2008 MicroFUN Workshop

MicroFUN Observations at Mt. Lemmon

15–18 Dec 2008 @NZ

Chung-Uk Lee, Seung-Lee Kim

Outlines

- Mt. Lemmon 1-m robotic telescope
  - History of the telescope
- Interactive observation
  - MicroFUN
- Future instrument upgrade
  - New CCD camera


Mt. Lemmon 1-m robotic telescope

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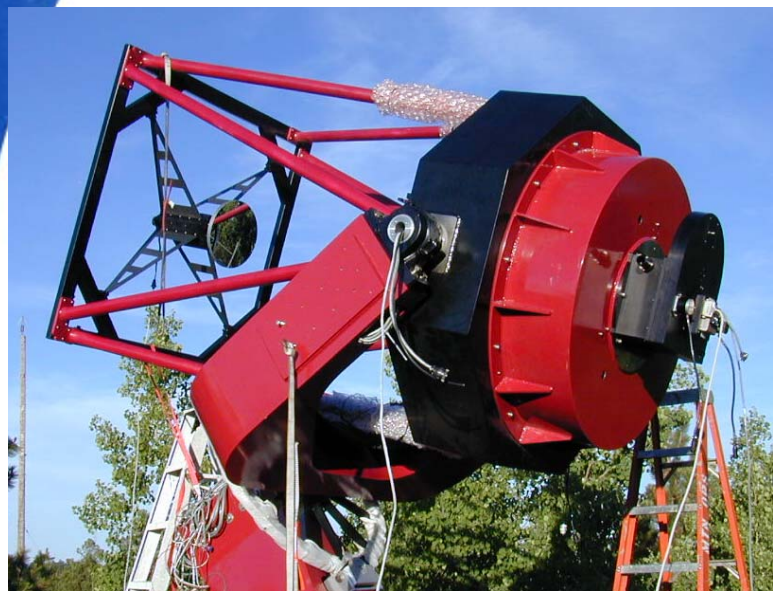

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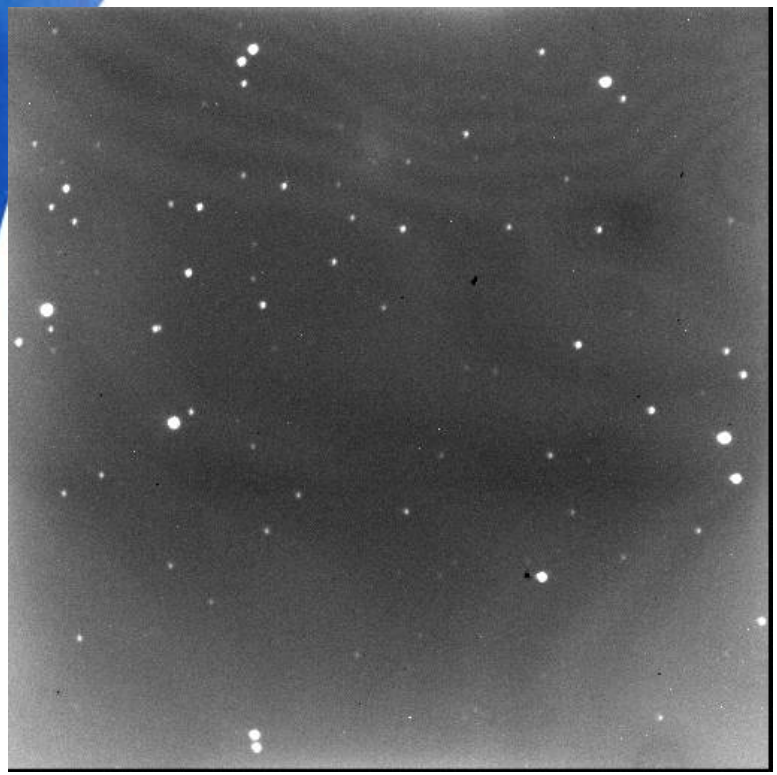

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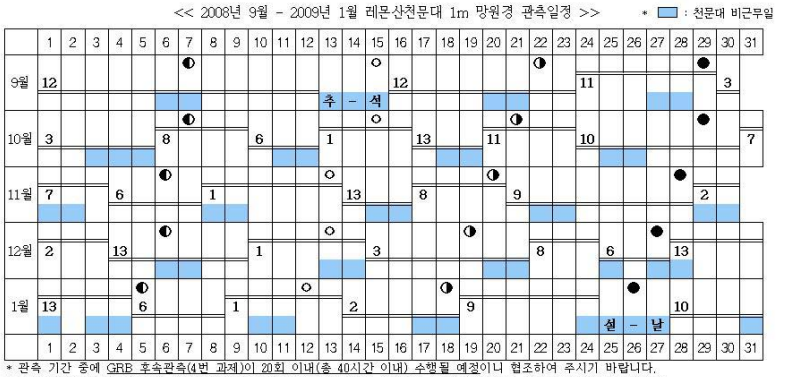

<< 2008년 9월 - 2009년 1월 레몬산천문대 1m 망원경 관측일정 >> * : 천문대 비근무일

* 관측 기간 중에 GRB 후속관측(4번 과제)이 20회 이내(총 40시간 이내) 수행될 예정이니 협조하여 주시기 바랍니다.
* 9월 1일부터 10월 10일까지 중력렌즈 후속관측(5번 과제)이 매일 1시간씩 수행될 예정이니 협조하여 주시기 바랍니다.

번 호	연구 제안자	계 목
1	김천휘, 김호일, 한원용, 이중욱 등	근접식쌍성계에서 제3천체의 검출 연구
2	윤태석	플생별 CH Cyg, UV Aur, TX CVn, AG Dra의 특이현상에 대한 측광 관측 연구
3	김용기, 한원용, I.L. Andronov 등	자기격변 변광성들의 CCD 측광관측
4	Y. Urata, 임명신, 박수종, 진호 등	Follow-up observation of Gamma-Ray Burst afterglows
5	한정호, 박병곤, 이중욱	중력렌즈 후속관측 실험
6	박수종, 고현주, 임명신, 이인덕 등	Optical variability observations of SNUQSOs : Classification of new quasars
7	이기원, 이병철, 박명구	SDSS에 나타난 격변변광성 후보들에 대한 후속 관측
8	이우백, 오규동	단주기 접촉식쌍성의 측광학적 연구
9	임홍서, 이중욱, 손봉원, 박수종 등	활동성 은하핵의 단주기 측광 변화 연구
10	김승리, R. Silvotti	Search for extrasolar planets around evolved compact pulsators
11	이재우	만기형 근접쌍성의 다중 파장영역 측광관측
12	김승리, 이중욱, 윤재혁, 백인경 등	기기점검(날씨불량-번개) 또는 산개성단내 변광천체 탐색 (레몬산천문대 장기 관측)
13	한원용, 김호일, 김천휘, 이중욱 등	근접쌍성의 강착판(accretion disk) 연구 (레몬산천문대 장기 관측)

* 2009년 1/2분기
2008년 12월 15
제출하여 주시
* 레몬산천문대는
관측이 이루어
관측방법(관측
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경우 관측시간
바랍니다.

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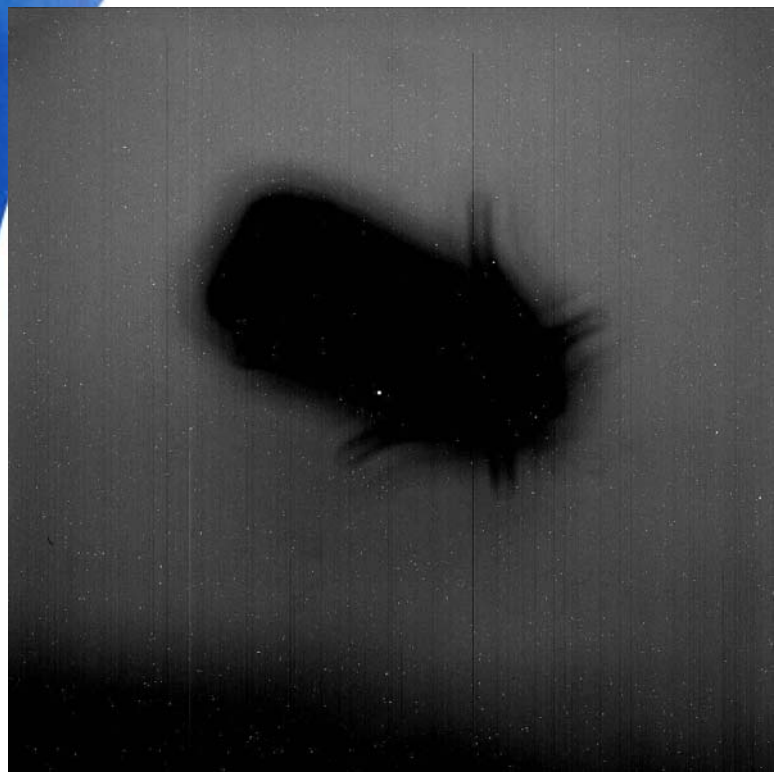

