Cloud cover and water vapor observed at Oma site,Tibet

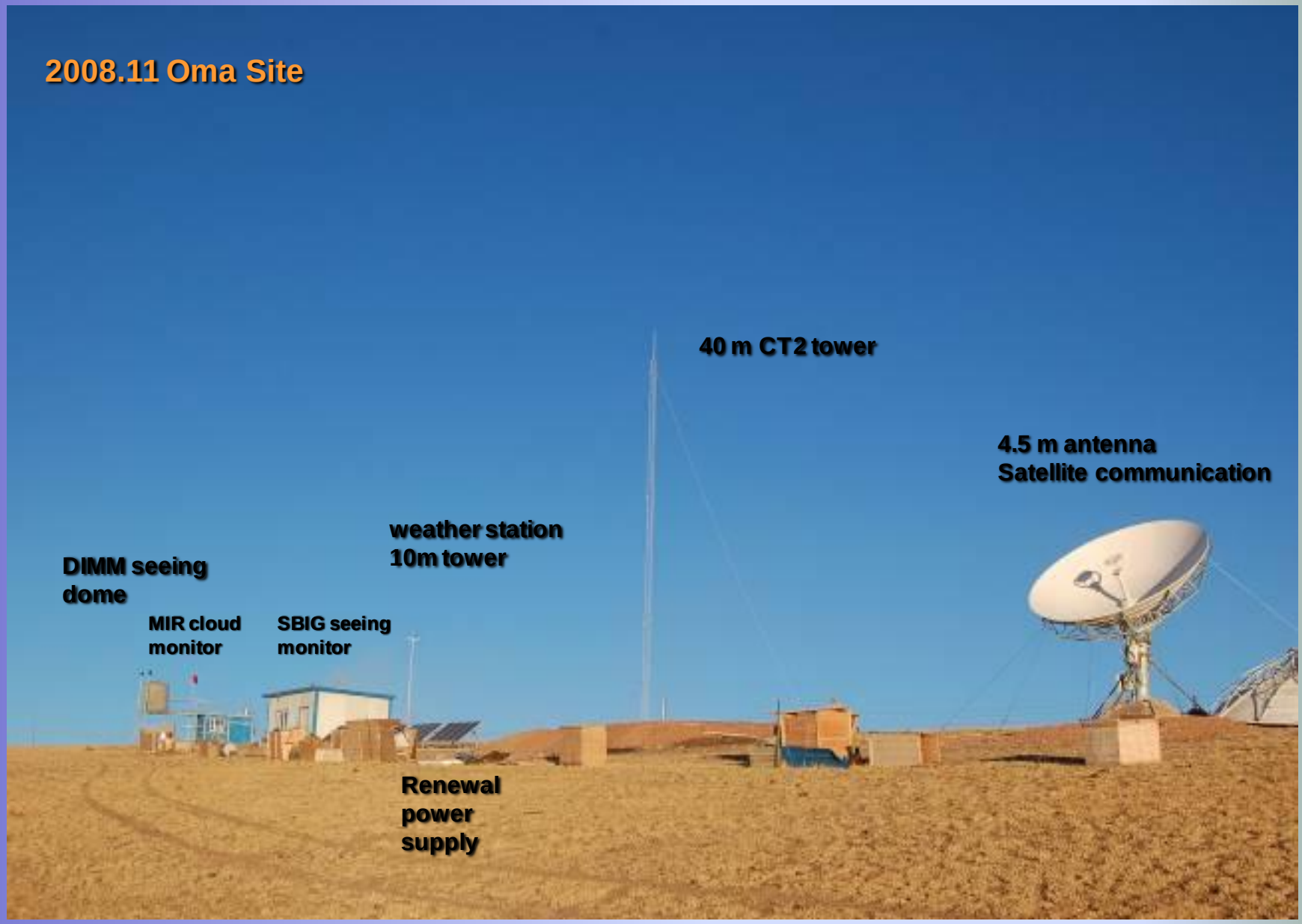
Wang Hong-shuai（王红帅）

(National Astronomical Observatories of China)

Kislovodsk 8.10.2010


Hanle
ali
Oma
New Delhi
Lhasa
gonggar
beijin
© 2010 Cnes/Spot Image
Image © 2010 TerraMetrics
Image © 2010 GeoEye
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
30°33'23.53" 北 89°54'25.66" 东 海拔 4739 米
©2010 Google
角海拔高度 3765.11 公里

