

Астроиклим муаммолари

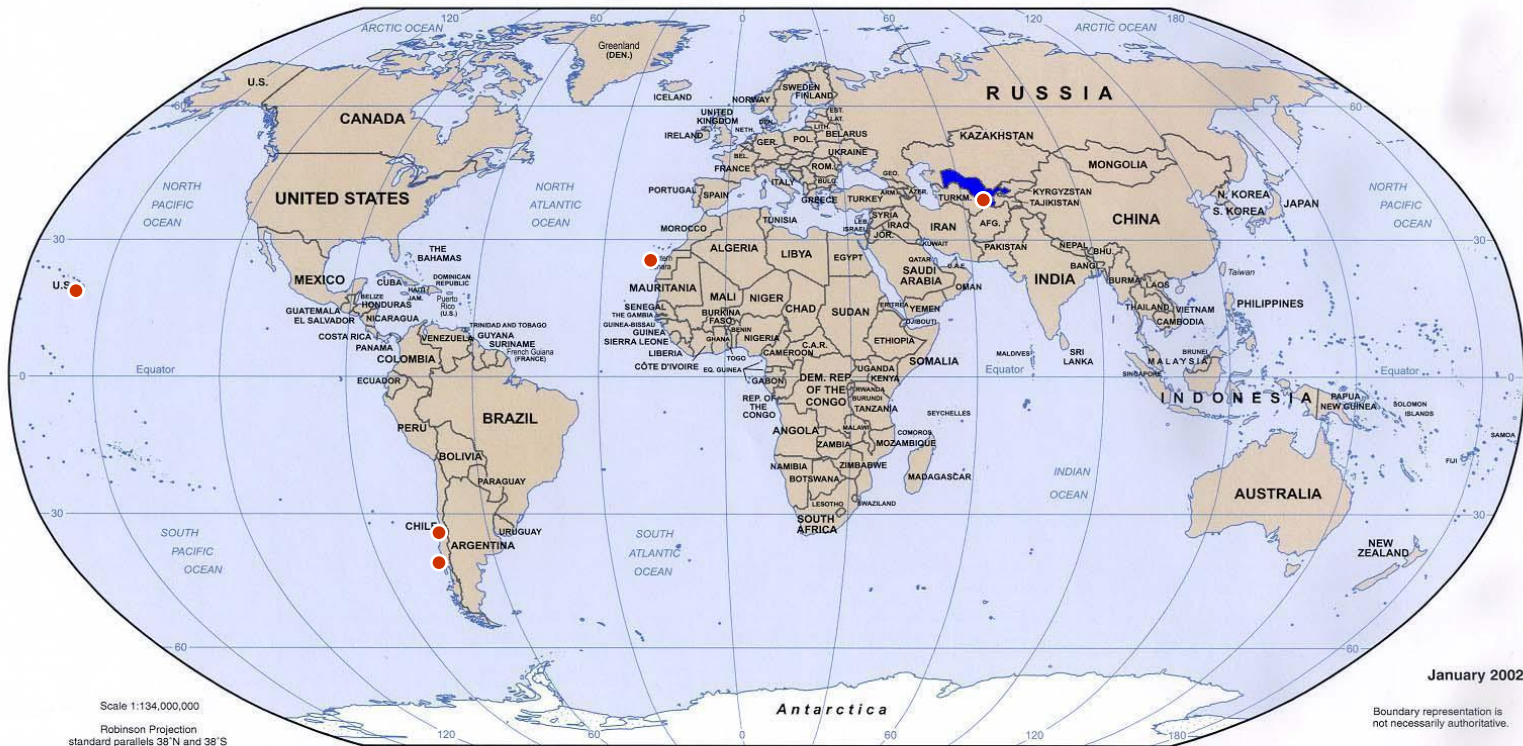
Собит Илёсов

**Узбекистон Фанлар академияси
Улугбек номидаги астрономия институту
Илмий ишлар буйича директор уринбосари**

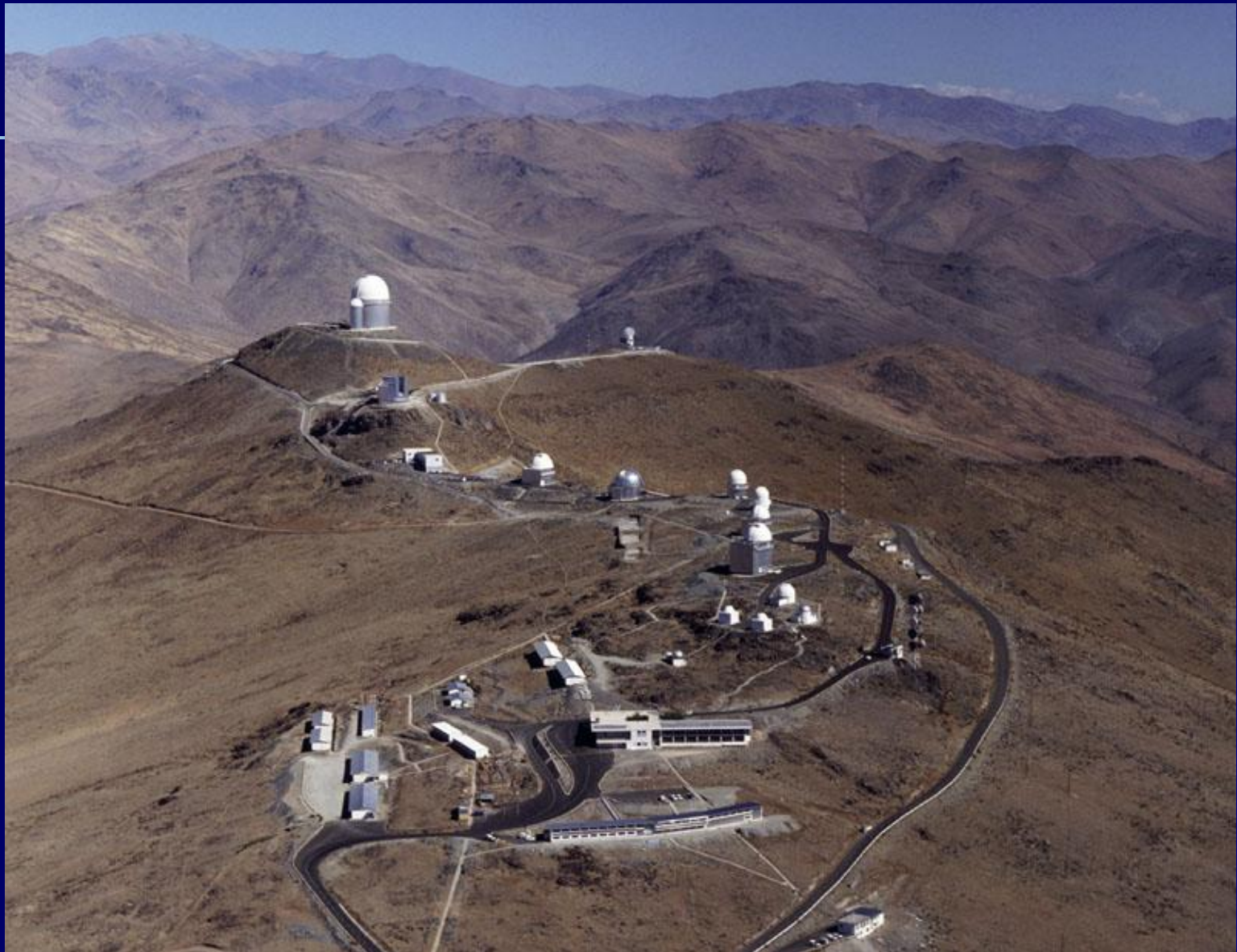
Астроиклимнинг асосий параметрлари

- Булутсиз кунлар сони
- Атмосфера шаффофлиги
- Осмон фони
- Тасвир сифати

Жахоннинг энг машхур обсерваториялари



