# University of Wisconsin HSRL PISTON and the Manila Observatory

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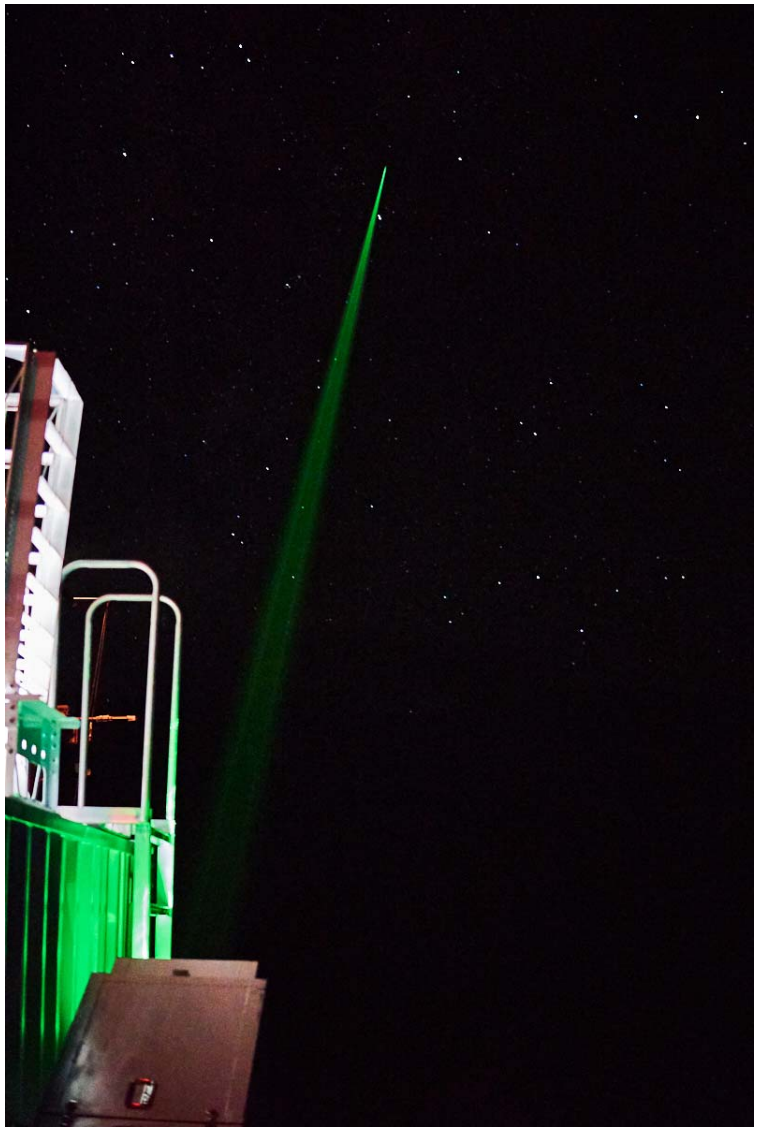
MYC 2019
Manila

