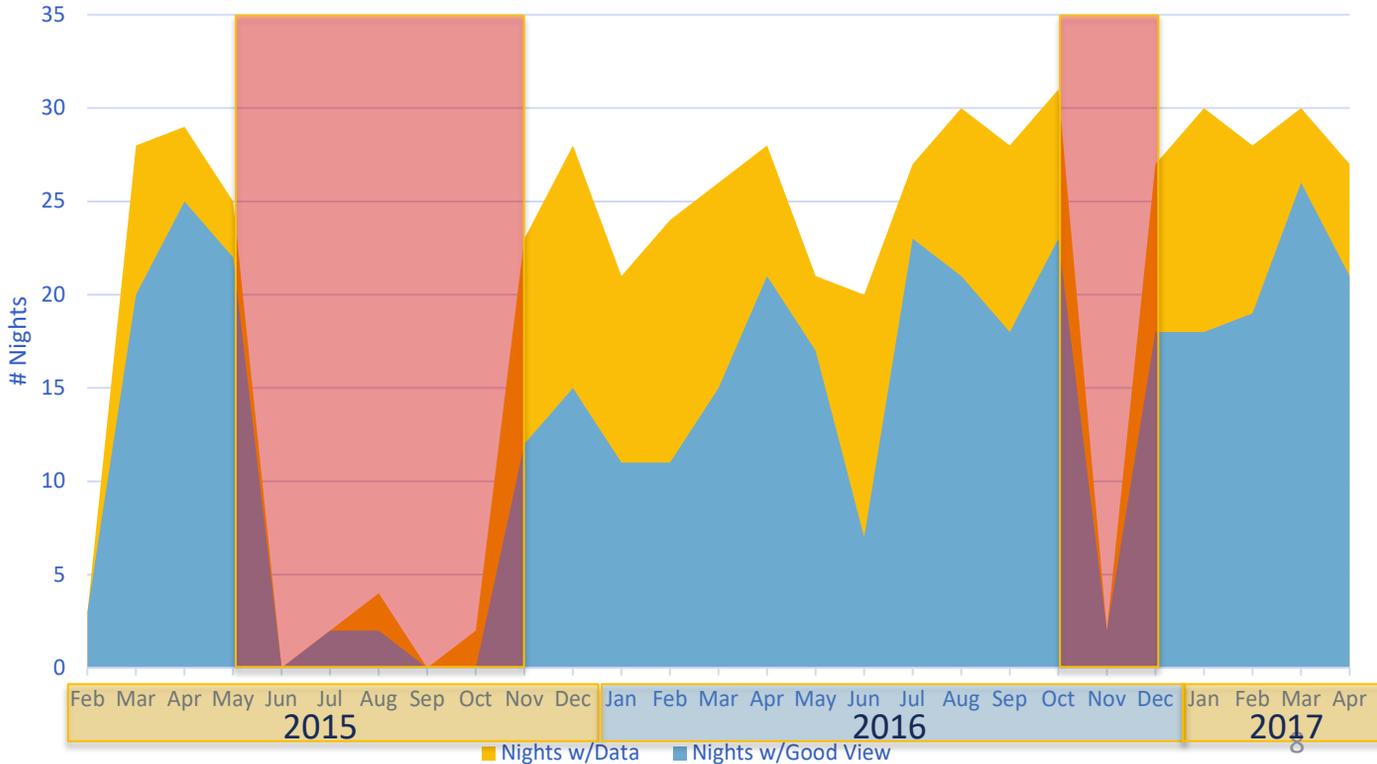
Victoria, Seycheles (6300): 06 Oct 2016 15:24:54 UT