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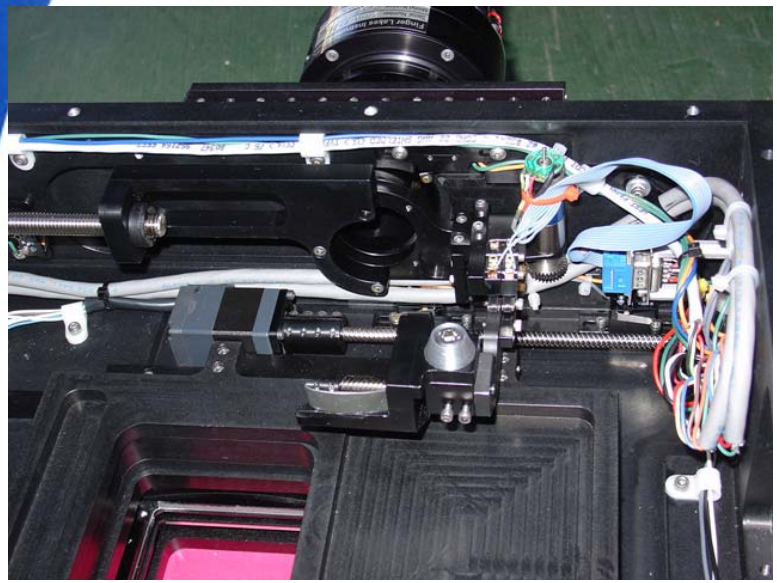

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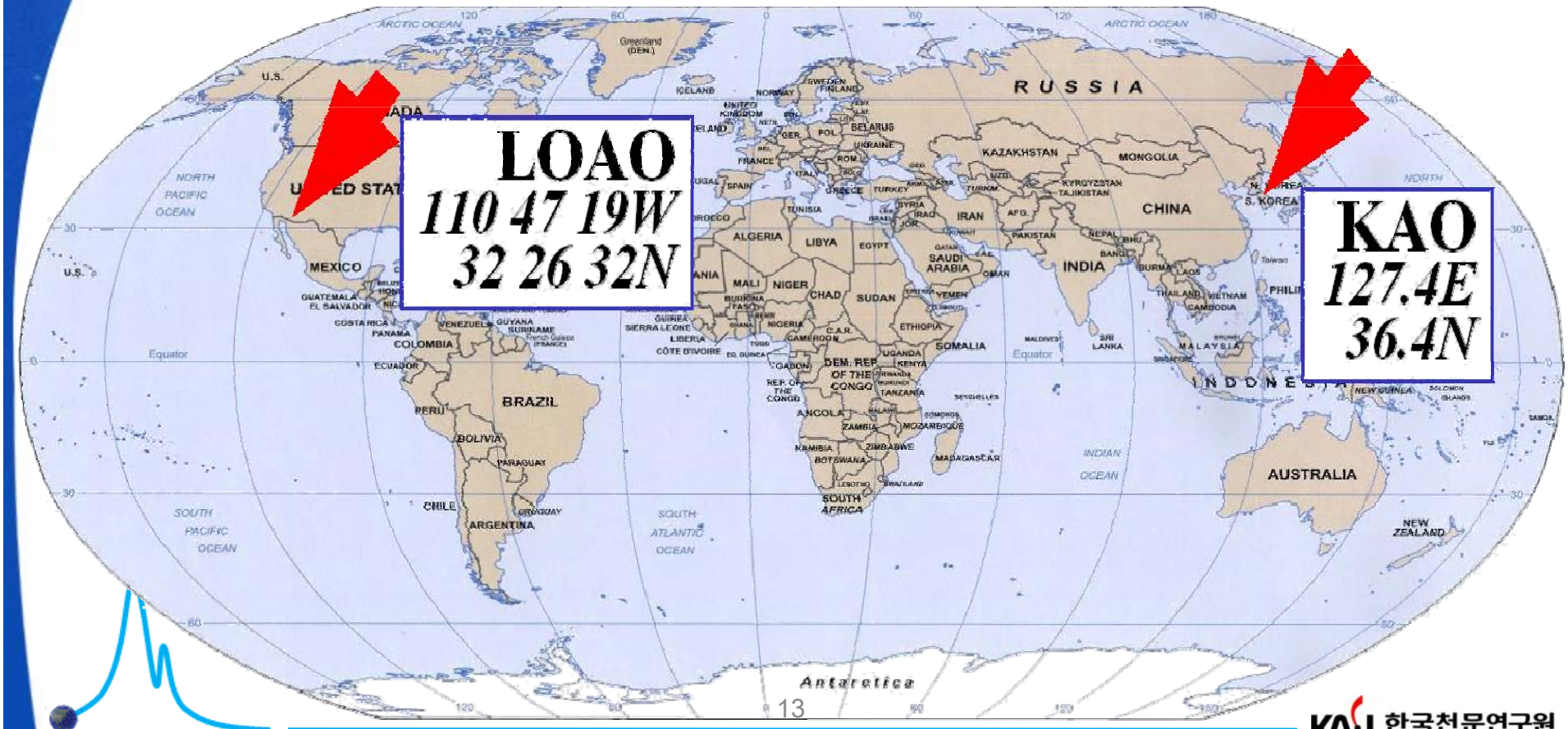
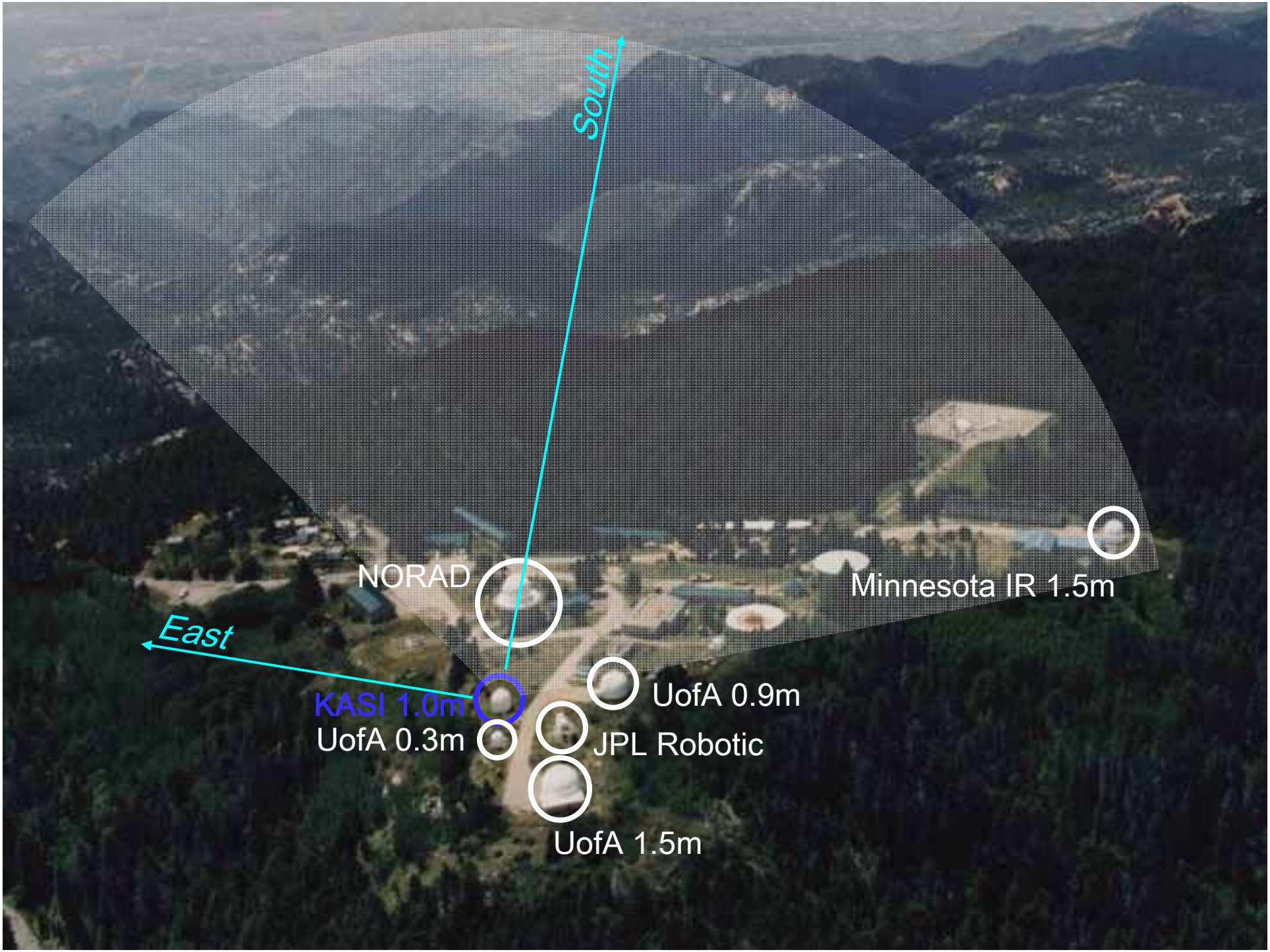
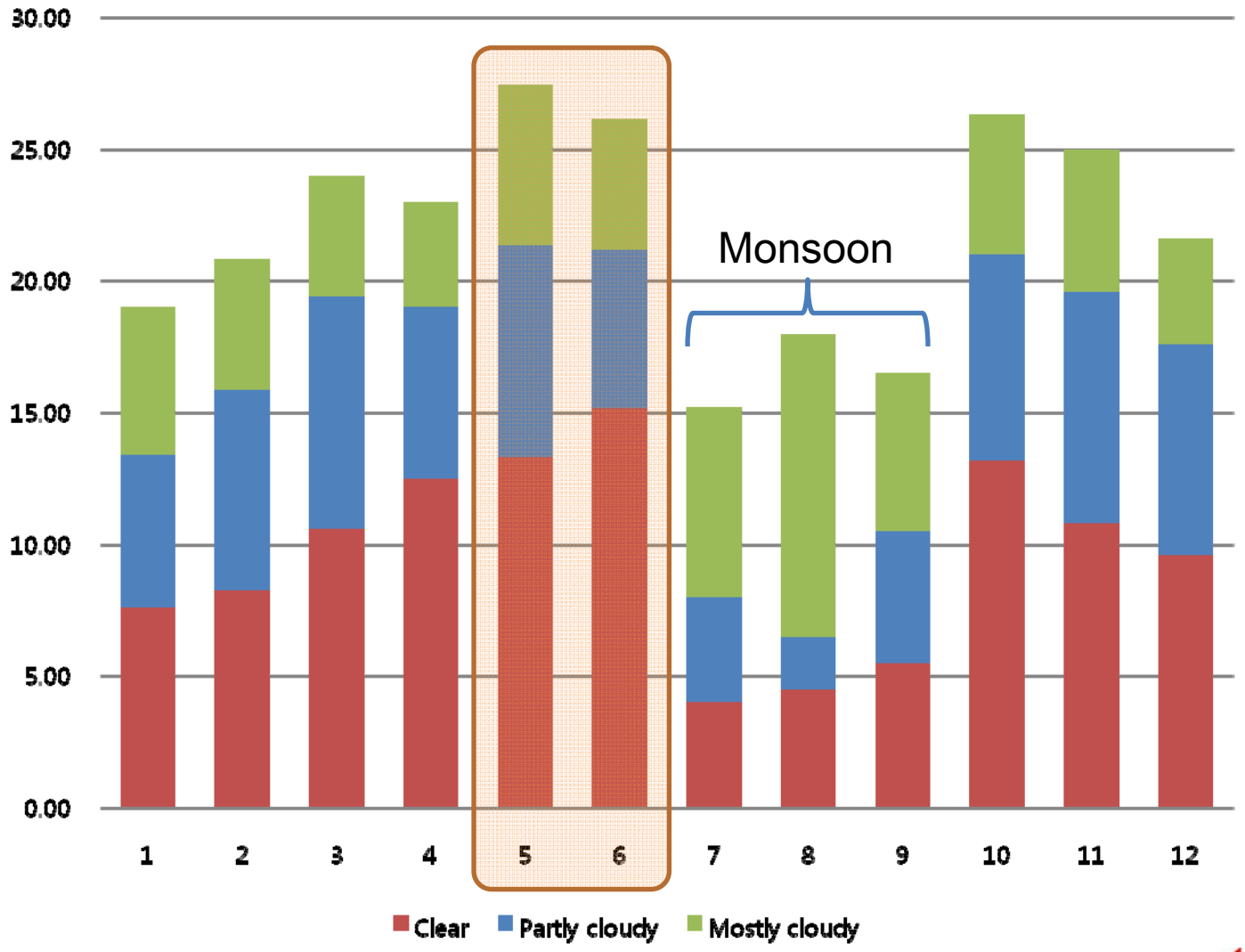
Mt. Lemmon observatory

