



AOT Retrievals of China Smog Events (Winter 2015-2016) Using Two Different S-NPP VIIRS AOT Products

Jingfeng Huang

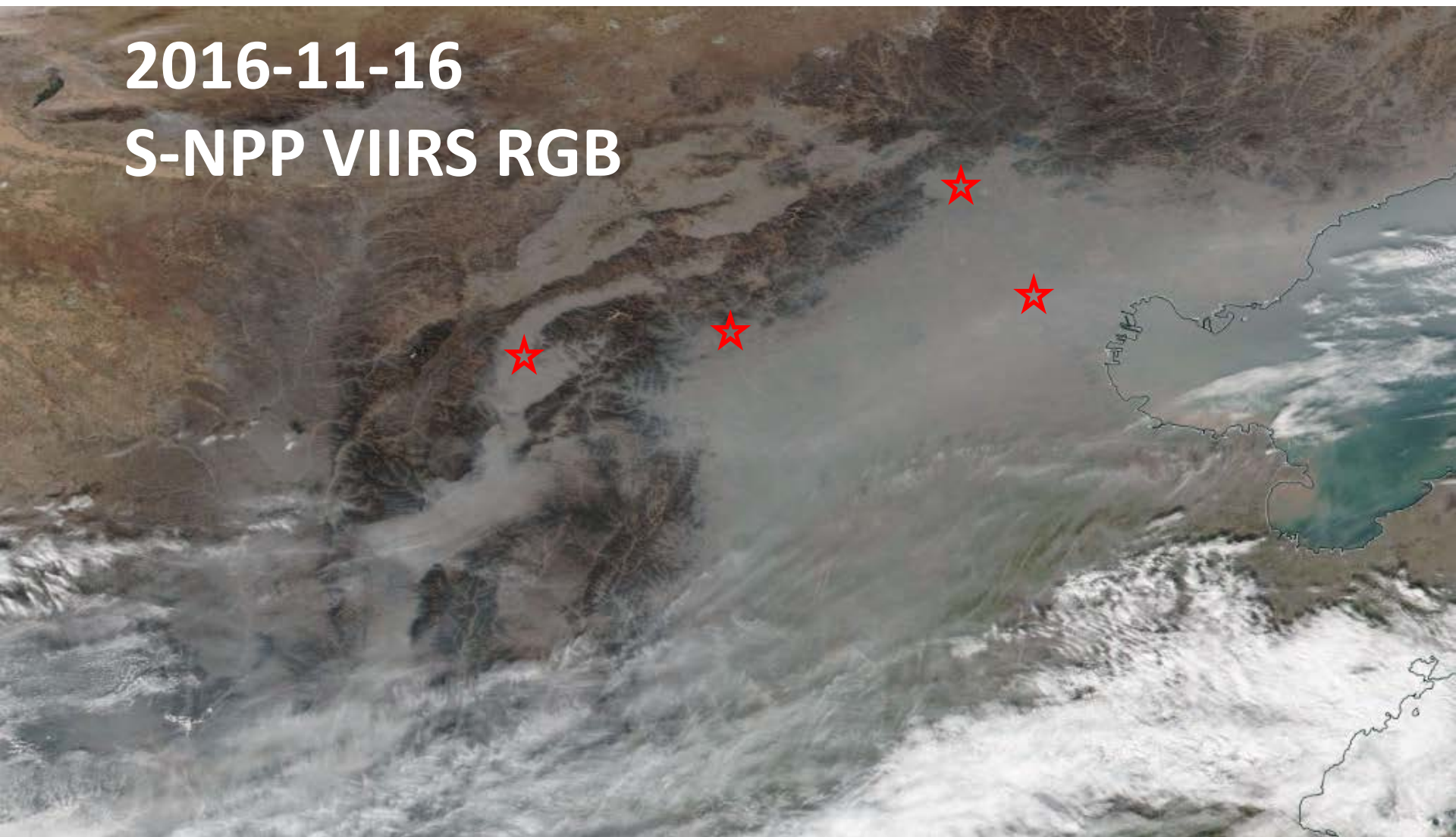
UMD/ESSIC/CICS @ NOAA/NESDIS/STAR

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Pubu Ciren, Lorraine A. Remer, Stephen Superczynski

AMS Annual Meeting 2017

Motivations

2016-11-16
S-NPP VIIRS RGB





Outline



1. The Two S-NPP VIIRS AOT Algorithms
 - IDPS: Interface Data Processing Segment
 - EPS: Enterprise Processing System
2. The Missing China Smog Retrievals in IDPS Product
3. The Improved China Smog AOT Retrievals in EPS
4. Characterization of China Smog Events using EPS
5. Summary



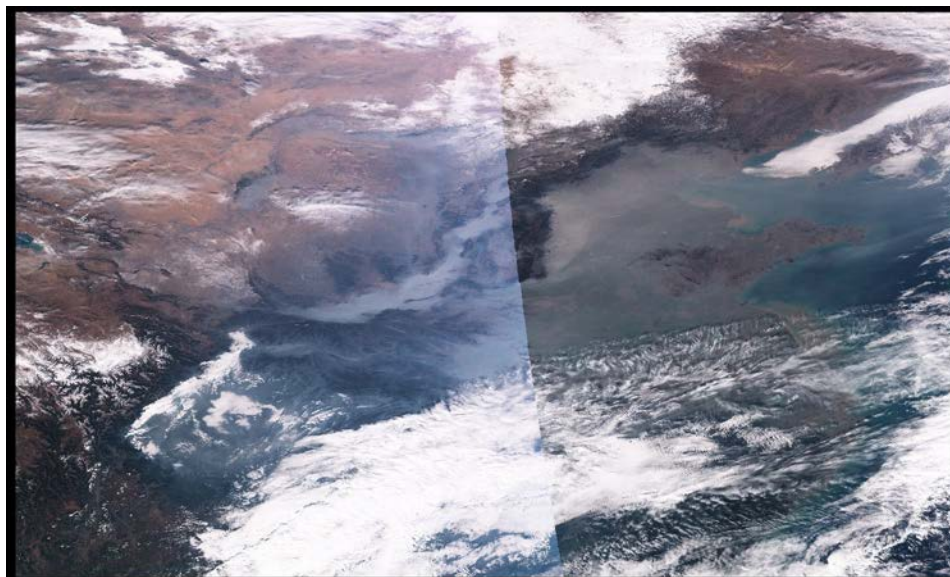
Difference Between IDPS and EPS



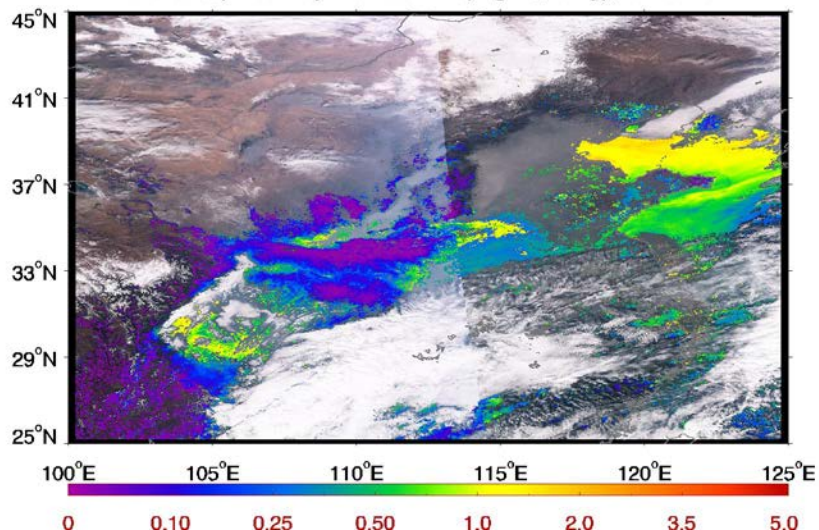
- EPS extends the AOT reporting range from $[0, 2.0]$ to $[-0.05, 5.0]$;
- EPS has AOT retrievals over both dark and bright surfaces;
- EPS has an internal heavy aerosol callback that tests heavy aerosol over cloud mask's water cloud pixels;
- IDPS missed AOT retrievals of some heavy China Smog events, how about EPS?

The Missing AOT Retrieval of China

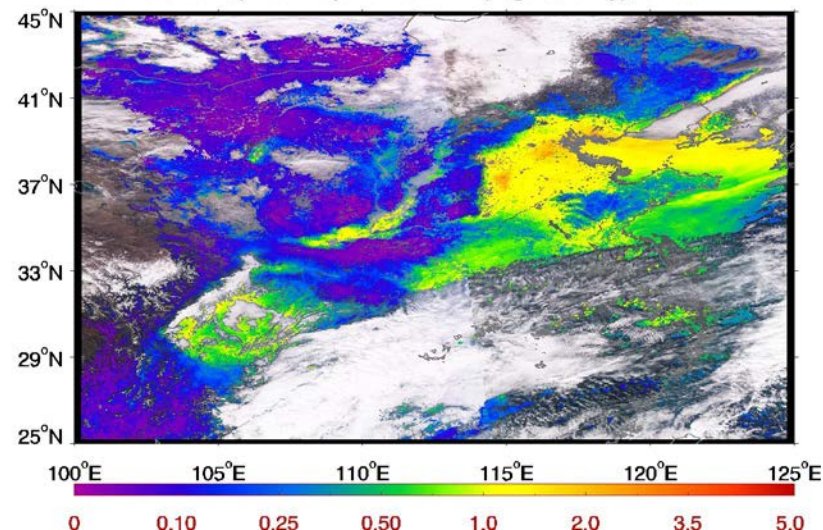
Smog, 2016-01-02



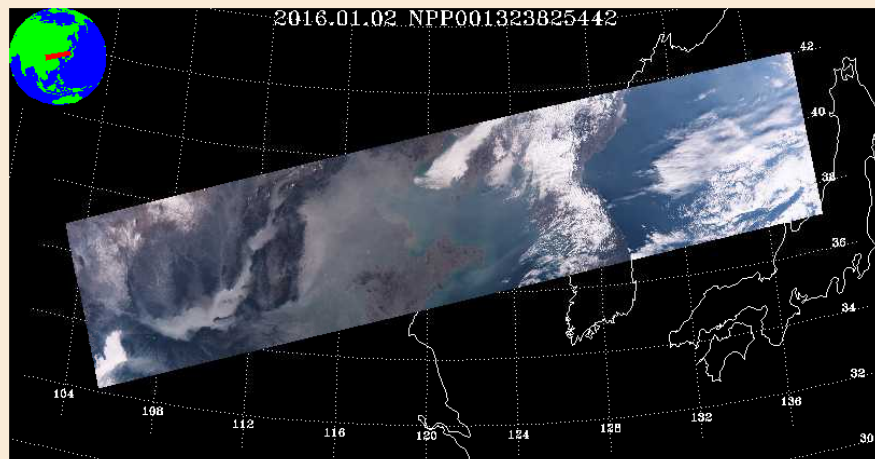
IP Aerosol Optical Depth at 550nm (High Quality), 20160102



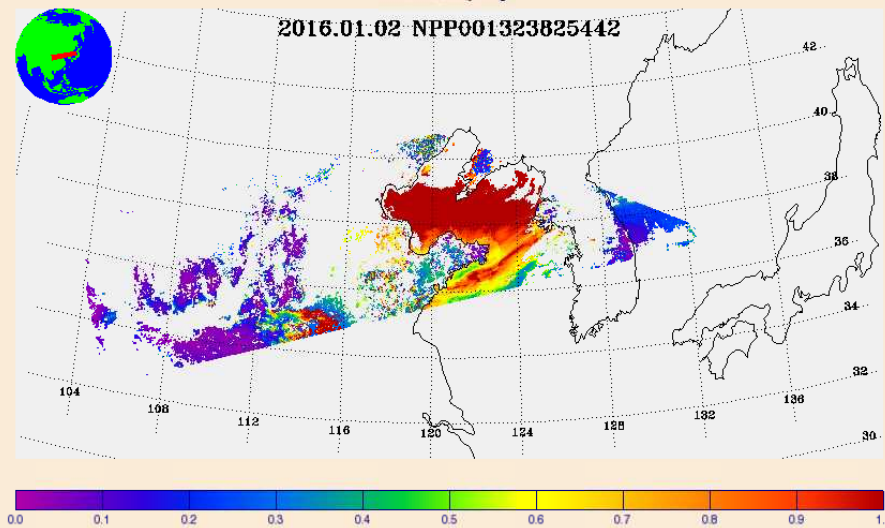
EPS Aerosol Optical Depth at 550nm (High Quality), 20160102