2008.11 Oma Site



Cloud cover

Cloud survey equipement

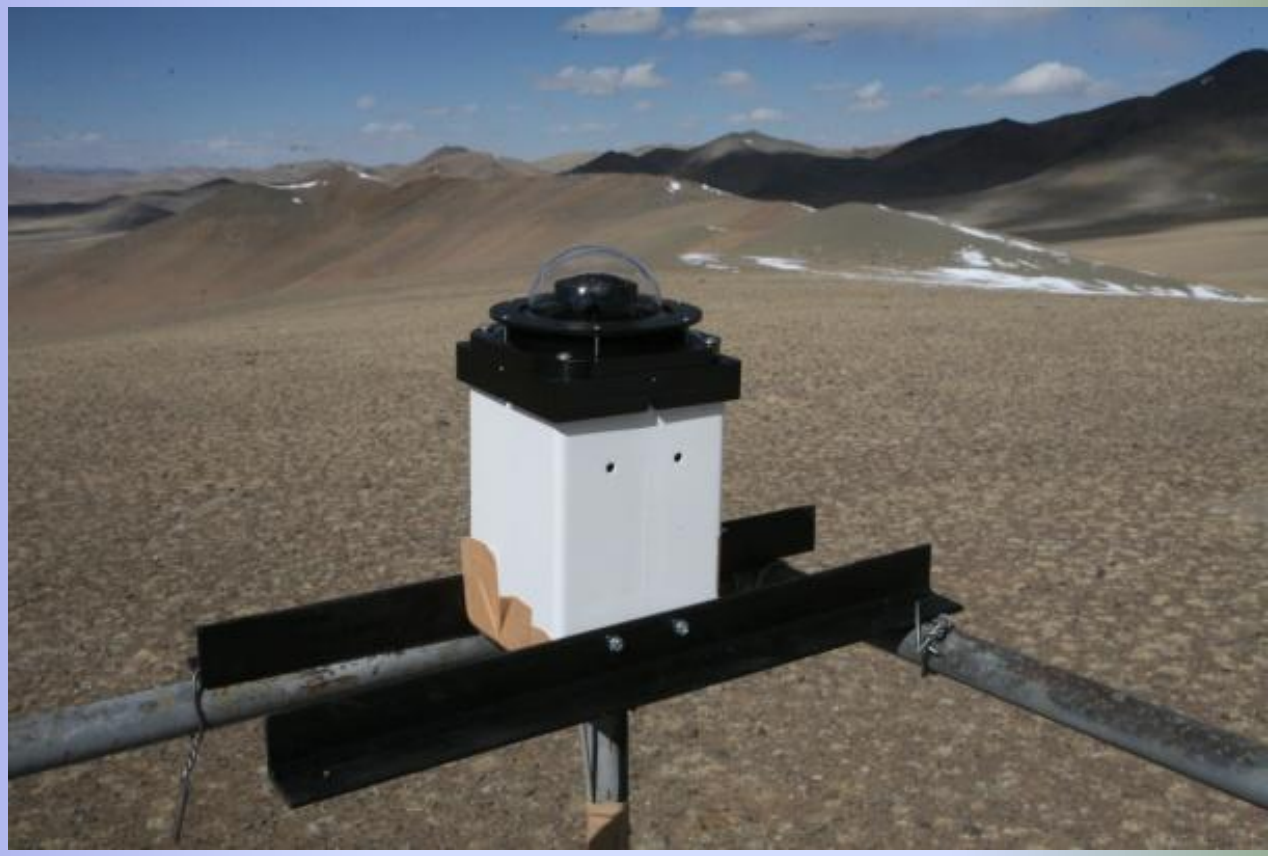
Day time：

NIKON COOLPIX 8800 camera with Fish-eye camera

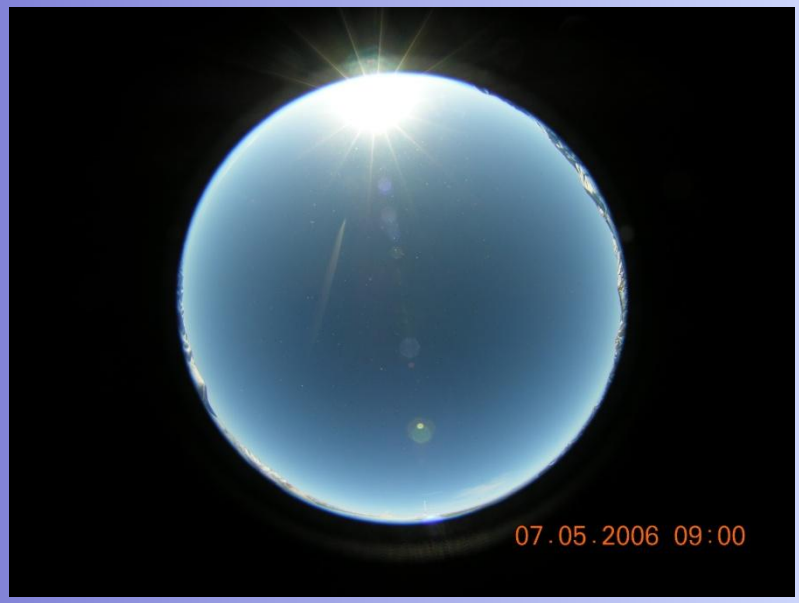
(2005.11-now)

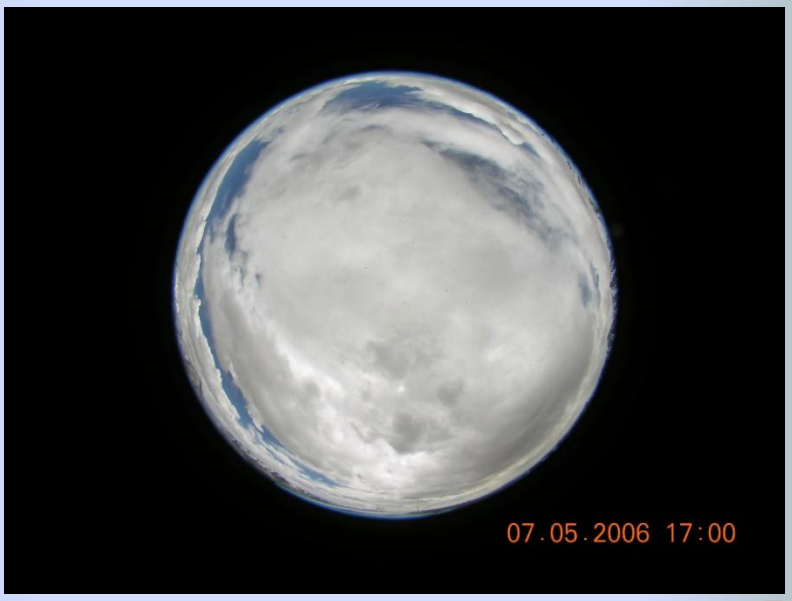
Night time：

SBIG A340 all-sky camera(2009.11-now)