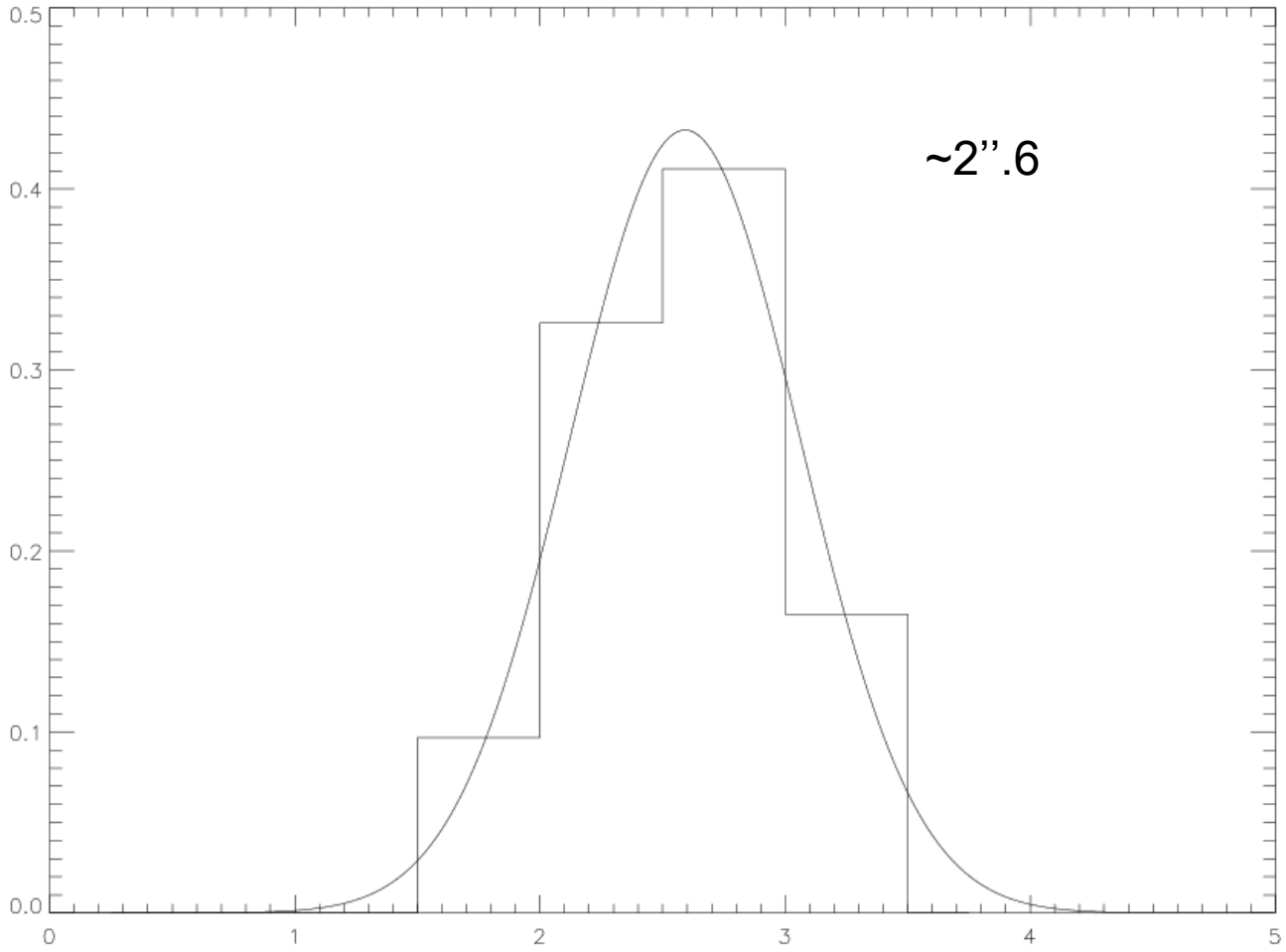



South
East
NORAD
Minnesota IR 1.5m
KASI 1.0m
UofA 0.3m
UofA 0.9m
JPL Robotic
UofA 1.5m

Weather statistics for 5 years (2003~2008)



