Experences of IRSF 1.4m South Africa[15]*:*

from 1998 to 2011

Shuji SATO (Nagoya Univ.)

South Africa

One of the most important locations

Lat. -32° Center of the galaxy goes through zenith

Lon. +20° （Australia 140° Chile 290° ） Trichotomizing Southern Sky

Time dependent events ex. GRB、Micro Lens, Novae, Super Novae, Occultation

IRSF 1.4 m telescope and SIRIUS

Simplest telescope
equipped with the
Luxurious Instrument

Waste
1 year

Learning
(10months)

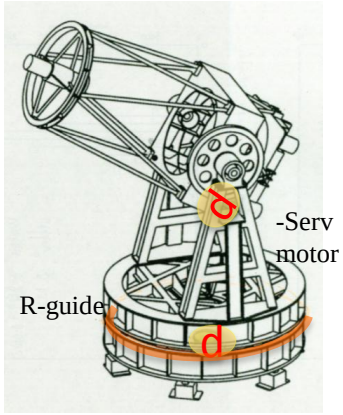
Design
(7months)

Fabrication
(8 months)

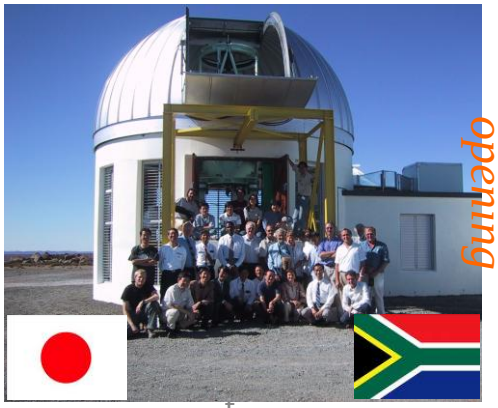
Construction
(2 months)

Financial Crisis

switch



Opening Nov. 15



opening

1998.

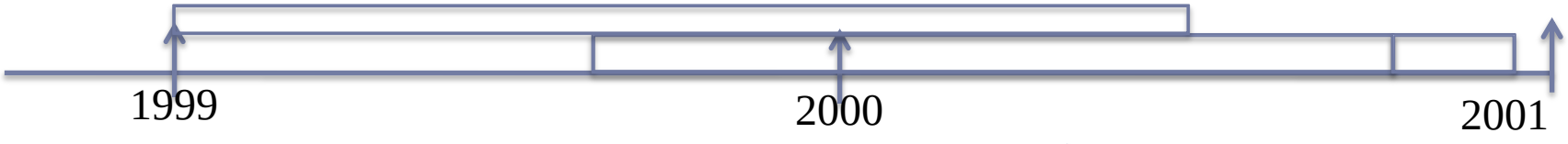
1999.1~10
roof of Univ

1999.4~10
Univ and Company

1999.11~2000.7
Factory @Kyoto

2000.11
Sutherland, South Africa

10th IRSF



Policy and Spirit of our group

DO IT BY OURSELVES

① Simplify

② Avoid “Blackbox”

Cast

- Telescope: IRSF1.4m tel — Nagata+Kato+Kurita+Kawai and I. Glass
- Instrument: SIRIUS IR cam — Tamura+Chie+Taka+Kawai+Yasu
- Sato supervise projects along with TRISPEC

for 3 year, Minimum Budget with Minimum Action,
then
10 year after, Maximum Output
“as *Simple as possible, without Blackbox*”

Support and Cost

- JAPAN 永山(Nagayama), 栗田(Kurita), 佐藤(Sato, NU), 長田(Nagata; KU), 田村(Tamura, NAOJ)

- SAAO Phil Charles (Director) Patricia Whitelock (vice-Director)
  Ian S. Glass (Astronomer)
  Cynthia and Glenda (Admin. and Secretary)

  Local staffs 3 technicians/engineers

  UCT Patrick Woudt (Lecturer)

◎ Cost for Maintenance

Instrument and Telescope ～20,000*US$* /year by **Japan** **Nagayama** & Kurita

1,500*k*円 = 125元 = *2,200 Won* = *600 kCT$*

Dome, Network, Power, Accommodation supported by **SAAO**

The Luxurious Instrument on the Simple telescope

Then,

The Small facility can
produce profound and fundamental science.

