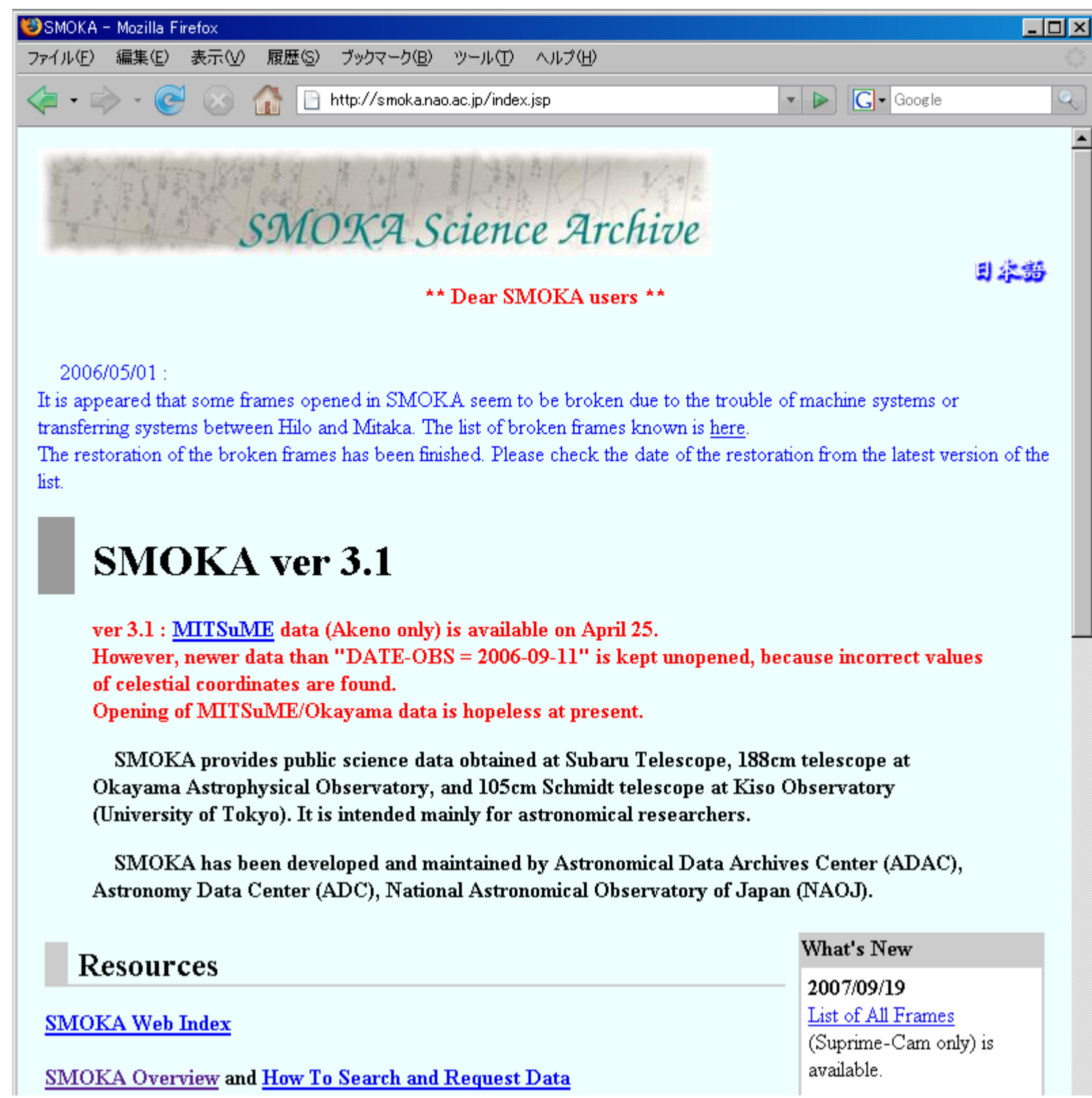# Current Status of SMOKA

Yamada, Y., Nakata, F., Yoshino, A., Yagi, M., Takata, T., Ichikawa, S. (NAOJ), Enoki, M. (Tokyo Keizai Univ.), Ozawa, T. (Misato Obs.), Horaguchi, T. (National Museum of Nature and Science)