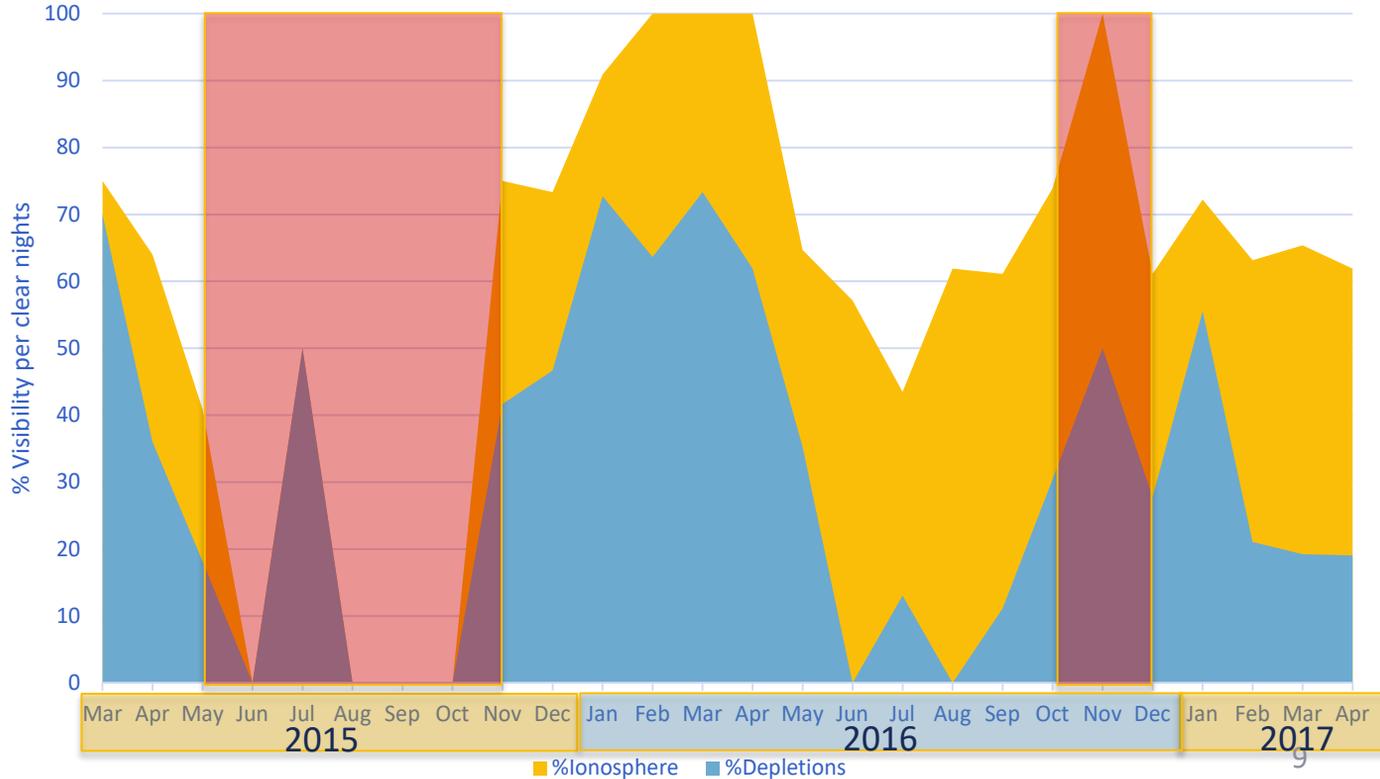
## By visual inspection:

- Moon Visibility in PMN or AMN segment.
- Percentage of view obstruction PMN and AMN.
  - 0 = 0%-25% | 1 = 25%-50% | 2 = 50%-75% | 3 = 75%-100%
- Gradient in the ionosphere, in 5577, 6300 and 7774.
- Are there depletions.
- If the depletion was visible in 5577, 6300 or 7774 and if it was PMN or AMN.
- Depletion extent and number of channels.
- EIA starting and ending location.