Day time all sky picture

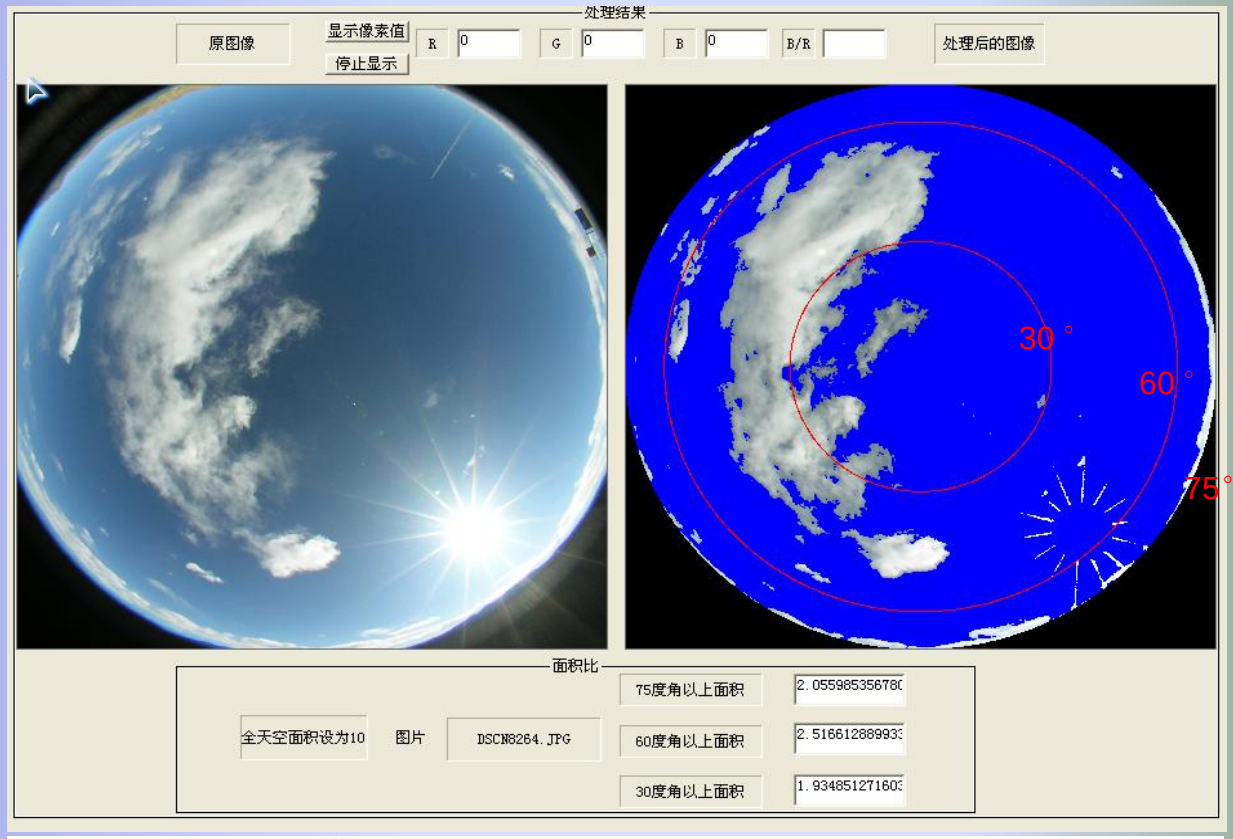




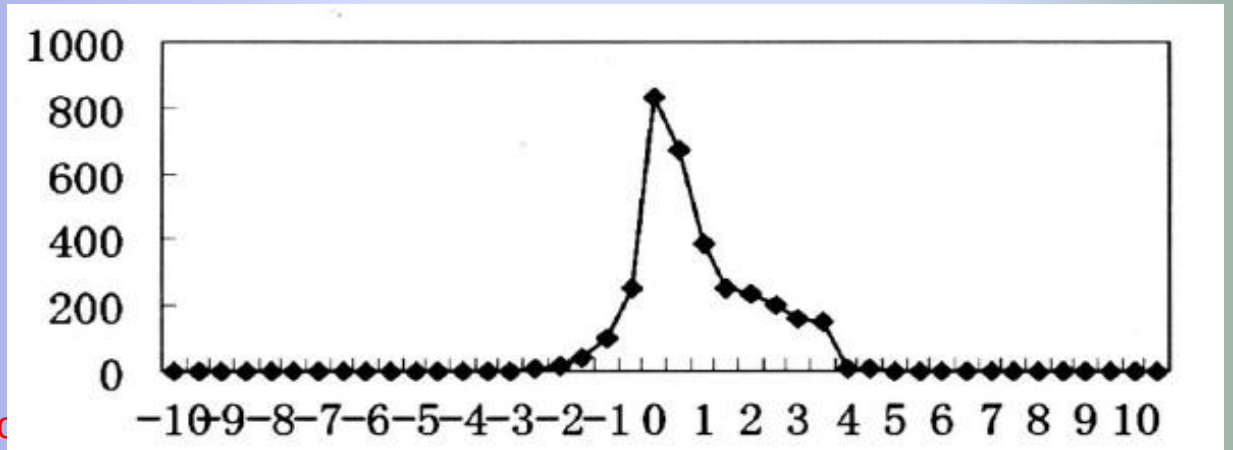
daytime cloud cover data processing

The best threshold of blue and red component is 1.3 to distinguish the cloud The threshold is obtained by a libradtran simulation(huo juan et al)

Red circle correspond to different zenith angle

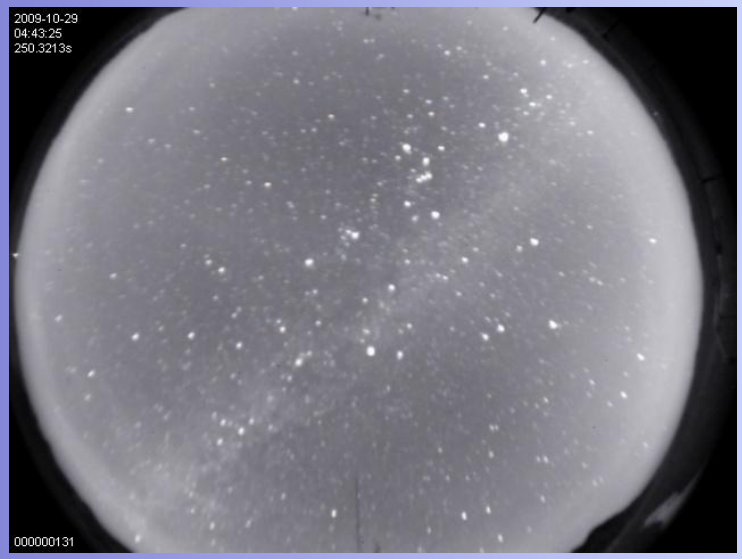


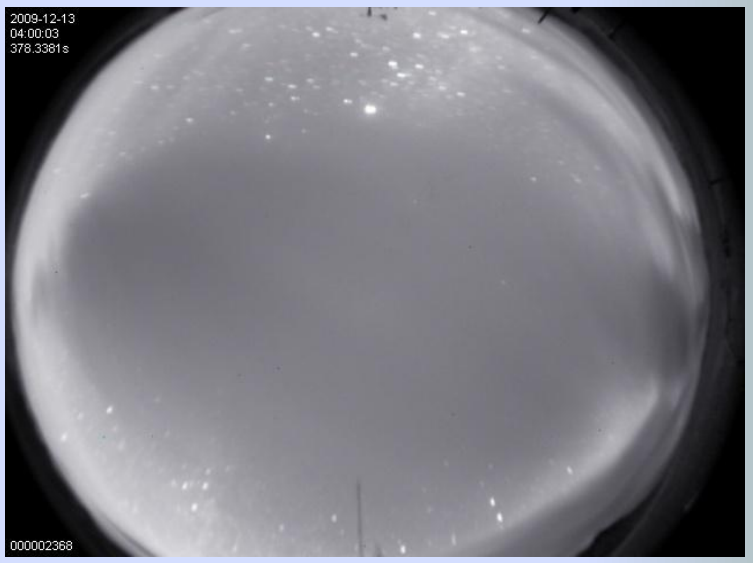
Comparison of cloudiness between computation and observation by naked eye