Fig. 1 – Top Page of SMOKA

**SMOKA (Subaru-Mitaka-Okayama-Kiso-Archive)** is the science archive system providing an access to the public data of the Subaru Telescope, the 188cm telescope at the Okayama Astrophysical Observatory, and the 105cm Schumidt telescope at the Kiso Observatory of the University of Tokyo. Everyone can get data for the purpose of astronomical research or education. SMOKA is developed and operated by the Astronomy Data Center of the National Astronomical Observatory of Japan.

## http://smoka.nao.ac.jp/

# 1. Current Status of SMOKA

## Archived Data

The SMOKA provides raw data, and also provides reduced data (bias subtracted and flat-fielded, and/or astrometric-calibrated data) for a part of Suprime-Cam data. The quick look images (QLI) and weather informations (temperature, humidity, images taken by sky monitor, etc.).
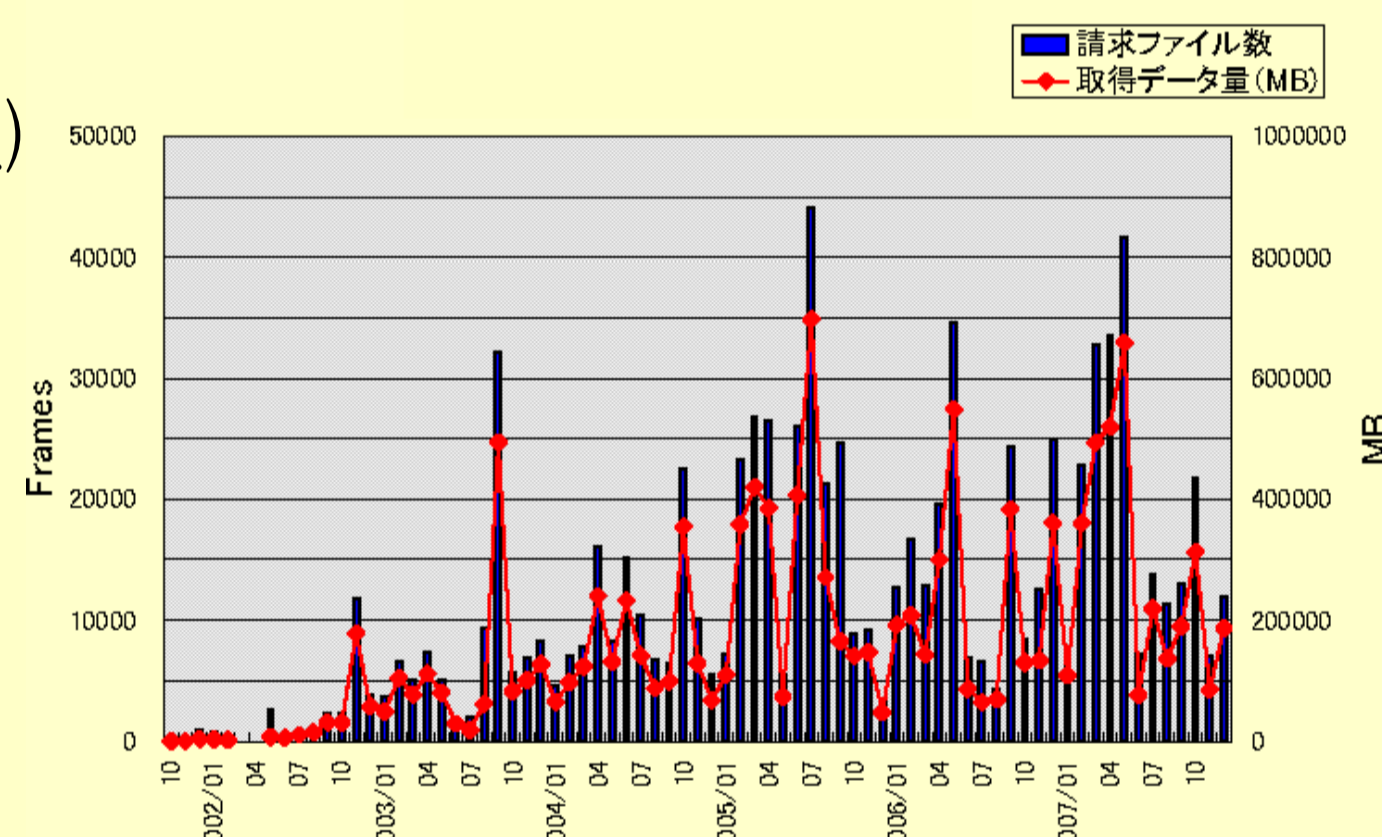
| | frames | occupation | |
|---|---|---|---|
| Subaru | 1075874 | 18 months | 1999~ |
| Okayama | 97674 | 2 years | 1991~ |
| Kiso | 144697 | 1 year | 1993~ |
| MITSuME | 5861 | 1 year | 2007~ |

