MATCH Aerosol - MODIS and VIIRS

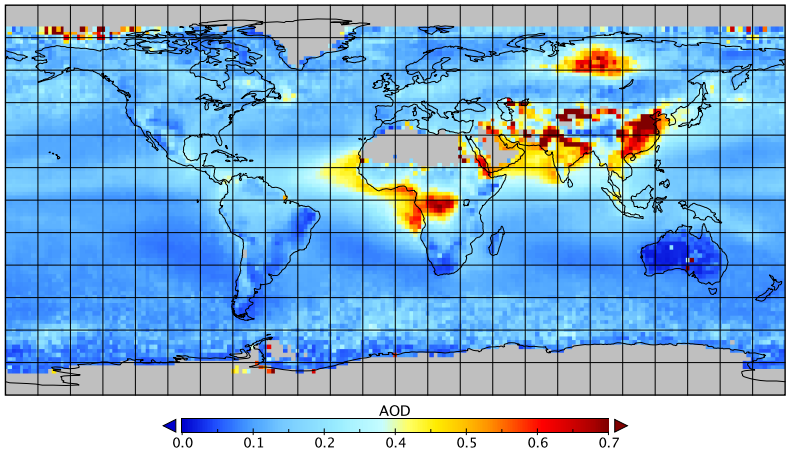
David Fillmore

2015 September 2

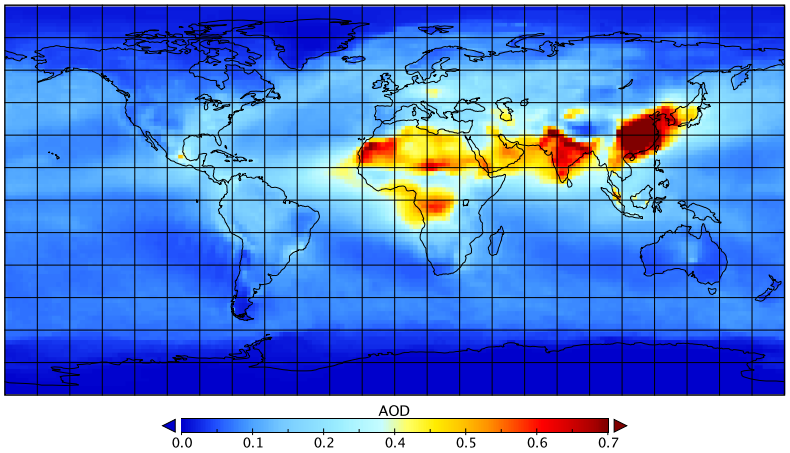
CERES Science Team Meeting, Seattle, WA

- MATCH Assimilation of MODIS-Like VIIRS L2 AOD

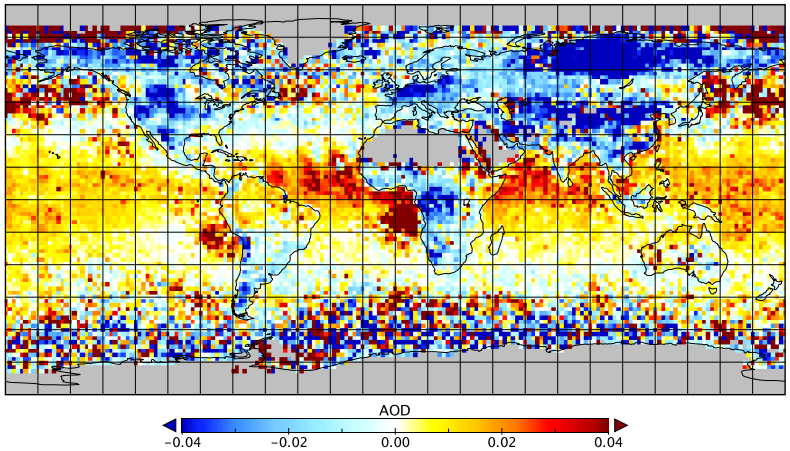
MODIS



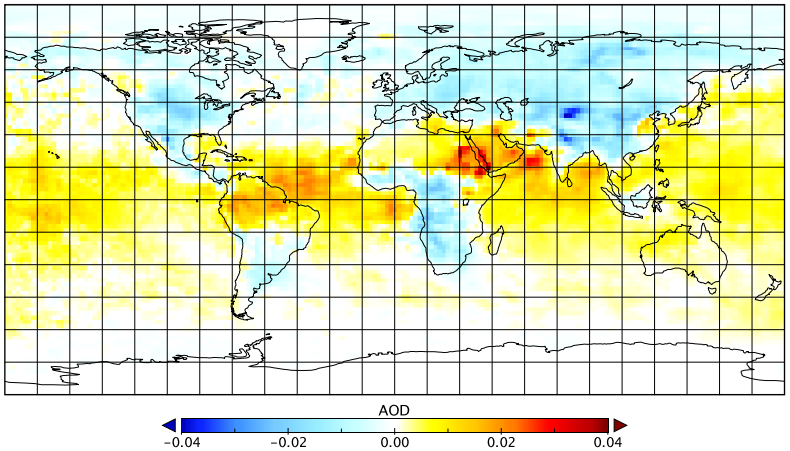
Assim MODIS

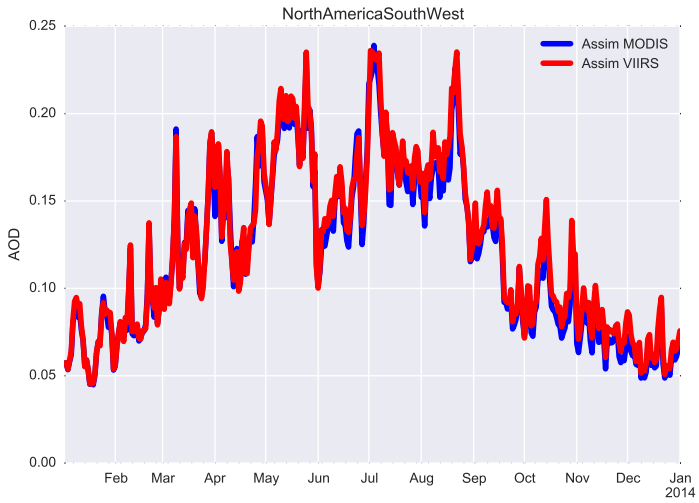


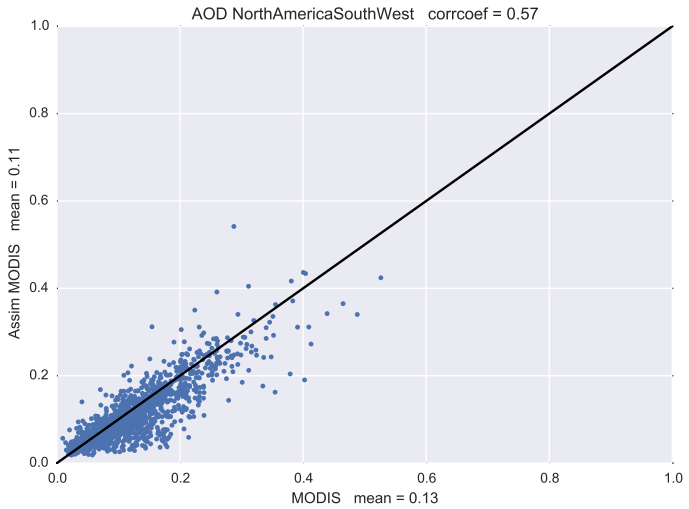
VIIRS – MODIS

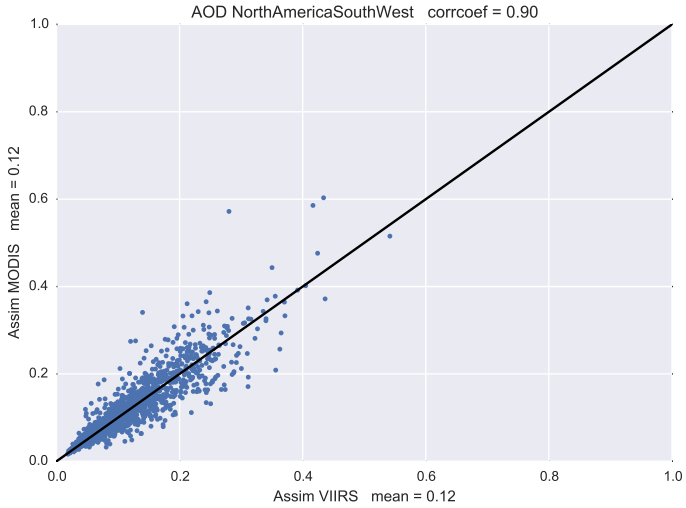


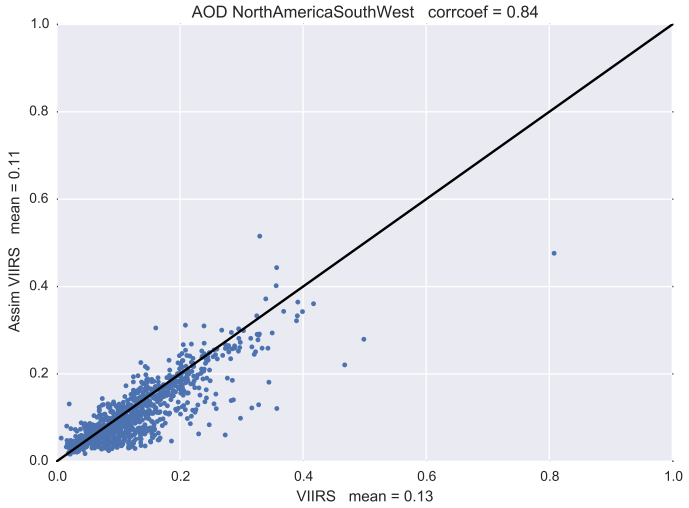
Assim VIIRS – Assim MODIS

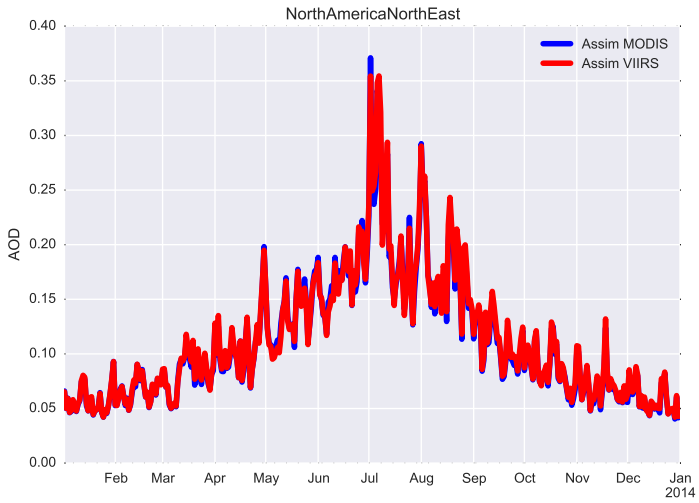



NorthAmericaSouthWest
Assim MODIS
Assim VIIRS
AOD
0.25
0.20
0.15
0.10
0.05
0.00
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