2001~2011

- 17 PhDs
- 82 papers
- 9 Japanese and 15 foreign Institues/Universities actually visited and observed
- Proceeding of the 10th Anniversary in this November

109 observers from 22 institutes (8 Japanese/ 15 foreign)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
148	562	789	675	643	598	661	715	515	454

average 623

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
名古屋大学	名市立大学	Unisa	京都大学	岐阜大学	York Univ	Yonsei U	Helsinki U	Stockholm U	宇宙研
国立天文台	UCT	PhysResLab	名古屋大学	名古屋大学	IvS,Leuven	PennState U	KyungHee U	名古屋大学	名古屋大学
東京大学	名古屋大学	神戸大学	東京大学	東京大学	North-West U	U Gottingen	名古屋大学	京都大学	京都大学
SAAO	東京大学	名古屋大学	国立天文台	京都大学	SouthamptonU	Oxford Univ	京都大学	国立天文台	国立天文台
	SAAO	東京大学	SAAO	国立天文台	名古屋大学	名古屋大学	国立天文台	東京大学	東京大学
	国立天文台	SAAO	UCT	SAAO	東京大学	東京大学	東京大学	岐阜大学	UCT
		UCT		UCT	京都大学	京都大学	岐阜大学	UCT	SAAO
		国立天文台			国立天文台	国立天文台	UCT	SAAO	Yonsei U
					岐阜大学	岐阜大学	U Gottingen	KyungHee U	
					SAAO	UCT	Yonsei U	North-West U	
					UCT		SAAO		
							Southhampton U		

2000 Opening

2002 Semi-auto operation

2004 Speed-up of readout

2006 Polari-metry

2008 WFCT-II

To Keep the activity

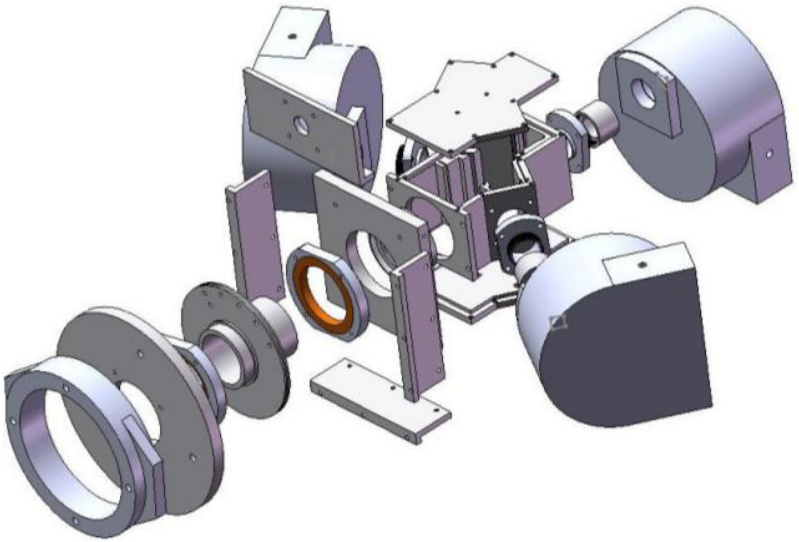
- *1998 Start of the Project "Thorough Studies of Magellanic Clouds*
- *2000 First (Infrared) Light of SIRIUS on IRSF and Opening ceremony at Sutherland Station, SA*
- *2002 Automatically programmed observations with SCRIPT-system*
- *2004 Updating of Readout-system "MESSIA-V" for reduction of exposure*
- *2005 Installation of SIRPOL (Linear) ; SIRIUS POLarimeter*
- *2006 Installation of SIRPOL (Circular)*
- *2007 Construction of WFCT-II (Wide-Field Cryogenic Telescope) in "SUMI-Hut"*
- *2009 Introduction of ND (neutral density) filters for observations of bright objects*
- *2010 Celebration of "10 years of IRSF Nagoya International Workshop*
- *2011 Introduction of Narrow-band filters (Brγ+Paα, H_2+[Fe II], J_{cont}+K_{cont}) for emission lines*
  Experiment of TRIPOL on the SAAO 75cm telescope