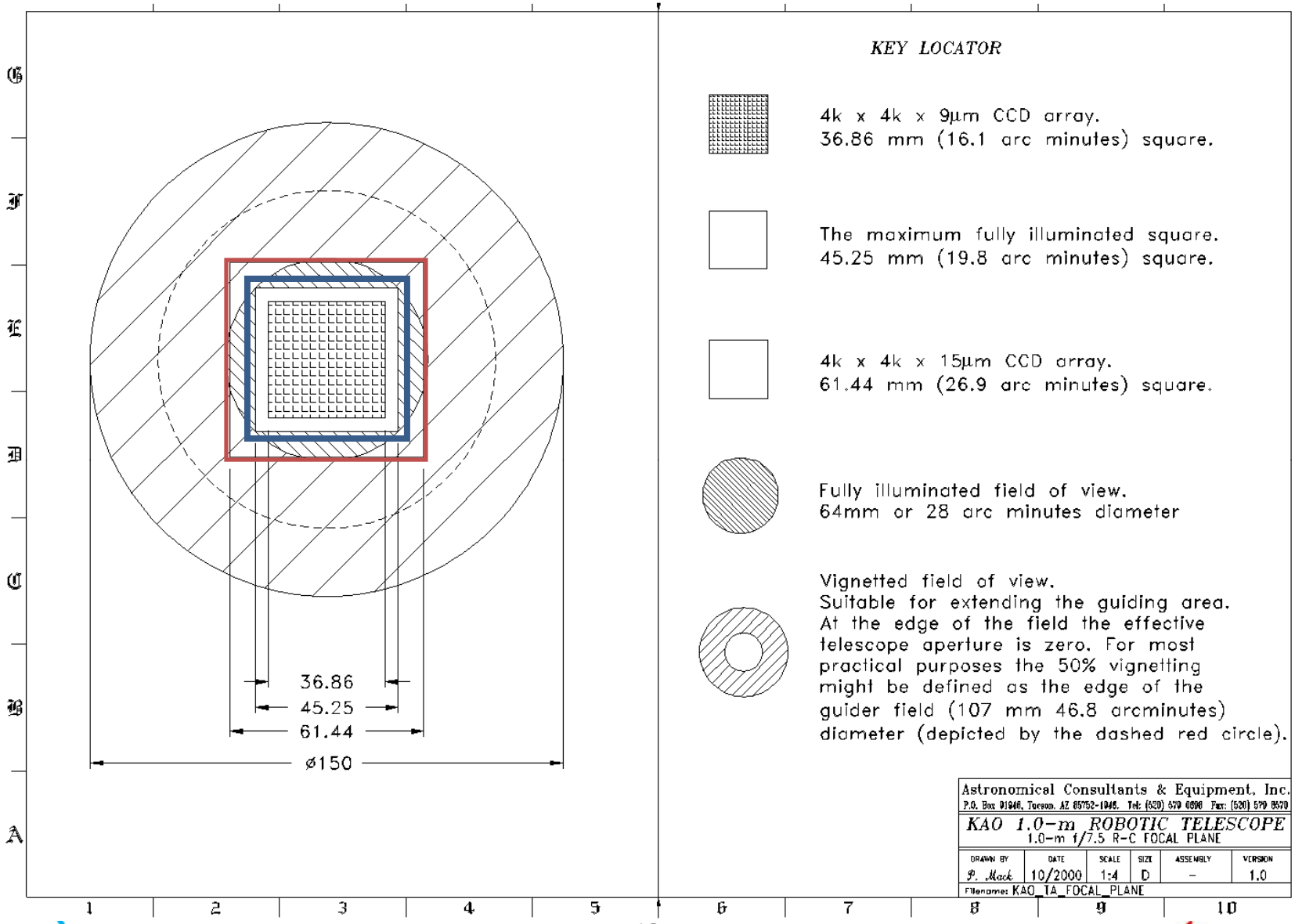
Seeing statistics for 5 years (2003~2008)



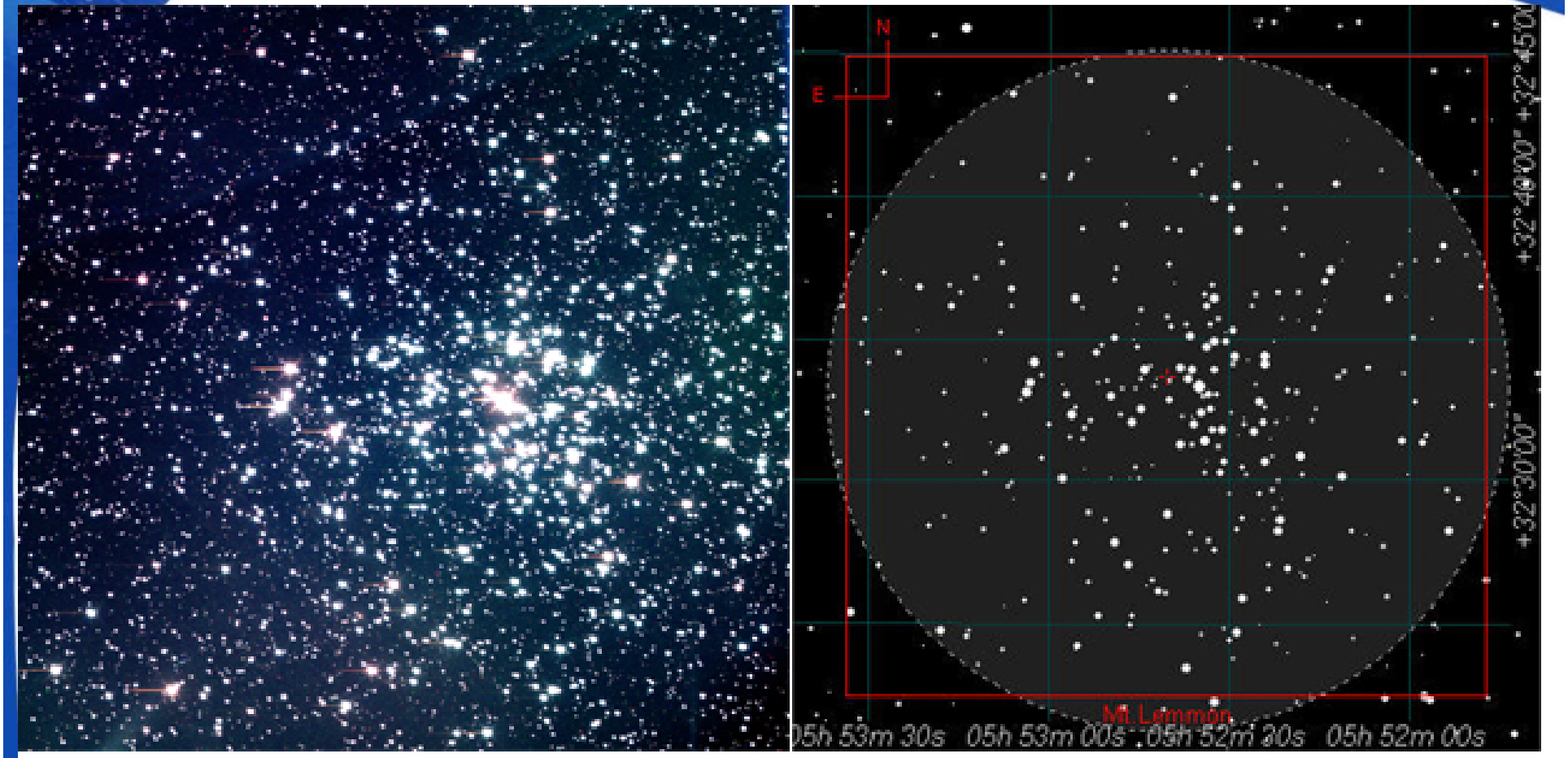
Optical parameters

System Component	Properties	Value in mm
Primary Mirror	Diameter (Physical)	1046
	Diameter (Optical)	1046 with 1000 minimum test area
	Radius of Curvature	5508.9
	Focal Length	2754.5
	Focal Ratio	2.633
	Conic Constant	-1.109198 (weak hyperbola)
Secondary Mirror	Diameter (Physical)	332.4 nominal
	Diameter (Optical)	330.4
	Radius of Curvature	-2606.7
	Conic Constant	-5.638903
System Characteristics	Effective Focal Length	7845
	Effective Focal Ratio	f/7.5
	Field of View (Diameter)	0.466 (28 arcmin)
	Plate Scale	26.25 arcsec/mm
Spacing	Prime Focus Intercept	845.7
	Primary-Secondary space	1908.7
	Back Focal Distance	500