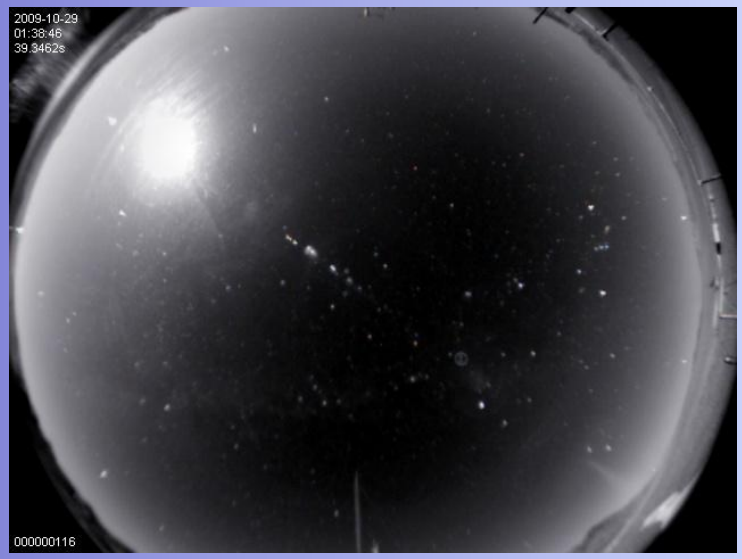


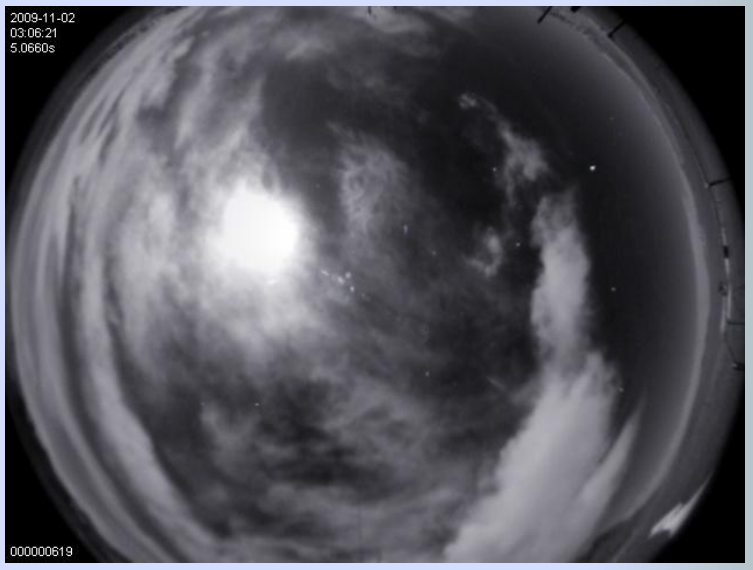
Wang Ho

Night time all sky picture

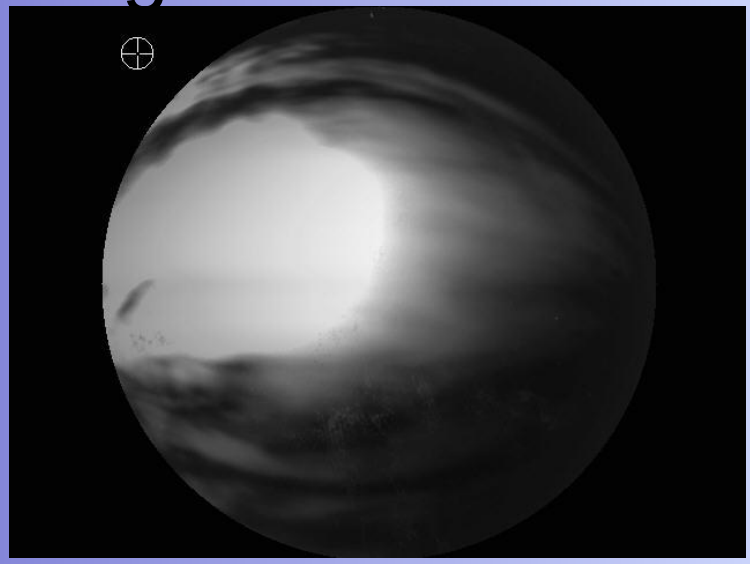


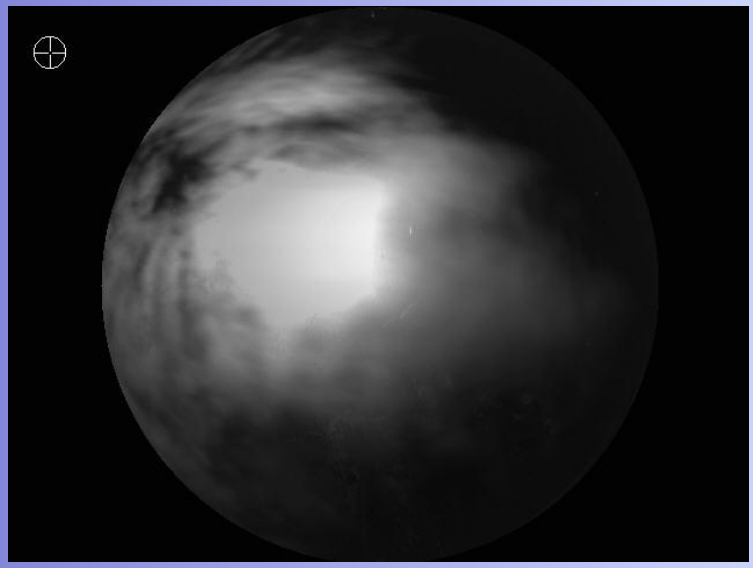


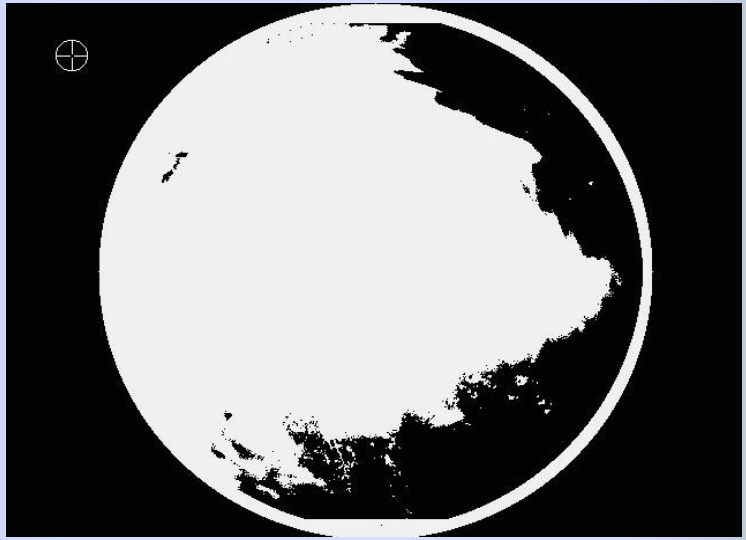




nighttime cloud cover data processing



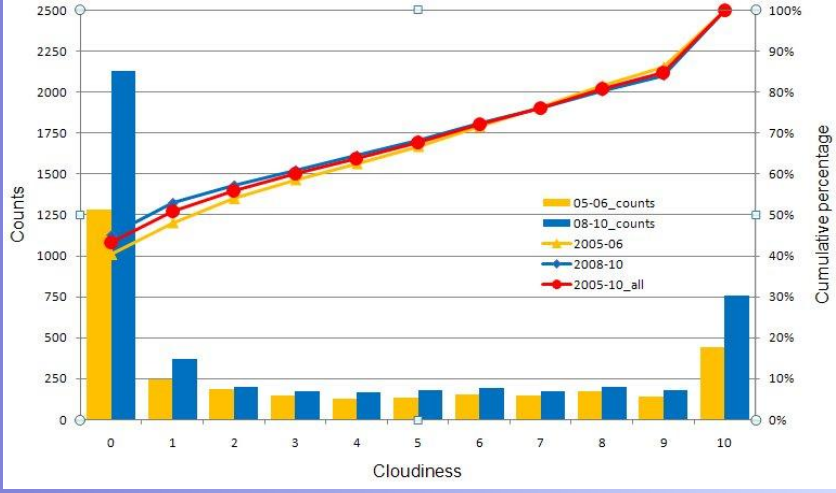


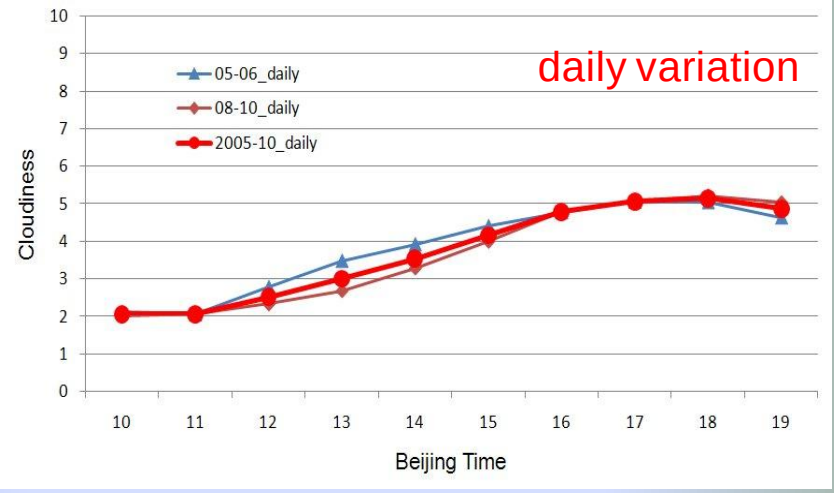