Чилидаги Ла Силла обсерваторияси



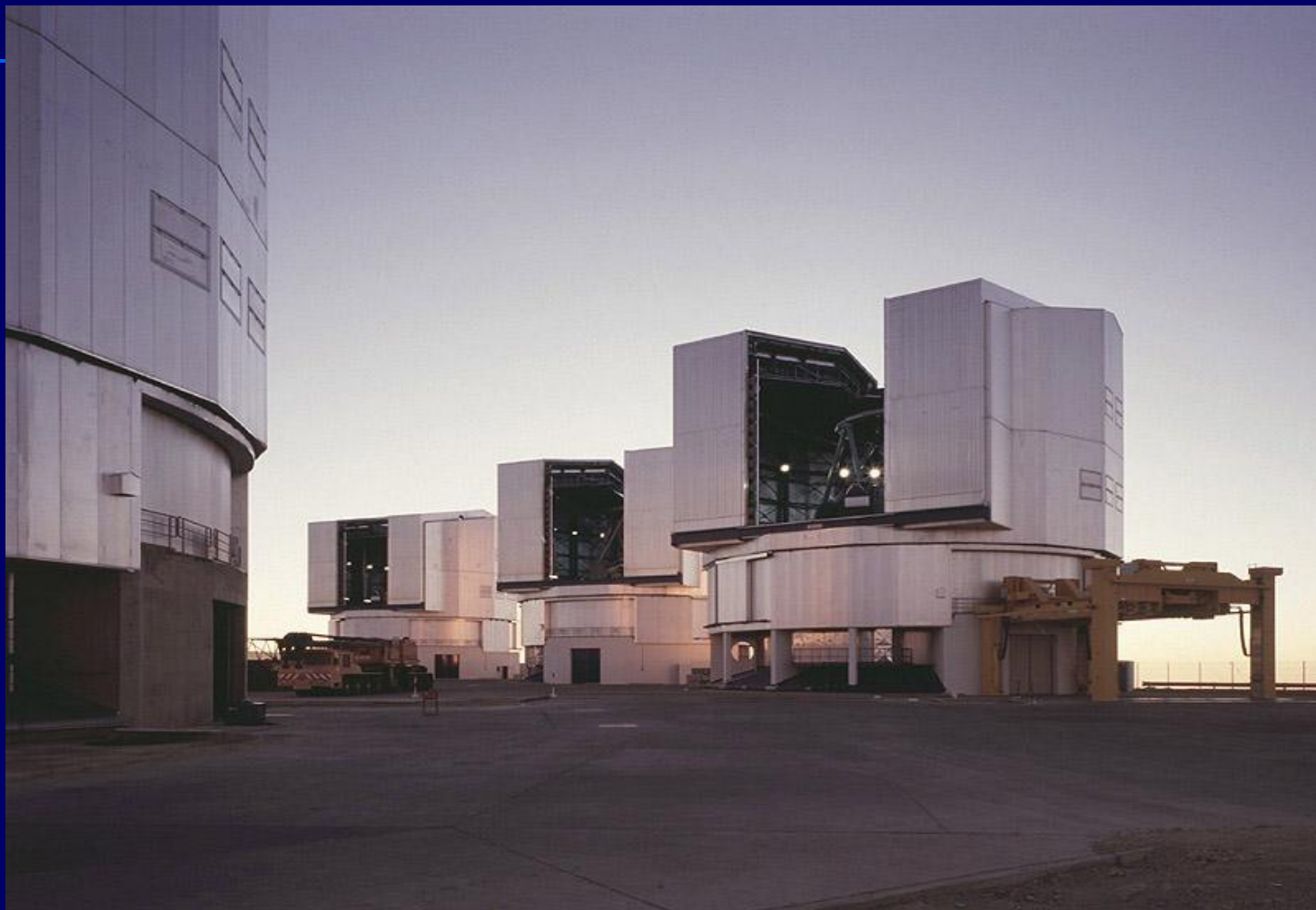
Гавай оролларидаги Мауна Кеа обсерваторияси



Шимолий Кавказ (Россия)даги 6- м телескоп



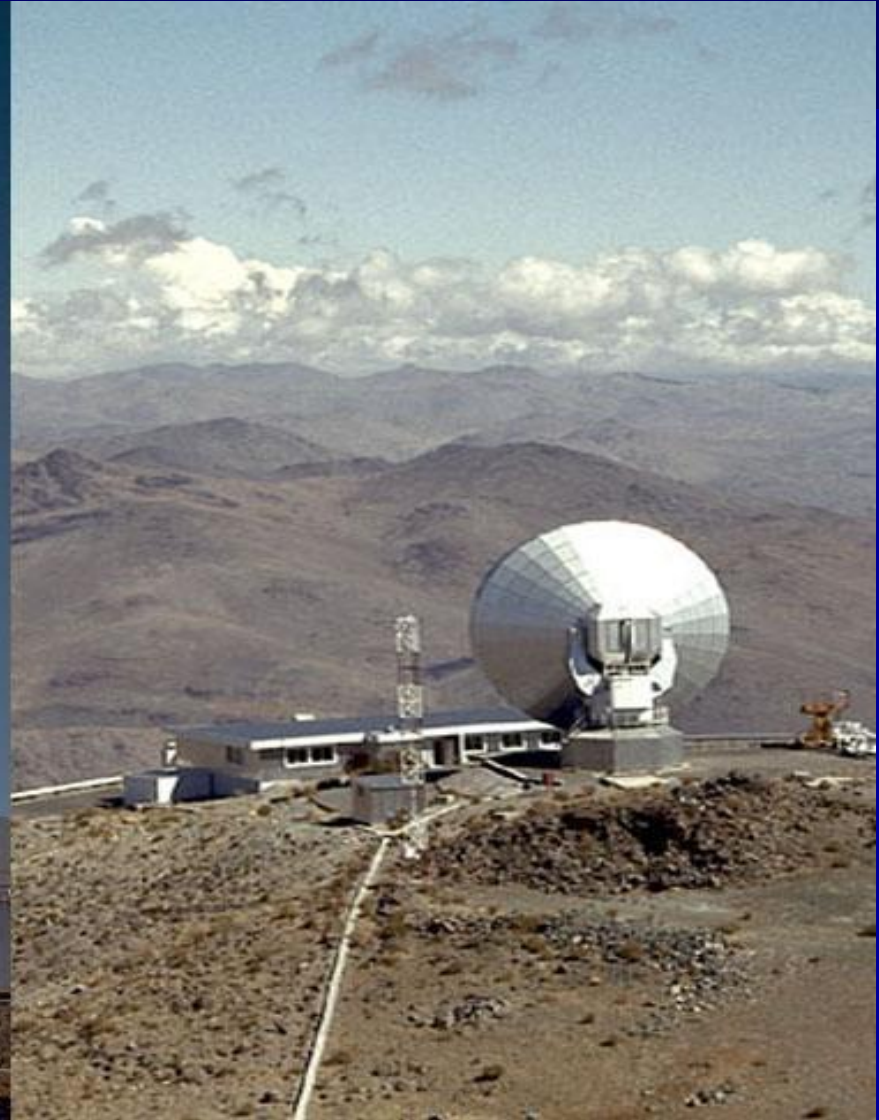
Чилидаги Параналь обсерваториясидаги 8-м лик телескоплар минораси



Мак-Марс Пирс Куёш телескопи



Диаметри 15 м булган радиотелескоп (Чили, ЕЖО)