# HSRL Overview

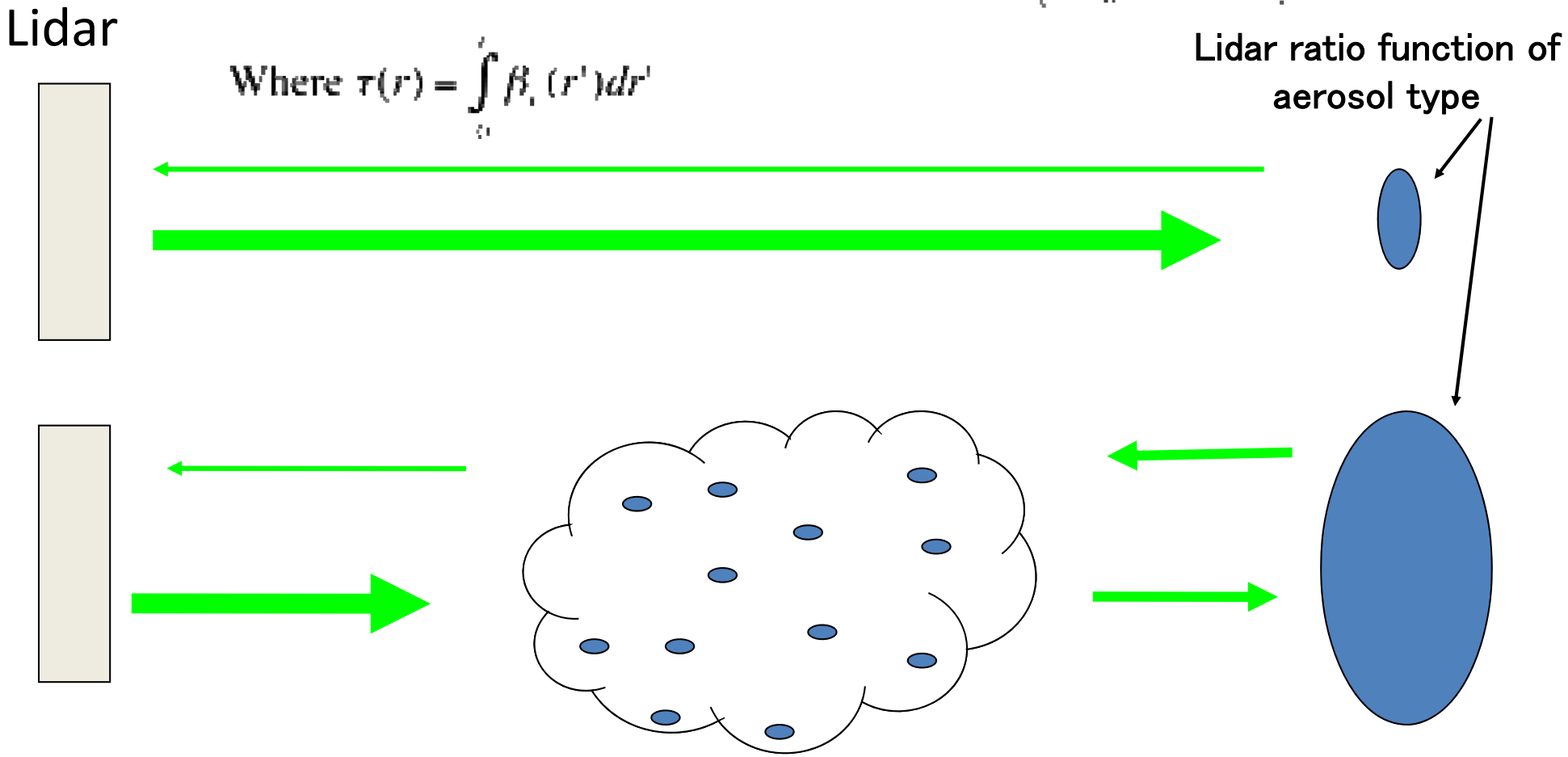
- Two University of Wisconsin HSRL instruments deployed to South East Asia
  - PISTON ship cruse 2018 (2 months)
  - Manila Observatory starting in December 2018 –December 2019
- All prelmimarny data and imagery is available on the UW HSRL website (hsrl.ssec.wisc.edu)
- Geostationary (AHI) imagery and products are being generated during the mission at 10 min temporal resolution with the ship track overlay leveraging the CAMP2eX mission support (mayon.ssec.wisc.edu)



# Single Channel Lidar

$$\frac{dN}{dt}(r) = N_0 \frac{cA_r}{2r^2}\left(\beta_a(r)\frac{P_a(\pi,r)}{4\pi} + \beta_m(r)\frac{3}{8\pi}\right)\exp\left(-2\int_0^r \beta_t(r')dr'\right)$$