2014


AOD NorthAmericaSouthWest corrcoef = 0.57
Assim MODIS mean = 0.11
MODIS mean = 0.13
1.0
0.8
0.6
0.4
0.2
0.0


AOD NorthAmericaSouthWest corrcoef = 0.90
Assim MODIS mean = 0.12
Assim VIIRS mean = 0.12
1.0
0.8
0.6
0.4
0.2
0.0


AOD NorthAmericaSouthWest corrcoef = 0.84
Assim VIIRS mean = 0.11
VIIRS mean = 0.13
1.0
0.8
0.6
0.4
0.2
0.0


NorthAmericaNorthEast
Assim MODIS
Assim VIIRS
AOD
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Feb
Mar
Apr
May
Jun
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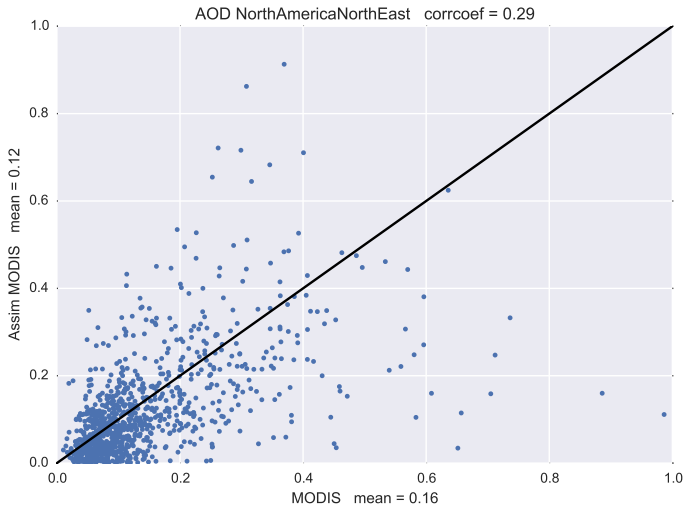
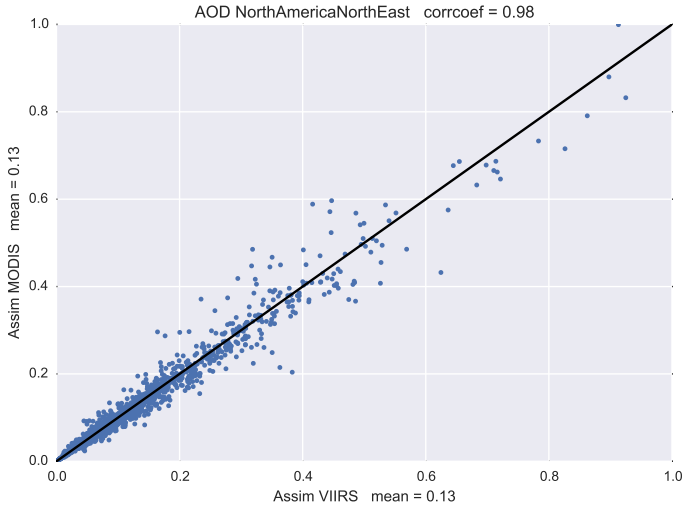
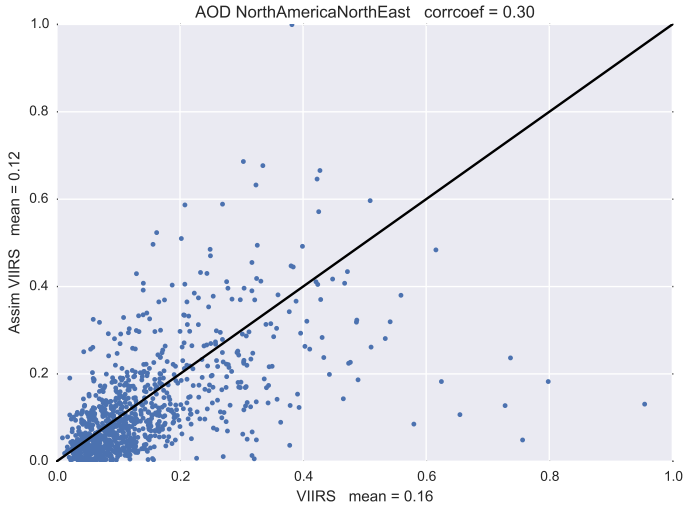
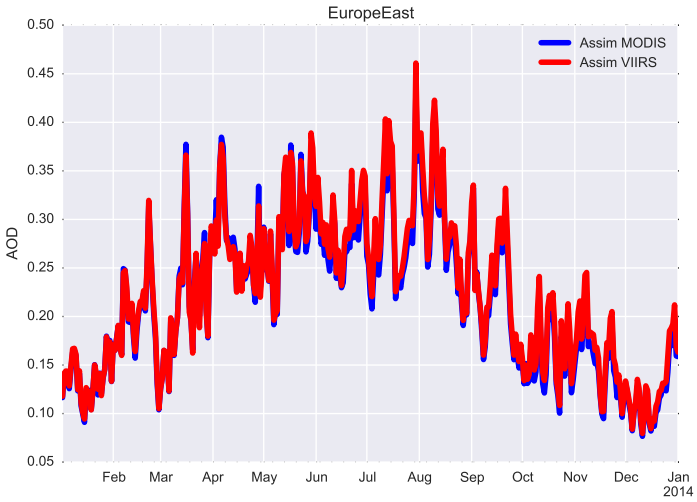
Jan
2014