Focal plane and CCD selection

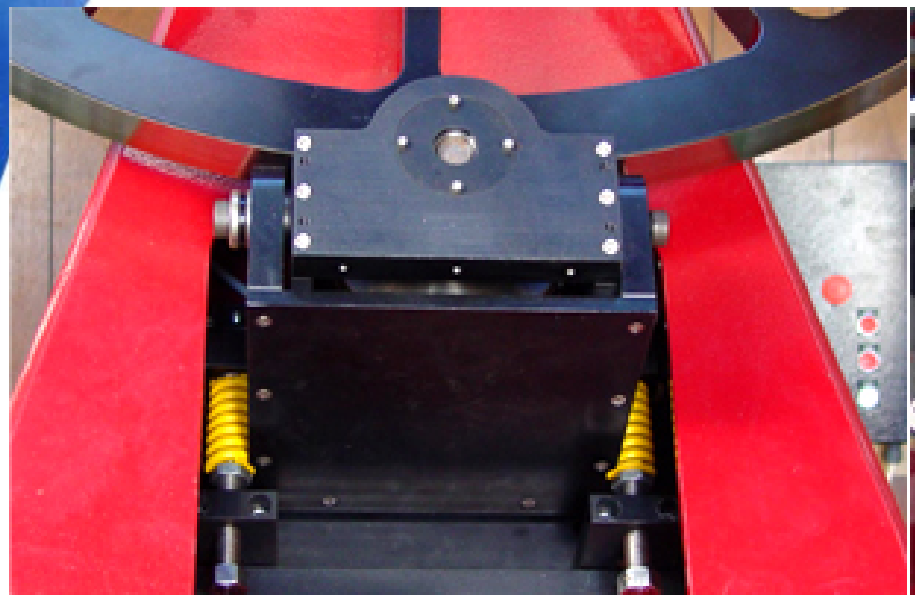


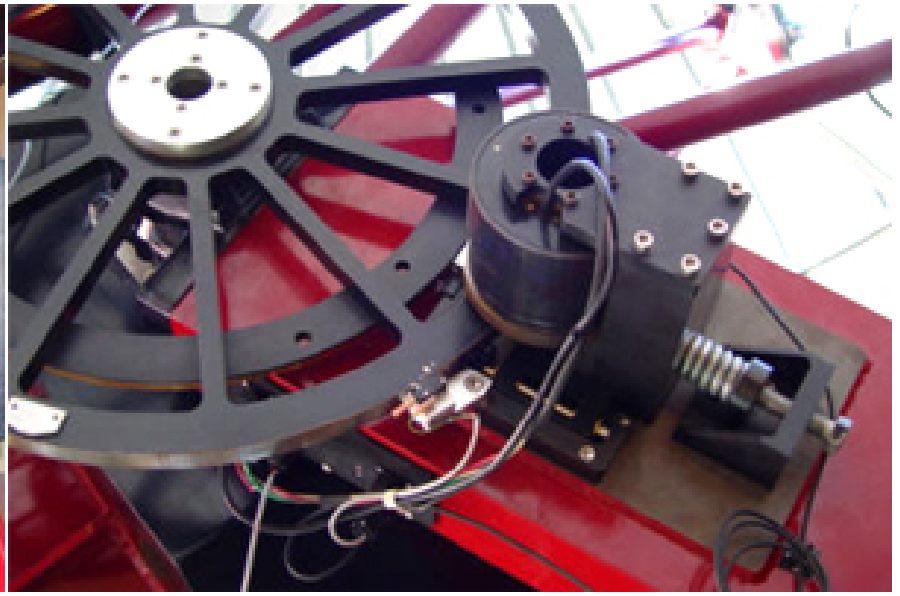
Field of View



〈 약 22.2분각의 시야를 갖는 M37과 성도와의 비교 (05 52.4, +32 33, 6.2m) 〉

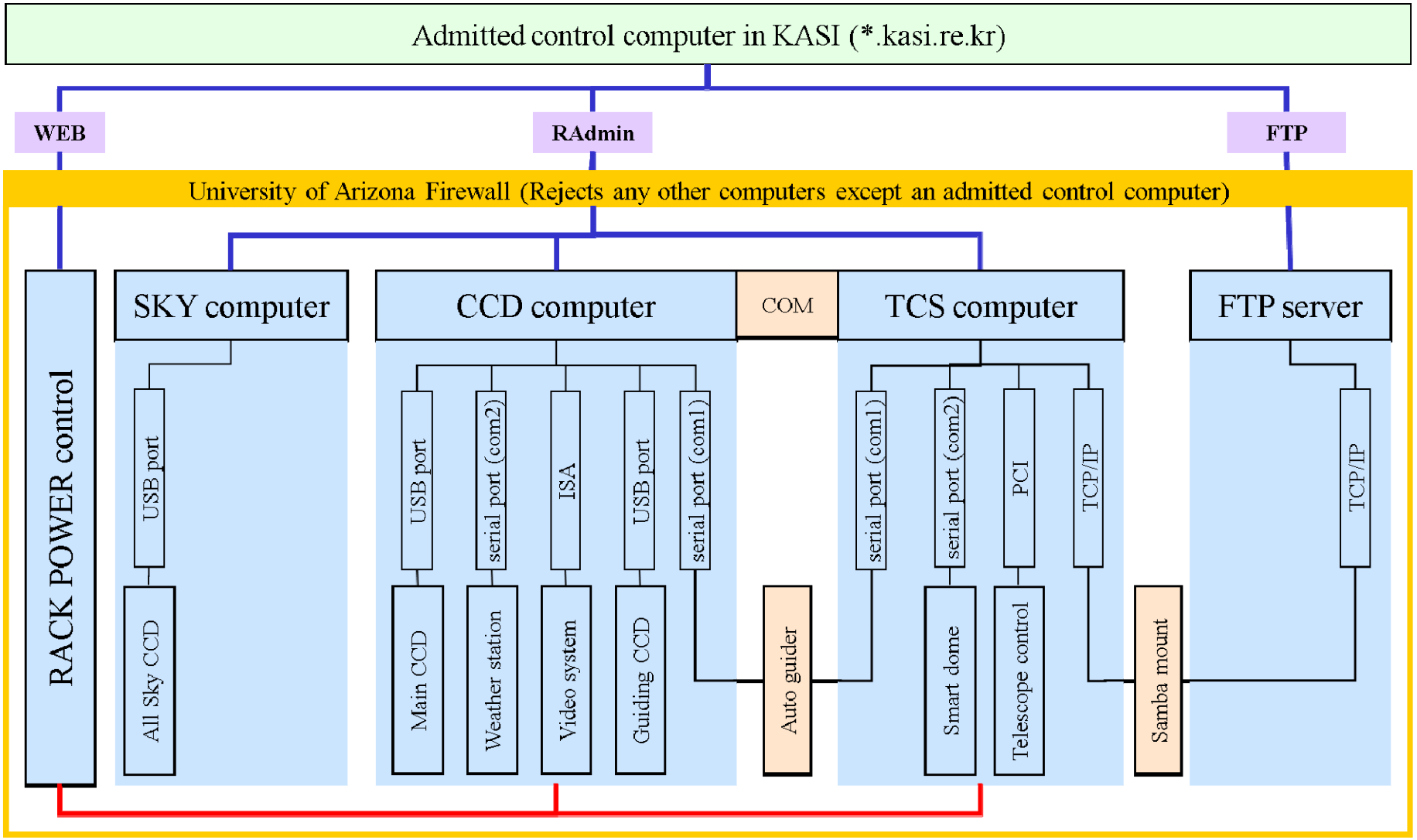
Frictional disk



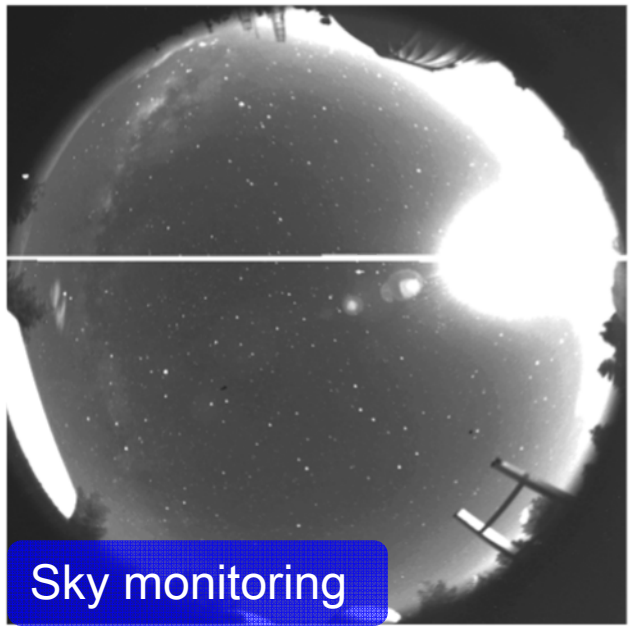


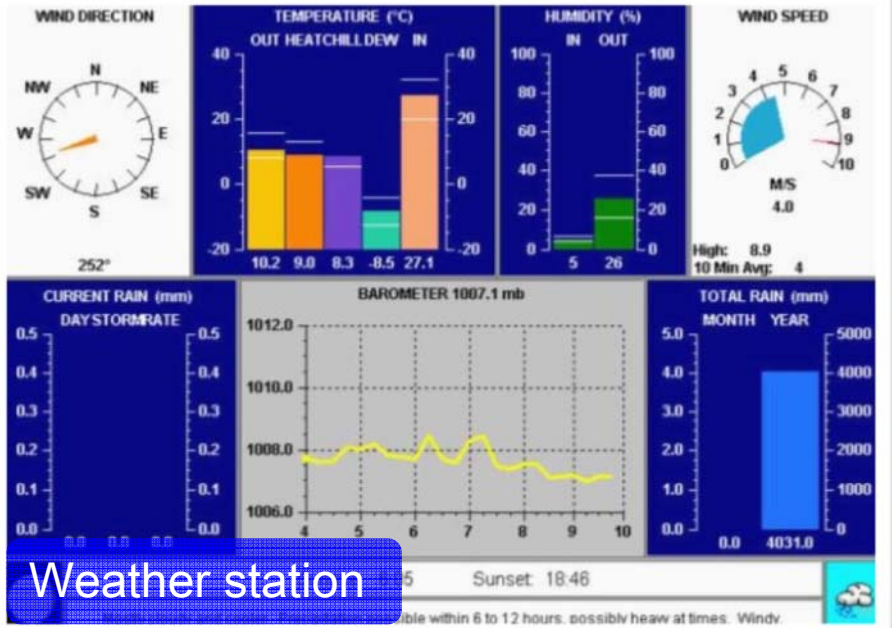
- No Periodic error

Connections between computers