Where $\tau(r) = \int_0^r \beta_t(r')dr'$



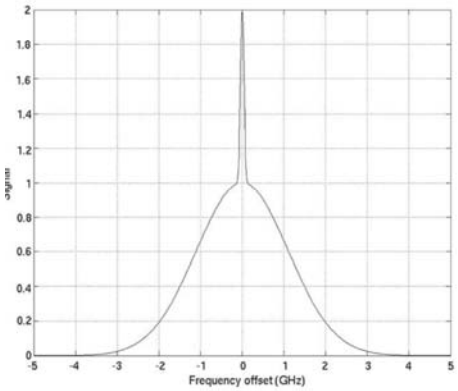
# The HSRL Technique

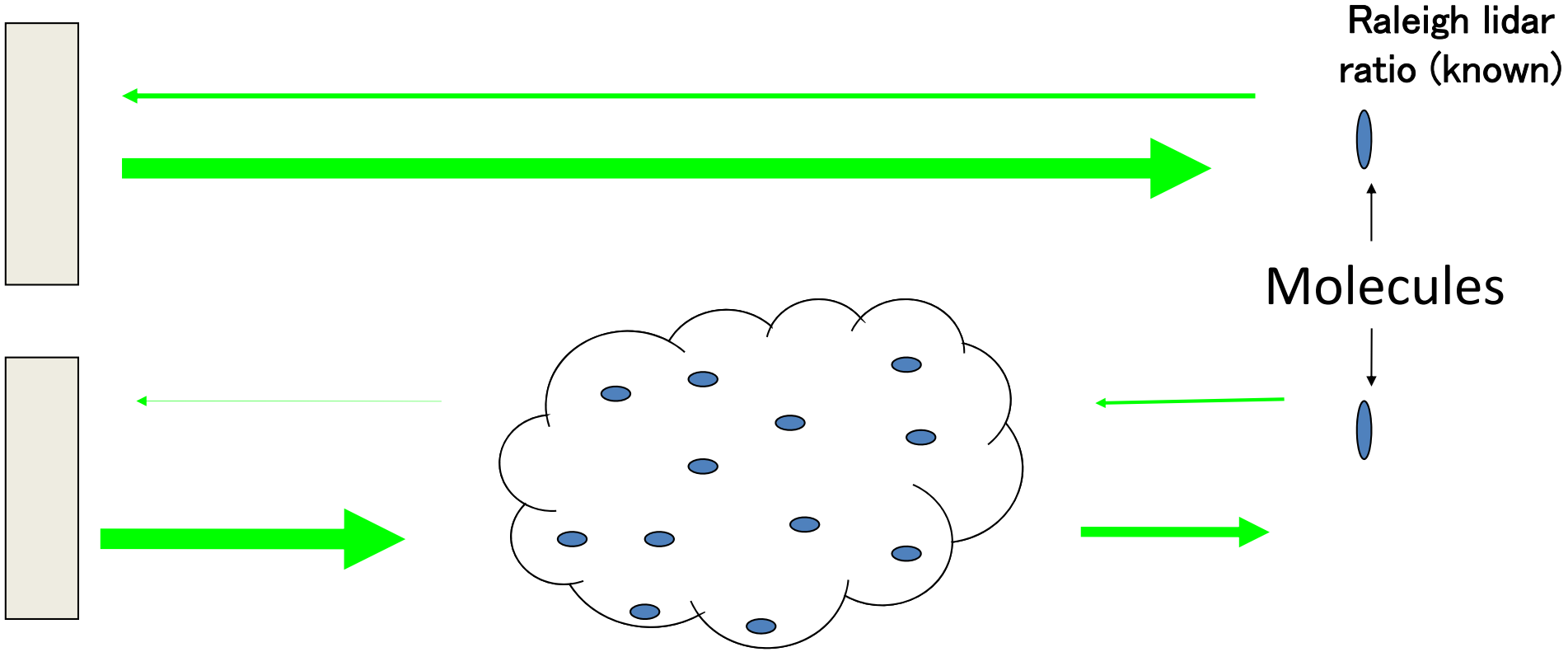
2 Equations

2 Unknowns

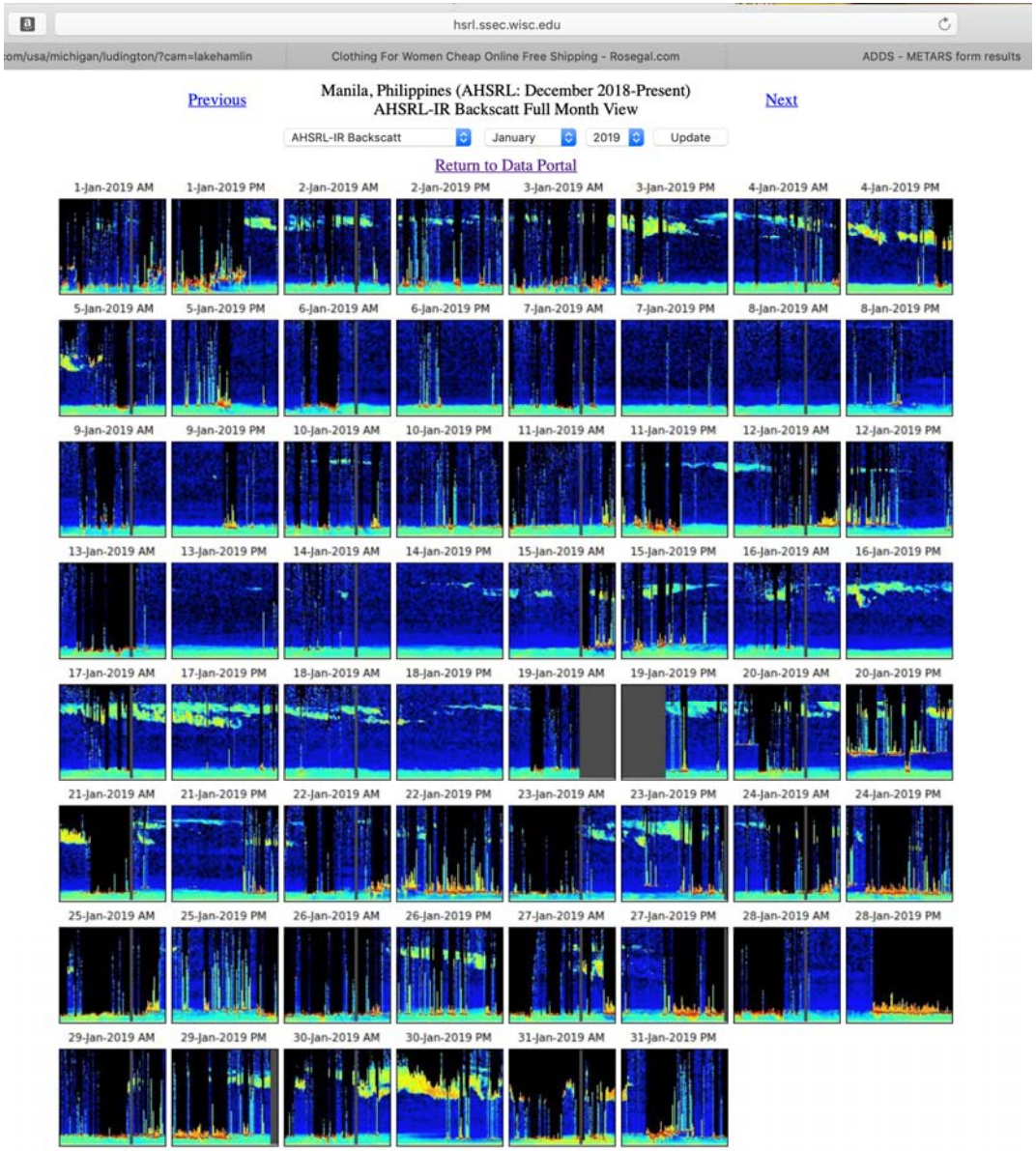
$$\frac{dN_m}{dt}(r) = N_o \frac{cA_r}{2r^2}\left(\beta_m(r)\frac{3}{8\pi}\right)\exp\left(-2\int_0^r \beta_t(r')dr'\right)$$