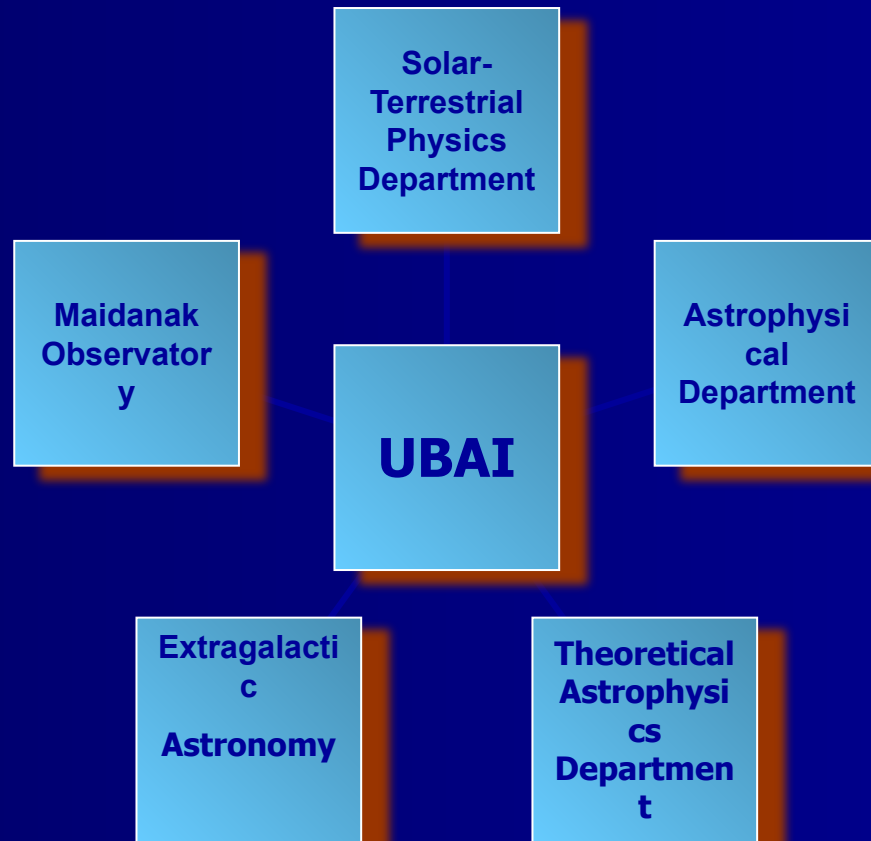
Аресибодаги диаметри 305 м булган радиотелскоп



**РФ ФА Физика институтига карашли
диаметри 600 м булган «РАТАН»
радиотелескопи**



UBAI structure



Асосий тадқиқот йуналишлари

- Қуёш физикаси, гелиосейсмология, астросейсмология;
- - юлдуз пайдо бўлиш соҳаларида ёш ностационар юлдузлар;
- - Галактикадан ташқи объектлар CCD-фотометрияси: квазарлар, гравитацион линзлар ва фаол ядроли галактикалар;
- - Ойнинг кулранг ёғдусини қайд этиш асосида Ер глобал исишини мониторинг қилиш;
- - релятивистик астрофизика, қора ўра атрофидаги зарралар ва майдонлар, айланувчи ва тебранувчи магнитланган нейтрон юлдузларнинг электромагнит нурланиши;
- - астроиклим тадқиқотлари;
- - космик геодинамика методлари билан Ер айланиши параметрларини мониторинг қилиш;
- - ночизиқли ва нотурғун галактикаларни моделлаш;
- - Ерни дистанцион зондлаш ва ГИС, сунъий йўлдошлар телекоммуникацияси ва навигацион тизимлар. Суфа платосида қурилаётган РТ-70 радиотелескопи учун илмий масалалар қўйиш.

Ноёб илмий объектлар ва ишлаб чиқариш:

- CCD-камера (600 Series SI 4096x4096, Spectral Instruments Inc) билан жиҳозланган 1.5 м
ли
АЗТ-22 телескопи;
- CCD-камерали тўртта Цейс телескопи;
- Ойнинг кулранг ёғдусини қайд этувчи ва астросейсмология робот-телескопи;
 - Атмосфера тасвир сифатини қайд этувчи DIMM-телескоп;
- GPS ва DORIS геопозицион сислемаларининг Ерда қабул қилувчи қурилмалари;
 - 10 га яқин кичик телескоплар;
- Ернинг сунъий йўлдошларидан олинган тасвирларни қайта ишлаш ва ГИС ни юритиш учун дастурий таъминот.



Mairanak Observatory is located at the south-east of the Republic of Uzbekistan at a distance of about 120 km south of the famous historical city of Samarkand.



Maidanak Observatory

- Altitude is 2600 m above sea level
- Longitude $66^{\circ}56'$ E
- Latitude $38^{\circ}41'$ N
- Not far from ancient cities Samarkand and Bukhara
- Belongs to UBAI - Ulugh Beg Astronomical Institute of the Uzbek Academy of Sciences
- Telescopes:
 - One 1.5 m AZT-22 (Litcarino, Russia)
 - Two 1 m (Karl ZEISS)
 - Three 0.6 m (LOMO)
 - And smaller ones

1.5m telescope AZT-22



- 1.5m telescope AZT-22 with liquid nitrogen cooled CCD-camera (SI 4096x4096)



1m telescope ZEISS-1000



- 1.0m telescope ZEISS-1000 with photomultiplier tube



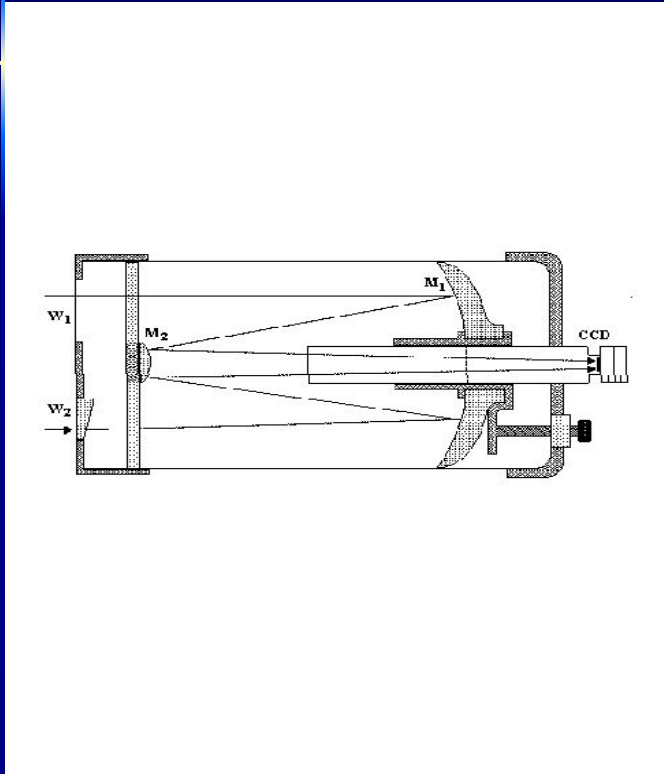
Some 0.6m telescopes



Майданак тогидаги илк тадқиқотлар

№	Studies	Reference	Results
1.	Clear night time	Novikova, 1970	58-60% of max. possible time
2.	Temperature	Gladishev & Shirokova, 1987	+13°C, in summer -15°C, in winter
3.	Wind speed	Gladishev & Shirokova, 1987	2.5 m/s
4.	Sky background	Kardopolov & Filip'ev, 1979	22 ^m .3-22 ^m .9 (in B-filter) 21 ^m .4-22 ^m .0 (in V-filter)
5.	Extinction coefficient	Zhelezhnyakova, 1984	0.15 (in V-filter)
6.	Seeing (FWHM, at $\lambda=0.5\mu\text{m}$)	Shevchenko, 1973 Artamonov et al., 1987 Shcheglov & Gur'yanov, 1991	0.55 arcsec 0.60 arcsec 1.00 arcsec