total amount of data : ~ 10 TB
rate of increase of data : ~ 1 TB / year

(Jan. 2008)

## Usage of SMOKA (Fig. 2)

Data Request :
5000-20000 frames / month
Users :
229 (29 Jan. 2008)



## Products of SMOKA

Papers using SMOKA
3 papers in 2003 (Suprime-Cam 3)
5 papers in 2004 (Suprime-Cam 5)
6 papers in 2005 (Suprime-Cam 5, CIAO 1)
9 papers in 2006 (Suprime-Cam 7, HDS 1, IRCS 1)
8 papers in 2007 (Suprime-Cam 6, CIAO 1, 2kCCD 1)

Astronomical Teaching Materials using SMOKA
"Hubble Law" for high school students
(by PAOFITS-WG (http://paofits.dc.nao.ac.jp))

## Current Status and Future Plan of SMOKA

Current version is SMOKA Ver. 3.1
Updates from Ver 3.0 (from previous Subaru UM)
- Data for new instrument are available. (MITSuME/OAO)
- Improvement of displaying weather information.
- Due to computer replacement, we stop development. (- Mar. 2008)

Development and Research Related to SMOKA
- Development and Operation of NAQATA (see Section 2)
- Position Calibration of Suprime-Cam Data (see Section 3)

Future Plan of SMOKA
- Providing astrometric calibrated data :
  Suprime-Cam, MOIRCS, 2kCCD etc.
- Providing data of new instruments and telescopes :
  FMOS (Subaru), ISLE, OAOWFC (OAO),
  KWFC (Kiso), MITSuME (Akeno/Okayama),
  Kanata Teles. (Higashi-Hirosima)…
- Quary using indices of quality assessment :
  add indices of quality assessment as search condition for
  several instruments
- Construction catalogs :
  catalogs of objects detected on Suprime-Cam data, etc.

# 2. Quality Check System "NAQATA"

"NAQATA" is the data assessment system for observed data obtained by the Subaru Telescope. The operation started on May 2007.
- Check for FITS data
  - Check for FITS format
    using "fitsverify" (NASA)
  - Check for keywords of FITS header
    - existence of indispensable keywords
    - data type in each keyword
- Assessment of the data quality
  - PSF (Point Spread Function)
    measure seeing and elongation (Fig. 3)
  - Limiting Magniture
    - determine zero point of magnitude using standard stars
    - determine limiting magnitude from noise of sky background and PSF
  - Gain and Readout Noise
    calculate from dome flat