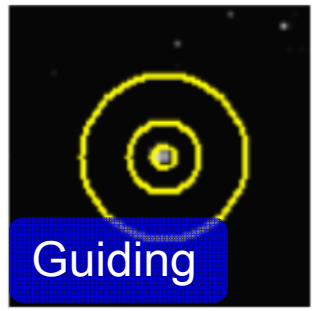


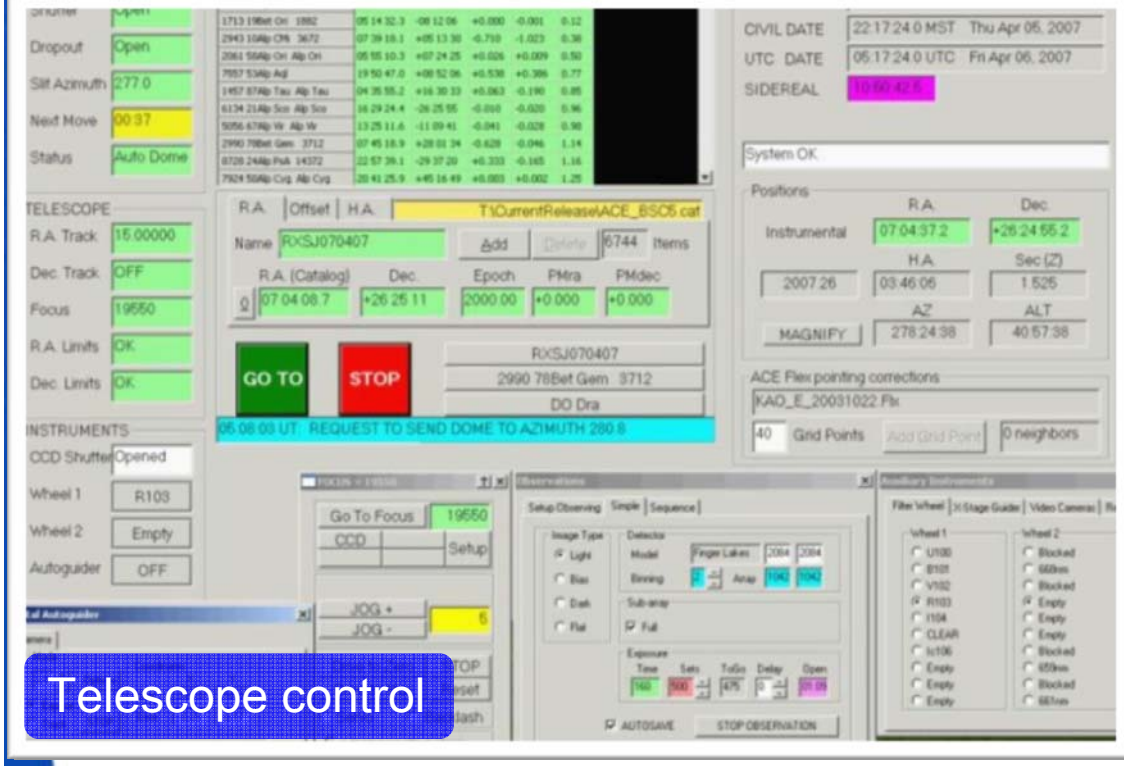
Interactive observation for μFUN

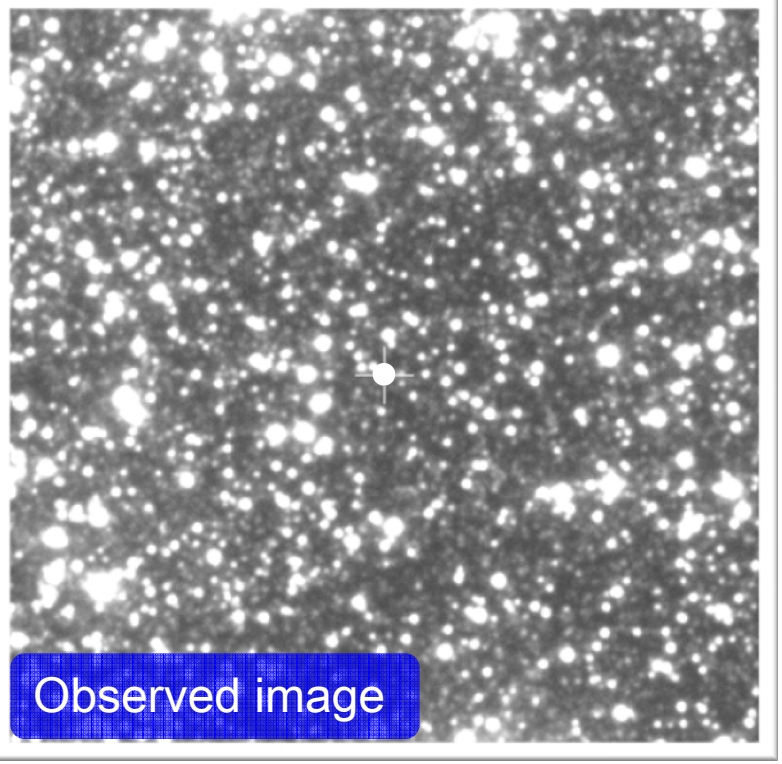

Sky monitoring


WIND DIRECTION
TEMPERATURE (°C)
OUT HEATCHILL DEW IN
HUMIDITY (%)
IN OUT
WIND SPEED
CURRENT RAIN (mm)
DAY STORMRATE
BAROMETER 1007.1 mb
TOTAL RAIN (mm)
MONTH YEAR
Sunset: 18:46
Weather station