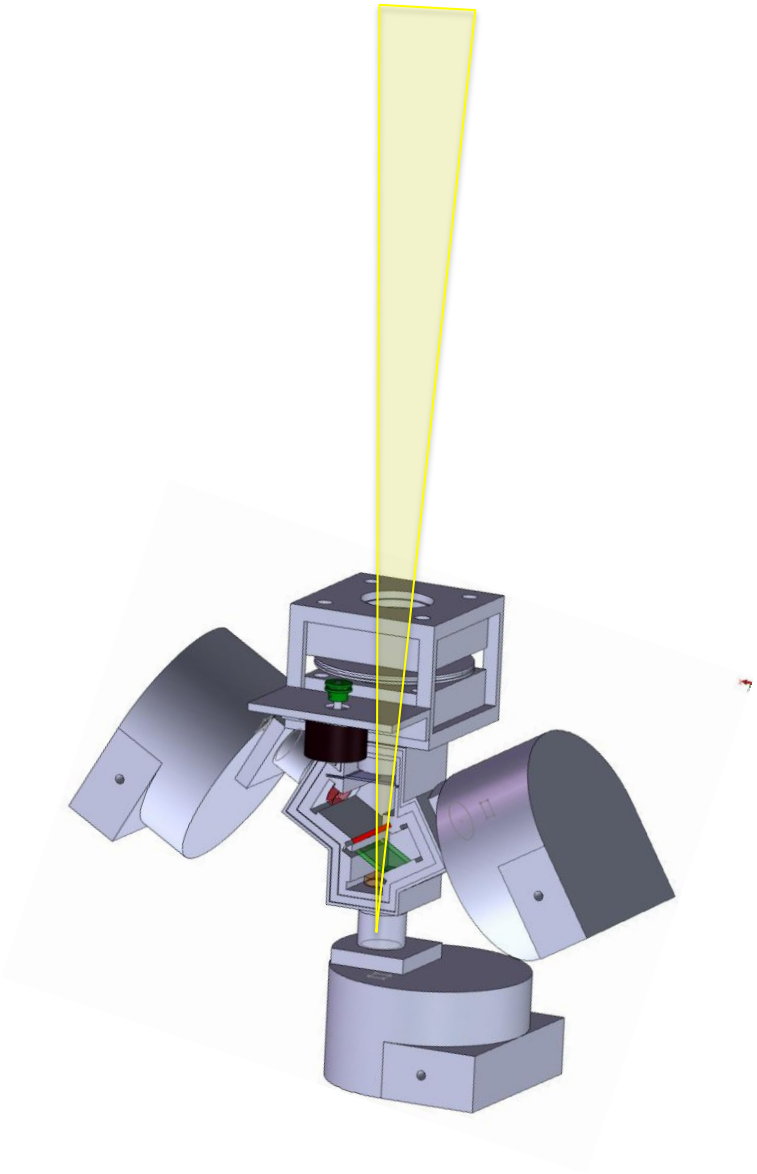
Triple-Range {g'r'i'} Imager and POLarimeter