Differential Image Motion Monitor (DIMM)



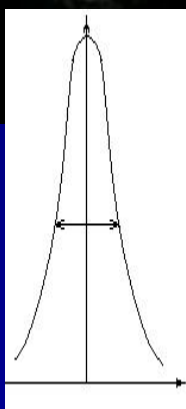
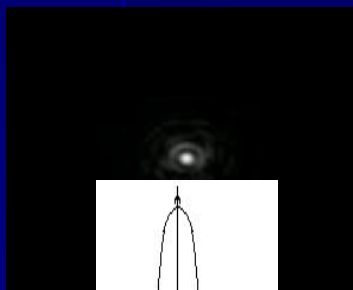
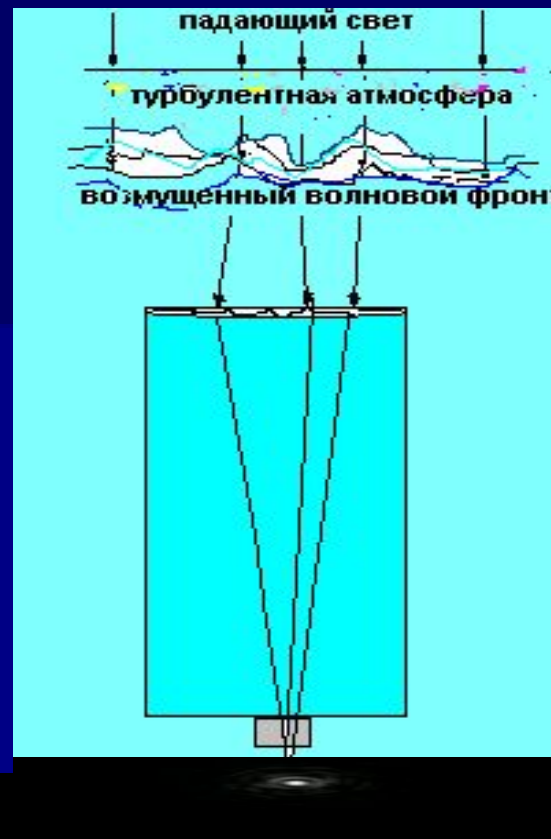
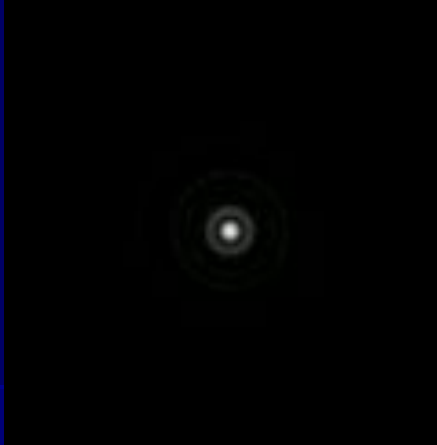
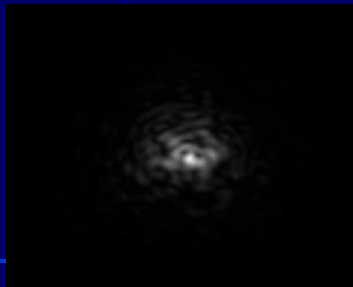
M_1 , M_2 are the parabolic primary and hyperbolic secondary mirrors, W_1 and W_2 are the entrance apertures. Two stellar images are separated on the detector by a wedge prism on W_2 .



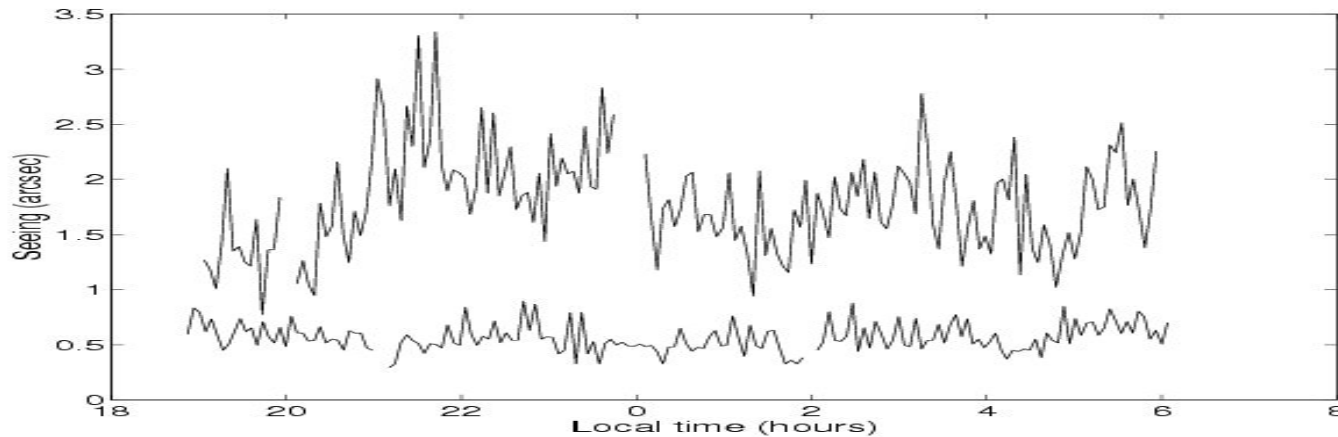
**Исследование качества изображения на
Майданакской обсерватории методом регистрации
дифференциальных дрожаний изображений звезд**