RGB Image [R=M5 (672 nm), G=M4 (555 nm), B=M3 (488 nm)]

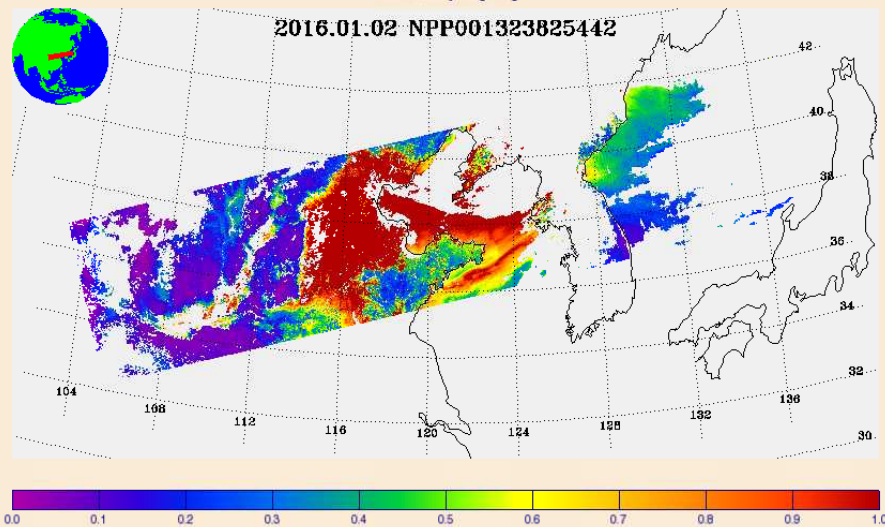


Aerosol Optical Thickness (IP) at 550nm
IP AOT Quality=High



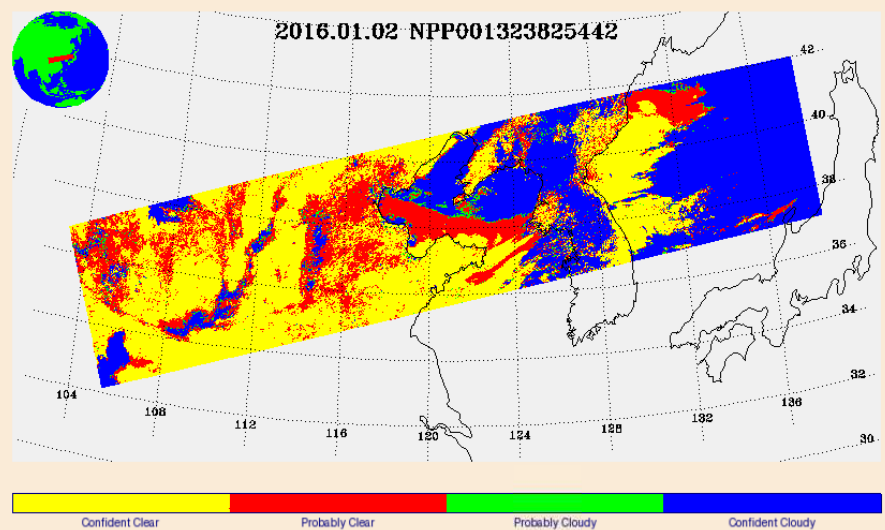
2016002_t0455425.h5

AOT at 550nm
Overall Quality Flag=High



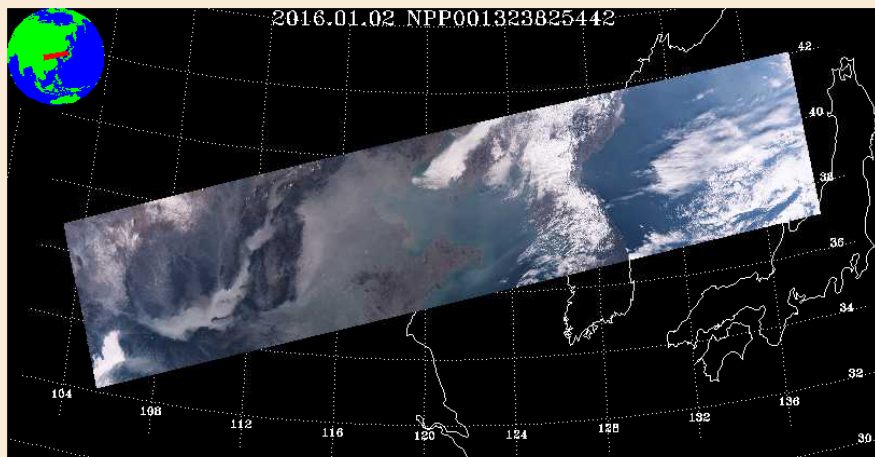
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VCM Cloud Confidence

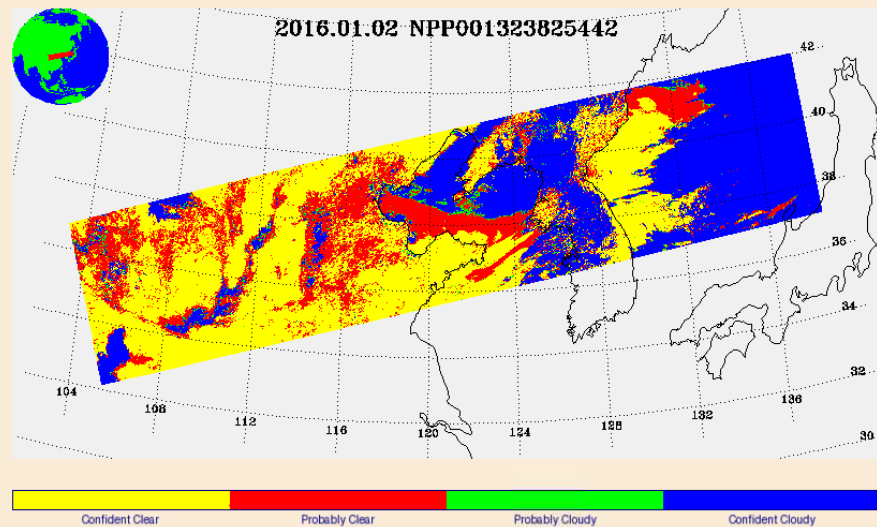


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RGB Image [R=M5 (672 nm), G=M4 (555 nm), B=M3 (488 nm)]

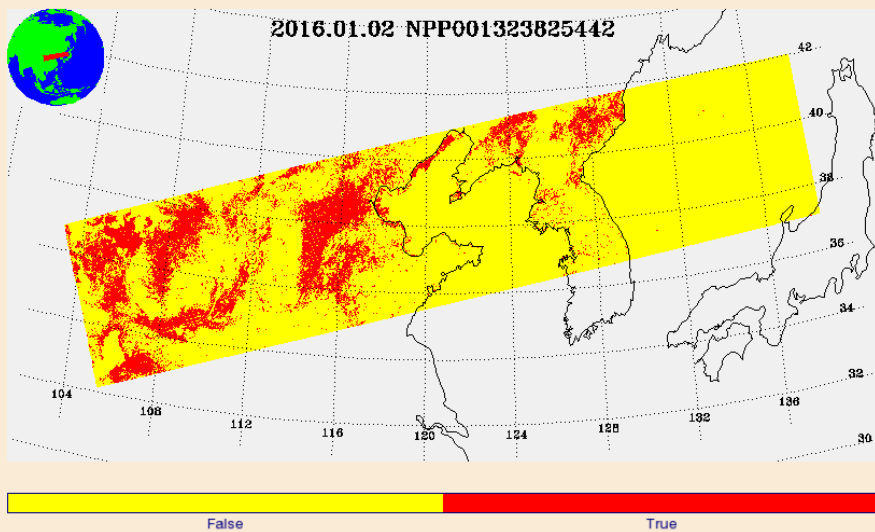


VCM Cloud Confidence



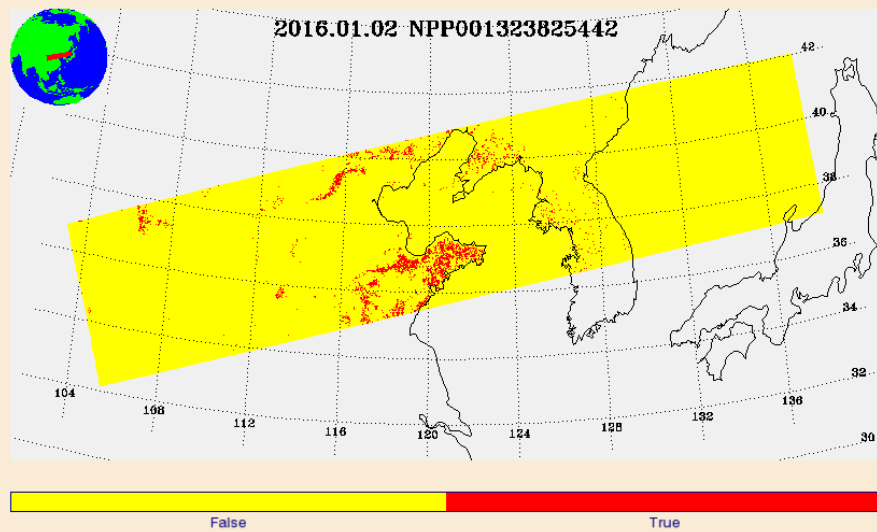
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IP Snow/Ice



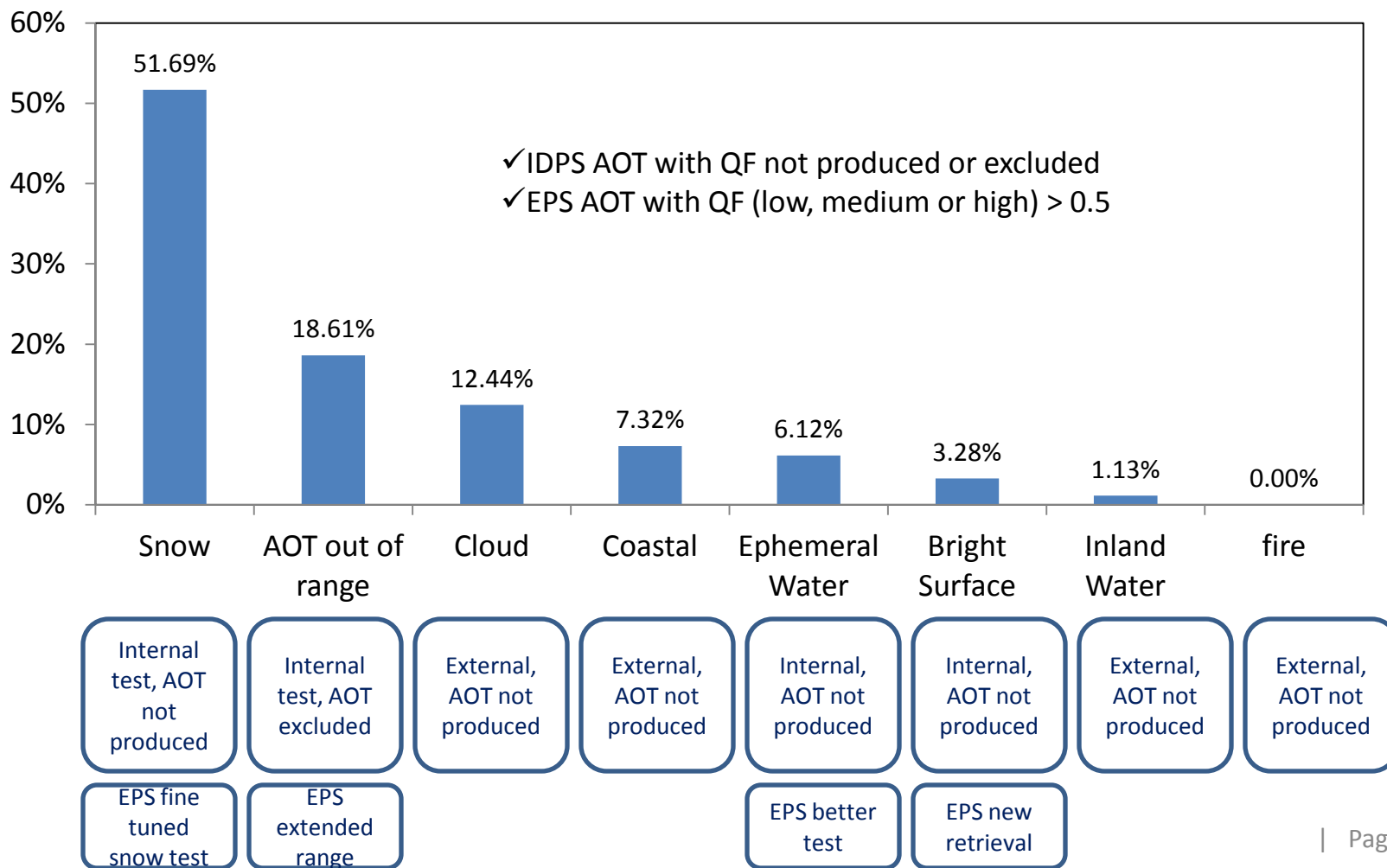
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IP AOT Out of Spec Range