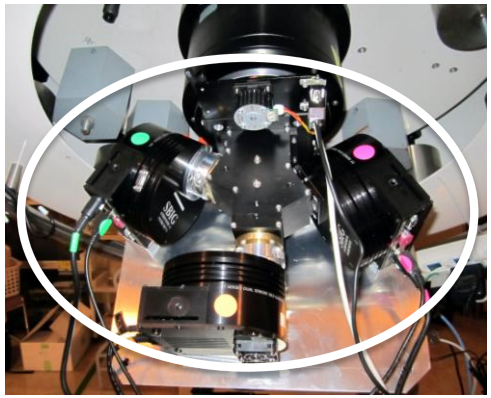
TRIPOL

Simple, lightweight and less-expensive

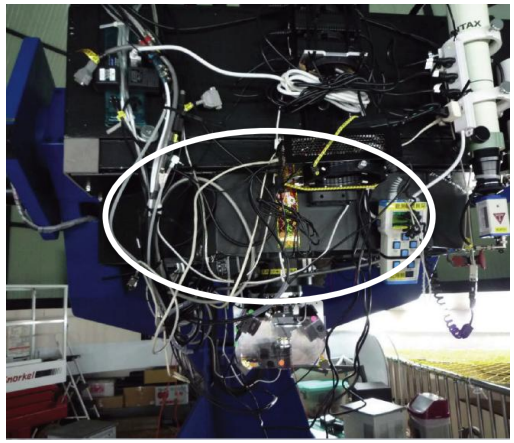
単純―軽快―廉価





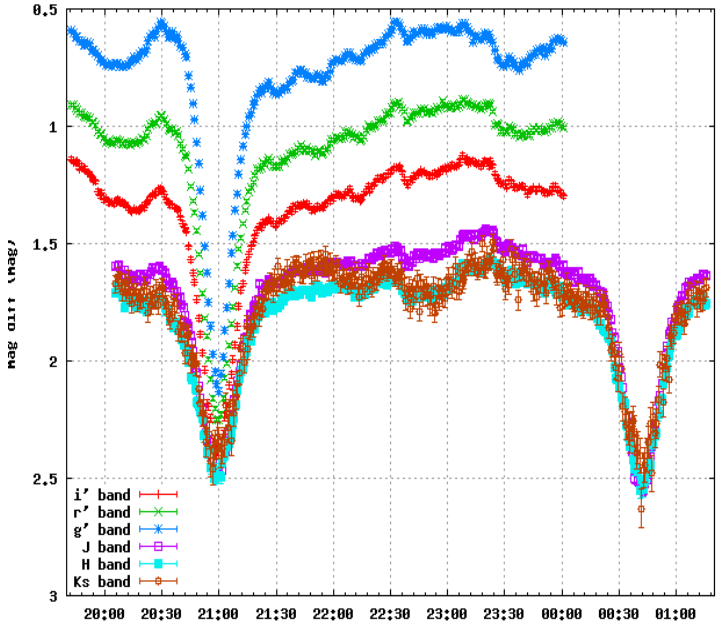


Anpachi 70 cm telescope



Lulin 100 cm telescope

SAAO 75 cm telescope



EC 2117

P ~ 3.6 h

	SAAO	Egypt	Uzbek	Ali	XingLong	Lulin	Sobeksan	Anpachi
Longitude	20°	30°	67°	80°	118°	121°	129°	137°

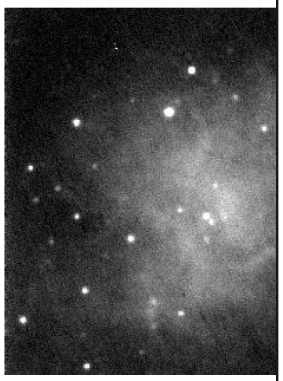
M1 C

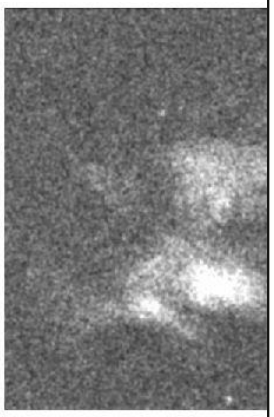
g'