We try to develope an method to get the cloud information,use an adaptive Threshold in the different area of the picture,but the precision need to be improved

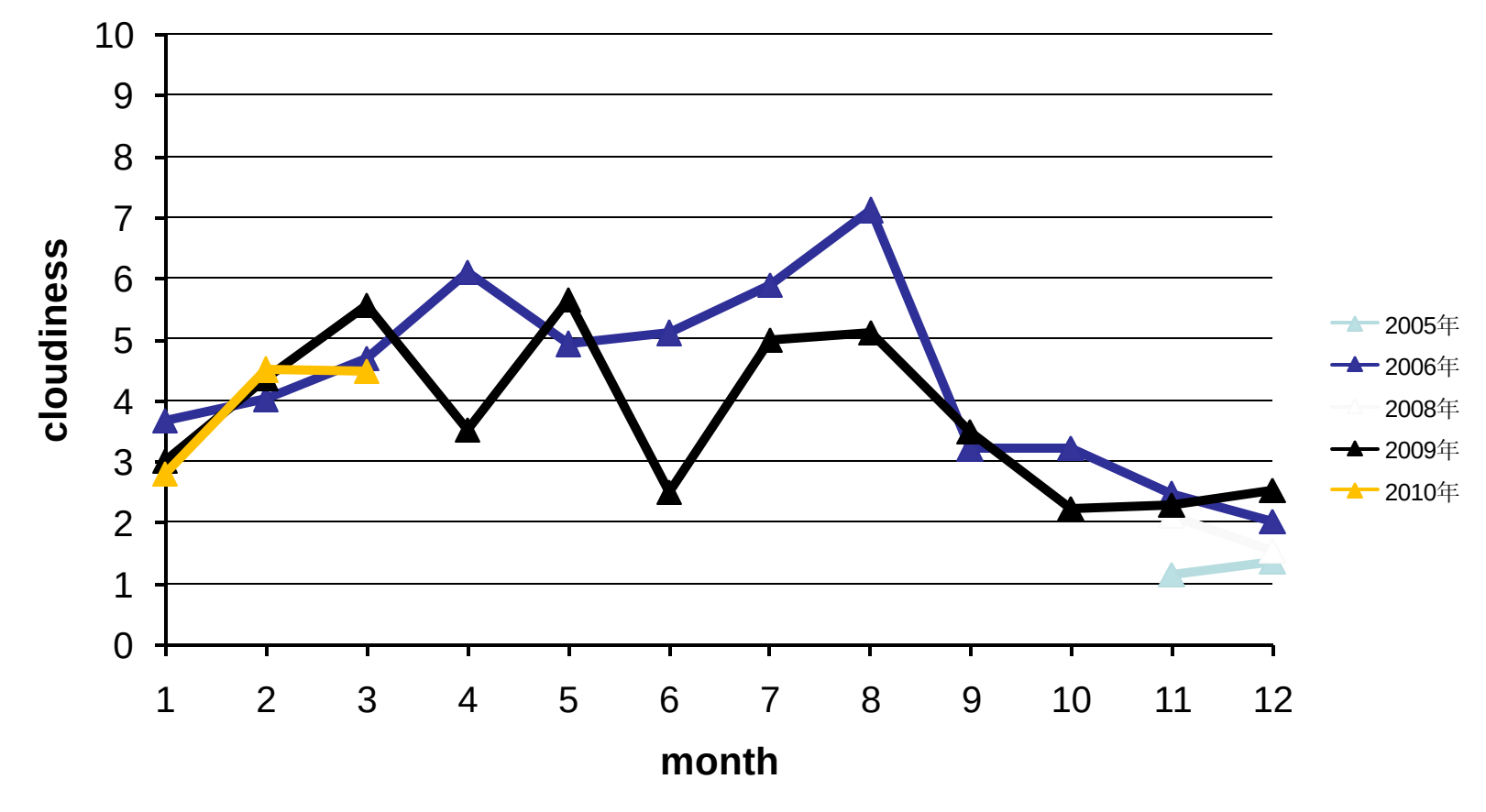
Oma daytime cloudiness results

Period	Clear day c<1	Partly cloudy c<3	Usable day c<7	Num. days
2005.10-2006.12	40.3%	54.0%	71.6%	425
2008.11-2010.03	45.1%	57.2%	72.4%	481
total	42.8%	55.7%	72.0%	906