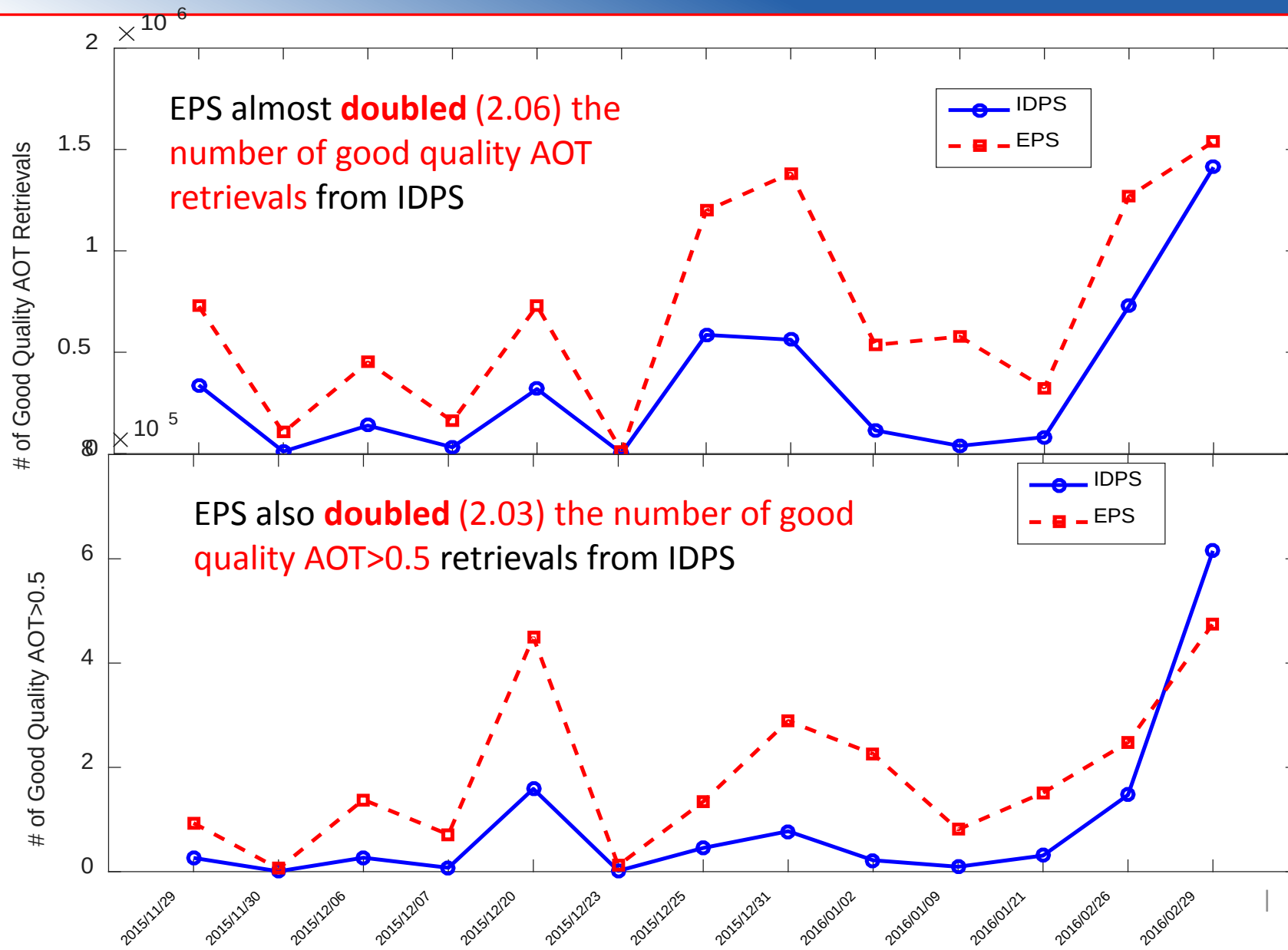


Why did IDPS miss the retrievals?

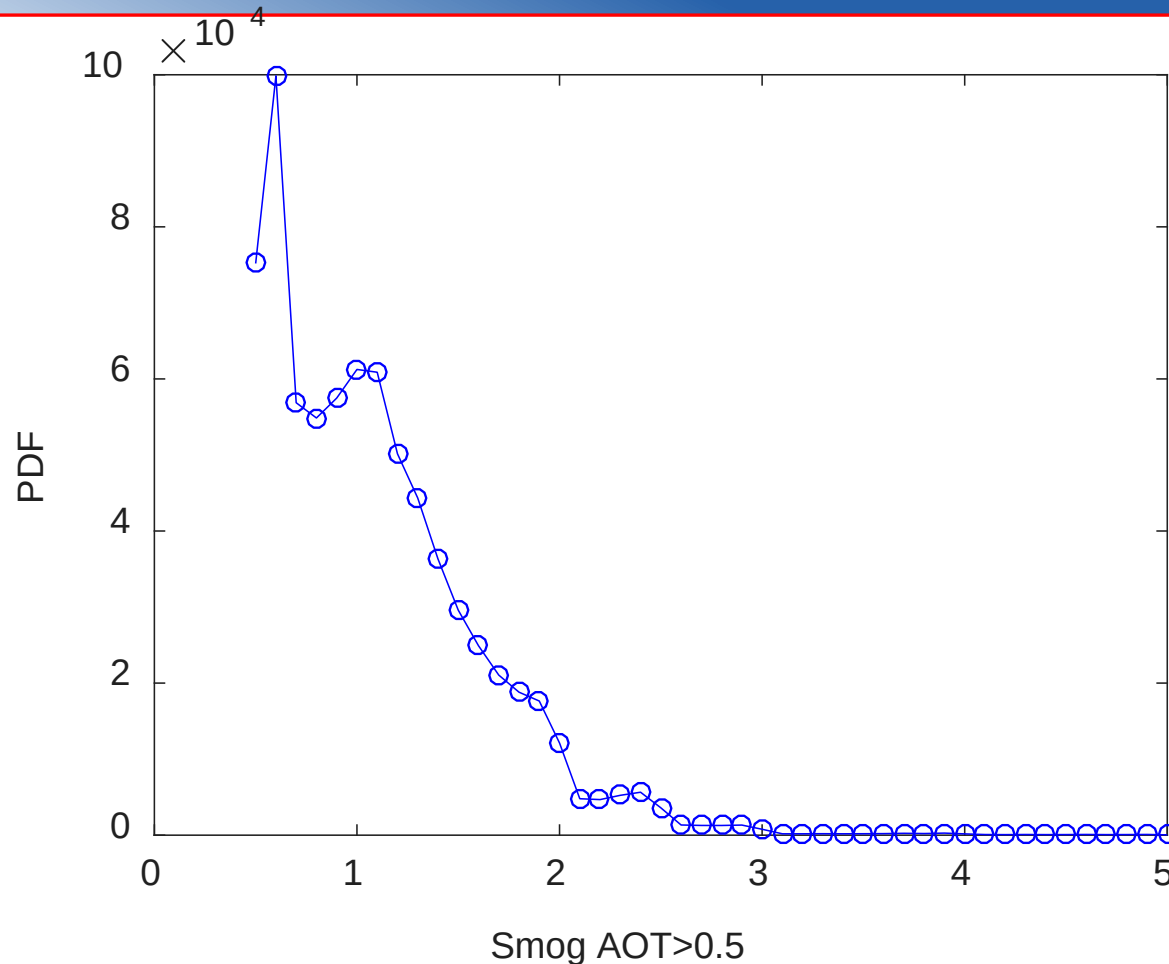
Percentile (%) of Factors Attributed for Not Retrieving Smog AOD