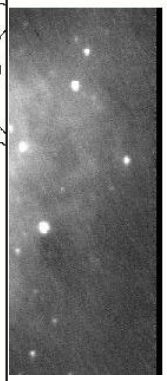
r'-band

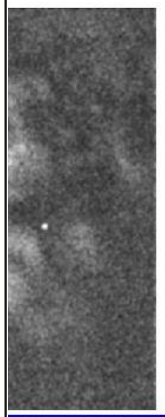
Intensity

Polarization

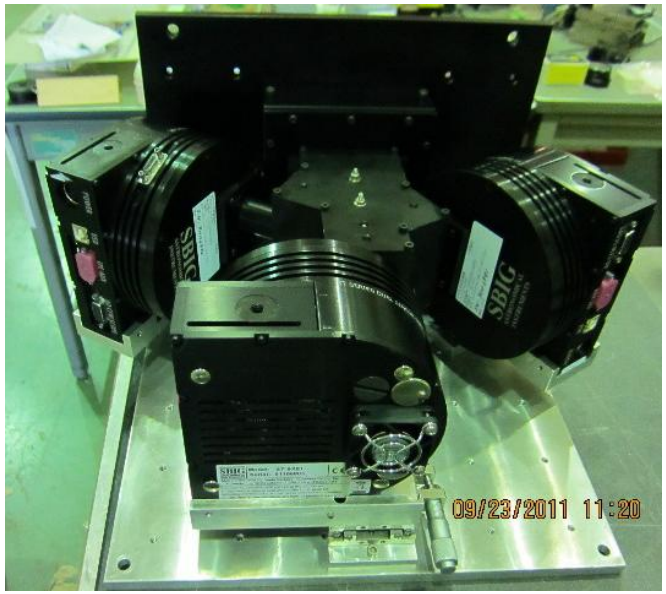








Polarization vector map
in 20 min integration on
Anpachi 70 cm telescope



単純ー軽快ー廉価　~1 m class

Size	35cm x 35cm x 20cm
Weight	15 kg

3 color Decomp.	TRICAM	1,500,000JYen ~20k *US$*
Polarizaiton	TRIPOL	3,500,000Yen ~47k *US$*

Scientific Activity for 10 years [2000～2010]

◎Visiting Observers

109 observers **5760** personxnights annual average 623 personxnights

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
148	562	789	675	643	598	661	715	515	454	personxnights

◎ Affiliations of visiting observers

24 institutes/universities (**9** Japanese/**15** foreign countries)

◎ Education **17** *PhDs*_recipients

Nagoya Univ.	**8**（長嶋千恵、永山貴宏、Jiang Ji Bo、馬場大介、西山正吾、加藤大輔、Joel Koerwer、羽田野裕史）
Univ. Tokyo	**3**（板由房、直井隆弘、松永典之）
NAOJ（Soken-Dai Univ）	**2**（神鳥亮、日下部展彦）
Kyoto Univ.	**1**（福江翼）
The University of Cape Town	**3**（Bonita de Swardt, Michelle E. Cluver, Ihab Riad）

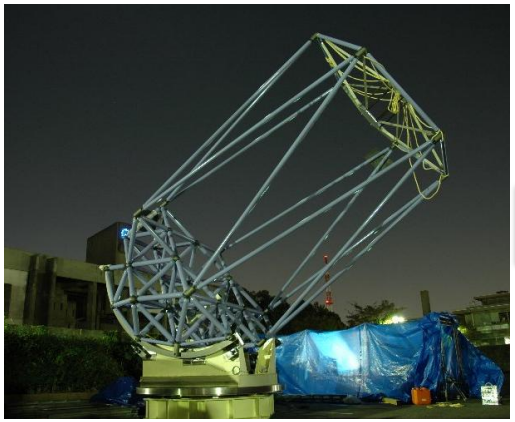
◎Research **82** *papers published* in Refereed Journals

Technical development in [2000～2010]

1998～
2000

Succeeded by Mr. Seki

Developed
by Dr. Kurita (Caltech)