AOD NorthAmericaNorthEast corrcoef = 0.29
Assim MODIS mean = 0.12
MODIS mean = 0.16
1.0
0.8
0.6
0.4
0.2
0.0


AOD NorthAmericaNorthEast corrcoef = 0.98
Assim MODIS mean = 0.13
Assim VIIRS mean = 0.13
1.0
0.8
0.6
0.4
0.2
0.0


AOD NorthAmericaNorthEast corrcoef = 0.30
Assim VIIRS mean = 0.12
VIIRS mean = 0.16
1.0
0.8
0.6
0.4
0.2
0.0


EuropeEast
Assim MODIS
Assim VIIRS
AOD
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
Feb
Mar
Apr
May
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Jul
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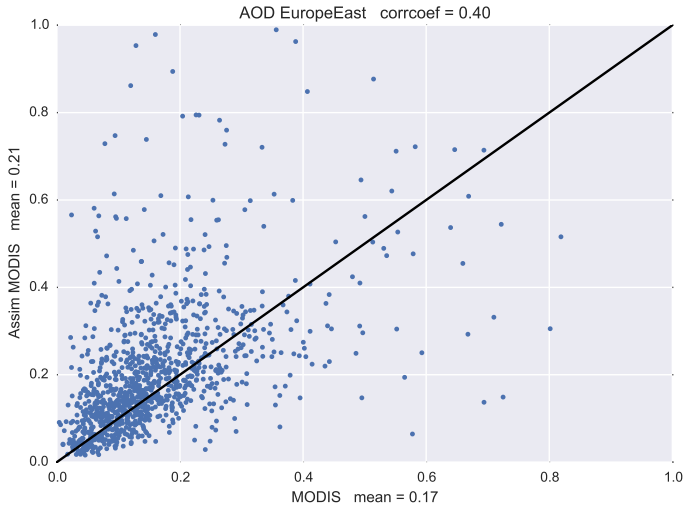
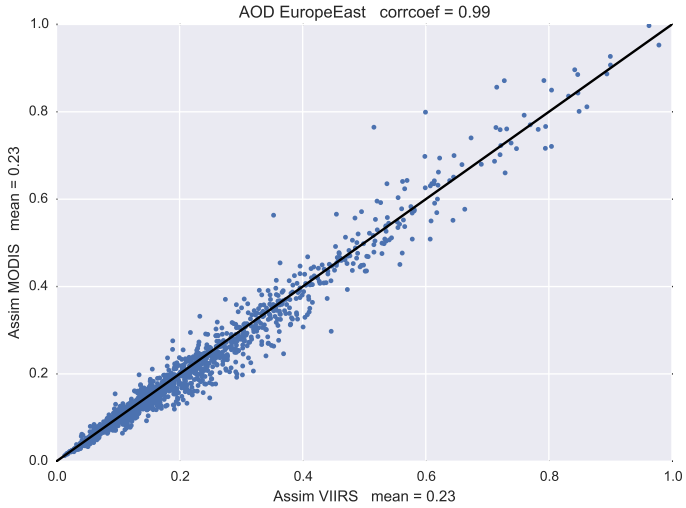
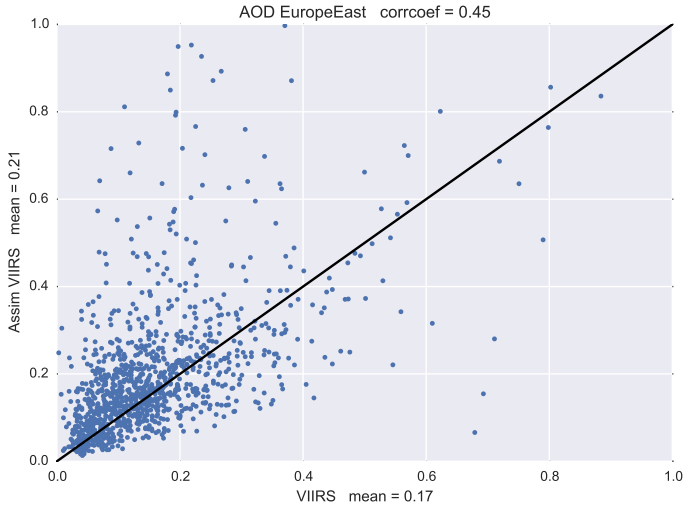
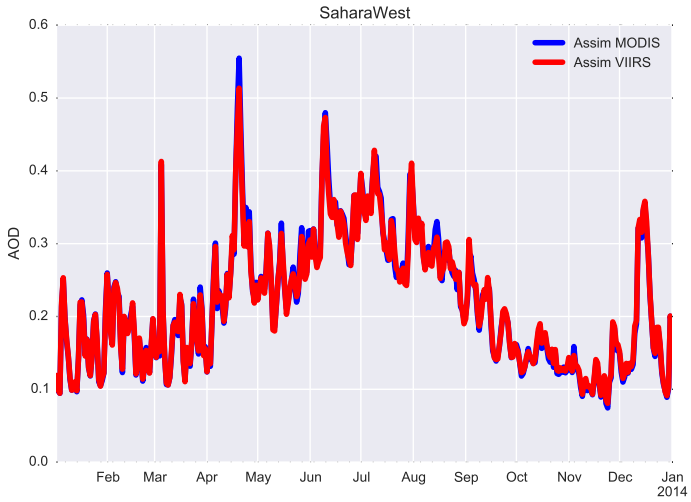
Nov
Dec
Jan
2014


AOD EuropeEast corrcoef = 0.40
Assim MODIS mean = 0.21
MODIS mean = 0.17
0.0
0.2
0.4
0.6
0.8
1.0