Fig. 3
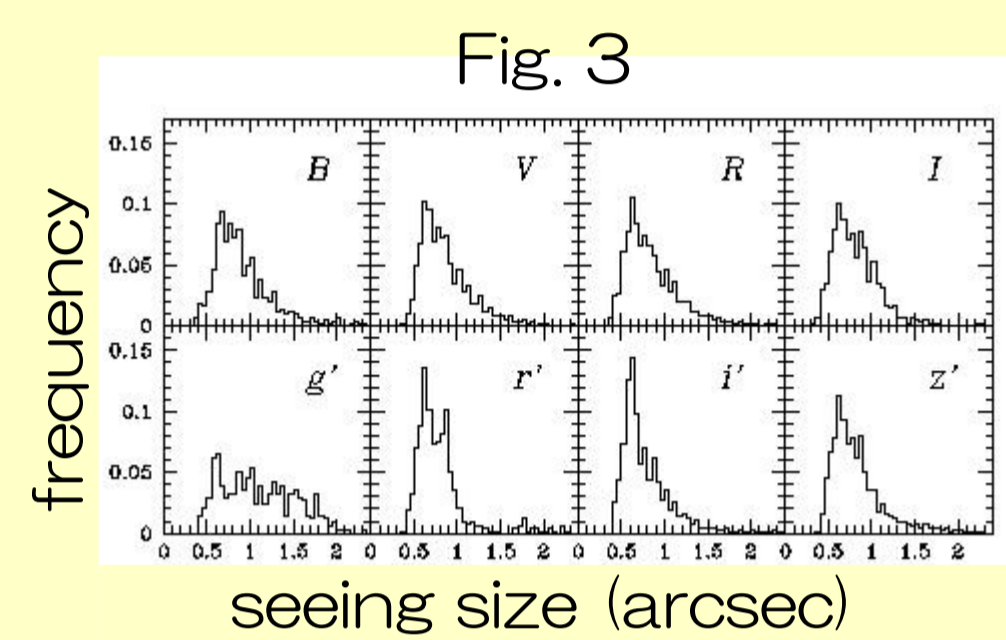
Indices of Data Quality
used as search condition in SMOKA
(PSF and limiting magnitude are already used in "SUP Search")

Final Aim : Construction of a Quality Control System
Judge continuation/cancellation of observation
using data just after observation
- Whether the data quality is enough for the purpose ?
- Is setting of instruments correct ?

# 3. Astrometric Calibration of Suprime-Cam Data

The informations of position (WCS, World Coordinate System) in the raw data of the Suprime-Cam slip off about 30 arcsec at maximum as shown in the Fig. 4. Since the positions of objects on a celestial sphere are very important information for the astronomy, it is thought that the position calibration promotes various studies.

Calibration of the WCS (Astrometric Calibration) is done by fitting coordinates of the stars detected on the Suprime-Cam CCDs with the position at the celestial sphere of the stars in the USNO-B1.0 catalog.
- fit by 3rd order expression
- fit 10 CCD chips at the same time
  using relative position between CCD chips
- thin out stars to make distribution of stars uniformly