Seychelles # Nights w/Data and w/Good View

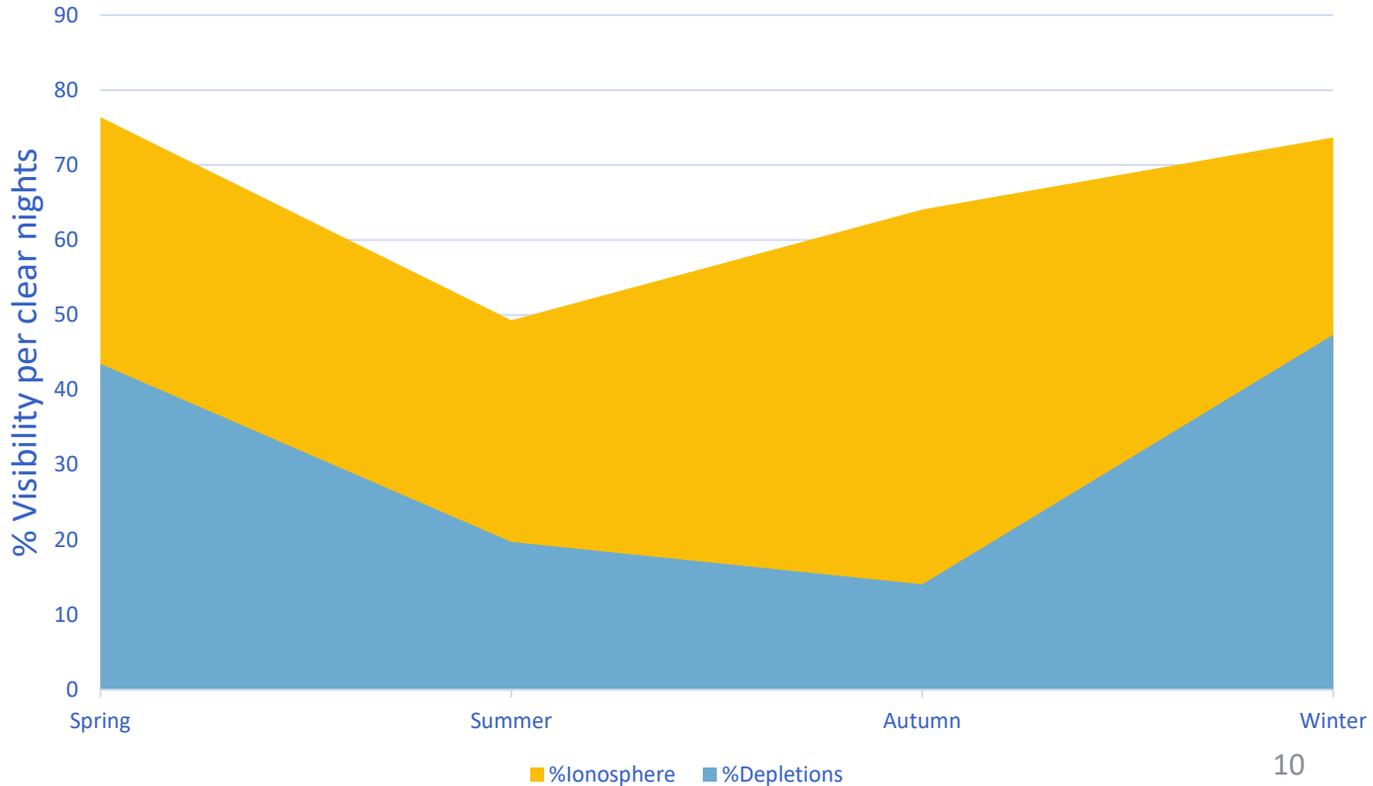


## Seychelles Ionosphere and Depletion Visibility per Clear Night



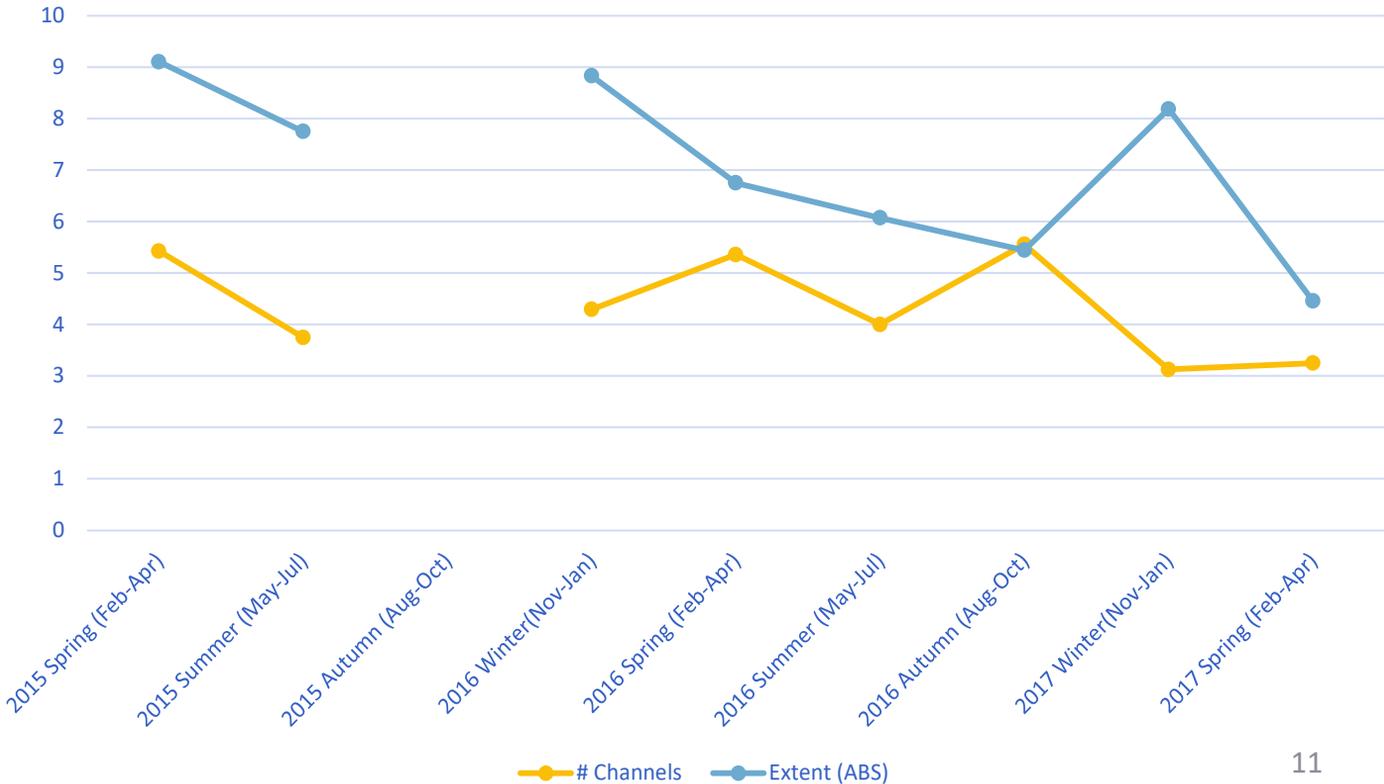
# Data: Seasonal

Seychelles Ionosphere and Depletion Visibility by Season: All Data