More good quality AOT in EPS



AOT Data Distribution



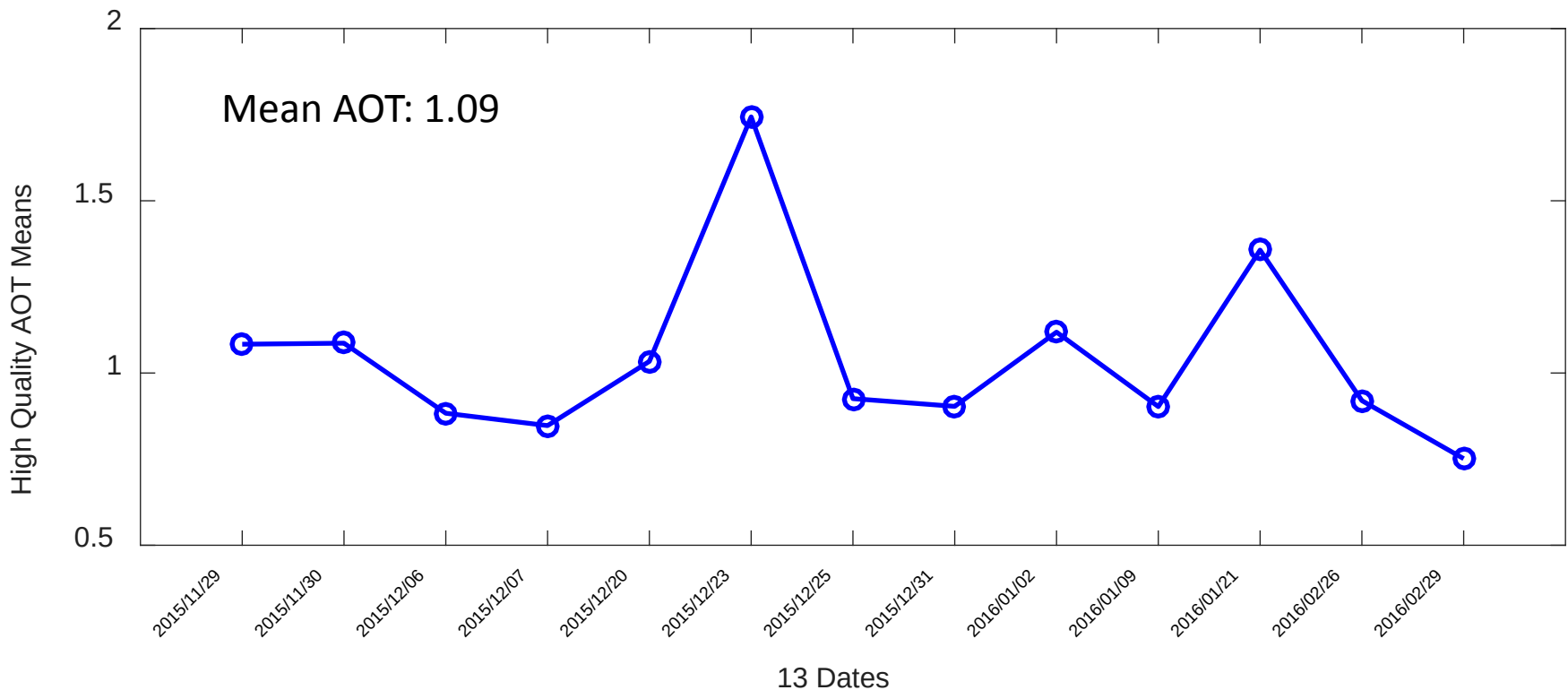
PDF of High Quality EPS AOT > 0.5

Mean AOT: 1.09

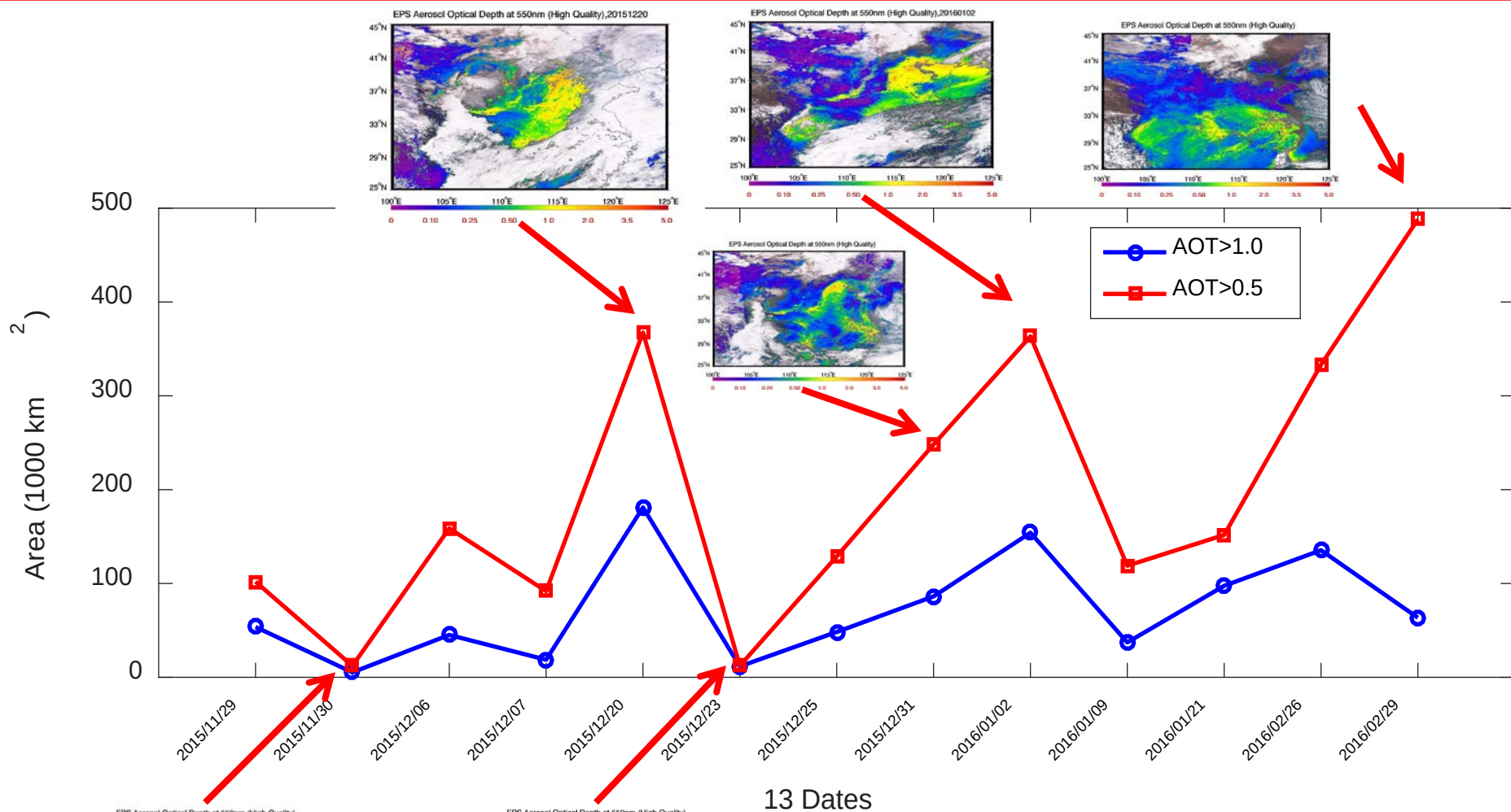
Highest: 4.998



Daily AOT Means (means of good quality AOT > 0.5)



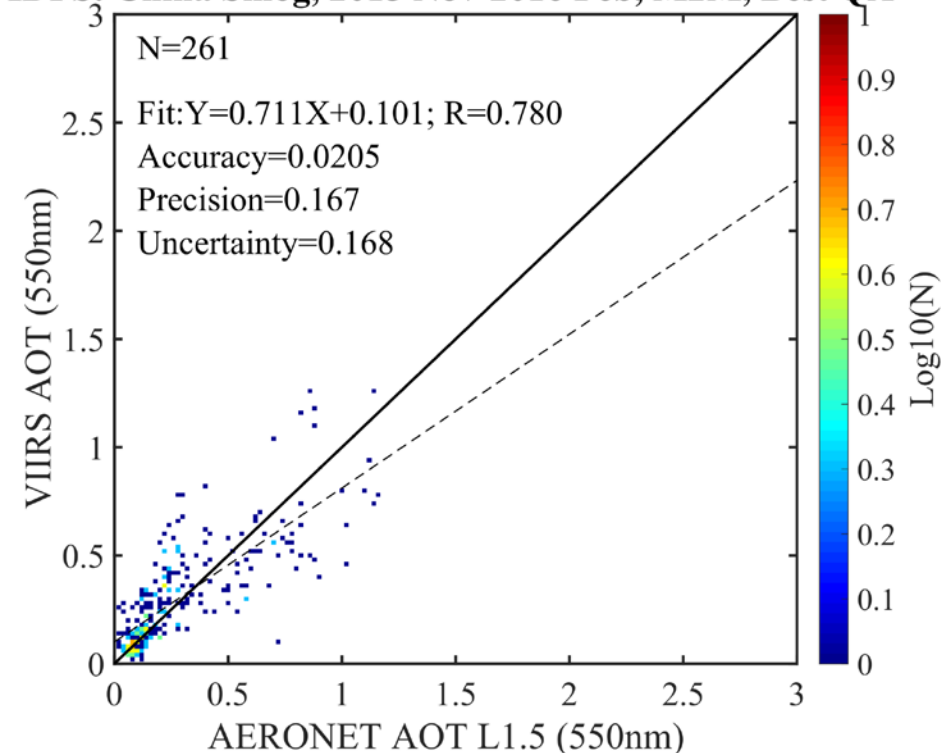
Spatial Coverage of Smog Event



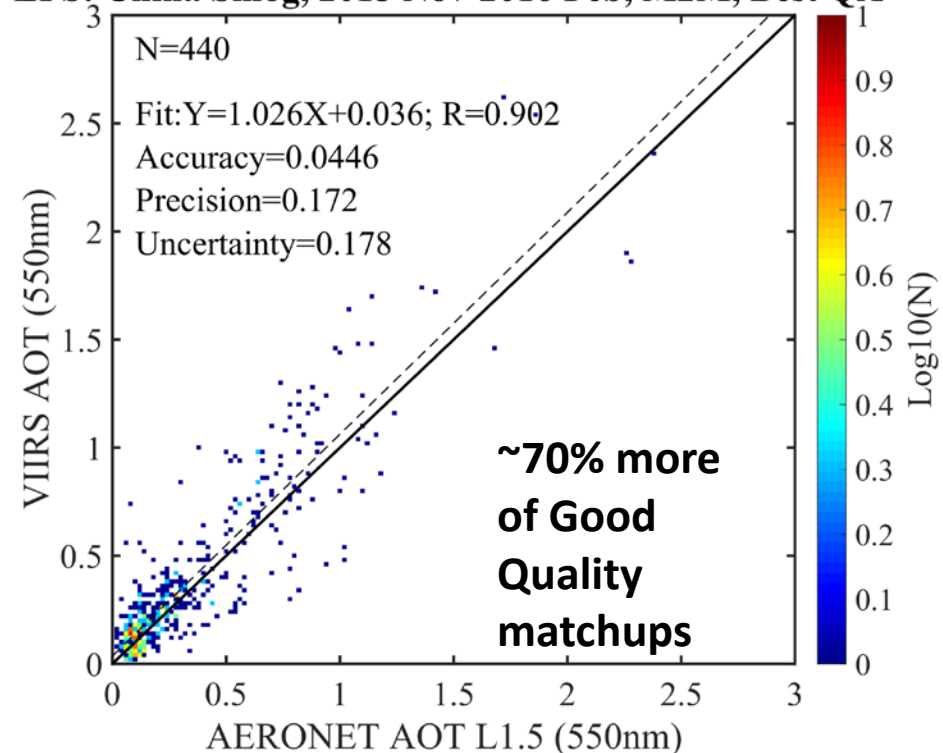
China smog events can be as large as 200,000 km² with AOT>1.0!

VIIRS vs. AERONET

IDPS: China Smog, 2015 Nov-2016 Feb, M2M, Best QA



EPS: China Smog, 2015 Nov-2016 Feb, M2M, Best QA



Summary

- The main reason for the IDPS VIIRS aerosol algorithm missed smog AOT retrievals is the snow test (52%), followed by AOT out of range (19%) and cloud screening (12%);
- EPS VIIRS Aerosol Algorithm has much more smog AOT retrievals than IDPS (~70% more);
- A large China Smog event can be as large as 200,000 km² with AOT > 1.0;
- EPS AOT has much better correlation with AERONET than IDPS;
- The EPS VIIRS aerosol algorithm will become operational soon.....

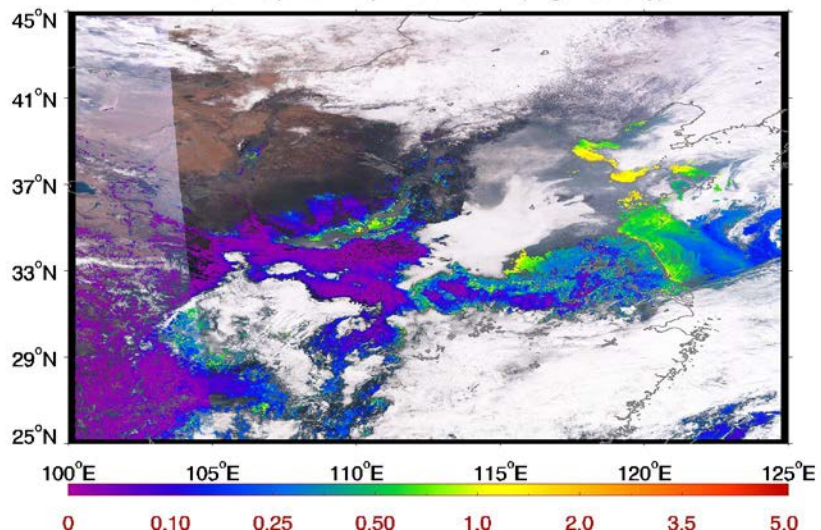


Back Up Slides

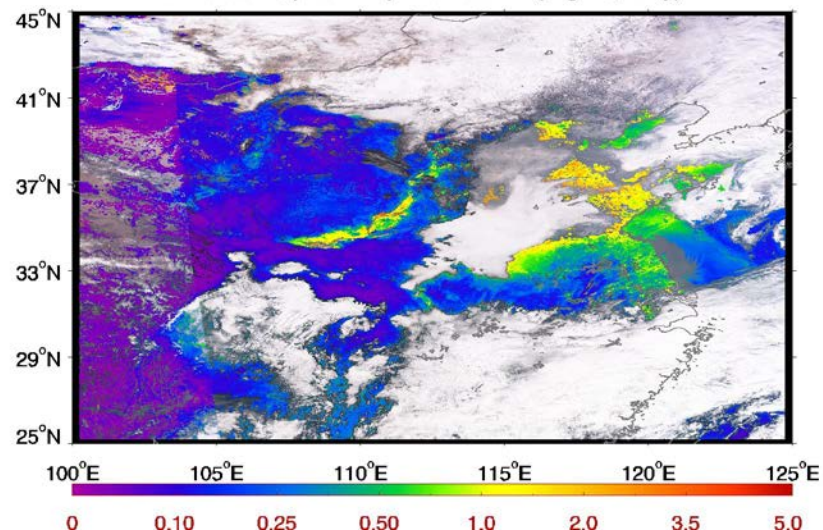
2015-11-29



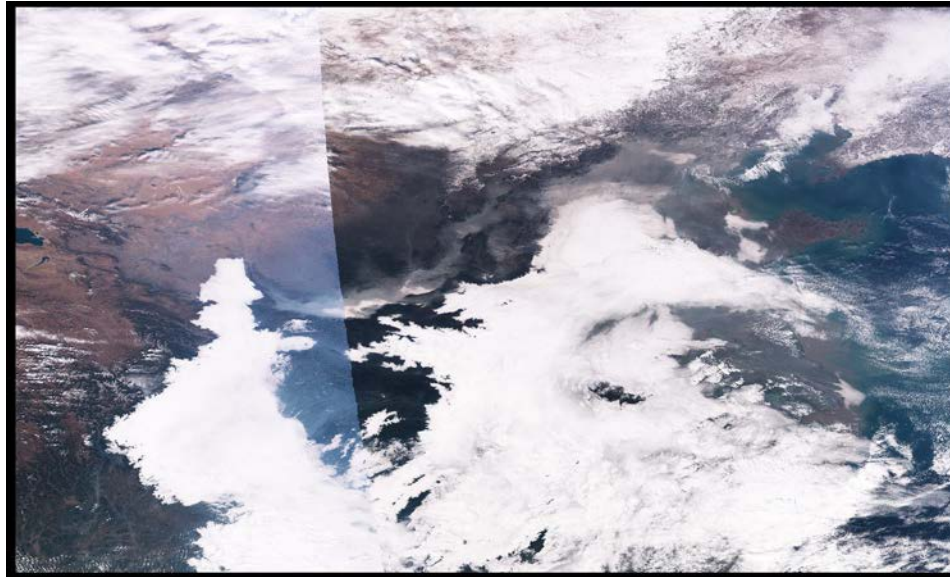
IP Aerosol Optical Depth at 550nm (High Quality)