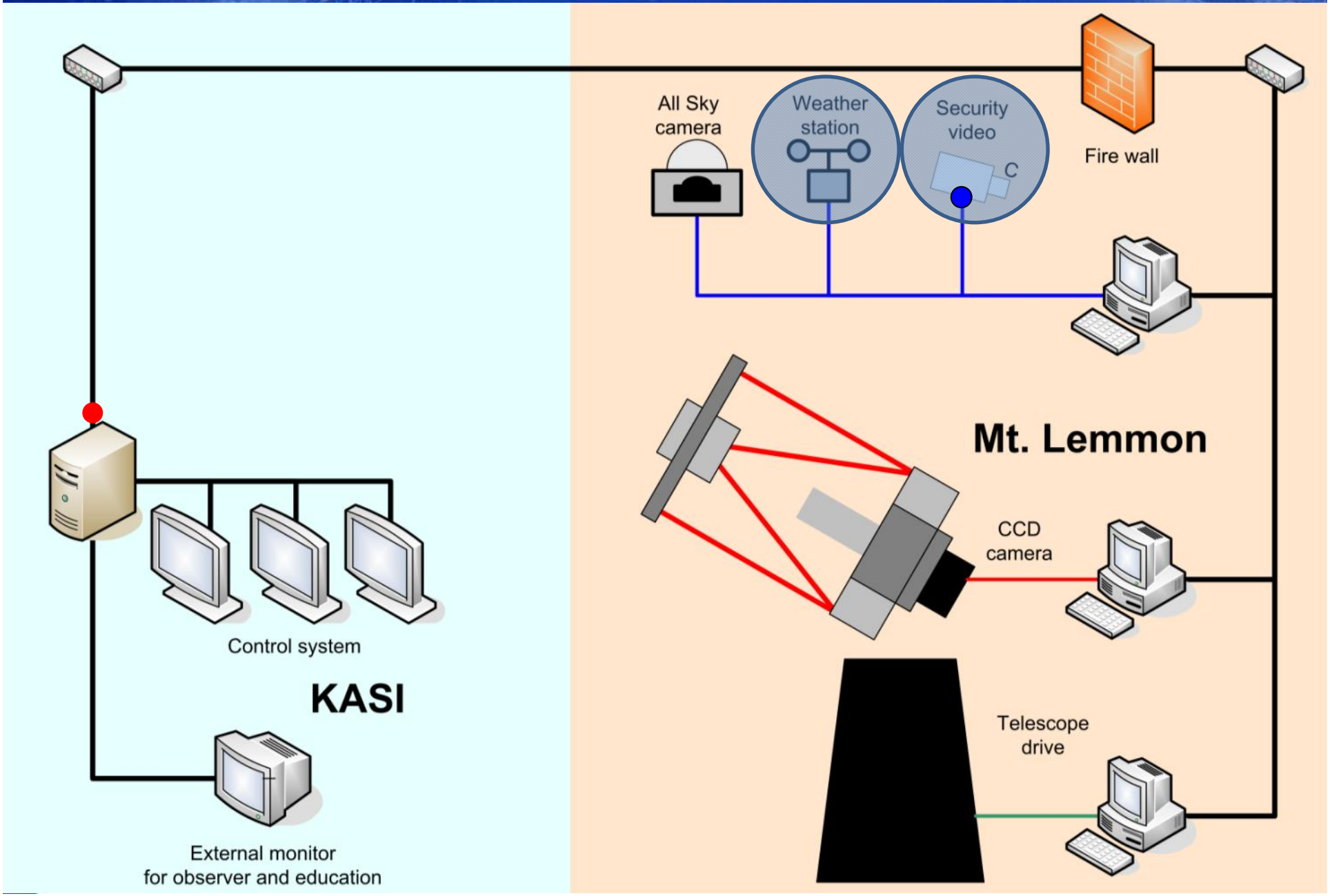

Clock sync


Guiding

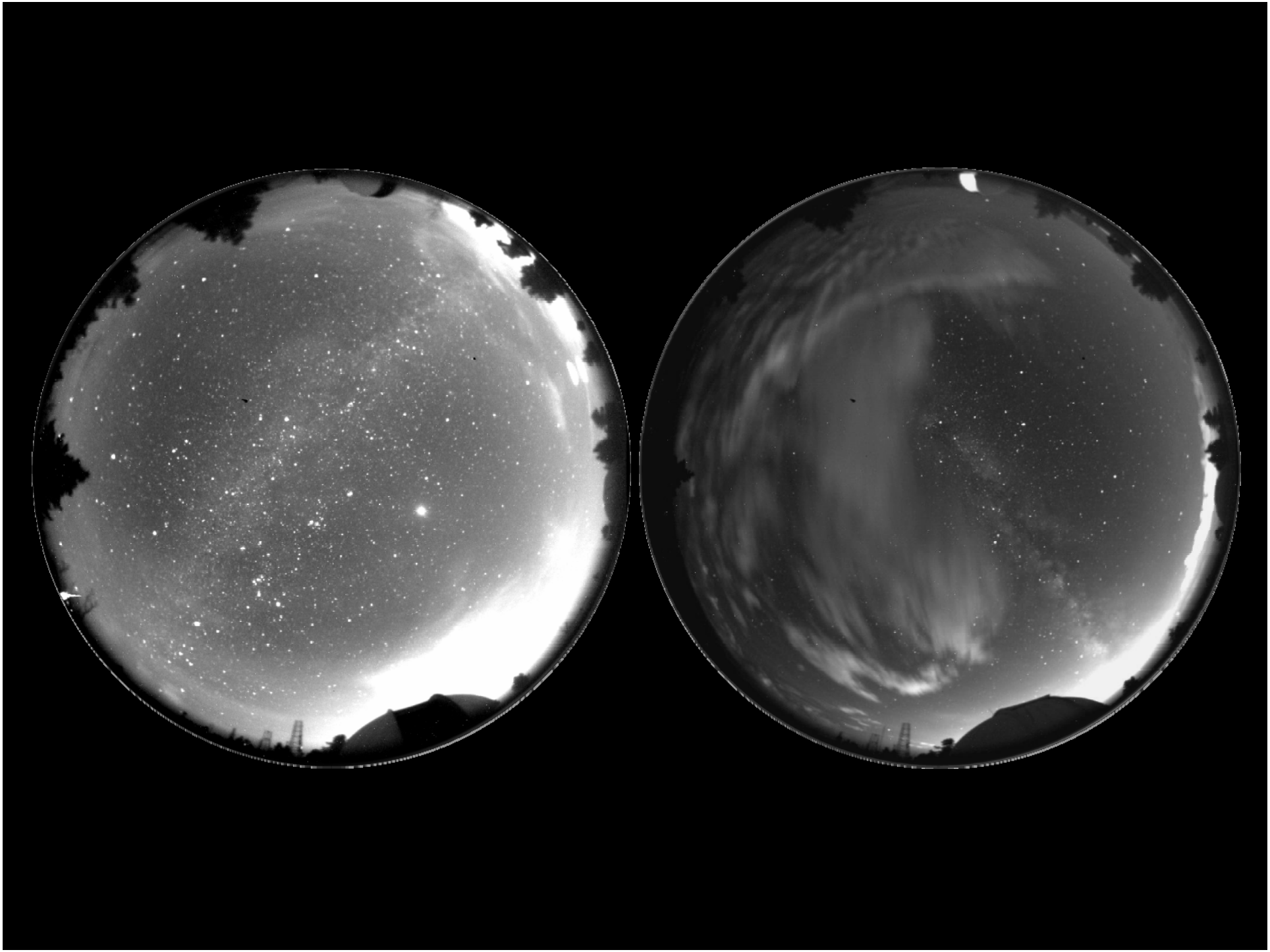

Telescope control

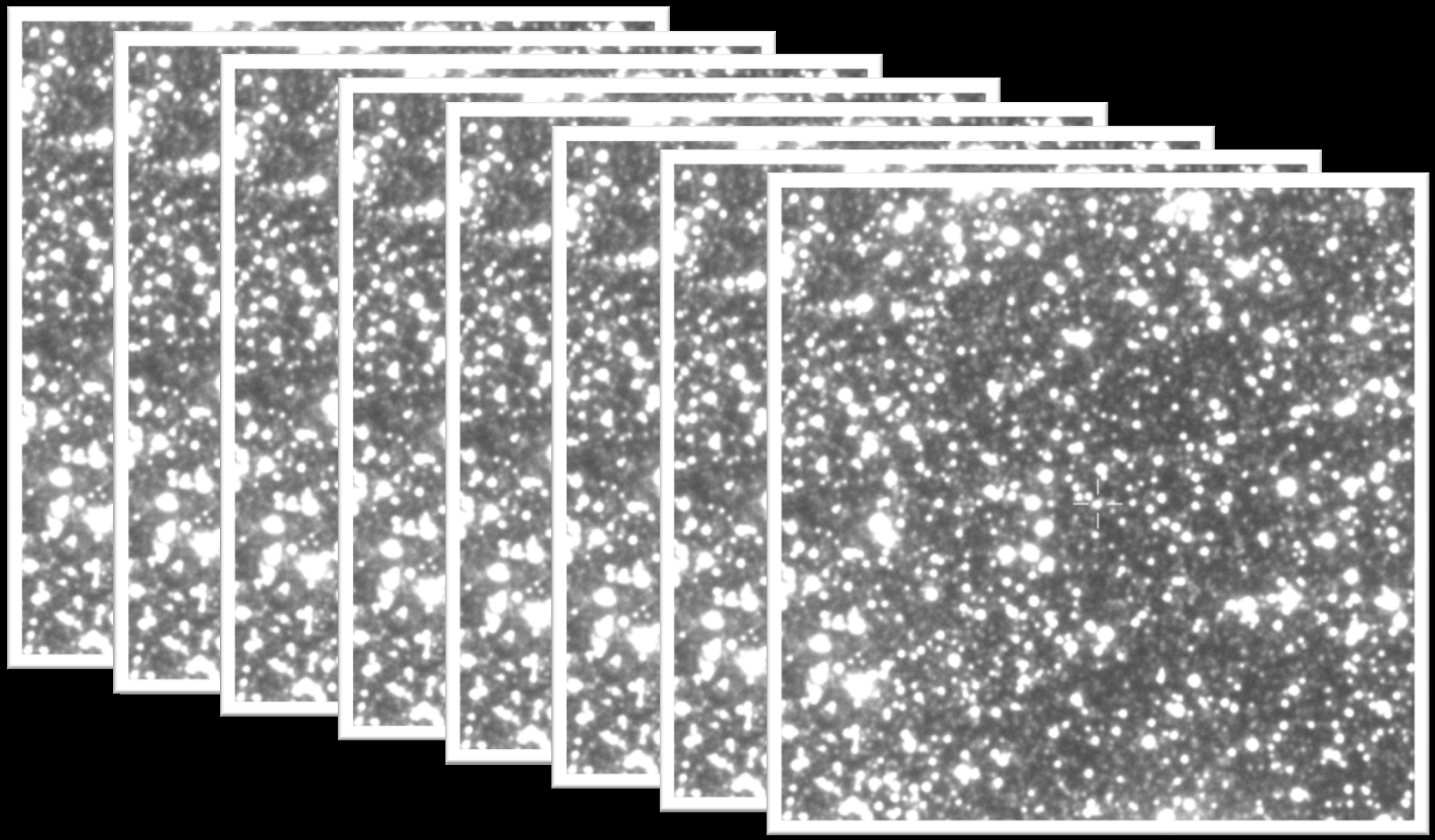

Observed image

Remote observation of u-FUN




DOME
SKY
CH3
CH4



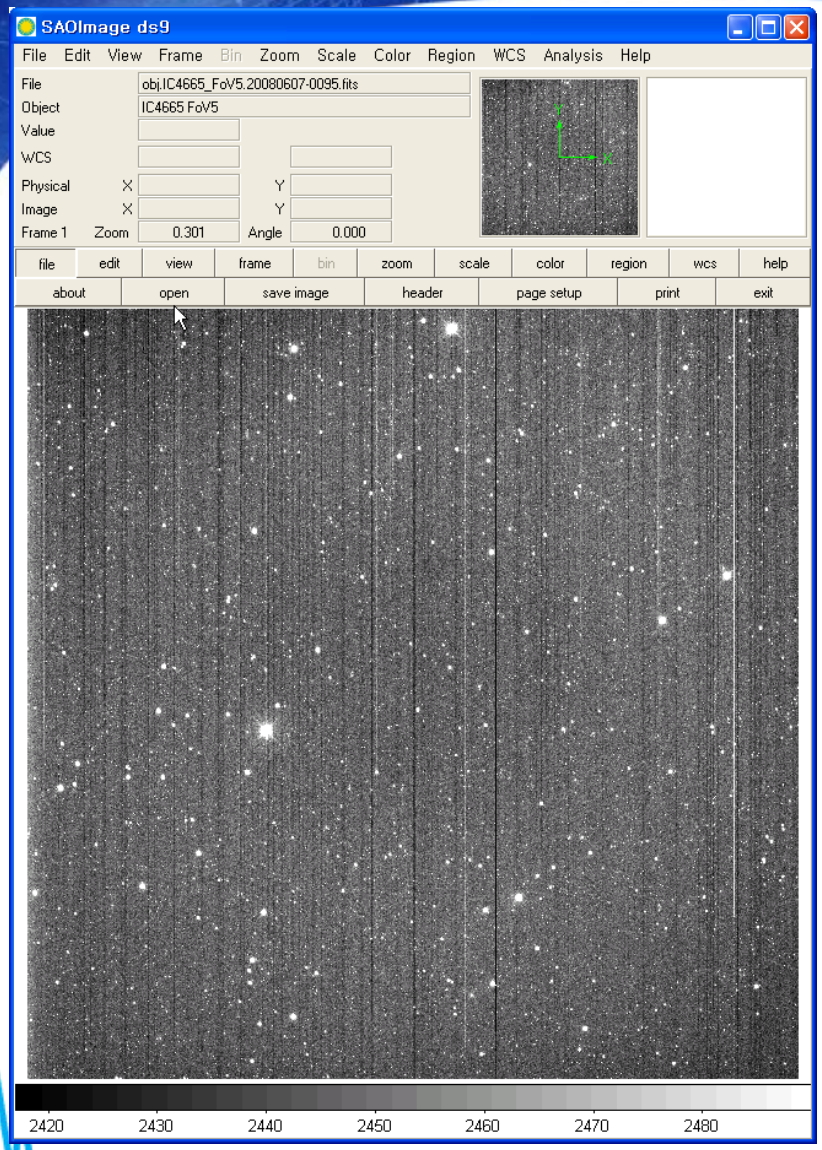


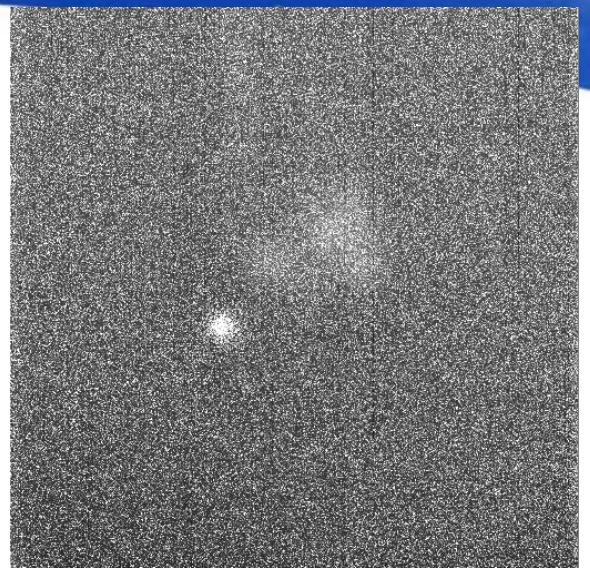
U-FUN observation

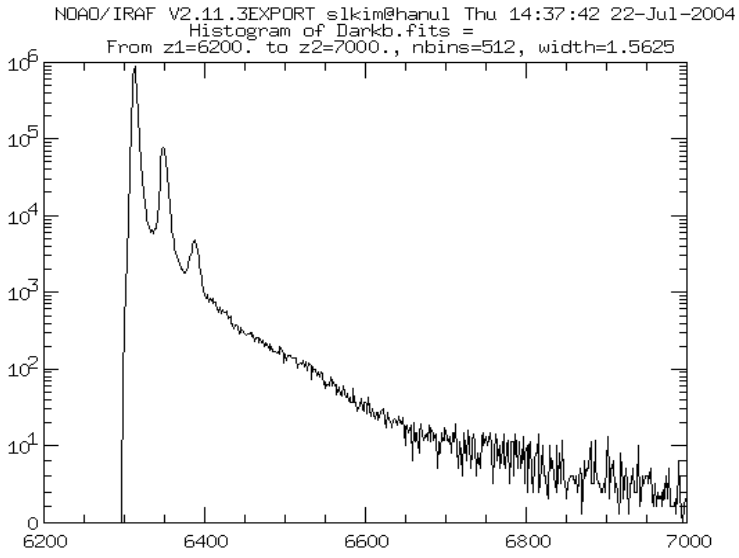
- **Low speed internet connection**
  - 200KB/ sec
  - sub image : 512 × 512 × 2bytes = 0.5MB