ULT-1
2002～2006

Today's evening
17:30

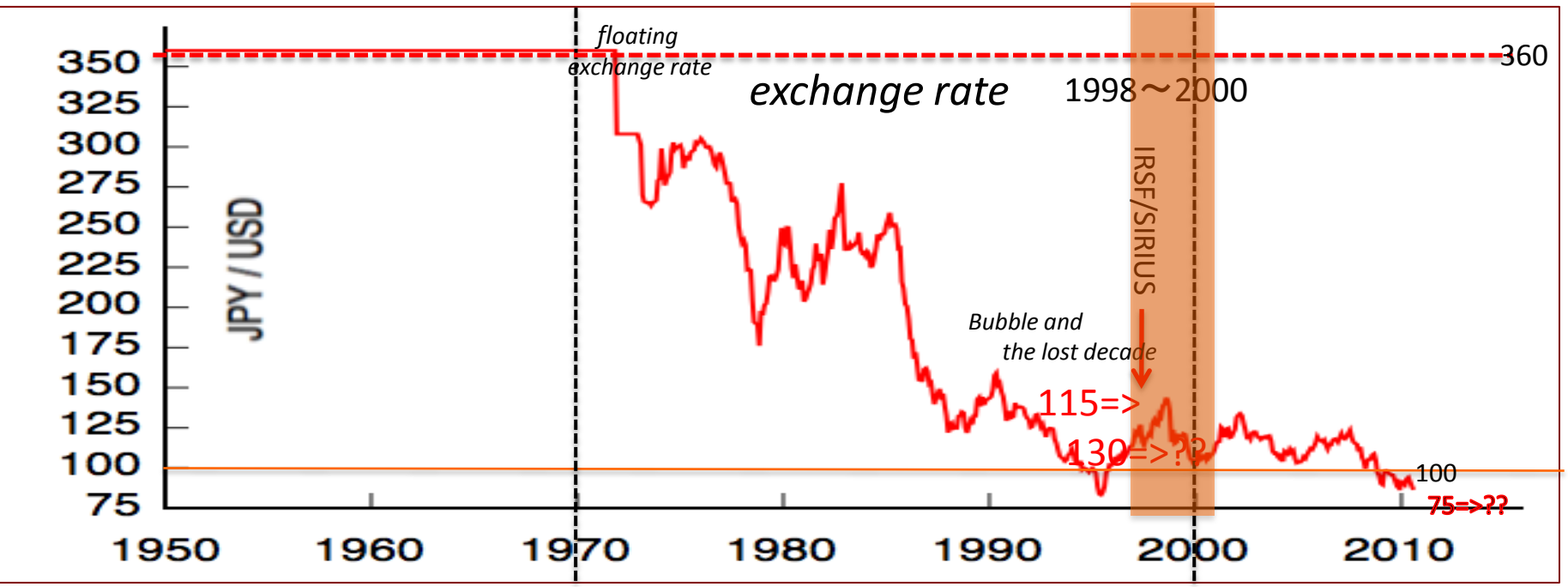
Visit
New telescope
Mounting

1997　Decide to join it on :　Import from USA

1998 ～2001　2億4030万円 of the total budget [7億0855万円]　1/3 of the total

～2.4M$=>1.8M$　　～7*M$=>5.3M&*

1998 *Financial Crisis* ➔a number of banks *bankrupt* ➔ 115JY/USD => 130=> ??