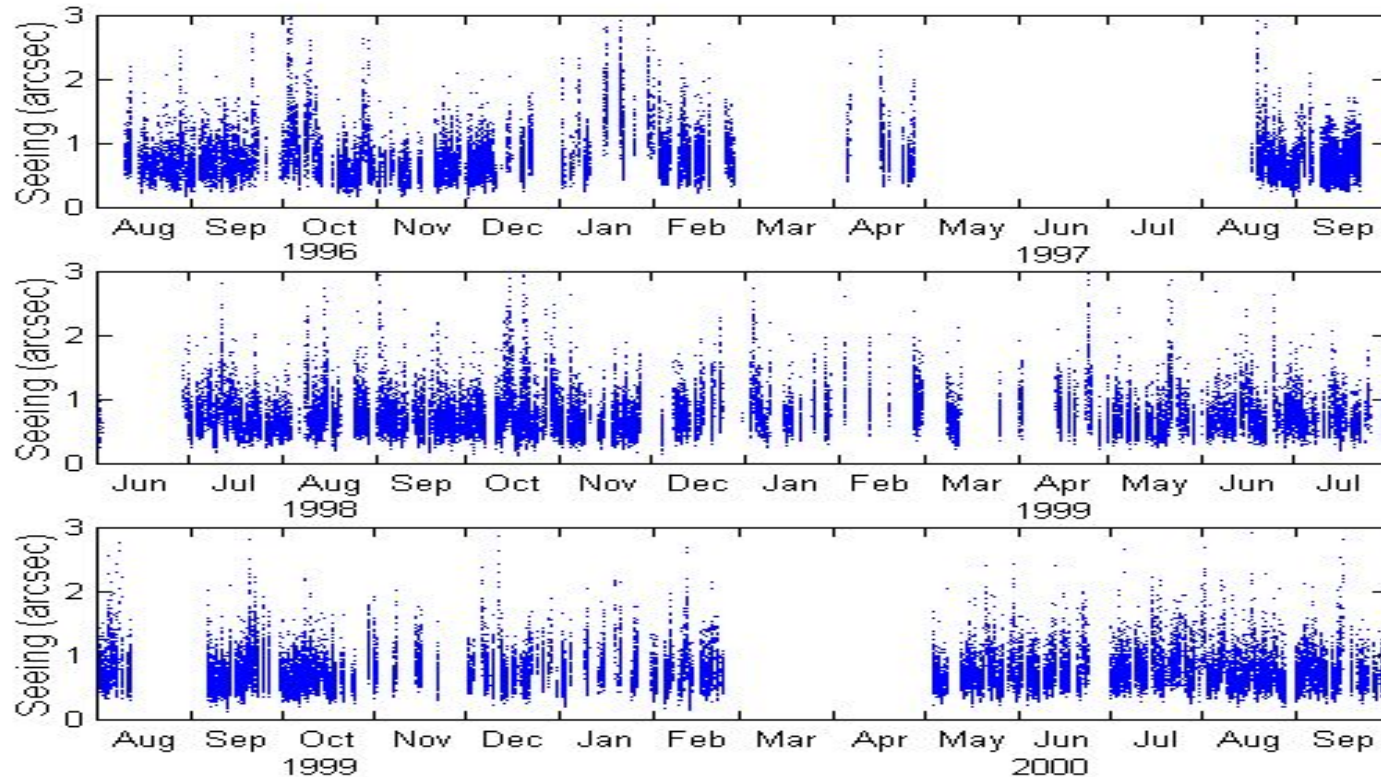
Очень плохое



ОТЛИЧНОЕ

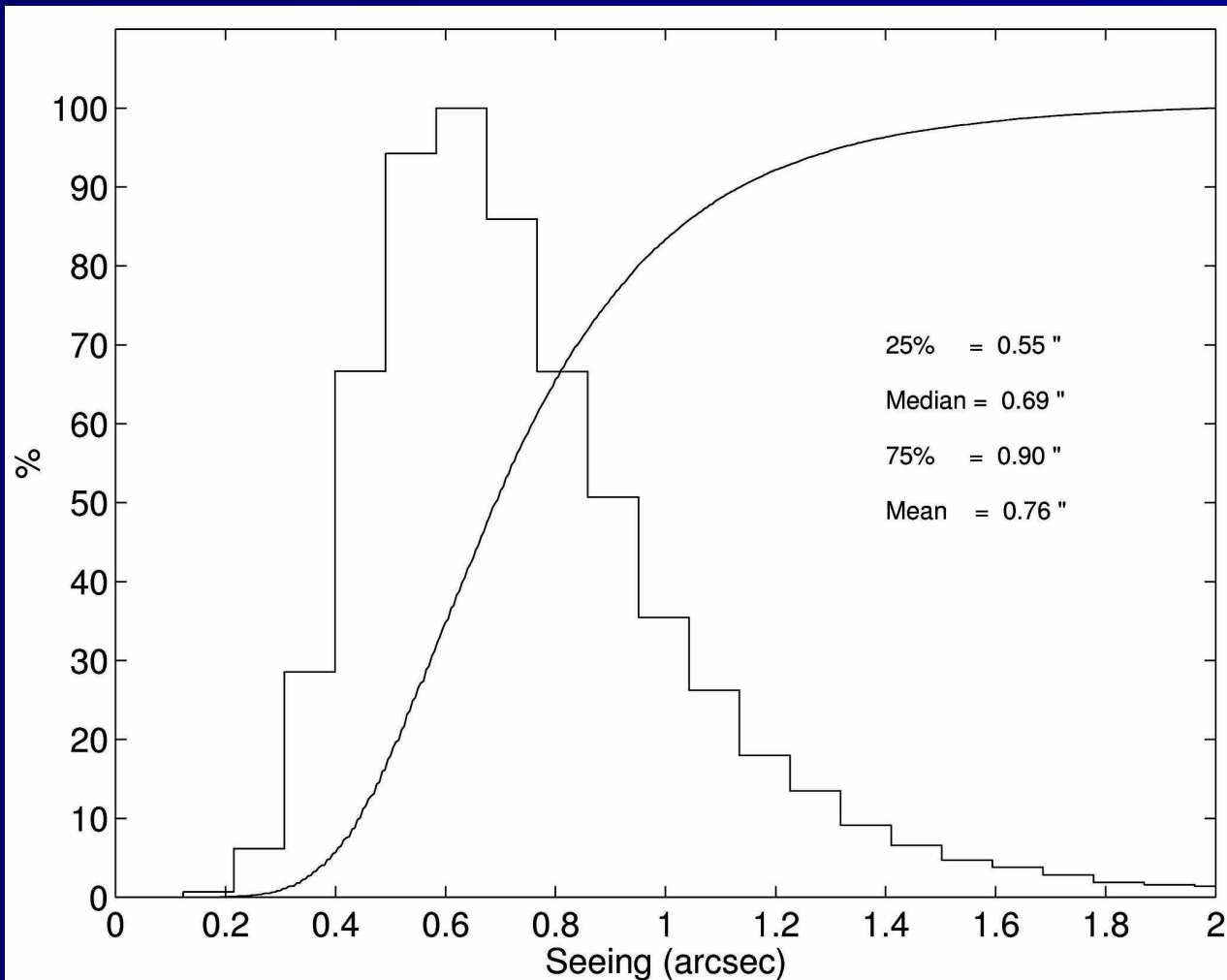


Maidanak seeing measured by DIMM in arcseconds at zenith and 0.5 μm : examples of a good and a bad nights