Daytime cloudiness monthly variation

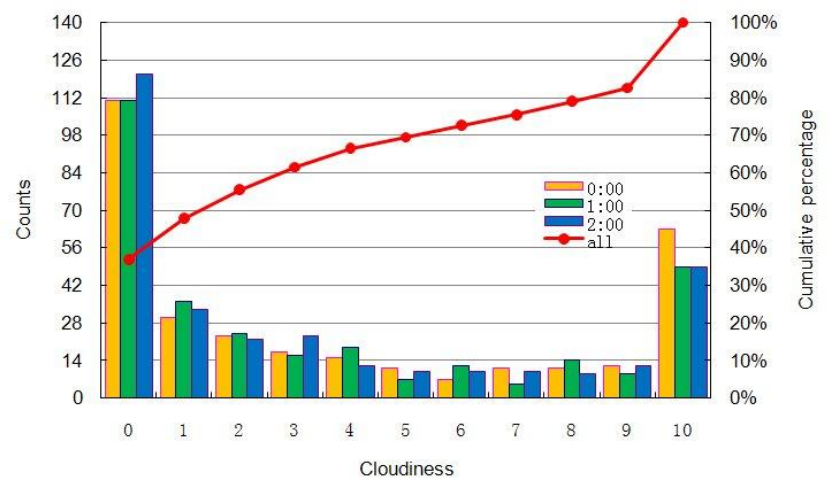


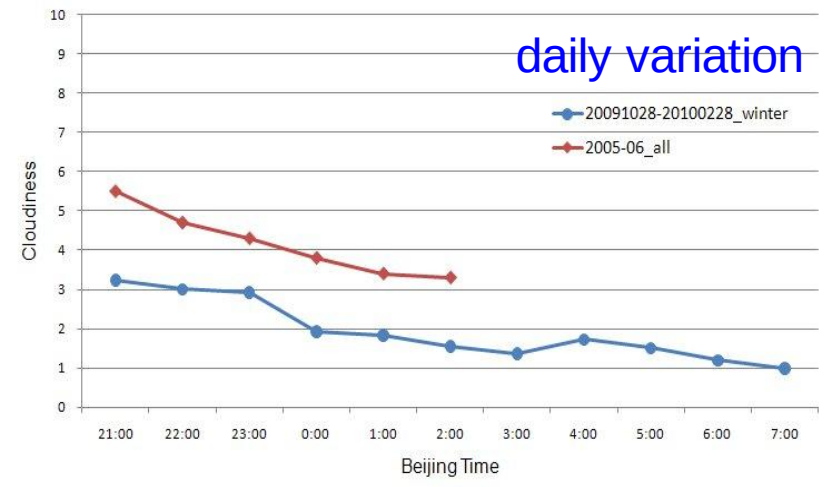
sep to mar : more clear sky

April may,july and august : cloudy

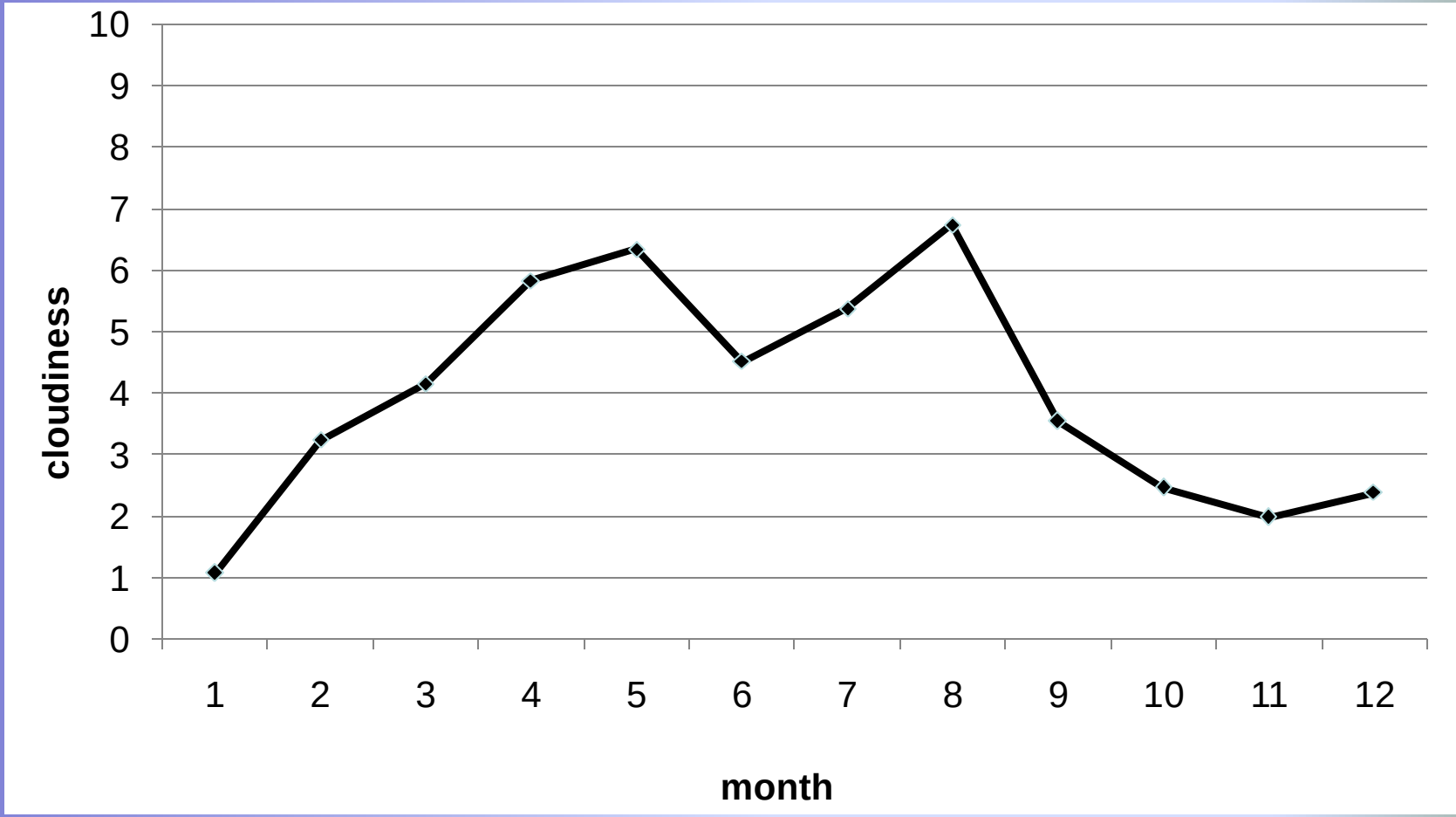
Oma: night time cloudiness results
(based on observation by naked eye)

Period	Clear night c<1	Partly cloudy c<3	Usable night c<7	Num. nights
2005-2006	42.7%	69.0%	75.4%	310
2008-2010	47.8%	66.5%	75.4%	480
average	45.8%	67.5%	75.4%	790





Night time monthly variation



sep to mar : more clear sky
April may,july and august : cloudy
The same as daytime

Precipitable Water Vapor instrument

DTF-5 , Sun- Photometer ,made by Anhui Institute of Optics & Fine Mechanics(Chinese Academy of Sciences)

Use 8 filter of different wavelength(before 2009.12,pwv only)