AOD EuropeEast corrcoef = 0.99
Assim MODIS mean = 0.23
Assim VIIRS mean = 0.23
0.0
0.2
0.4
0.6
0.8
1.0


AOD EuropeEast corrcoef = 0.45
Assim VIIRS mean = 0.21
VIIRS mean = 0.17
0.0
0.2
0.4
0.6
0.8
1.0


SaharaWest
Assim MODIS
Assim VIIRS
AOD
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Feb
Mar
Apr
May
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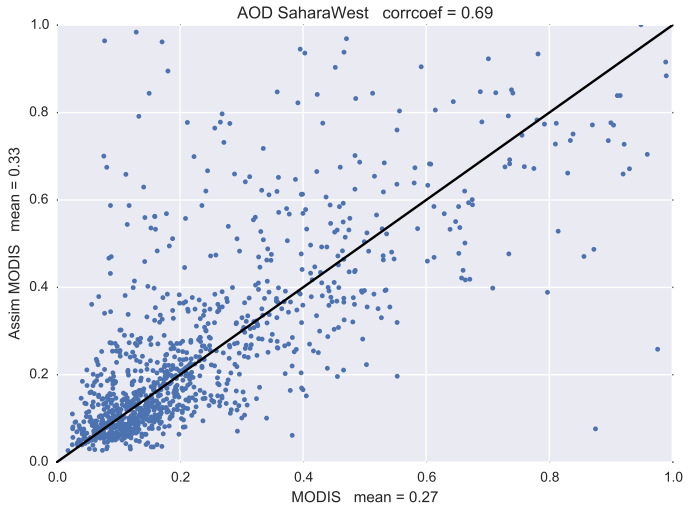
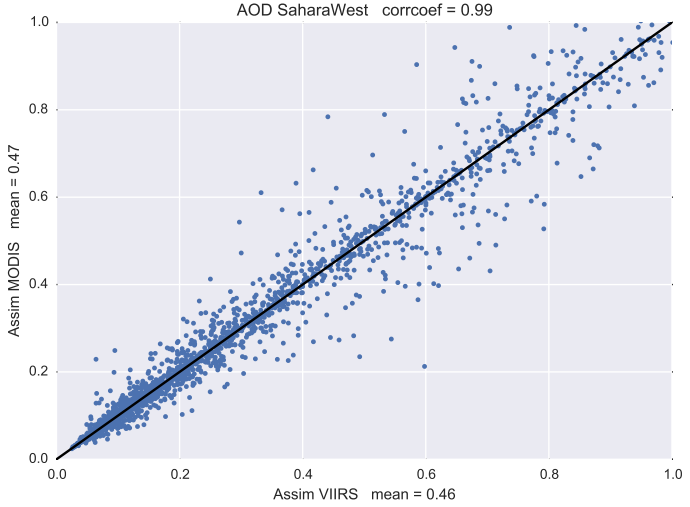
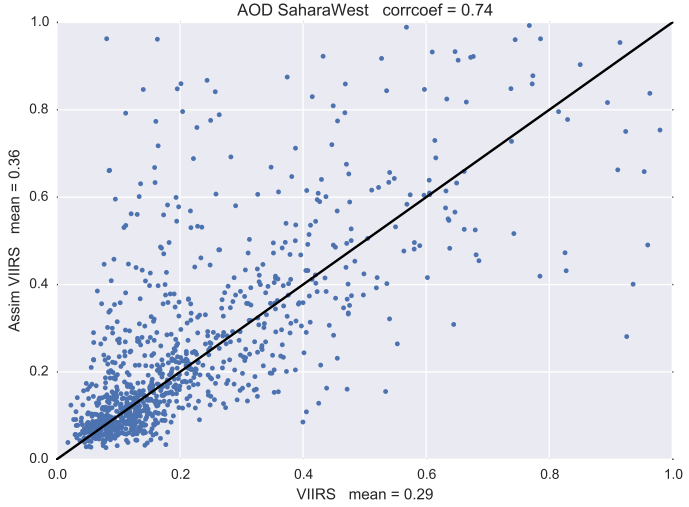
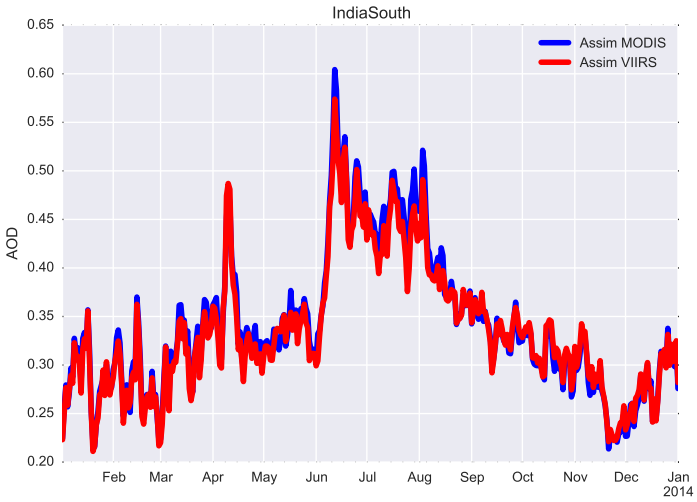
Nov
Dec
Jan
2014


AOD SaharaWest corrcoef = 0.69
Assim MODIS mean = 0.33
MODIS mean = 0.27
0.0
0.2
0.4
0.6
0.8
1.0


AOD SaharaWest corrcoef = 0.99
Assim MODIS mean = 0.47
Assim VIIRS mean = 0.46
0.0
0.2
0.4
0.6
0.8
1.0


AOD SaharaWest corrcoef = 0.74
Assim VIIRS mean = 0.36
VIIRS mean = 0.29
0.0
0.2
0.4
0.6
0.8
1.0