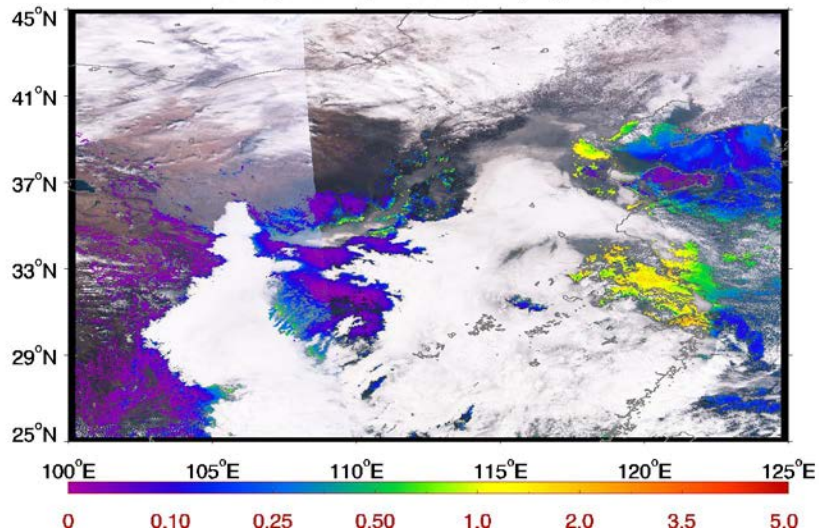
EPS Aerosol Optical Depth at 550nm (High Quality)



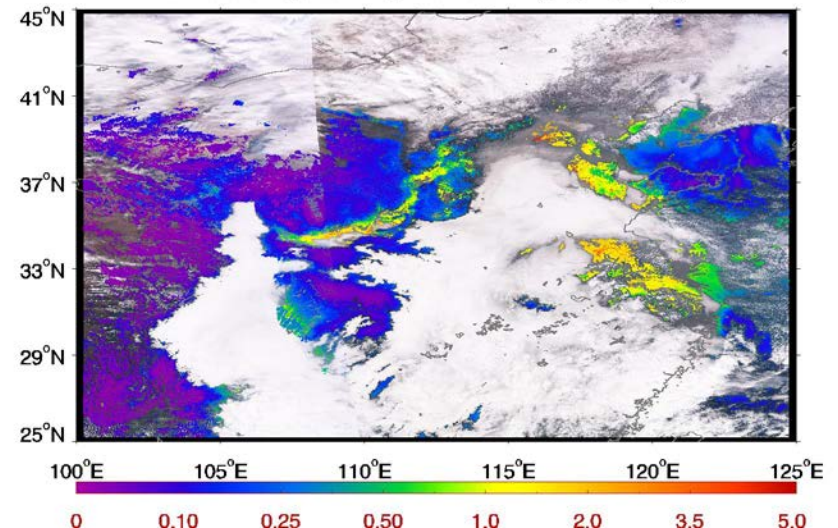
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IP Aerosol Optical Depth at 550nm (High Quality)



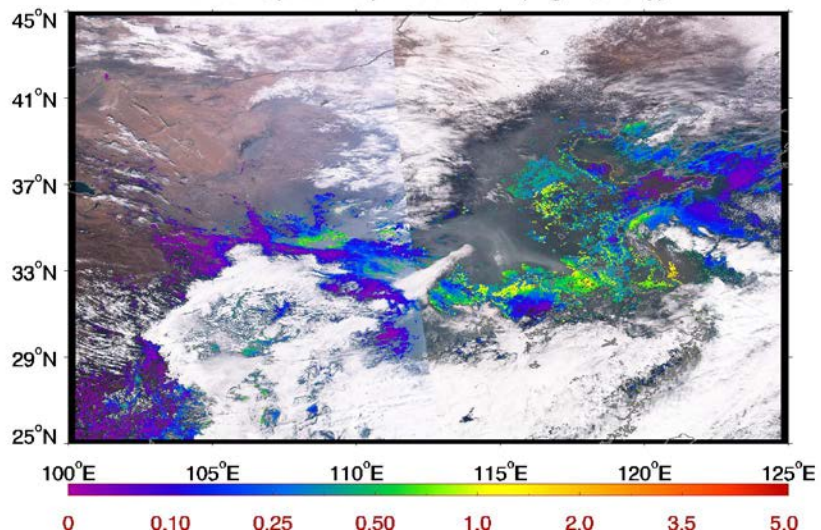
EPS Aerosol Optical Depth at 550nm (High Quality)



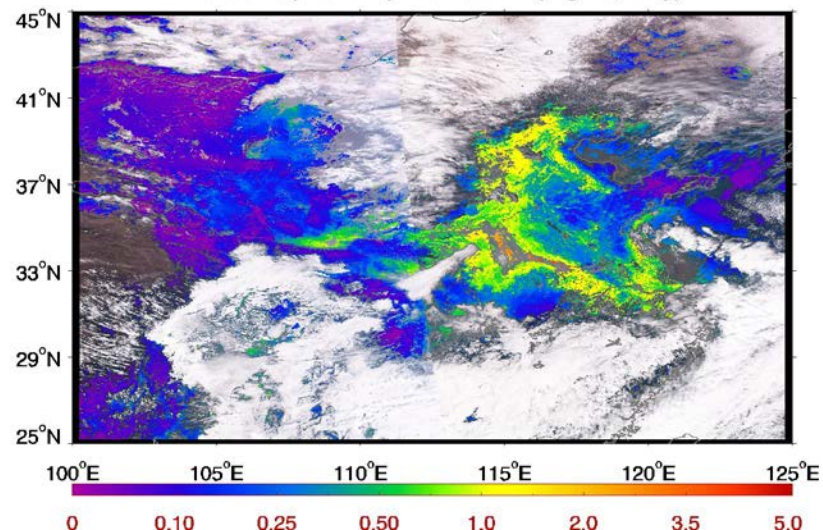
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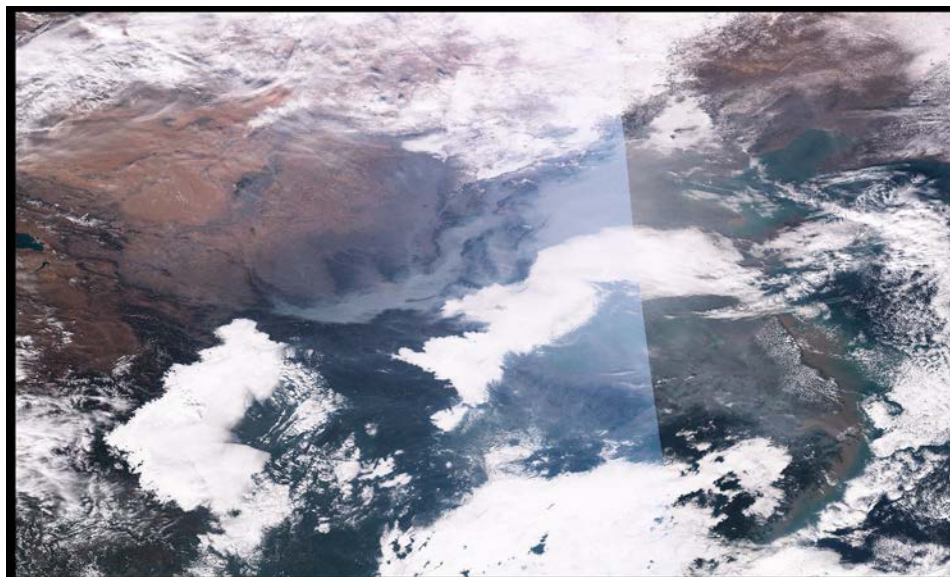
IP Aerosol Optical Depth at 550nm (High Quality)



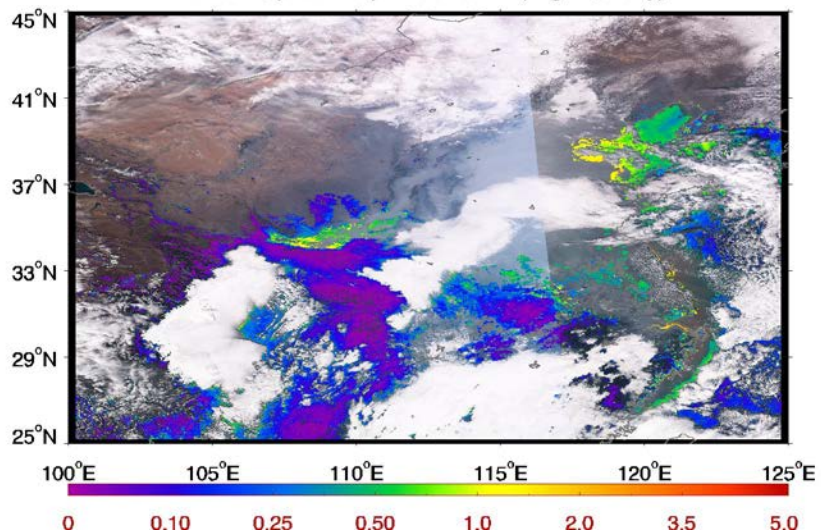
EPS Aerosol Optical Depth at 550nm (High Quality)



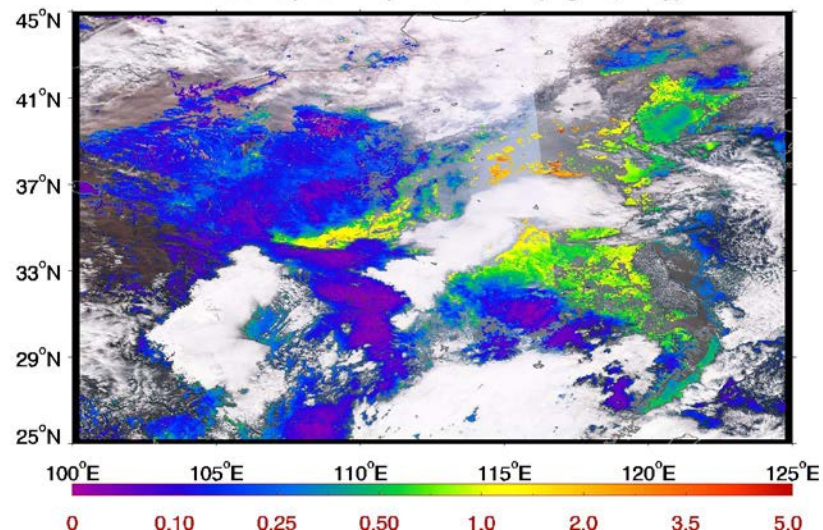
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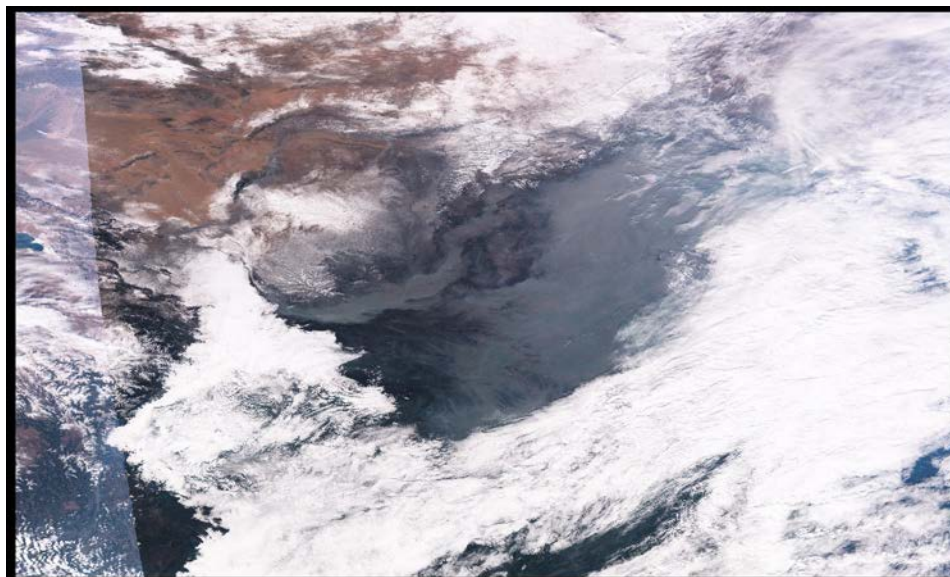
IP Aerosol Optical Depth at 550nm (High Quality)