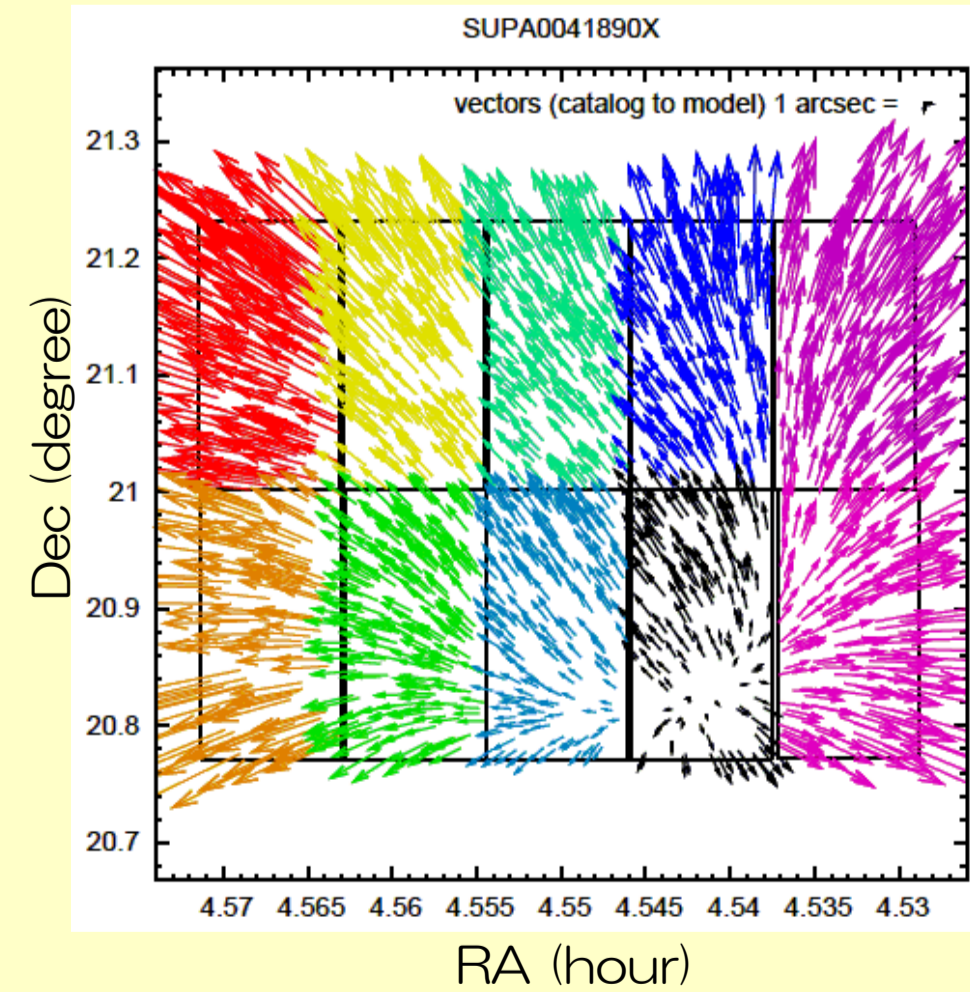Difference between coordinates of model and USNO-B1.0 catalog
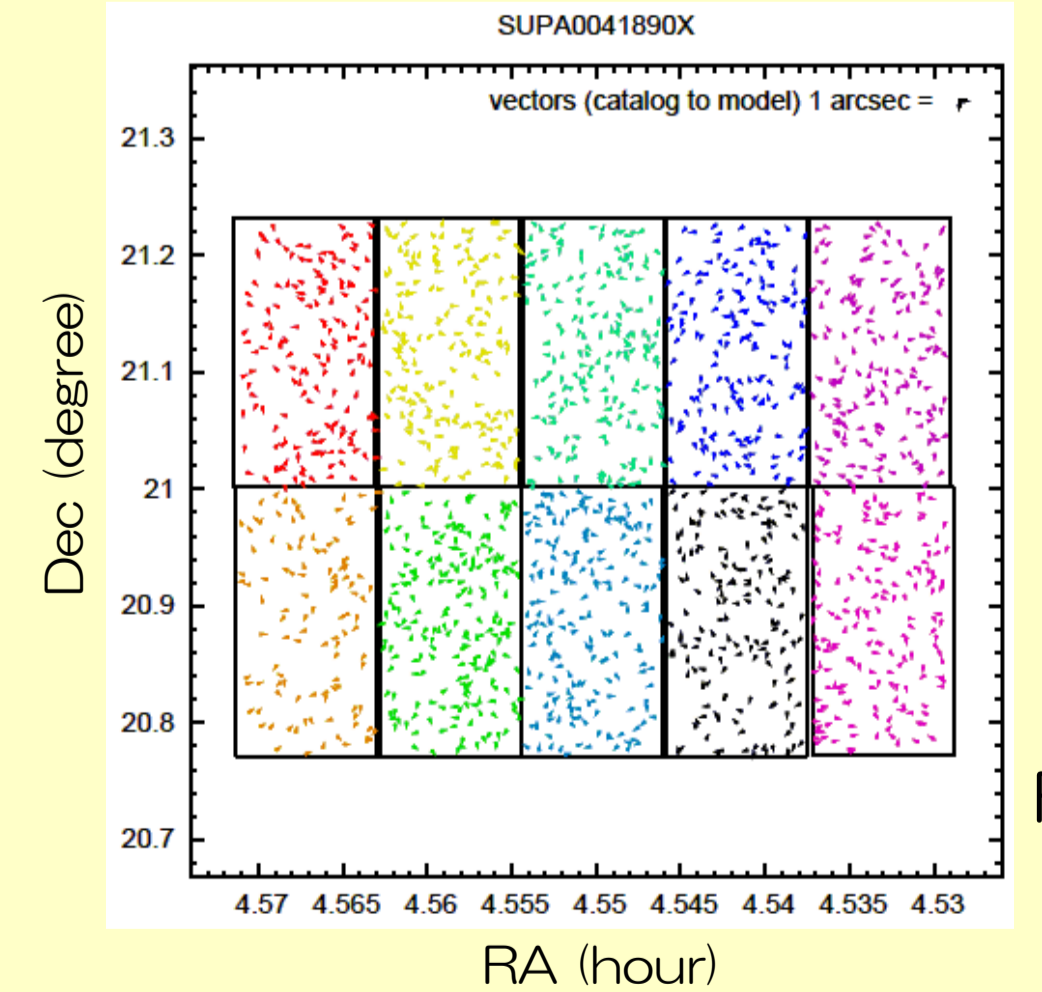