$$\frac{dN_a}{dt}(r) = N_o \frac{cA_r}{2r^2}\left(\beta_a(r)\frac{P_a(\pi,r)}{4\pi}\right)\exp\left(-2\int_0^r \beta_t(r')dr'\right)$$



# HSRL at the Manila Observatory



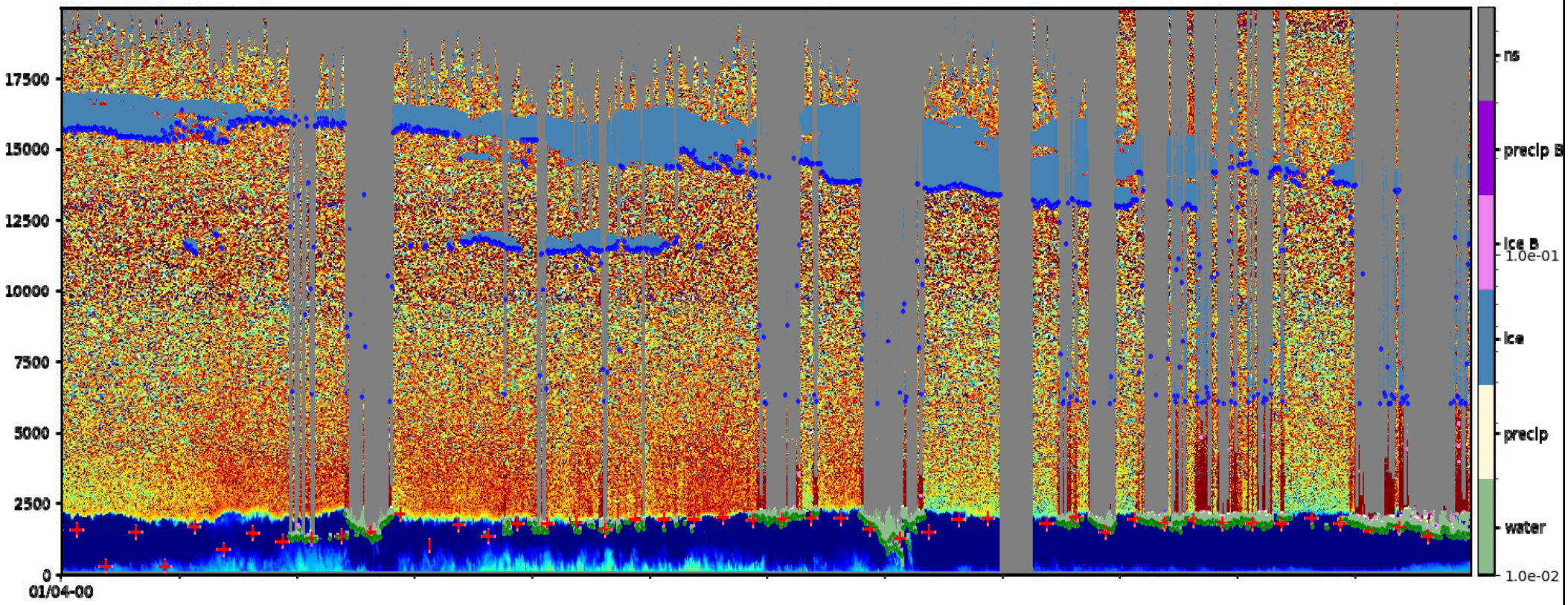

[hsrl.ssec.wisc.edu](hsrl.ssec.wisc.edu)