# Depletion Data

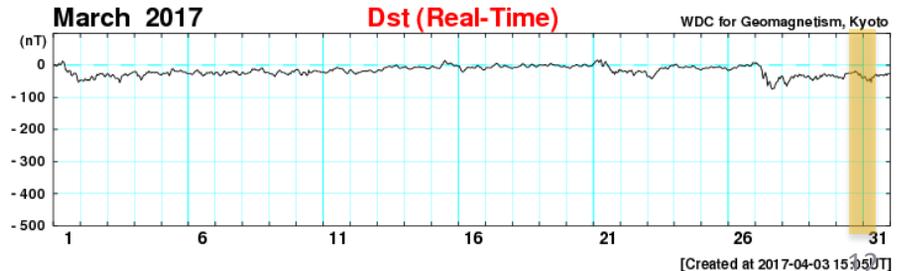
Number of Channels and Latitudinal Extent of Depletions



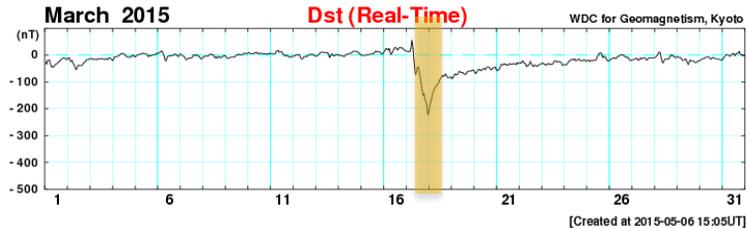
# Storm Events

## Storm Events:

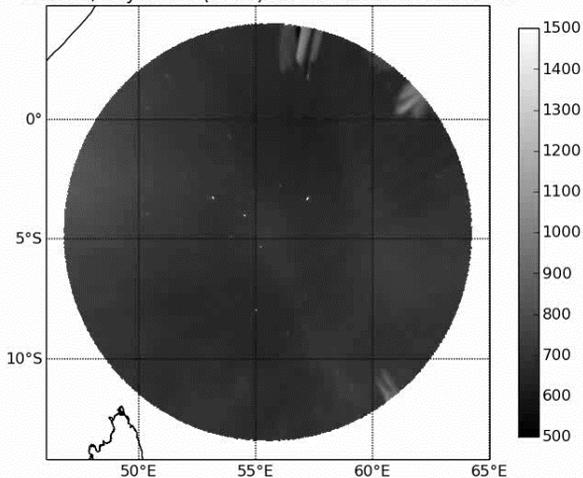
- March 17<sup>th</sup>, 2015
- April 2<sup>nd</sup>, 2016
- March 30<sup>th</sup>, 2017