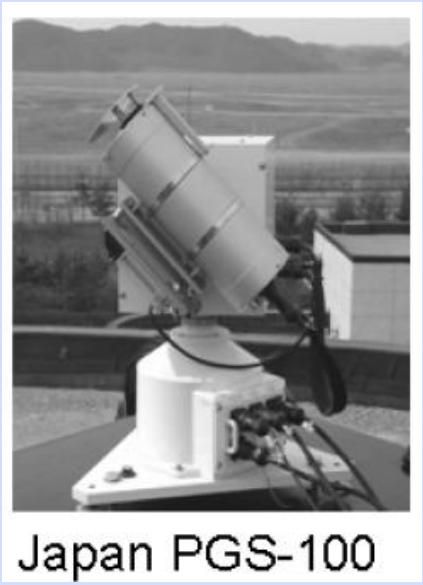
wavelength(*nm*)	*400*	*520*	*610*	*670*	*780*	*860*	*940*	*1050*
bandwidth(*nm*)	*7.60*	*8.70*	*10.00*	*9.50*	*10.40*	*12.60*	*10.60*	*10.00*

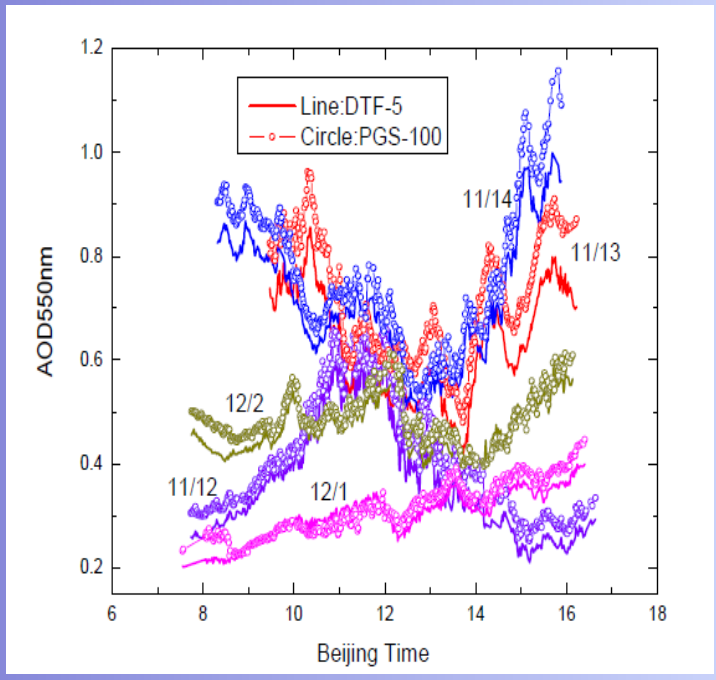
Measure the intensity of solar radiation ,retrieve atmospheric aerosol optical depth and atmospheric precipitable water vapor

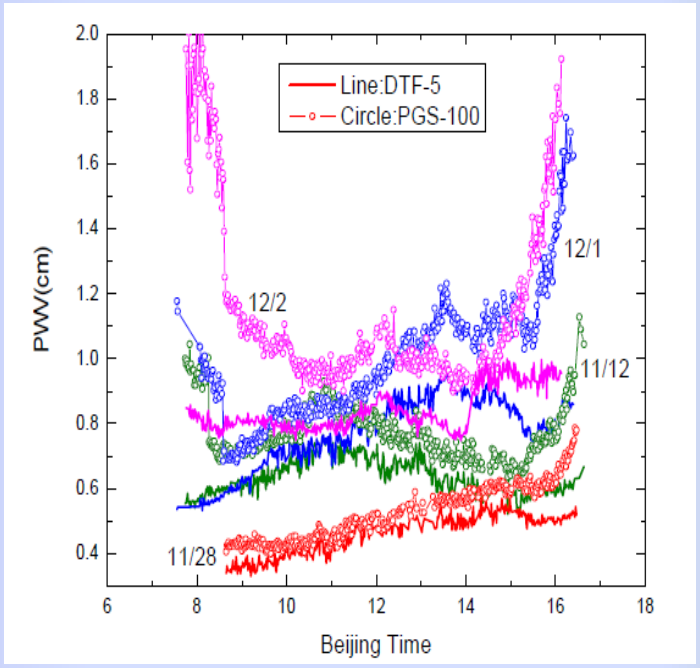
DTF-5 at Oma site

Comparison to PGS-100

Before our observation at Oma, DTF-5 had compared to a japanese Sun-photometer(PGS-100) at same wavelength ,the PGS-100 was used in AERONET