Image courtesy of Ms. Genie Lorenzo

# HSRL Example from Manila

January 4th 2019

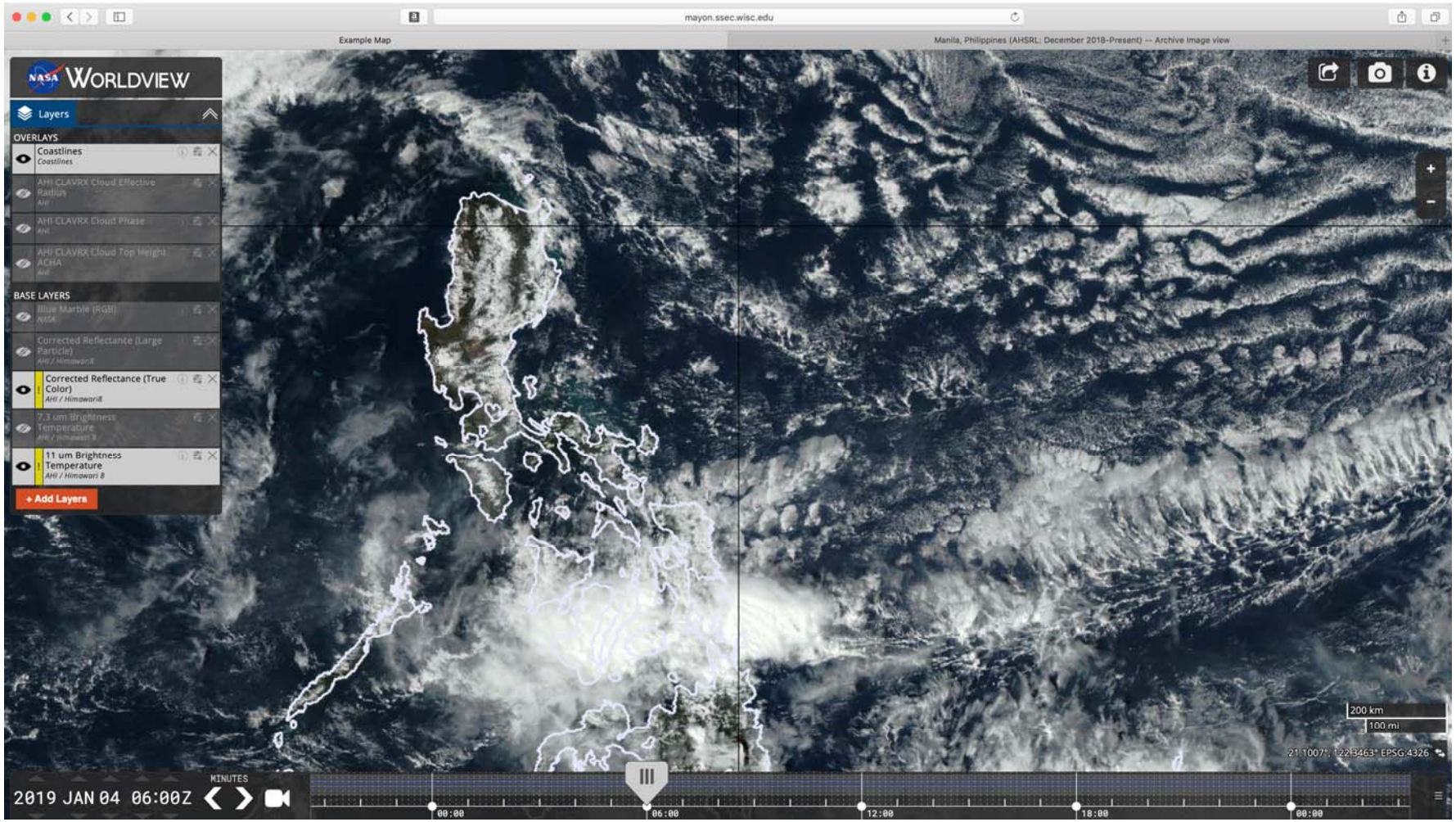
Depolarization



# Geo-Worldview

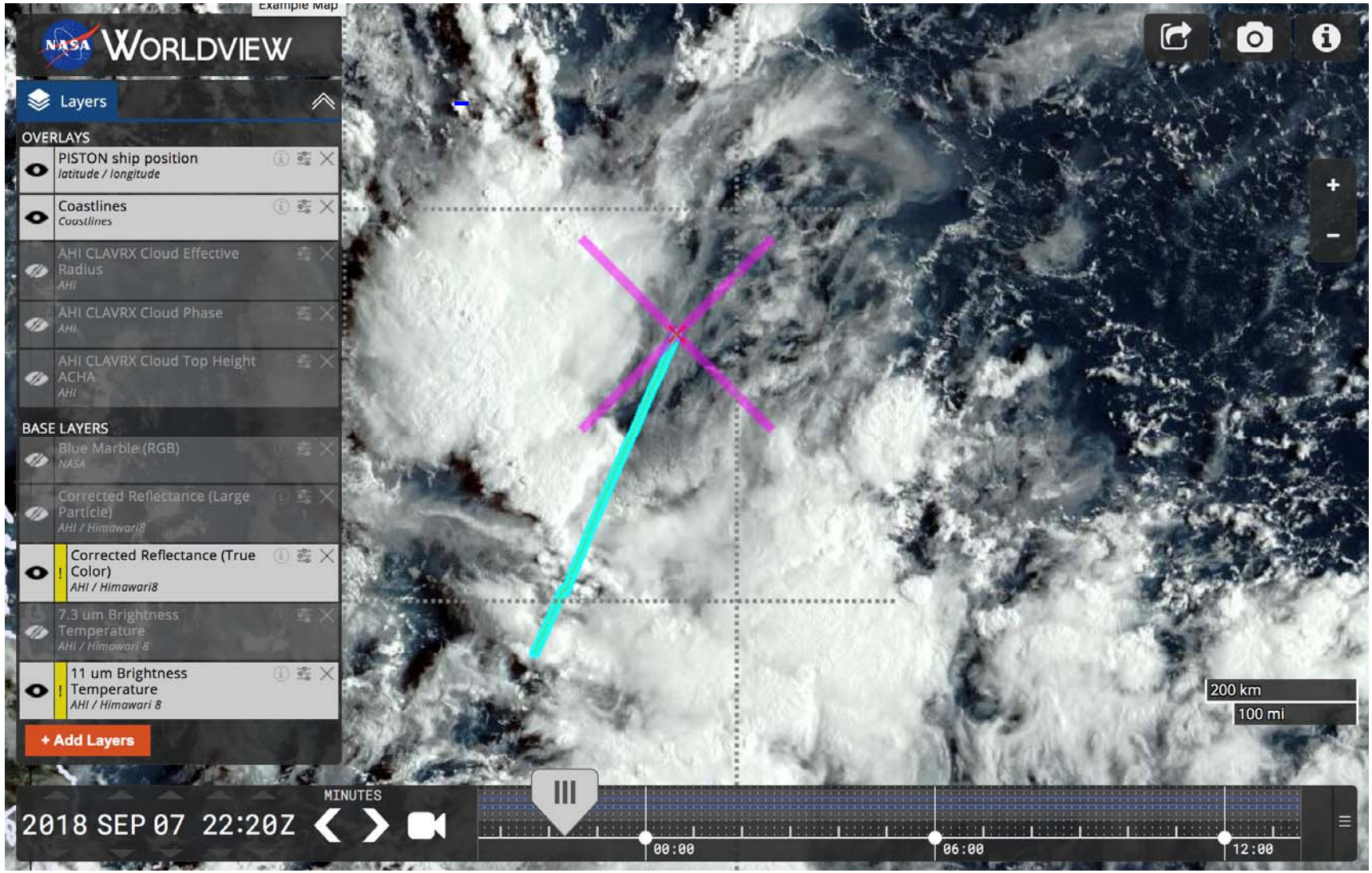