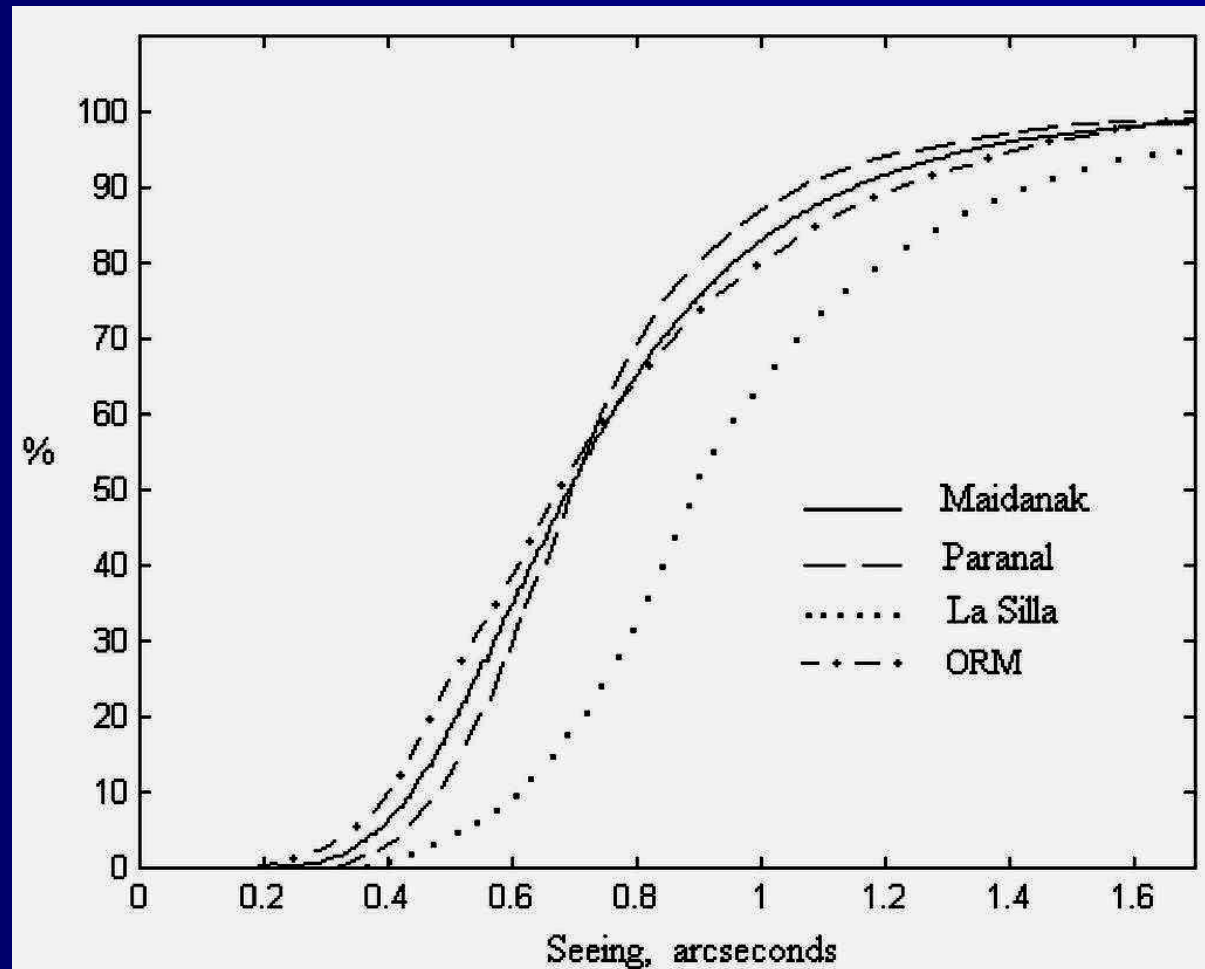


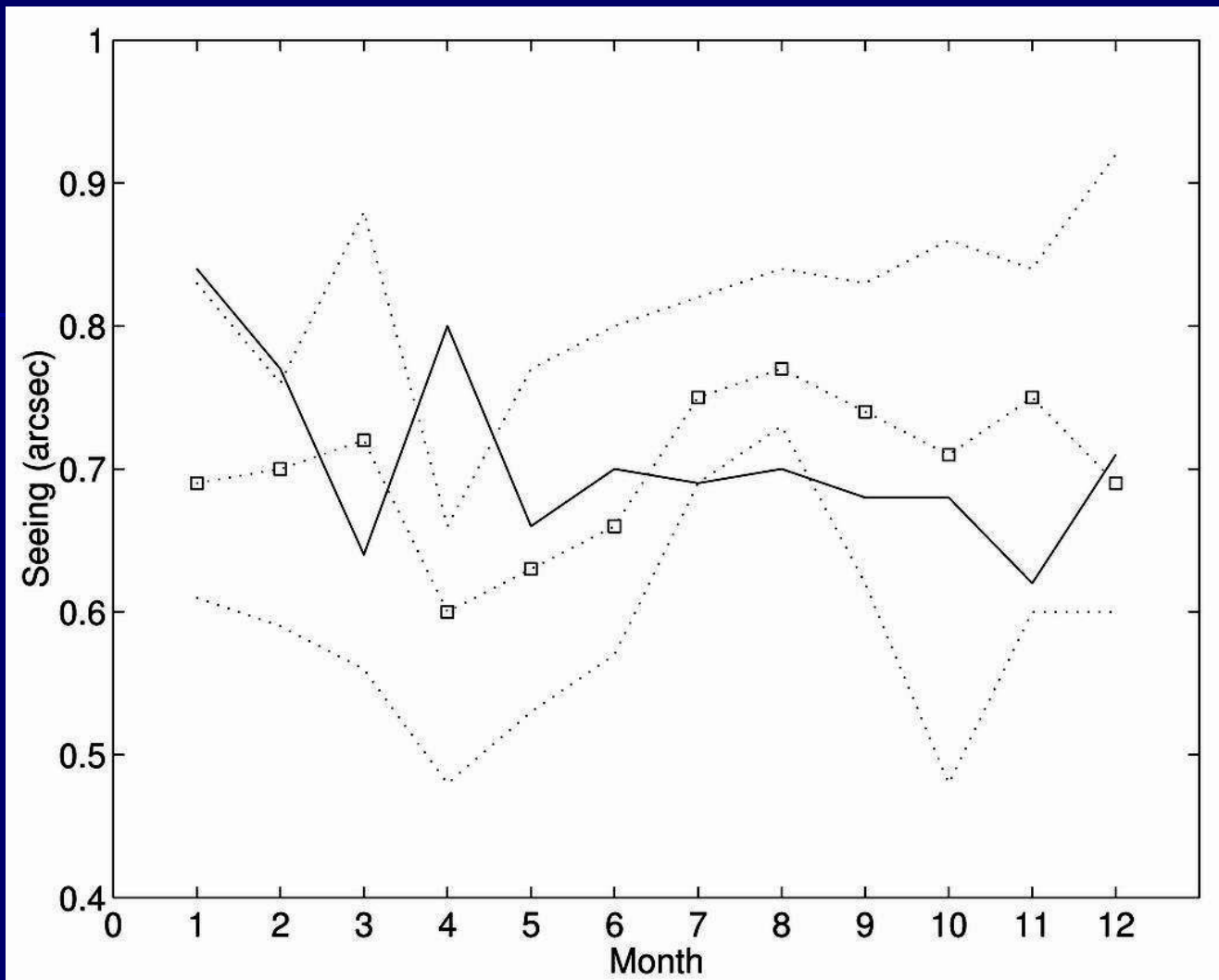
The full series of seeing measurements obtained at Maidanak with the DIMM from August 1996 up to November 2000

Histogram and cumulative distribution



Comparison with other observatories





Monthly median seeing at Maidanak in [1996-1999] (full line) and at Paranal (squares on dotted line) with the minimum and maximum monthly averages (dotted lines) during the period [1993-1999]

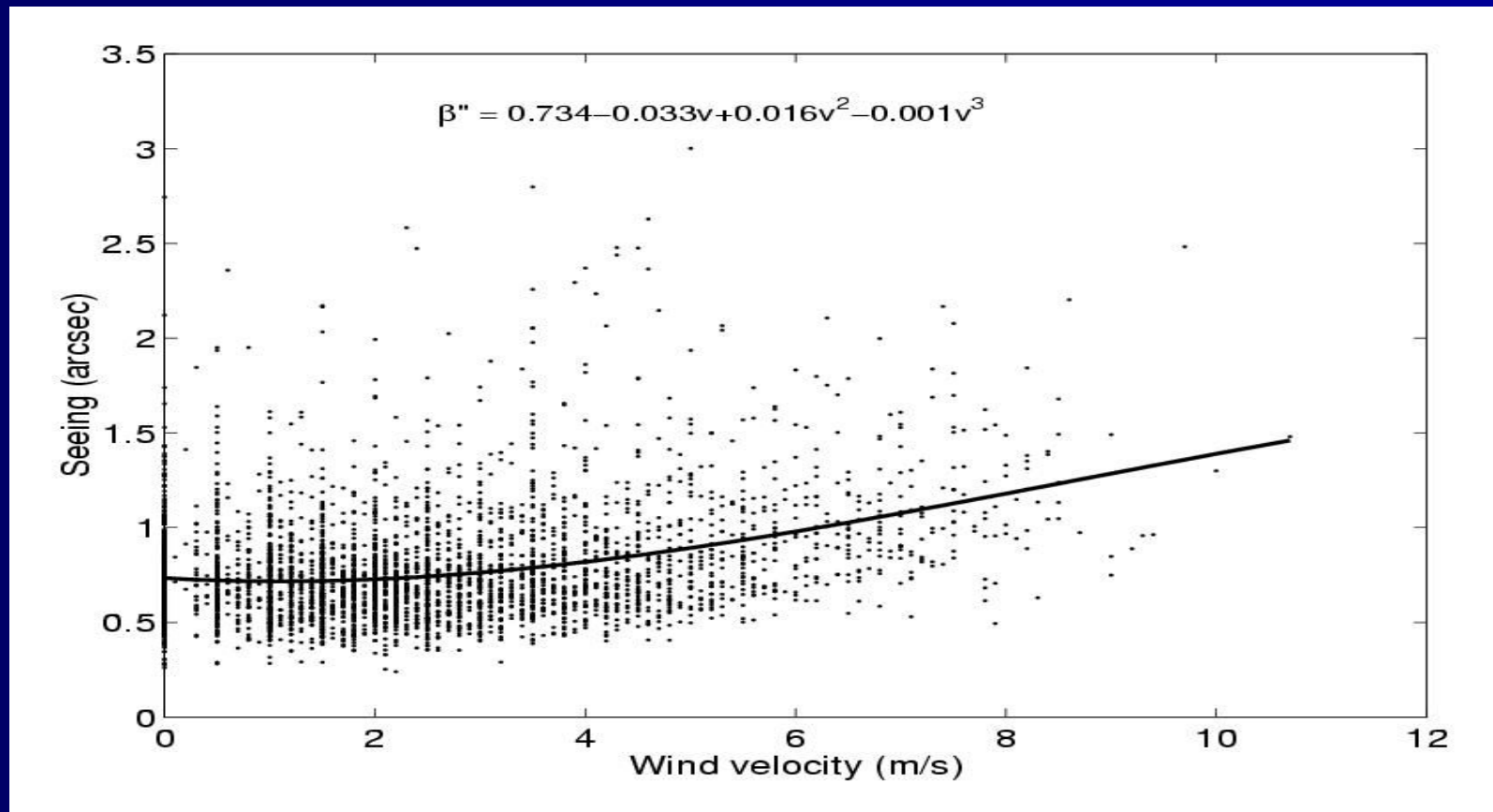
Monthly average fraction of clear nights at Maidanak in [1979-1985] (Gladisheva & Shirokova 1987) and of photometric nights at La Silla and Paranal during period [1983-1997] (Sarazin 1997b)