- **Exposure & readout time**
  - Flushing & Readout : 10 secs
  - Exposure : 150 - 300 secs
- **Daily data acquisition**
  - Bytes : 50MB in Max. / day
  - Approx. 5-10 minutes for downloading


Upgrade

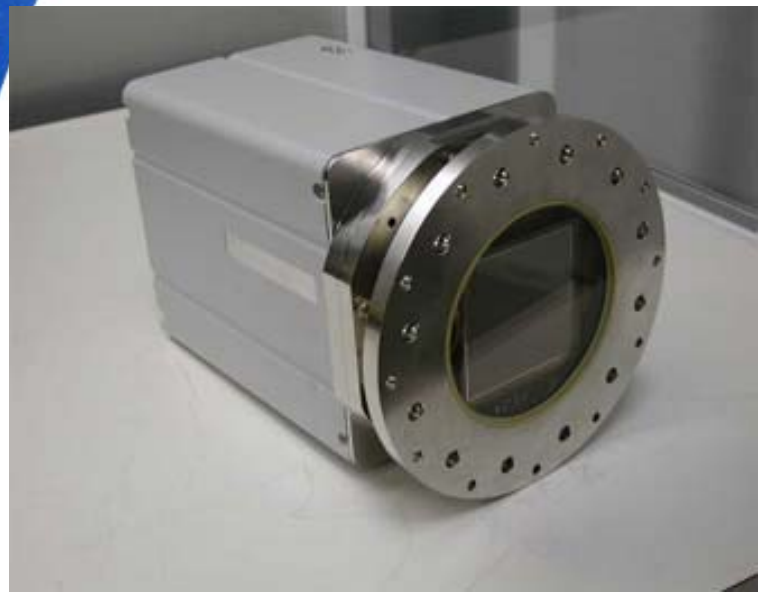
Aging of CCD camera







New CCD camera



- Fairchild Imaging
- 4k x 4k x 15um Array
- Back-illuminated
- High sensitivity
- Fast readout rate
- Operation temperature -60C
- Full 16-bit resolution
- Readout noise ~ 10e-