- Strong drop in Dst
- Two large depletion channels
- Westward movement of depletions
- Tilt on southern end of depletions
- Brightest in 6300
- Visible but dimmer in 7774
- One EIA brightening

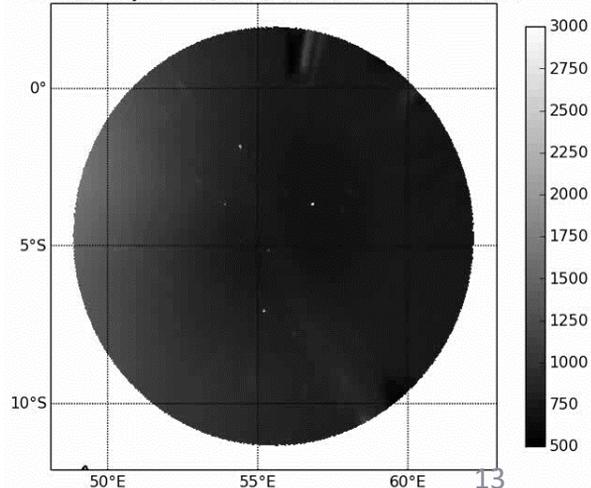


Victoria, Seycheles (7774): 17 Mar 2015 15:46:39 UT



6300 →  
← 7774

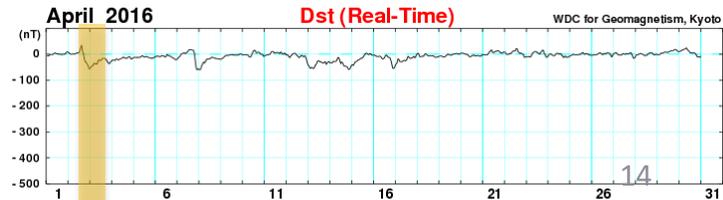
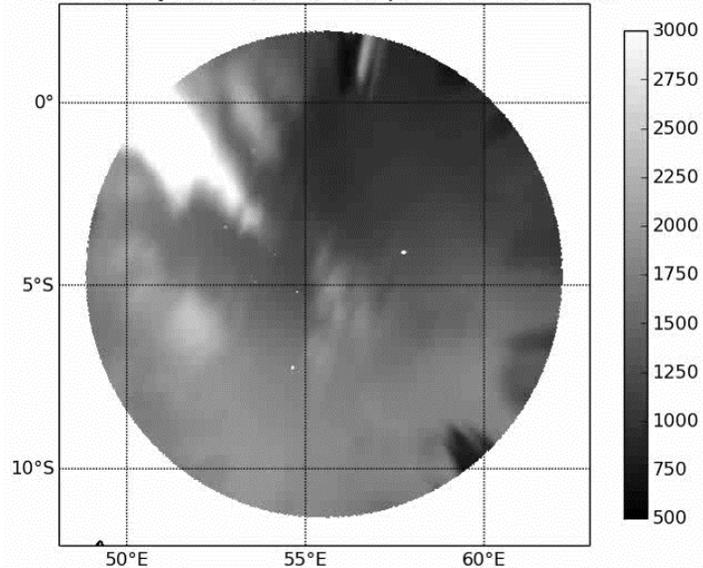
Victoria, Seycheles (6300): 17 Mar 2015 15:40:31 UT



April 2<sup>nd</sup>, 2016

- Weaker drop in Dst
- Eastward and westward movement
- Slight tilt (not as defined as on 3/17/15) in westward transition.
- Brightest in 6300.
- Two peaks in brightness of the EIA