Fig. 4 before


Fig. 5 after

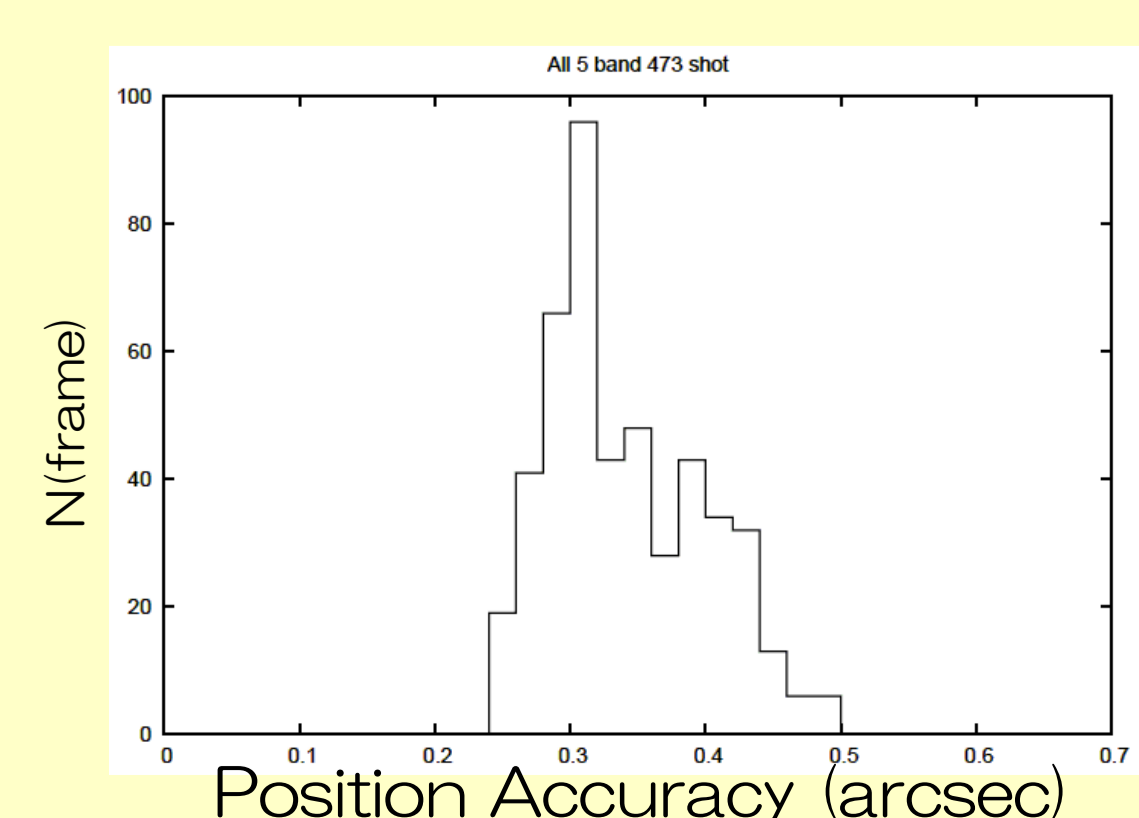Distribution of Position Accuracy
(achieved 0.2 - 0.5 arcsec)