IndiaSouth
Assim MODIS
Assim VIIRS
AOD
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
Feb
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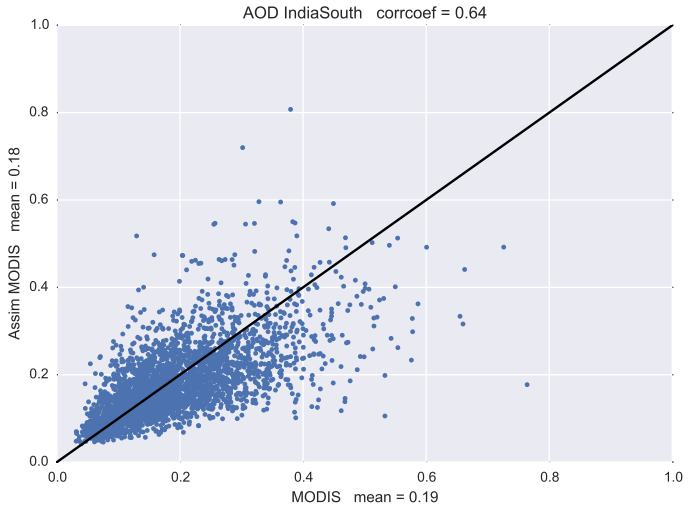
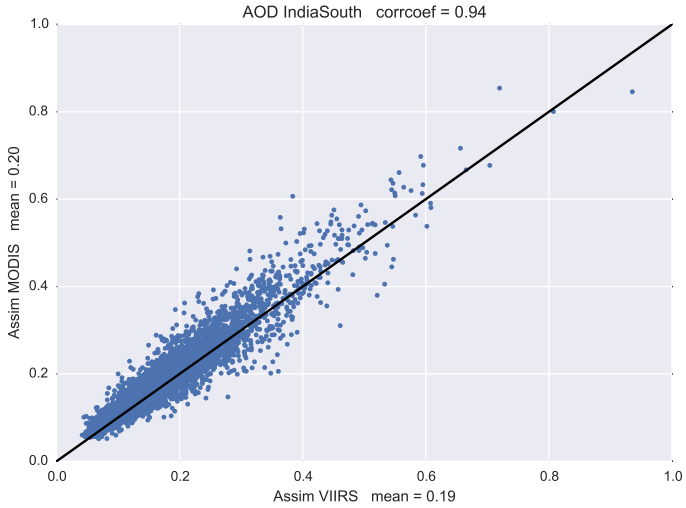
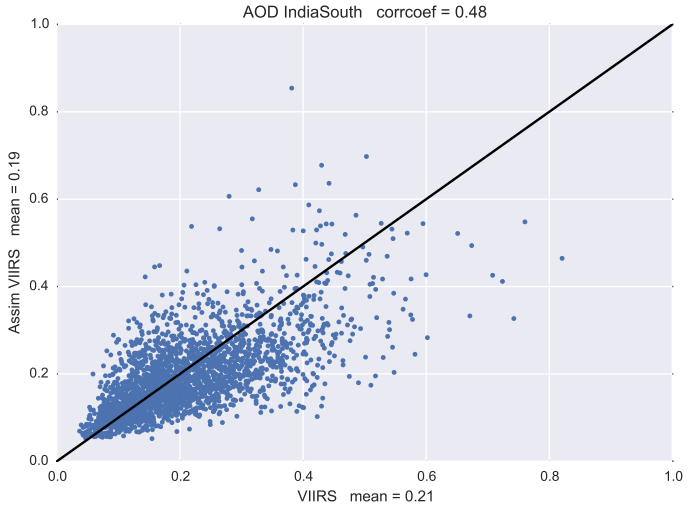
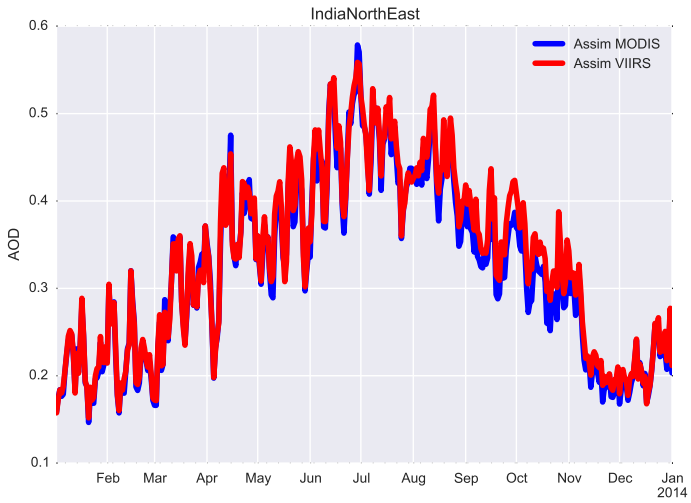
Jan
2014


AOD IndiaSouth corrcoef = 0.64
Assim MODIS mean = 0.18
MODIS mean = 0.19
0.0
0.2
0.4
0.6
0.8
1.0


AOD IndiaSouth corrcoef = 0.94
Assim MODIS mean = 0.20
Assim VIIRS mean = 0.19
0.0
0.2
0.4
0.6
0.8
1.0


AOD IndiaSouth corrcoef = 0.48
Assim VIIRS mean = 0.19
VIIRS mean = 0.21
0.0
0.2
0.4
0.6
0.8
1.0


IndiaNorthEast
Assim MODIS
Assim VIIRS
AOD
0.6
0.5
0.4
0.3
0.2
0.1
Feb
Mar
Apr
May
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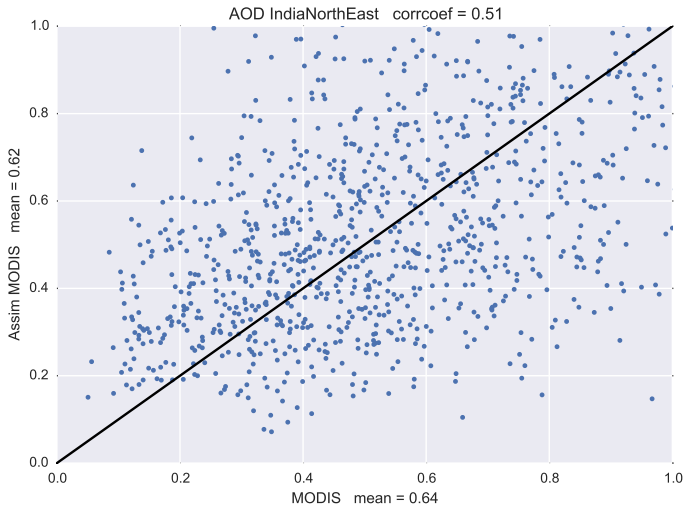
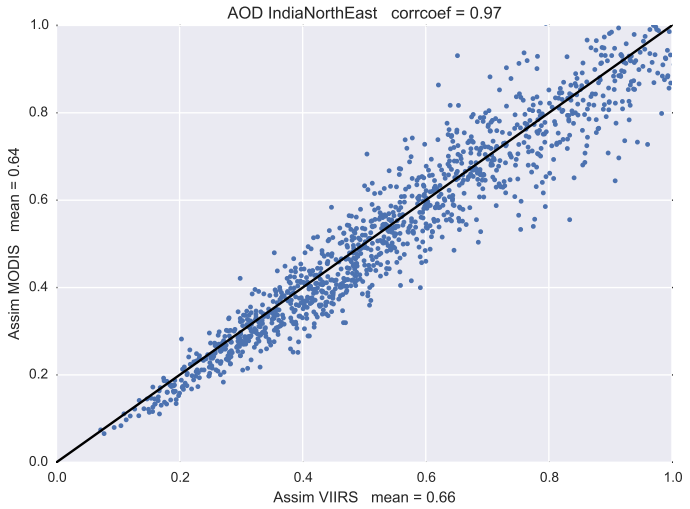
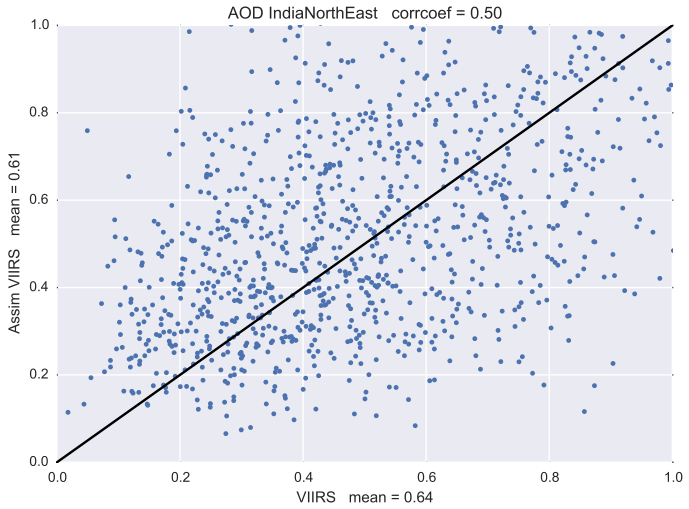
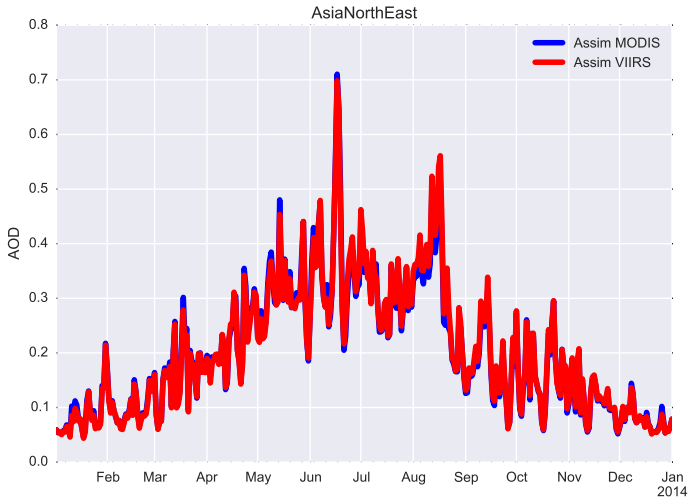
Jan
2014