Month	Maidanak	La Silla	Paranal
January	31	73	77
February	54	79	84
March	42	76	83
April	47	63	79
May	44	40	70
June	79	34	70
July	92	42	75
August	81	48	73
September	84	54	85
October	55	57	83
November	42	67	84
December	46	69	77
Total	58	59	78

Month	Wind, m/s			Temperature			
	Median	max	mean	Median	Min	Max	mean
January	2.8	9.7	3.22	-7.20	-14.20	1.40	-6.19
February	1.0	8.0	1.96	-6.80	-15.40	-1.00	-7.01
March	2.0	9.3	2.44	-4.40	-9.40	-2.00	-4.69
April	3.7	8.5	3.55	2.70	-4.00	6.20	2.00
May	2.3	4.9	2.41	8.00	5.00	13.40	8.61
June	3.2	9.0	3.33	11.60	5.80	17.20	11.74
July	2.0	8.5	2.27	14.20	7.20	24.50	14.32
August	2.0	10.7	2.26	14.20	4.40	19.50	13.56
September	2.2	8.6	2.50	11.20	1.20	17.60	11.62
October	2.0	10.0	2.27	5.20	-4.80	12.50	4.99
November	1.5	9.0	1.87	0.80	-7.80	9.40	0.61
December	0.5	6.8	1.16	-6.65	-13.60	2.00	-6.43
Total	1.95	9.03	2.46				

Seasonal statistics of wind velocity (m/s) and temperature (Celsius) measured once per 6 m above ground during DIMM seeing measurements at Maidanak for period August 1996 to October 2000 reorganized on 12 months basis

Dependence of the seeing on ground level wind speed at Mt. Maidanak



Ground layer turbulence

- MAST- the instrument is developed at Nice University (UNSA) (M.Azouit, F. Manigault, A.Agabi et al.)
- Couple of temperature sensors at the altitudes up to 25.5m
- The temperature microfluctuations are measured on each level
- From C_T^2 to C_N^2

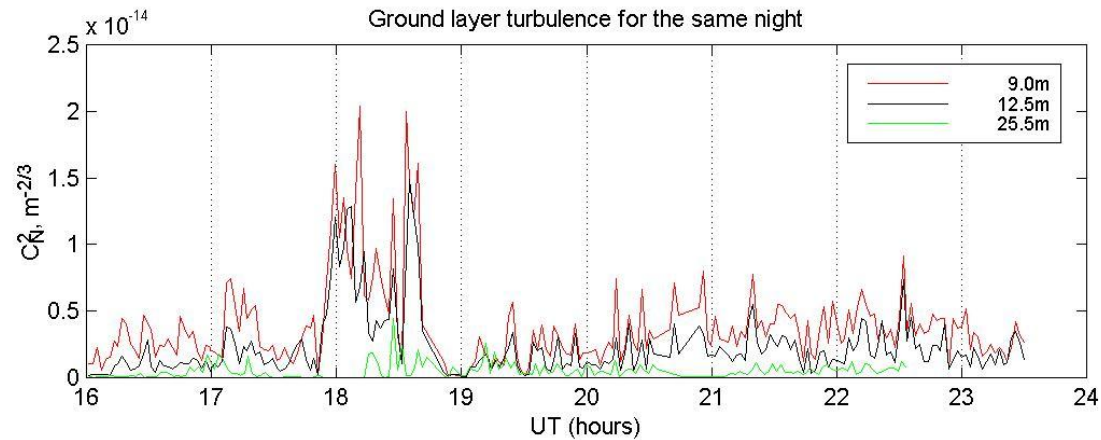
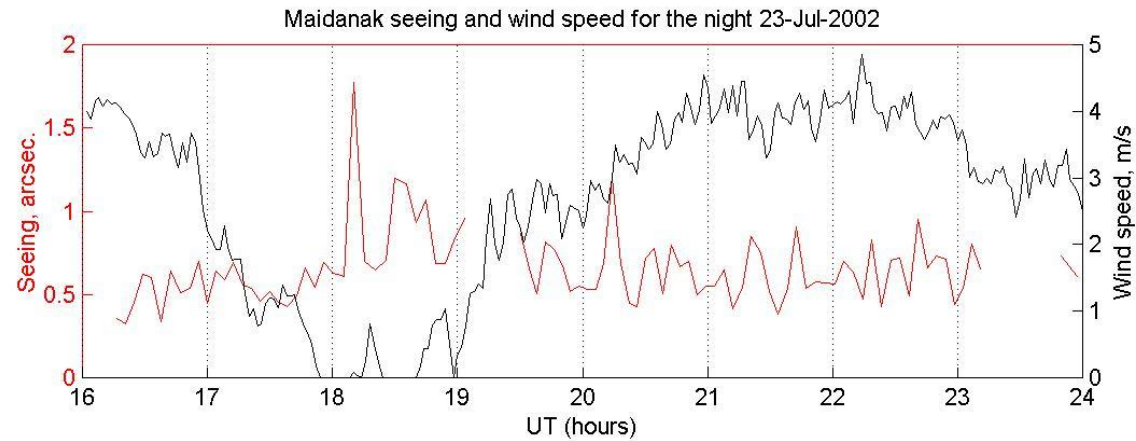
Ground layer turbulence