Fig. 6

Atmospheric Refraction
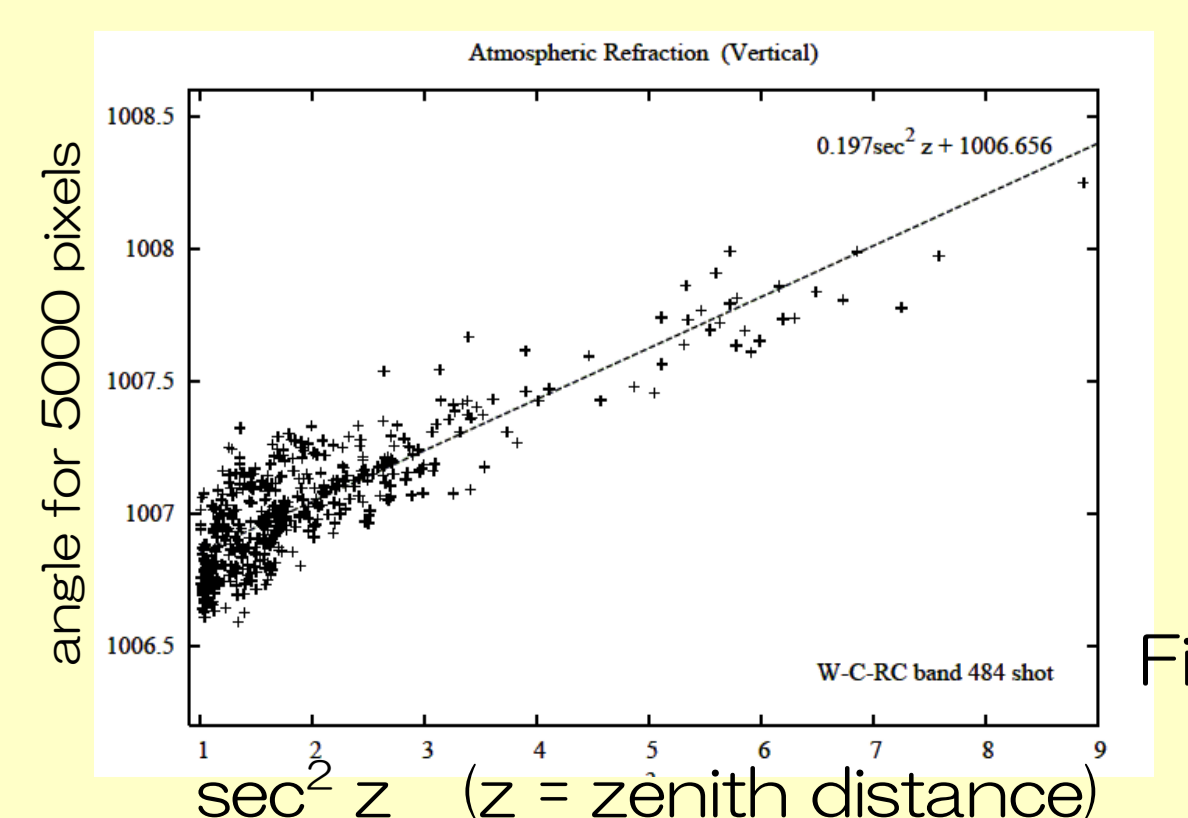(larger refraction at lower elevation)


Fig. 7