# Hosted at UW SSEC

[mayon.ssec.wisc.edu](mayon.ssec.wisc.edu)



# AHI September 7th 2018

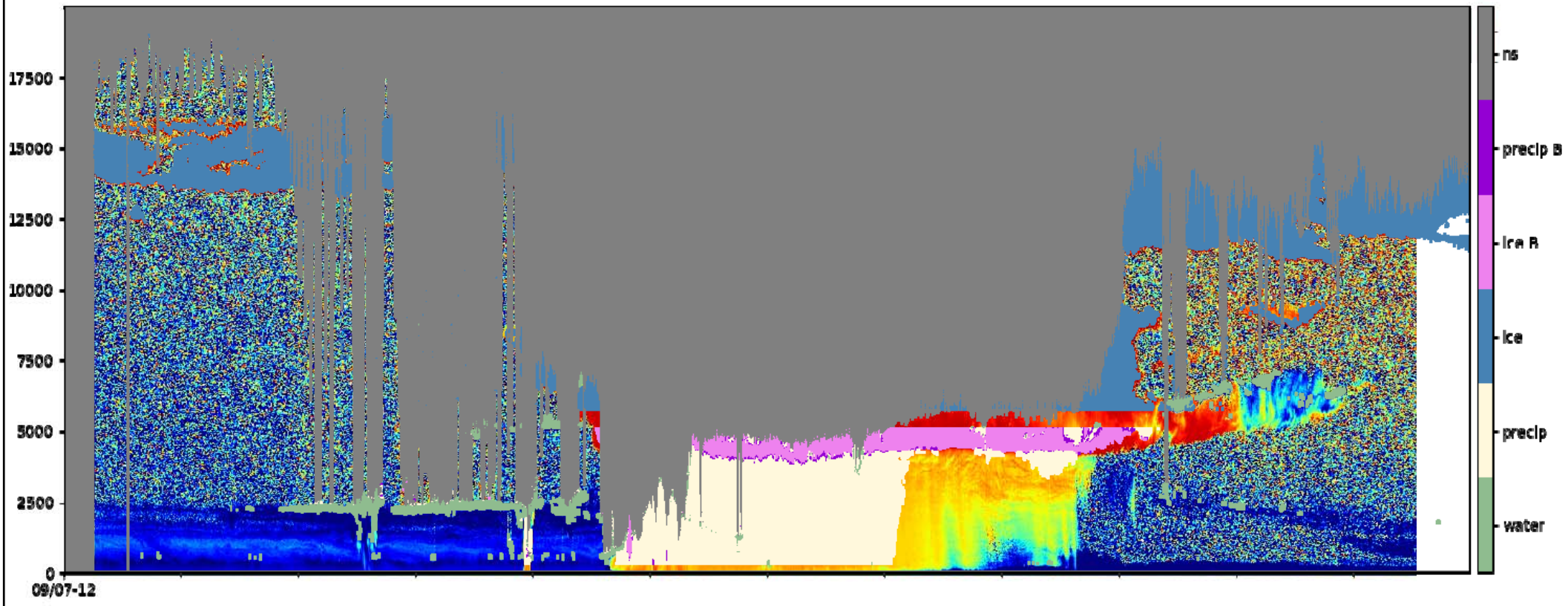
[mayon.ssec.wisc.edu](mayon.ssec.wisc.edu)