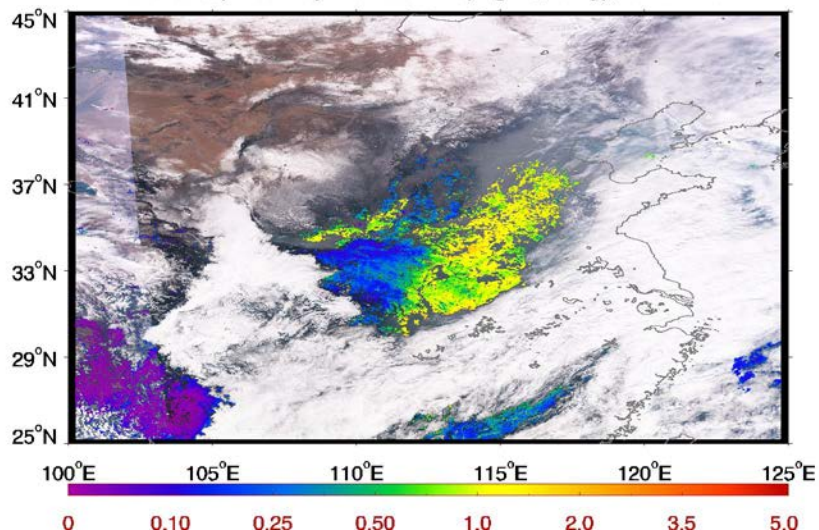
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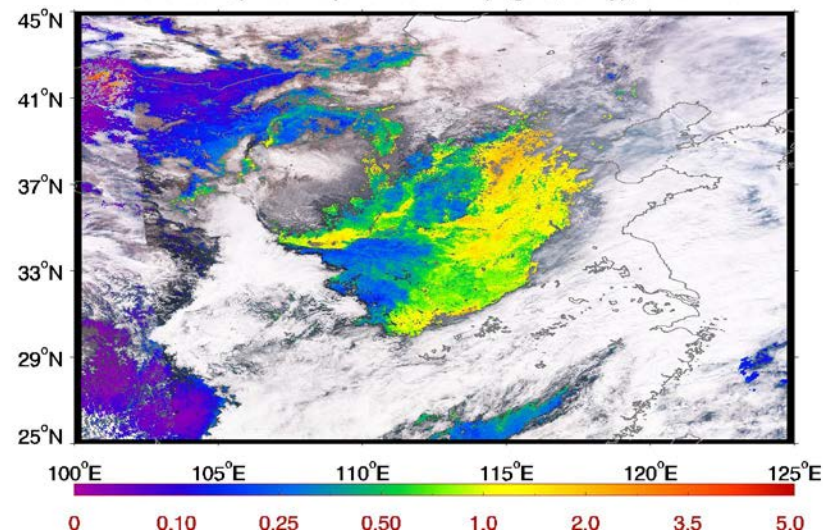
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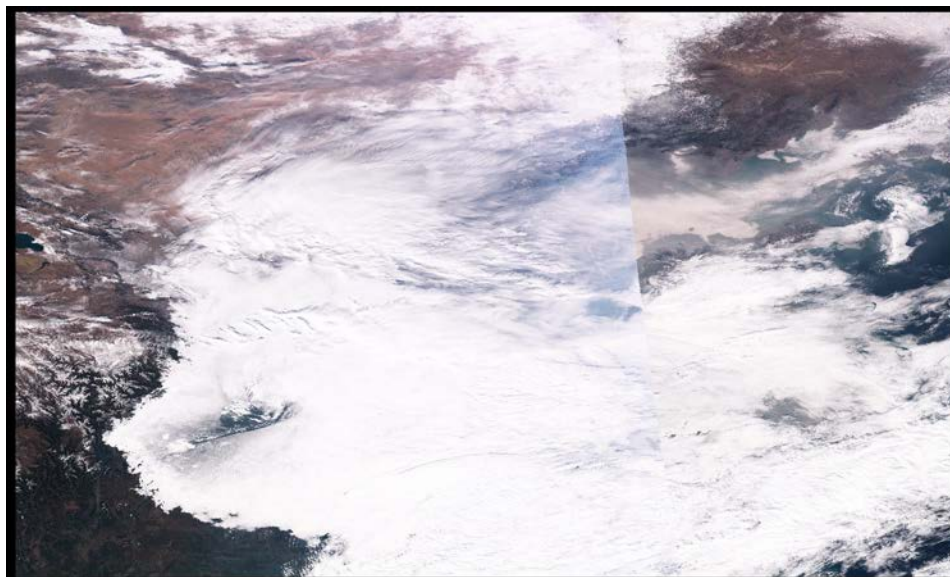
IP Aerosol Optical Depth at 550nm (High Quality), 20151220



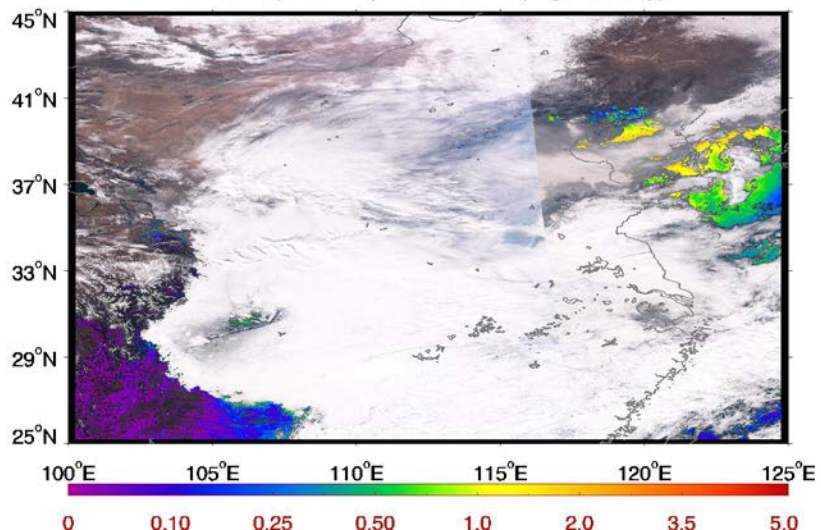
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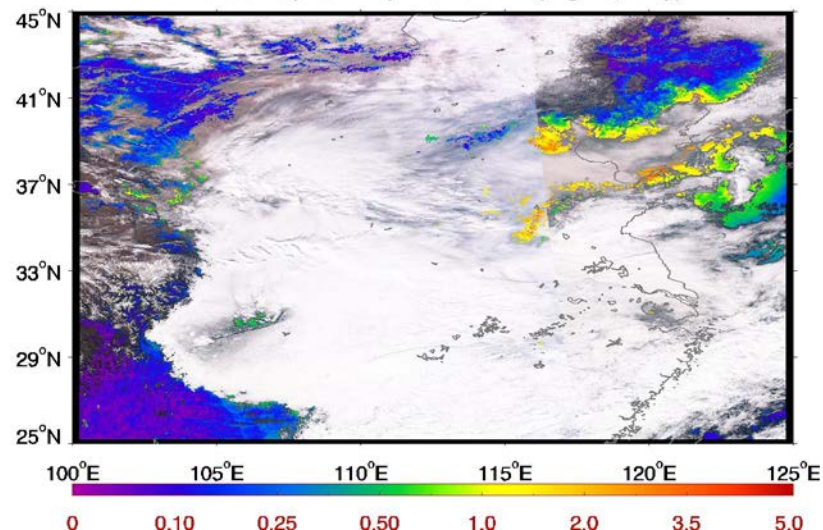
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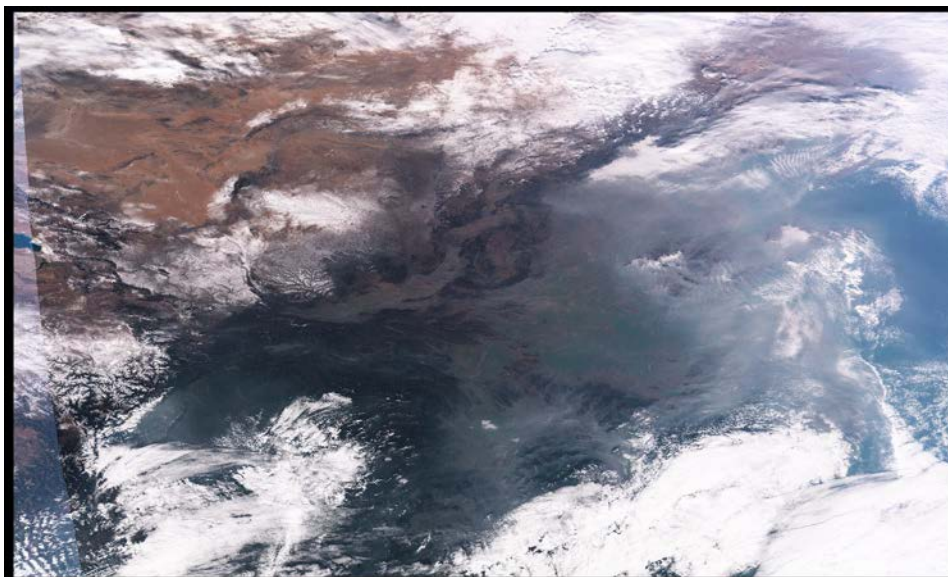
IP Aerosol Optical Depth at 550nm (High Quality)



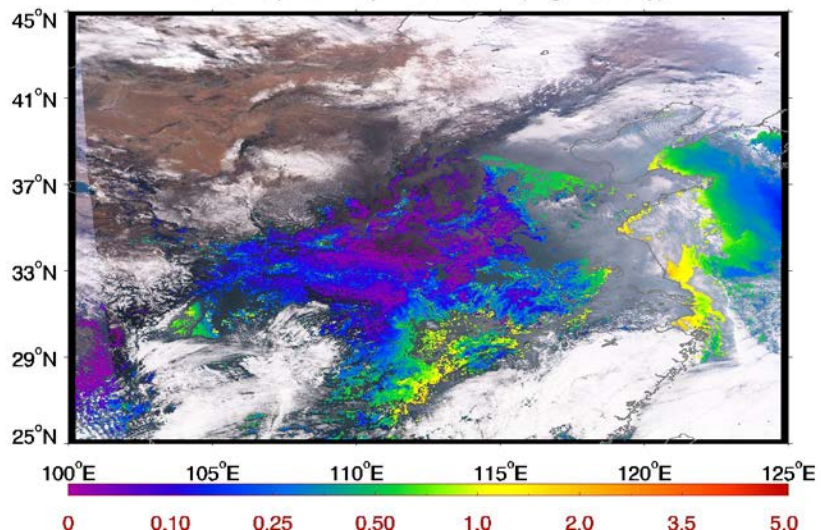
EPS Aerosol Optical Depth at 550nm (High Quality)