➔**1998 end**　**Decide to** Make a telescope by ourselves in Japan

KEY items

Key I. Partnership with a small company,

In Collaboration and Competition between ---

Key II. Innovative technology

◎ R-guide ball-bearing

Japanese product THK

◎ Dyna-Serv Pulse and Servo motor

Japanese product YOKOGAWA

DM series: 1A/1B/1C

○ friction drive

○ Heidenhain Encoder Germany product

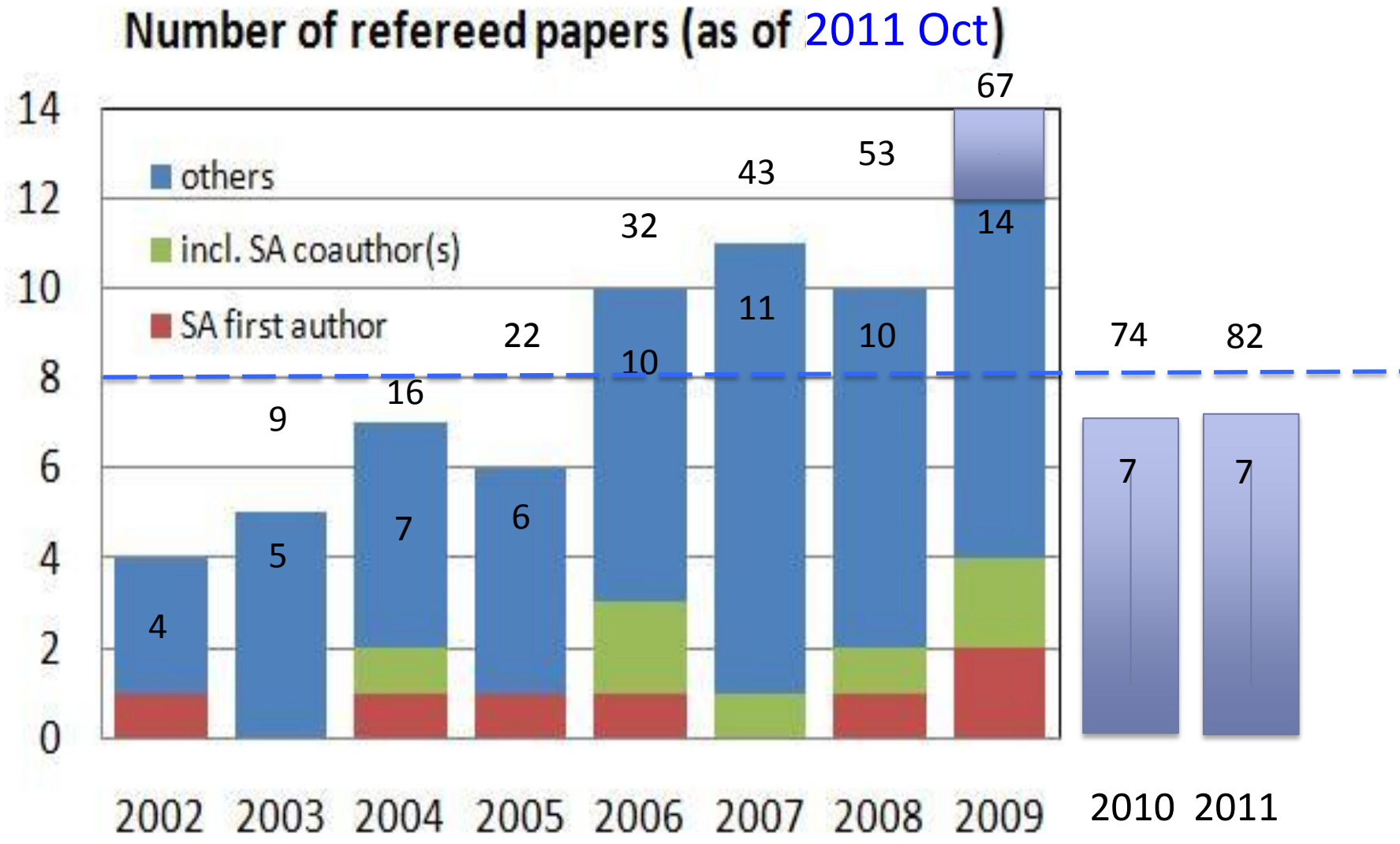
== As the results of I and II ;

①Cheap cost, ②Quick construction, ③Easy operation

1億円～1M$ (+1M$)

2-years

over the world


Number of refereed papers (as of 2011 Oct)
others
incl. SA coauthor(s)
SA first author
14
12
10
8
6
4
2
0
4
9
5
16
7
22
6
32
10
43
11
53
10
67
14
74
7
82
7
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

24 institutes (9 Japanese/15 foreign)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
名古屋大学	名市立大学	Unisa	京都大学	岐阜大学	York Univ	Yonsei U	Helsinki U	Stockholm U	宇宙研
国立天文台	UCT	PhysResLab	名古屋大学	名古屋大学	IvS,Leuven	PennState U	KyungHee U	名古屋大学	名古屋大学
東京大学	名古屋大学	神戸大学	東京大学	東京大学	North-West U	U Gottingen	名古屋大学	京都大学	京都大学
SAAO	東京大学	名古屋大学	国立天文台	京都大学	SouthamptonU	Oxford Univ	京都大学	国立天文台	国立天文台
	SAAO	東京大学	SAAO	国立天文台	名古屋大学	名古屋大学	国立天文台	東京大学	東京大学
	国立天文台	SAAO	UCT	SAAO	東京大学	東京大学	東京大学	岐阜大学	西はりま天文台
		UCT		UCT	京都大学	京都大学	岐阜大学	UCT	UCT
		国立天文台			国立天文台	国立天文台	UCT	SAAO	SAAO
					岐阜大学	岐阜大学	U Gottingen	KyungHee U	Yonsei U
					SAAO	UCT	Yonsei U	North-West U	
					UCT		SAAO		
							Southhampton U		

IRSF/SIRIUS

2 years Construction

10 years Operation

TRISPEC

12 years since 1994

If without *TRISPEC*

SIRIUS never realized

Nakaya, Yamamuro, Watanabe, ---

Agematsu

17 years since 1970

If without *Agematsu*

IRSF never realized

Noguchi, Kobayashi, ---Nagata, Tamura --

Enjoy sciences with small telescope and instrument