AOD IndiaNorthEast corrcoef = 0.51
Assim MODIS mean = 0.62
MODIS mean = 0.64
1.0
0.8
0.6
0.4
0.2
0.0


AOD IndiaNorthEast corrcoef = 0.97
Assim MODIS mean = 0.64
Assim VIIRS mean = 0.66
1.0
0.8
0.6
0.4
0.2
0.0


AOD IndiaNorthEast corrcoef = 0.50
Assim VIIRS mean = 0.61
VIIRS mean = 0.64
1.0
0.8
0.6
0.4
0.2
0.0


AsiaNorthEast
Assim MODIS
Assim VIIRS
AOD
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Feb
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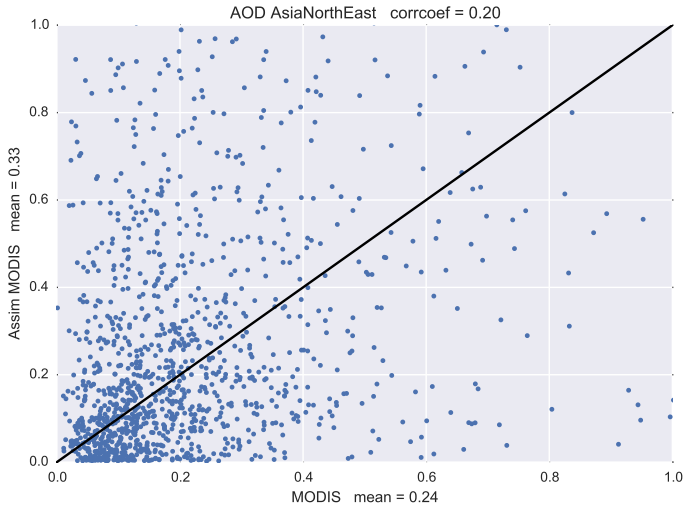
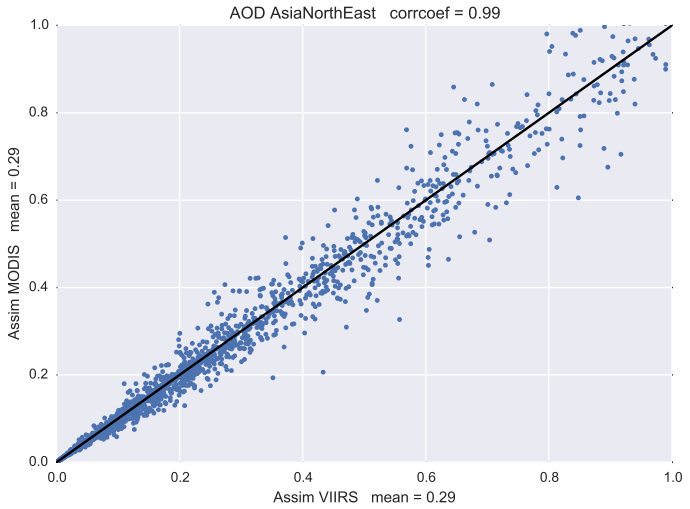
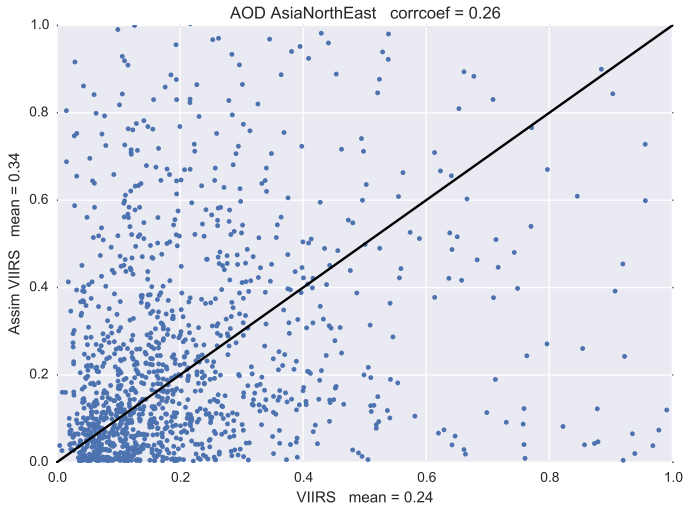
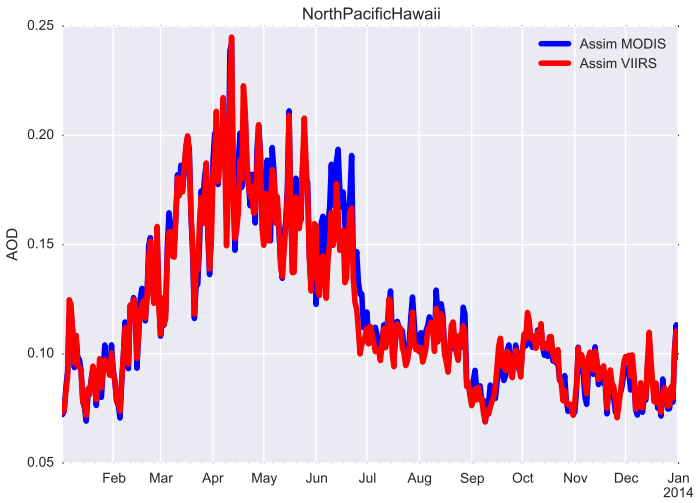
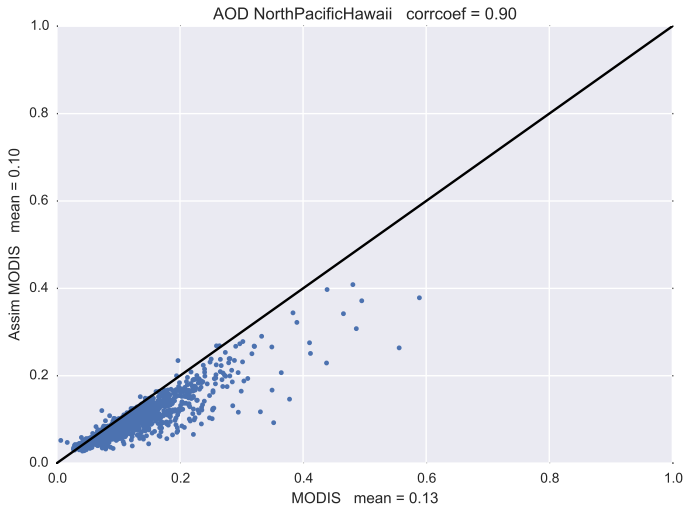
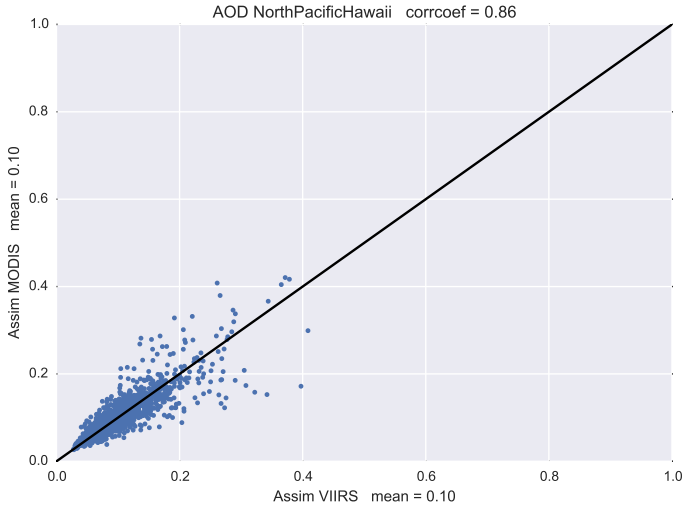