# HSRL PISTON

September 7th 2018

Depolarization

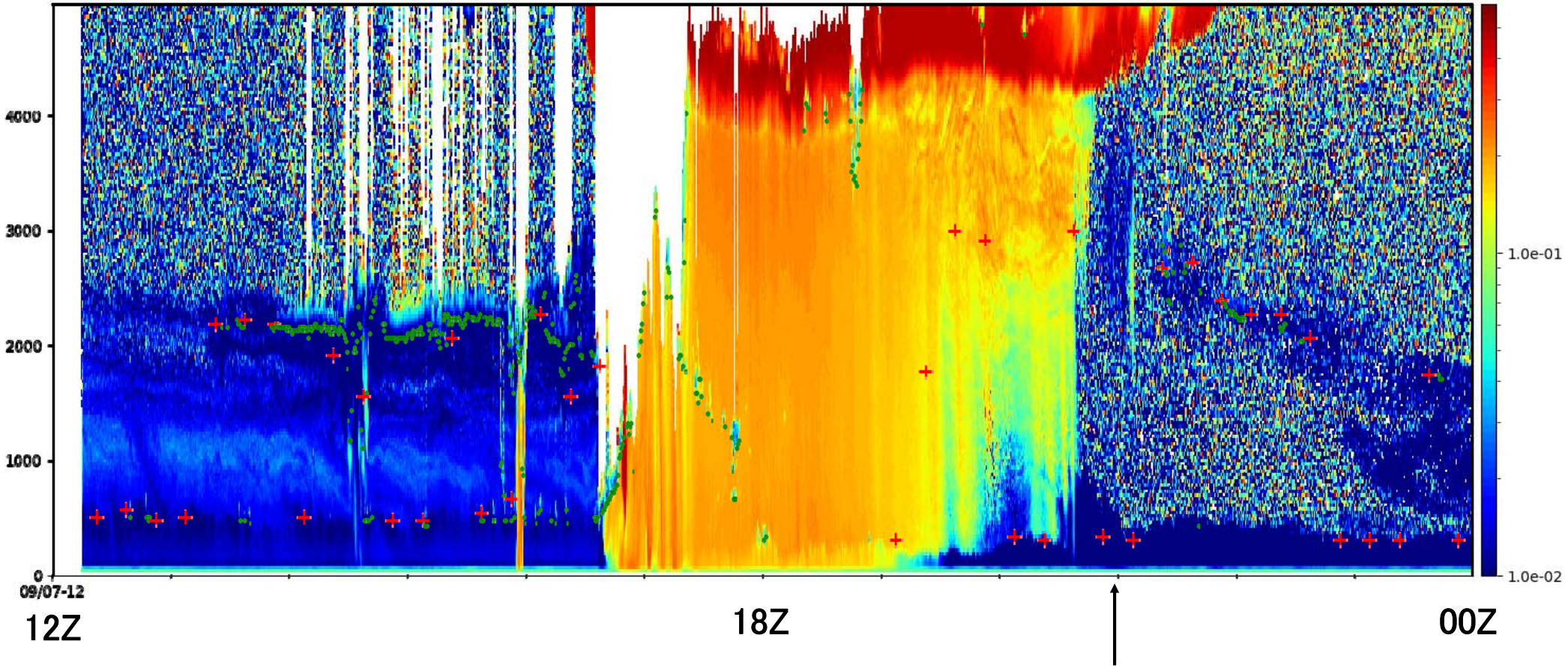



Notice the significant reduction in mix layer height and aerosol cross-section after precipitation