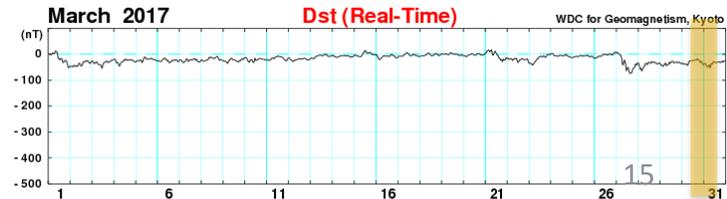
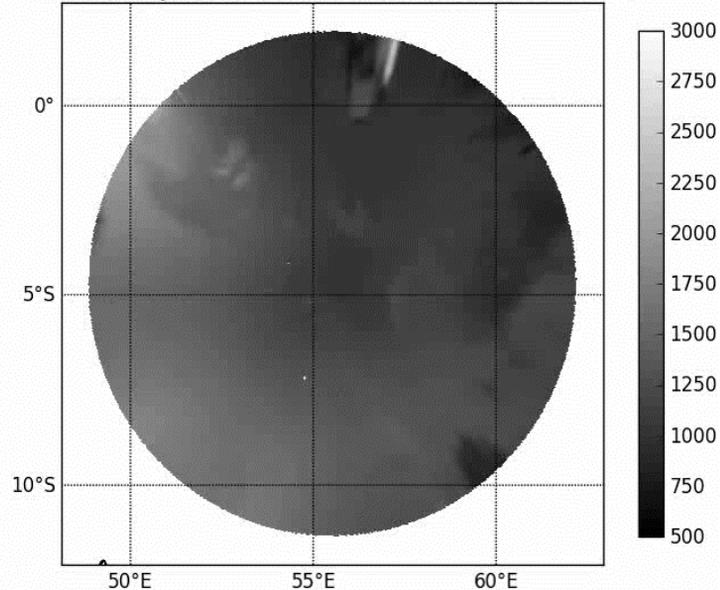
Victoria, Seycheles (6300): 02 Apr 2016 15:36:39 UT



# March 30<sup>th</sup>, 2017

- No major drop in Dst
- Eastward and westward movement
- Slight tilt in slight westward transition.
- Brightest in 6300.
- Two peaks in brightness of the EIA, not as strong compared to 4/2/16

Victoria, Seycheles (6300): 30 Mar 2017 15:37:53 UT



## Verifying Ionosphere:

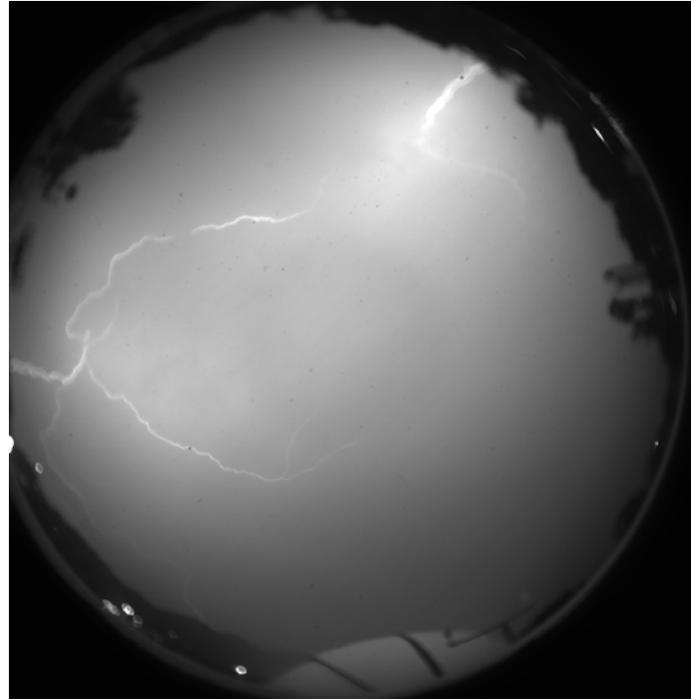
- Pre-reversal enhancement (PRE), Secondary enhancement some nights.
- Ionosphere decay post PRE, some special occasions.
- Night time eastward flow of depletions, but Geomagnetic conditions can reverse direction.
- Depletion degradation along with Ionosphere.
- Seasonal similarities:
  - Ionosphere visibility higher in Equinox months.
  - Number of nights with depletions higher in Equinox months.
- Downward trend in Ionosphere visibility and depletions synonymous with solar cycle.
  - Difficult to define due to data outages. Depletion data supports it.

## Events:

- Each event required a sharp or prolonged Dst.
- Can see eastward reversal and westward movement depending on what time you're viewing geomagnetic storm conditions.

# Acknowledgements

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