AOD AsiaNorthEast corrcoef = 0.20
Assim MODIS mean = 0.33
MODIS mean = 0.24
0.0
0.2
0.4
0.6
0.8
1.0

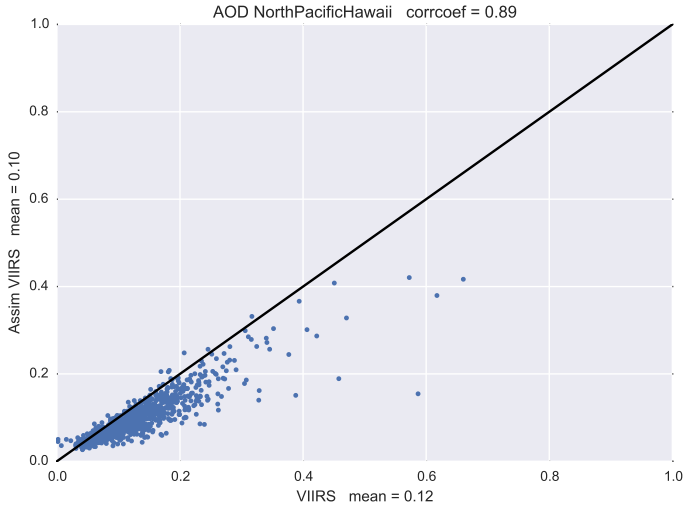

AOD AsiaNorthEast corrcoef = 0.99
Assim MODIS mean = 0.29
Assim VIIRS mean = 0.29
0.0
0.2
0.4
0.6
0.8
1.0

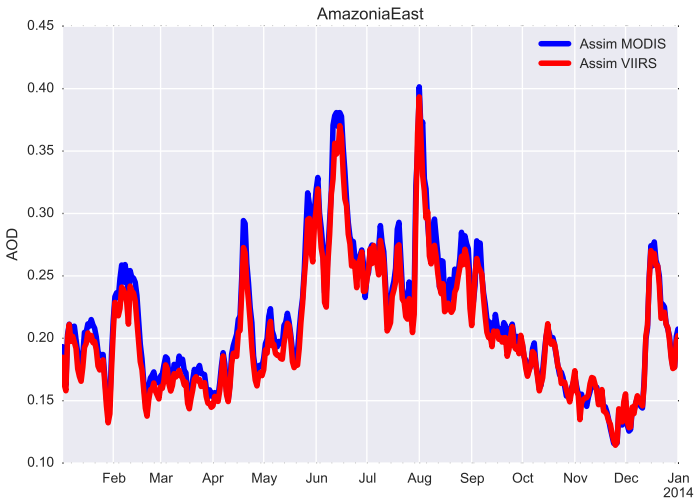

AOD AsiaNorthEast corrcoef = 0.26
Assim VIIRS mean = 0.34
VIIRS mean = 0.24
0.0
0.2
0.4
0.6
0.8
1.0


NorthPacificHawaii
Assim MODIS
Assim VIIRS
AOD
0.25
0.20
0.15
0.10
0.05
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
2014


AOD NorthPacificHawaii corrcoef = 0.90
Assim MODIS mean = 0.10
MODIS mean = 0.13
0.0
0.2
0.4
0.6
0.8
1.0


AOD NorthPacificHawaii corrcoef = 0.86
Assim MODIS mean = 0.10
Assim VIIRS mean = 0.10
0.0
0.2
0.4
0.6
0.8
1.0


AOD NorthPacificHawaii corrcoef = 0.89
Assim VIIRS mean = 0.10
VIIRS mean = 0.12
0.0
0.2
0.4
0.6
0.8
1.0