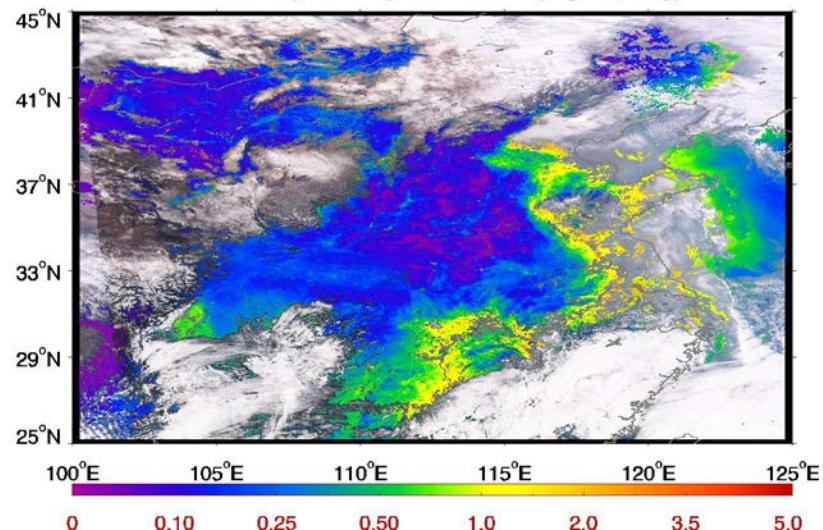
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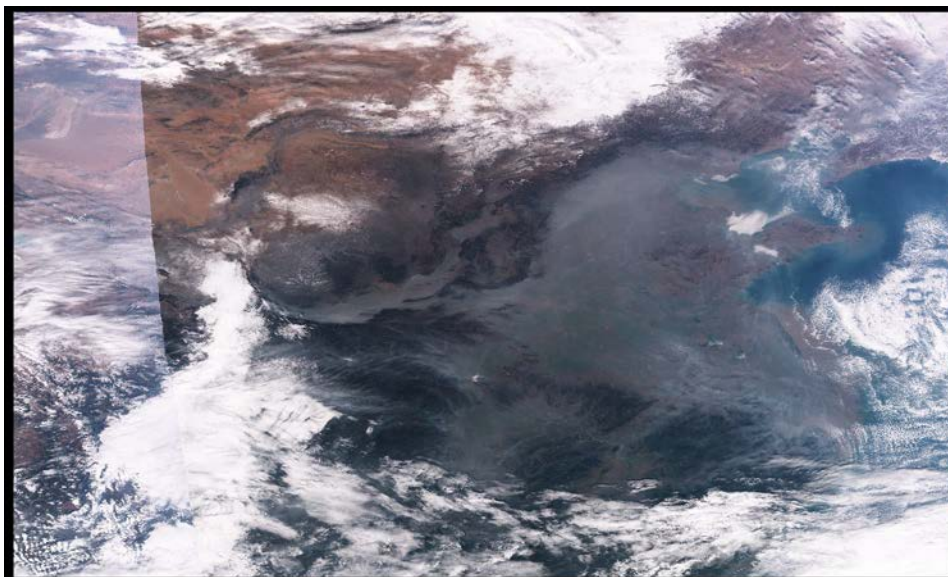
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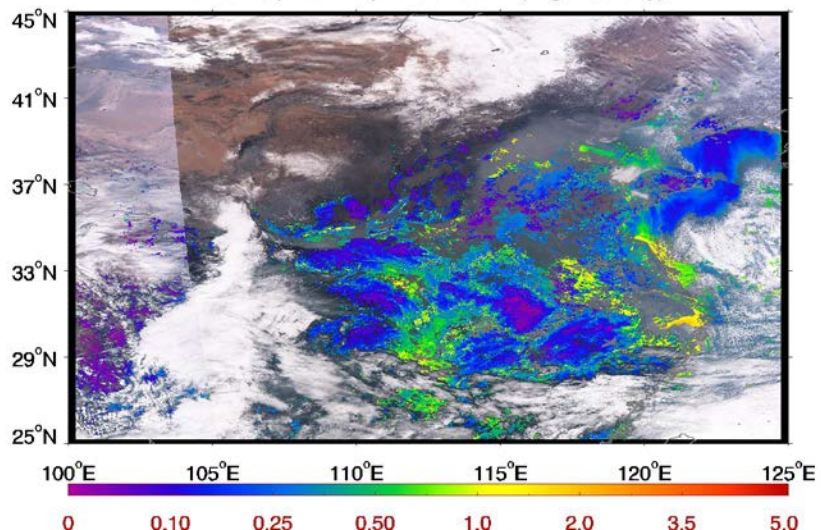
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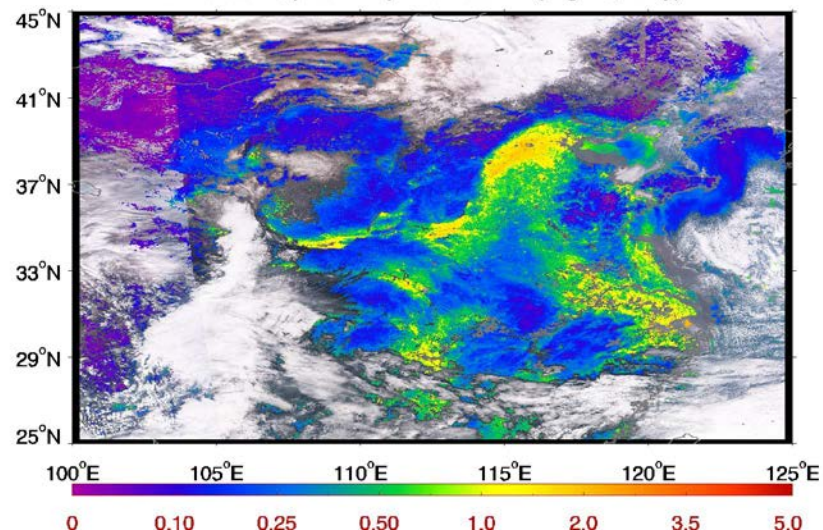
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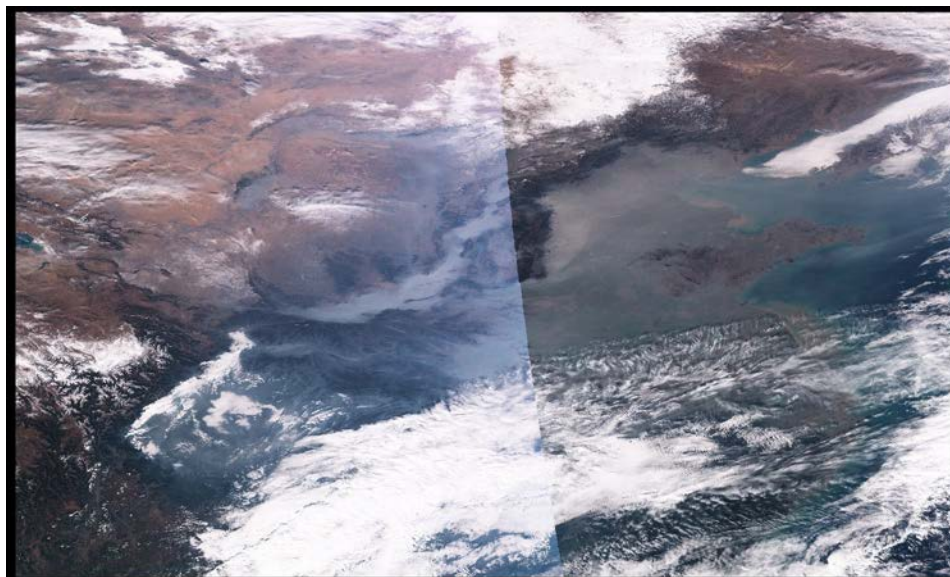
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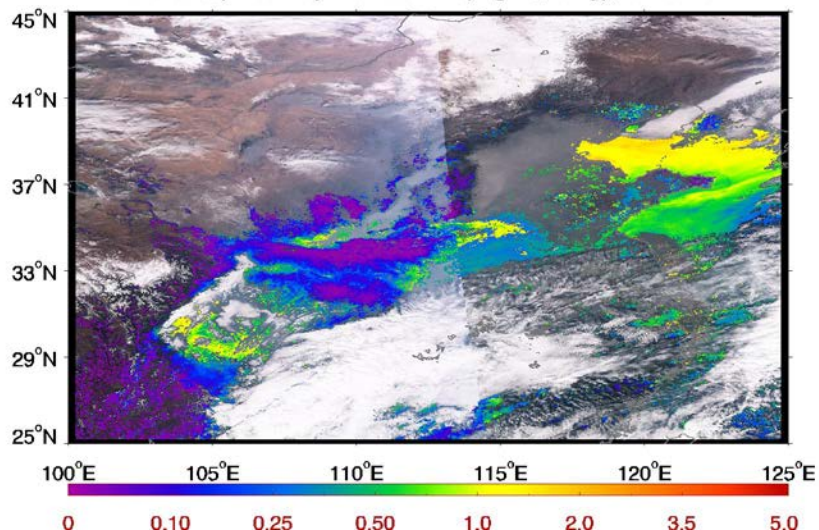
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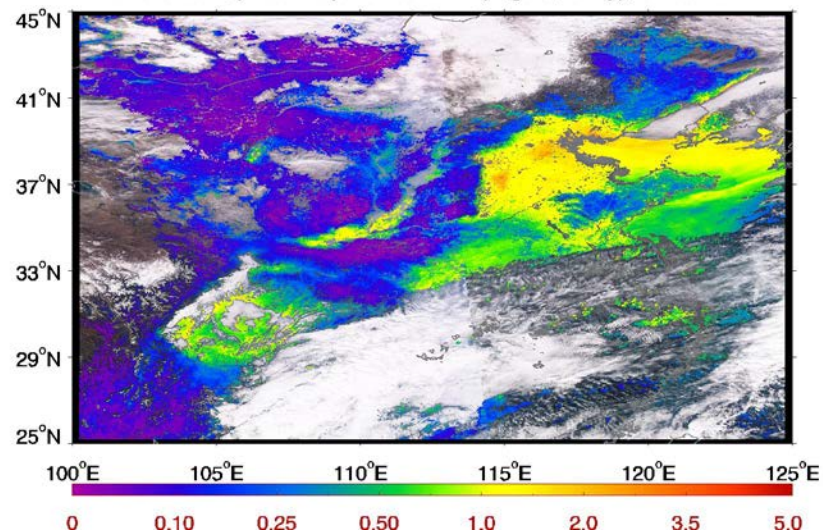
2016-01-02



IP Aerosol Optical Depth at 550nm (High Quality), 20160102



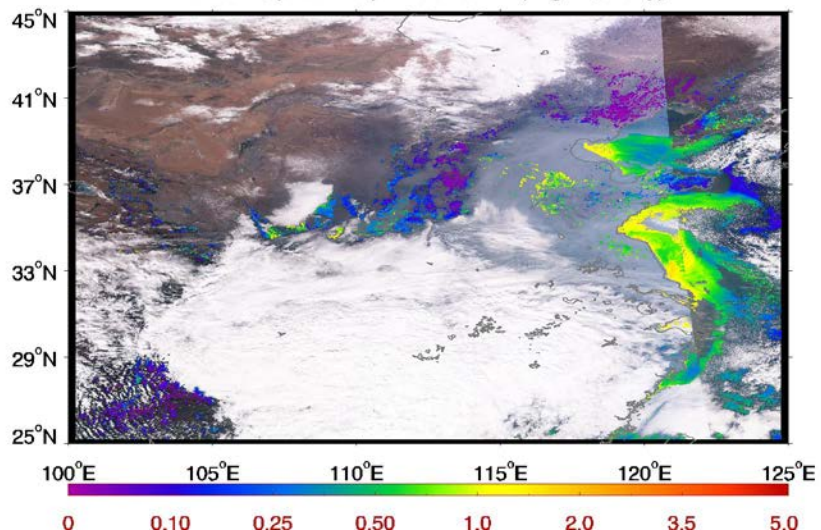
EPS Aerosol Optical Depth at 550nm (High Quality), 20160102



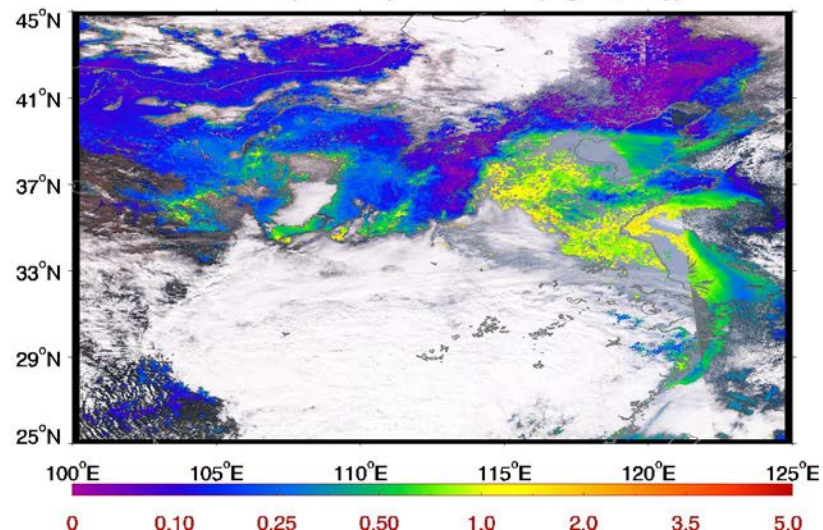
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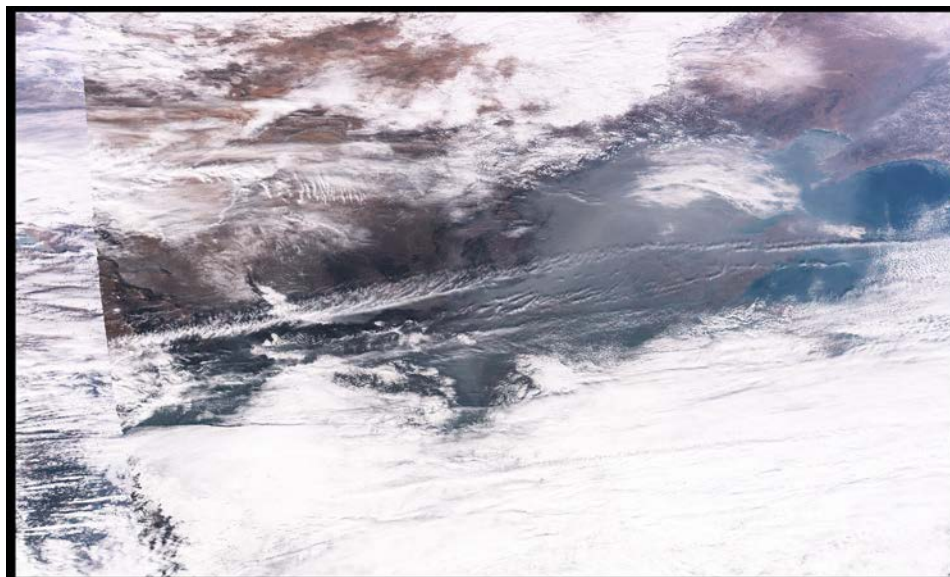
IP Aerosol Optical Depth at 550nm (High Quality)