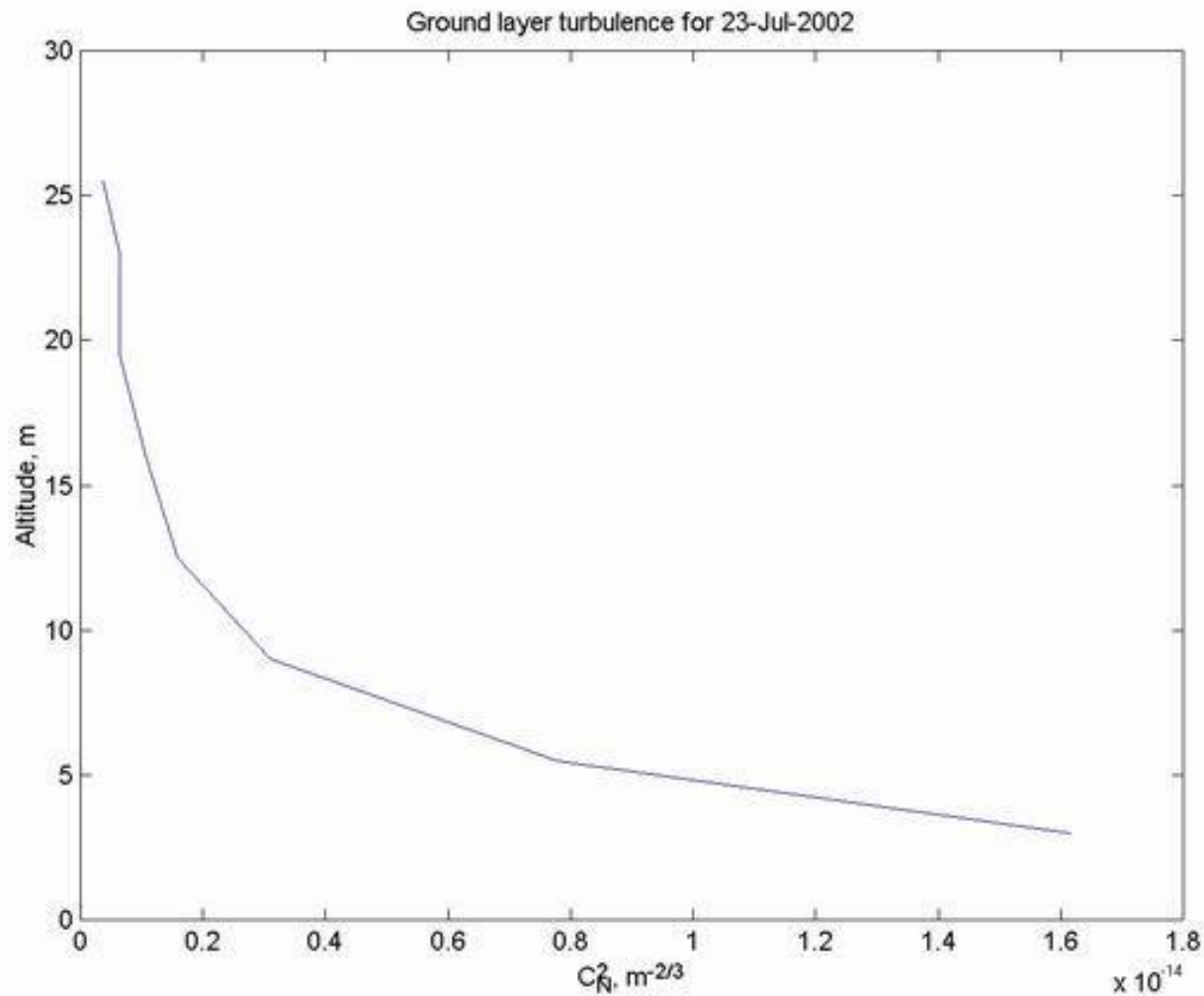
Ground layer turbulence



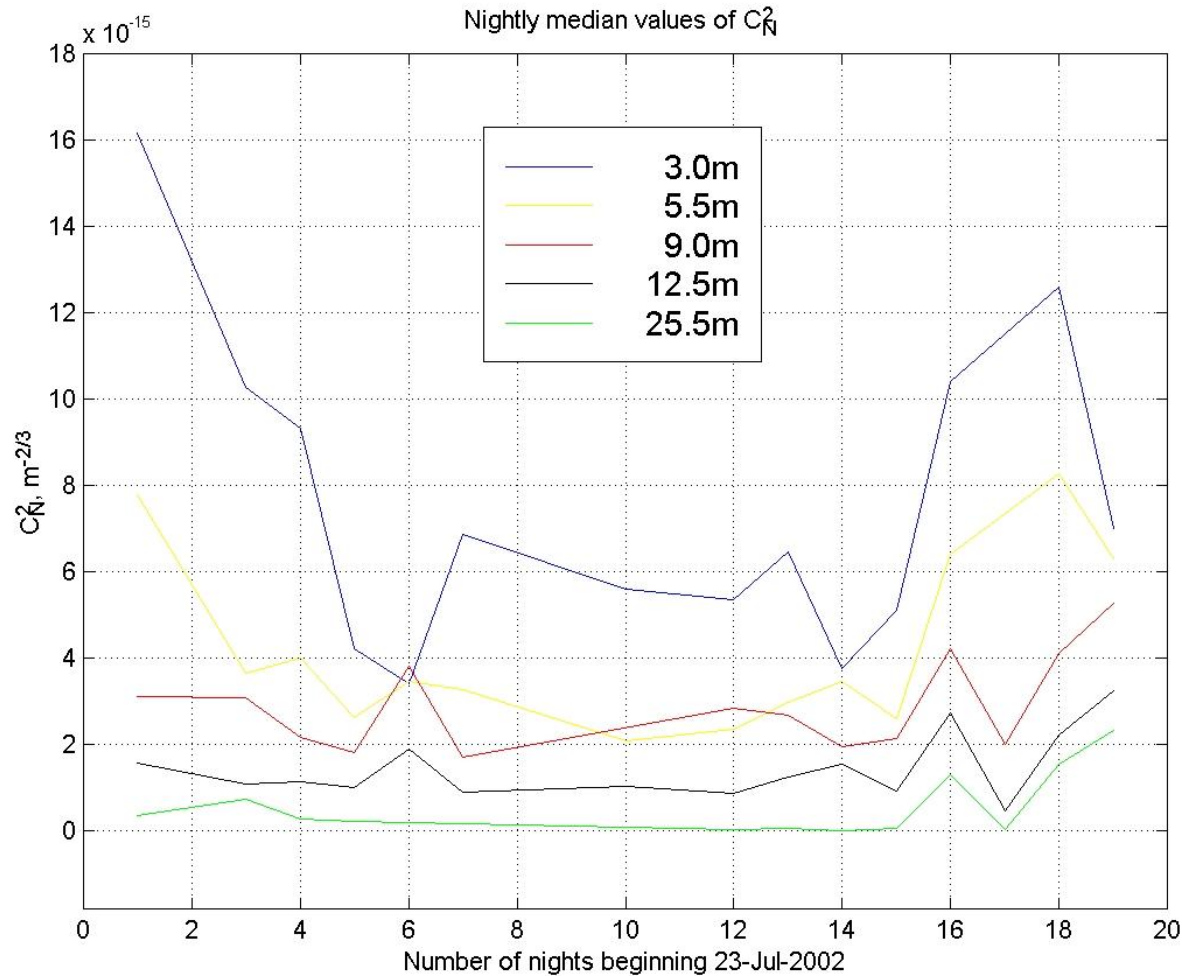
Correlation with seeing and wind speed



C_N^2 versus altitude



Night by night variations



Comparison with Paranal

Site	Median seeing	Log(C_N^2) at 3m	Log(C_N^2) at 7(9)m	Log(C_N^2) at 21(23)m
Paranal	0.66	-14.2	-14.7	-15.4
Maidanak	0.69	-14.1	-14.5	-14.9

Atmospheric transparency in UBVR filters

- U B V R

- 3464 4227 5488 6760 Å

- During the 12 summer season of Maidanak in period 09-Jun-1991 - 05-Oct-2002 performed in 856 nights.