# HSRL PISTON

September 7th 2018 (<5 km)

Depolarization



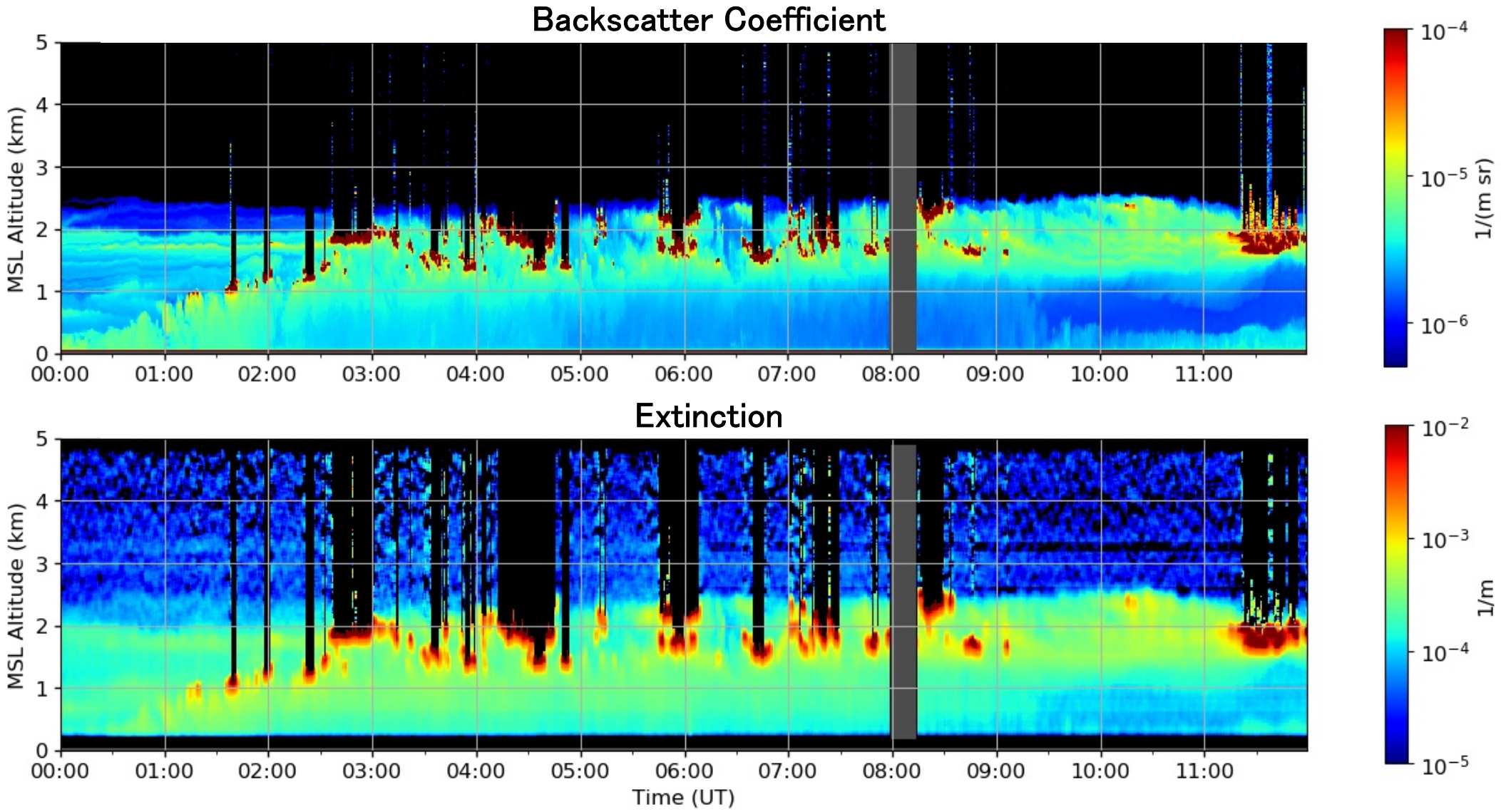

Notice the reduction in aerosol concentration after precipitation

# Morning in Manila

February 25th

# Manila HSRL Observations

February 25th 2019



# Conclusions

- The University of Wisconsin HSRL was deployed to Manila in December of 2018 with the support of NASA and the Manila Observatory
- The system is capable of high resolution observations of clouds and aerosols at multiple wavelengths (532 and 1064 nm) including direct measurements of the extinction and lidar ratio at 532 nm.
- The system will operate through the CAMP2eX field mission this fall providing long term characterization of the aerosol, clouds and precipitation in metro Manila
- A second system deployed on a Office of Navel Research (ONR) ship (PISTON) last summer with the possibility of a second deployment in 2019