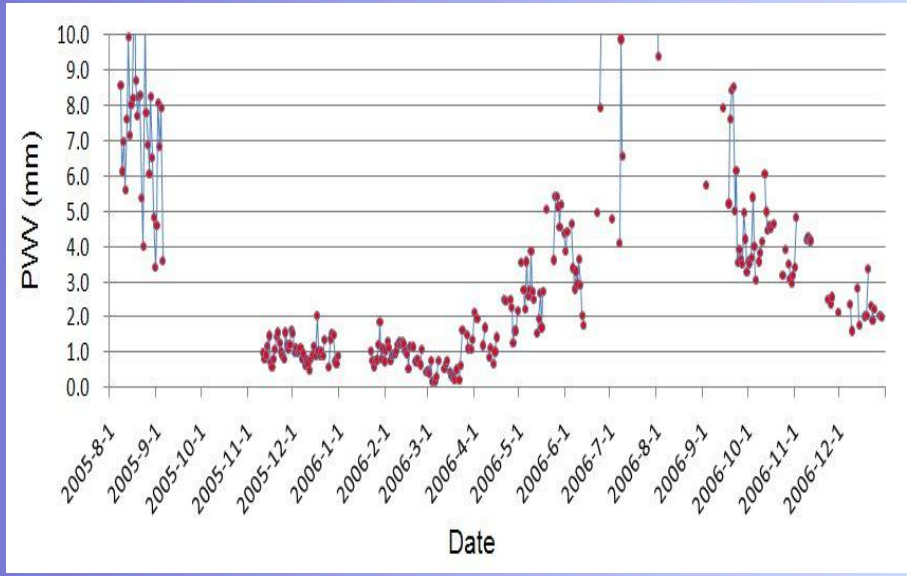


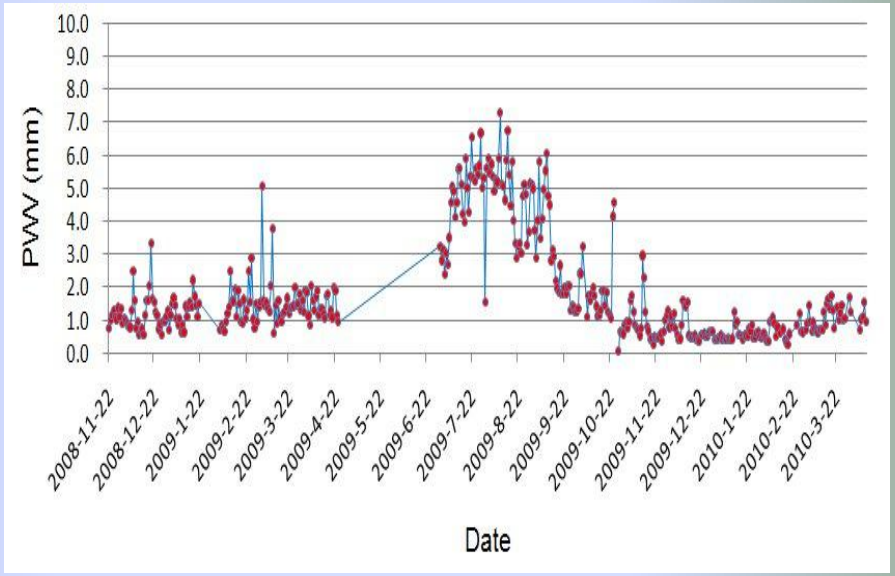
the relative error

	11/10	11/11	11/12	11/13	11/14	11/19	11/25	11/27	11/28	11/30	12/1	12/2
AOD1050*nm*	17.42	18.89	14.56	16.11	6.56	8.07	6.52	9.11	14.36	8.41	8.63	6.35
AOD940*nm*	16.55	17.84	14.31	15.67	6.99	7.86	6.60	8.93	14.23	8.56	8.42	6.37
AOD860*nm*	17.11	18.83	14.01	16.84	8.96	10.07	8.74	11.48	15.99	9.78	10.38	7.18
AOD780*nm*	11.95	11.63	11.40	12.68	5.00	6.82	4.95	7.60	13.25	6.10	7.35	4.84
AOD670*nm*	9.26	9.21	11.12	9.76	3.76	5.40	3.98	6.03	9.52	4.92	5.31	3.79
AOD610*nm*	8.87	8.70	10.62	9.66	4.40	5.45	4.31	6.15	10.88	5.18	5.72	4.02
AOD550*nm*	9.43	9.61	11.23	11.91	6.99	6.40	5.78	7.63	14.62	7.86	6.73	4.78
AOD520*nm*	7.65	7.50	8.46	10.80	6.34	5.18	4.51	7.28	15.56	6.10	6.45	3.71
AOD400*nm*	7.71	7.57	7.84	8.47	5.85	7.50	6.11	9.25	16.26	5.35	7.98	4.84
PWV	35.30	33.41	17.35	28.05	30.17	17.73	26.20	21.48	12.08	26.61	21.02	20.31
α	11.52	12.54	5.92	7.56	1.54	5.11	4.58	8.05	8.45	3.11	5.57	3.75
β	16.84	18.21	14.22	15.70	6.5	7.91	6.40	8.94	14.26	8.23	8.47	6.19

Precipitable Water Vapor Result at Oma

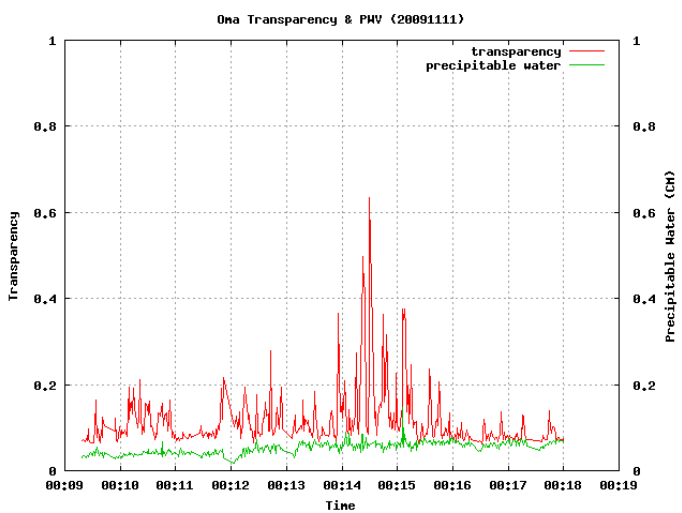
Period	Median (mm)	Percent. PWV<0.5	Percent. PWV<1.0	Percent. PWV<1.5	Percent. PWV<2.0	Num. days
200508-200612	2.2	5.0%	23.1%	39.2%	46.5%	260
200811-201003	1.3	10.1%	37.4%	61.8%	75.1%	406
average	1.6	8.1%	31.8%	53.0%	63.9%	790

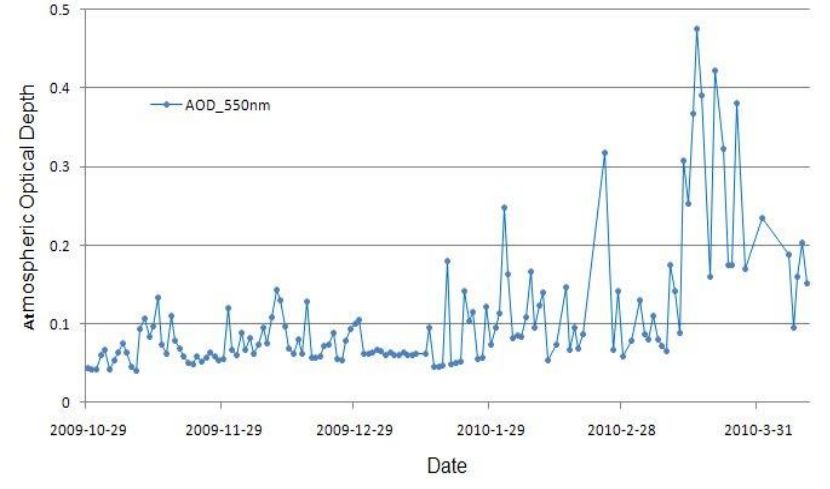


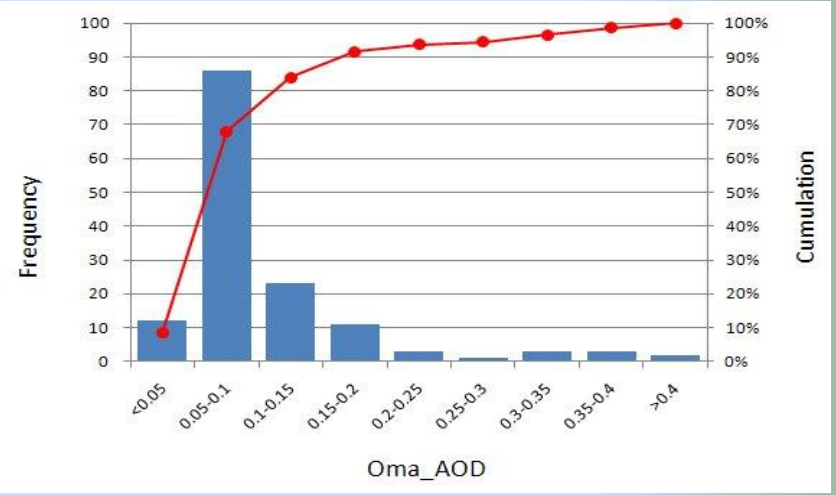


Atmospheric aerosol Optical Depth Results at Oma

Period	Median	Average	Percent. AOD<0.05	Percent. AOD<0.1	Percent. AOD<0.2	Num. days
2009.11-2010.03	0.08	0.11	8.3%	68.1%	91.7%	144







Thank you for your question