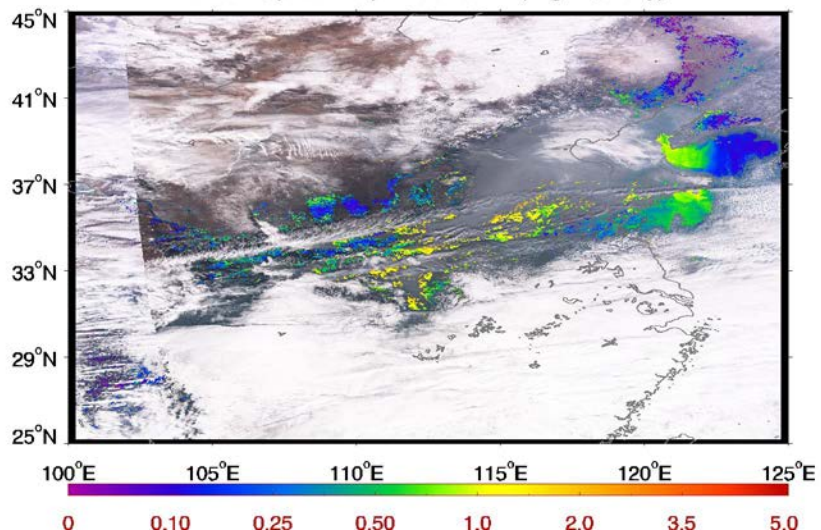
EPS Aerosol Optical Depth at 550nm (High Quality)



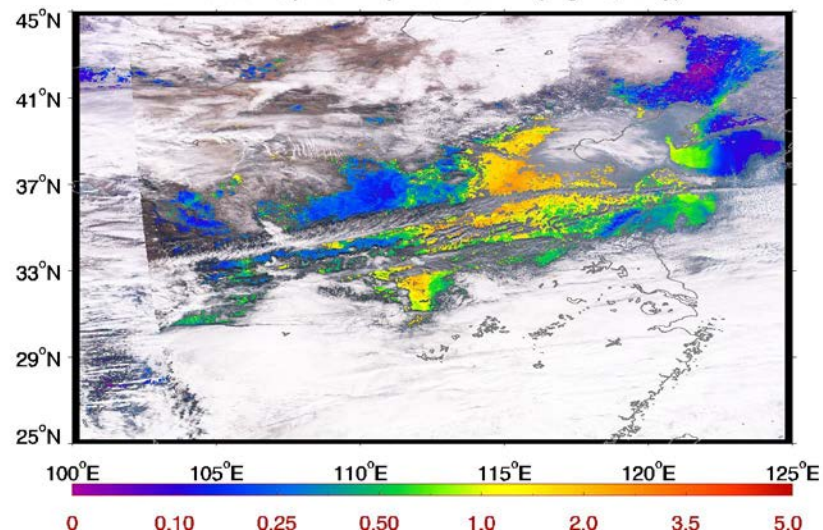
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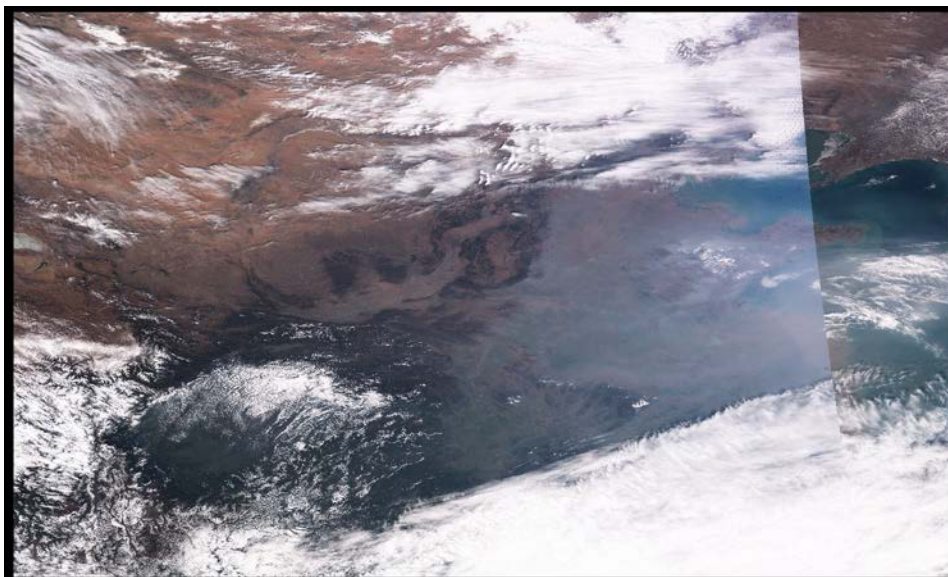
IP Aerosol Optical Depth at 550nm (High Quality)



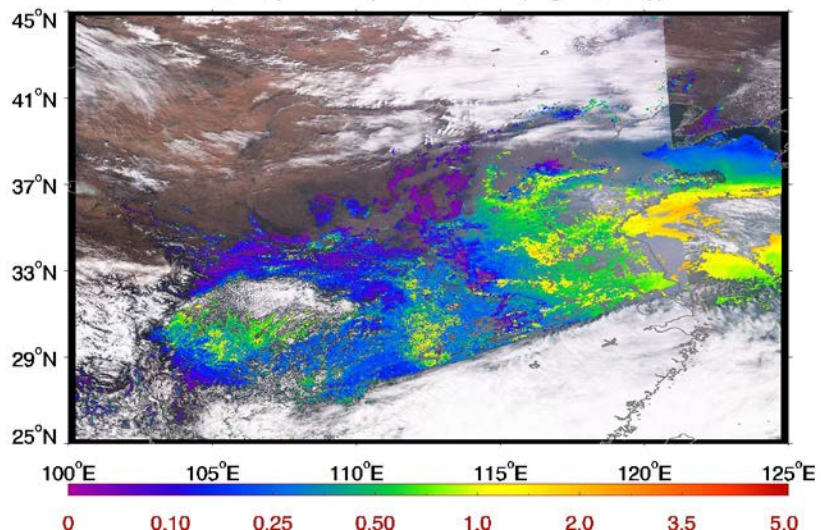
EPS Aerosol Optical Depth at 550nm (High Quality)



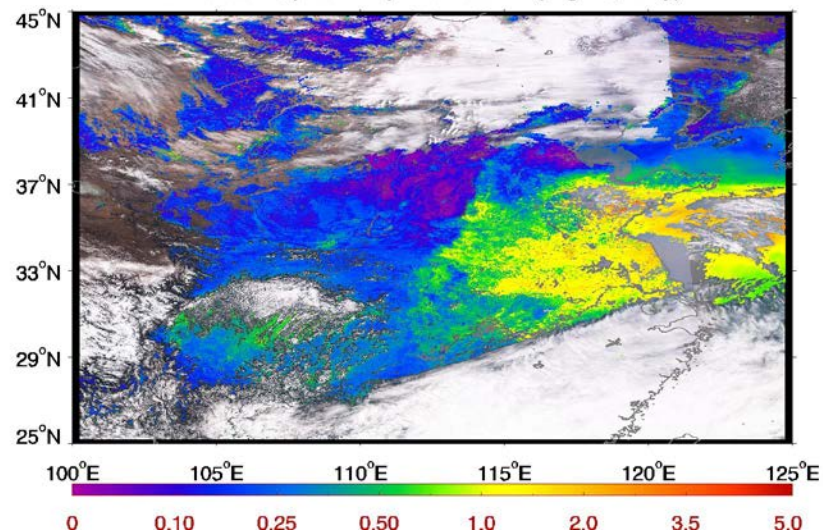
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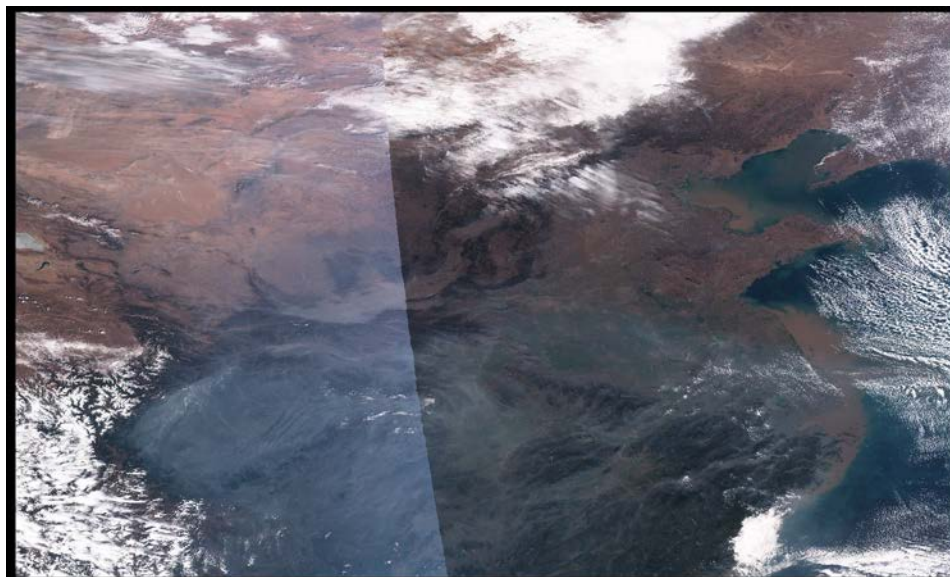
IP Aerosol Optical Depth at 550nm (High Quality)



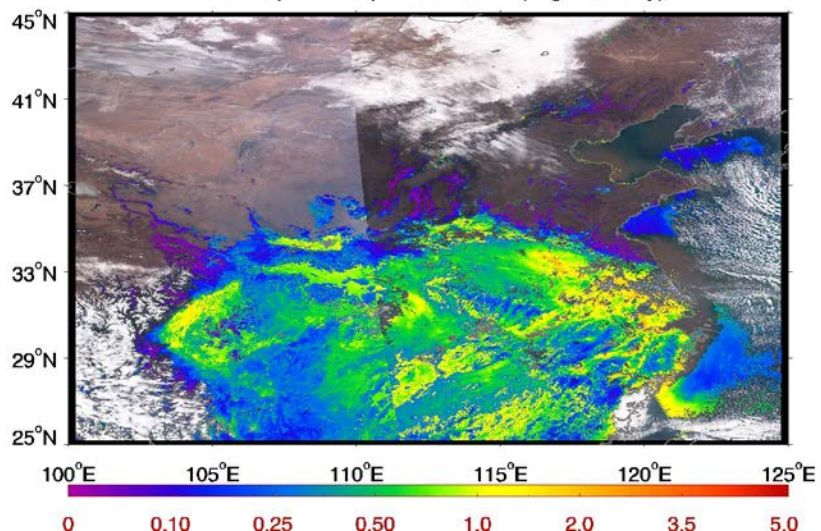
EPS Aerosol Optical Depth at 550nm (High Quality)



2016-02-29



IP Aerosol Optical Depth at 550nm (High Quality)



EPS Aerosol Optical Depth at 550nm (High Quality)