AmazoniaEast
Assim MODIS
Assim VIIRS
AOD
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
Feb
Mar
Apr
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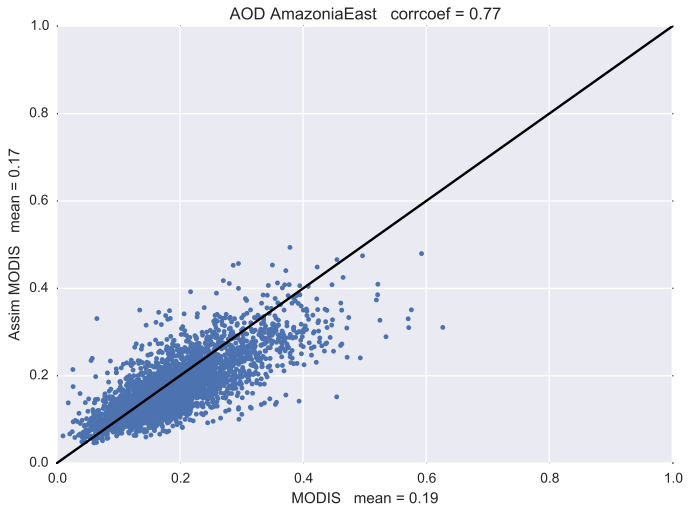
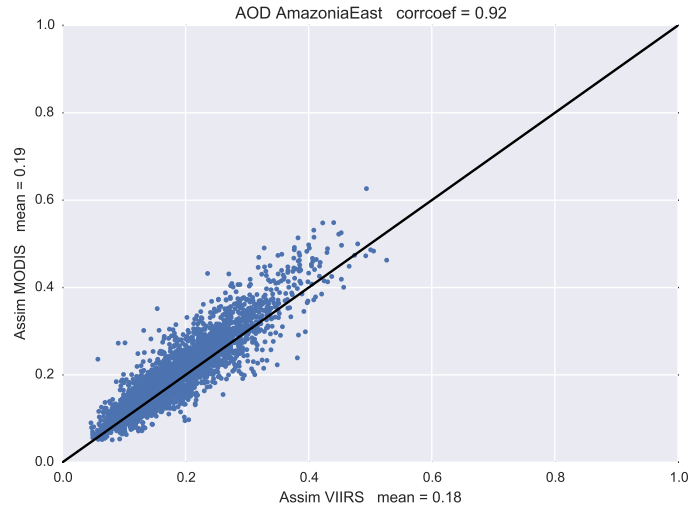
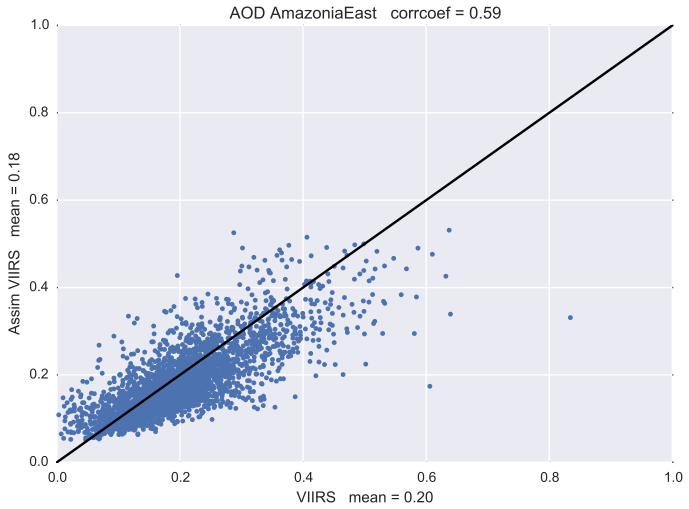
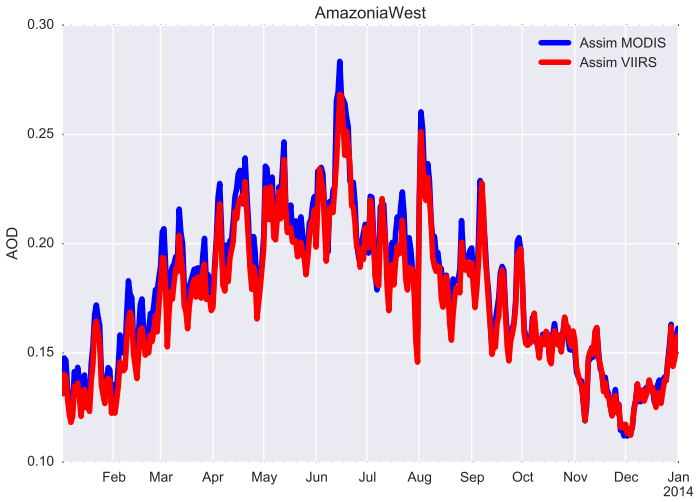
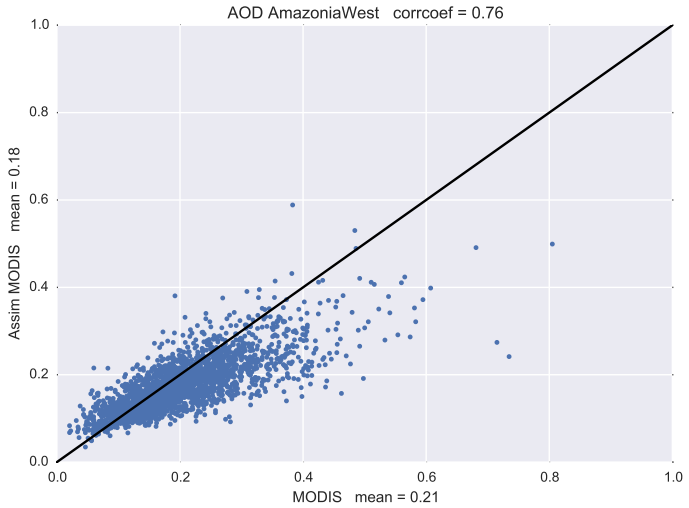
Jan
2014

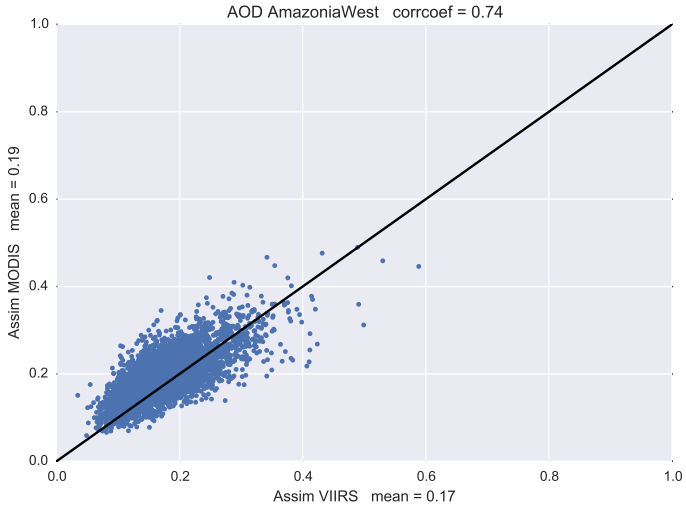

AOD AmazoniaEast corrcoef = 0.77
Assim MODIS mean = 0.17
MODIS mean = 0.19
0.0
0.2
0.4
0.6
0.8
1.0

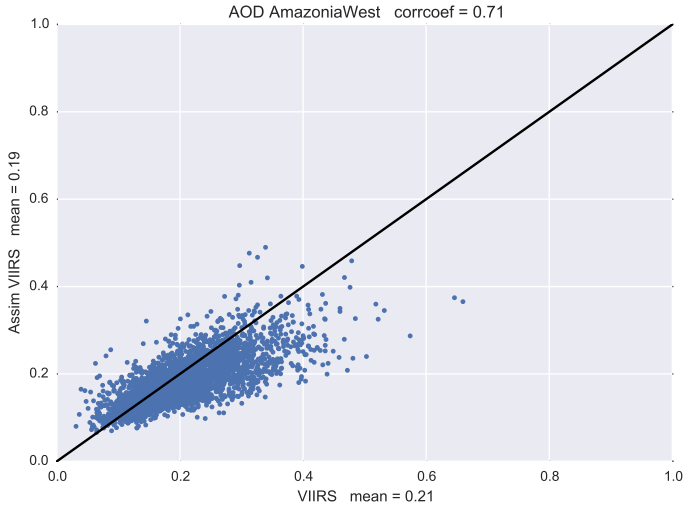

AOD AmazoniaEast corrcoef = 0.92
Assim MODIS mean = 0.19
Assim VIIRS mean = 0.18
0.0
0.2
0.4
0.6
0.8
1.0


AOD AmazoniaEast corrcoef = 0.59
Assim VIIRS mean = 0.18
VIIRS mean = 0.20
0.0
0.2
0.4
0.6
0.8
1.0


AmazoniaWest
Assim MODIS
Assim VIIRS
AOD
0.30
0.25
0.20
0.15
0.10
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
2014


AOD AmazoniaWest corrcoef = 0.76
Assim MODIS mean = 0.18
MODIS mean = 0.21
0.0
0.2
0.4
0.6
0.8
1.0


AOD AmazoniaWest corrcoef = 0.74
Assim MODIS mean = 0.19
Assim VIIRS mean = 0.17
0.0
0.2
0.4
0.6
0.8
1.0


AOD AmazoniaWest corrcoef = 0.71
Assim VIIRS mean = 0.19
VIIRS mean = 0.21
0.0
0.2
0.4
0.6
0.8
1.0

- Switch from MODIS Collection 5.1 to MODIS-Like VIIRS AOD
- Regional mean AOD jumps typically $< 5\%$
- VIIRS AOD $>$ MODIS AOD Ocean
- VIIRS AOD $<$ MODIS AOD Land