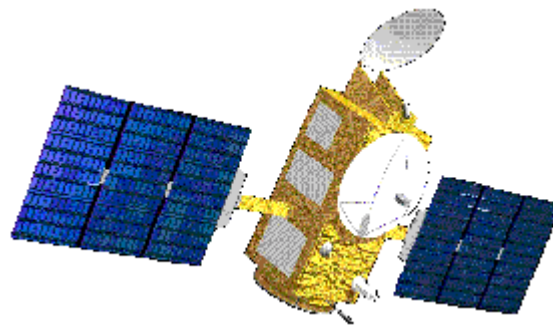
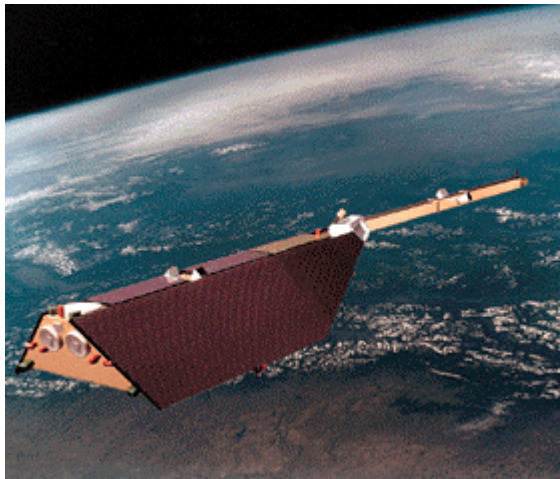


The SLR Network from a QC Perspective



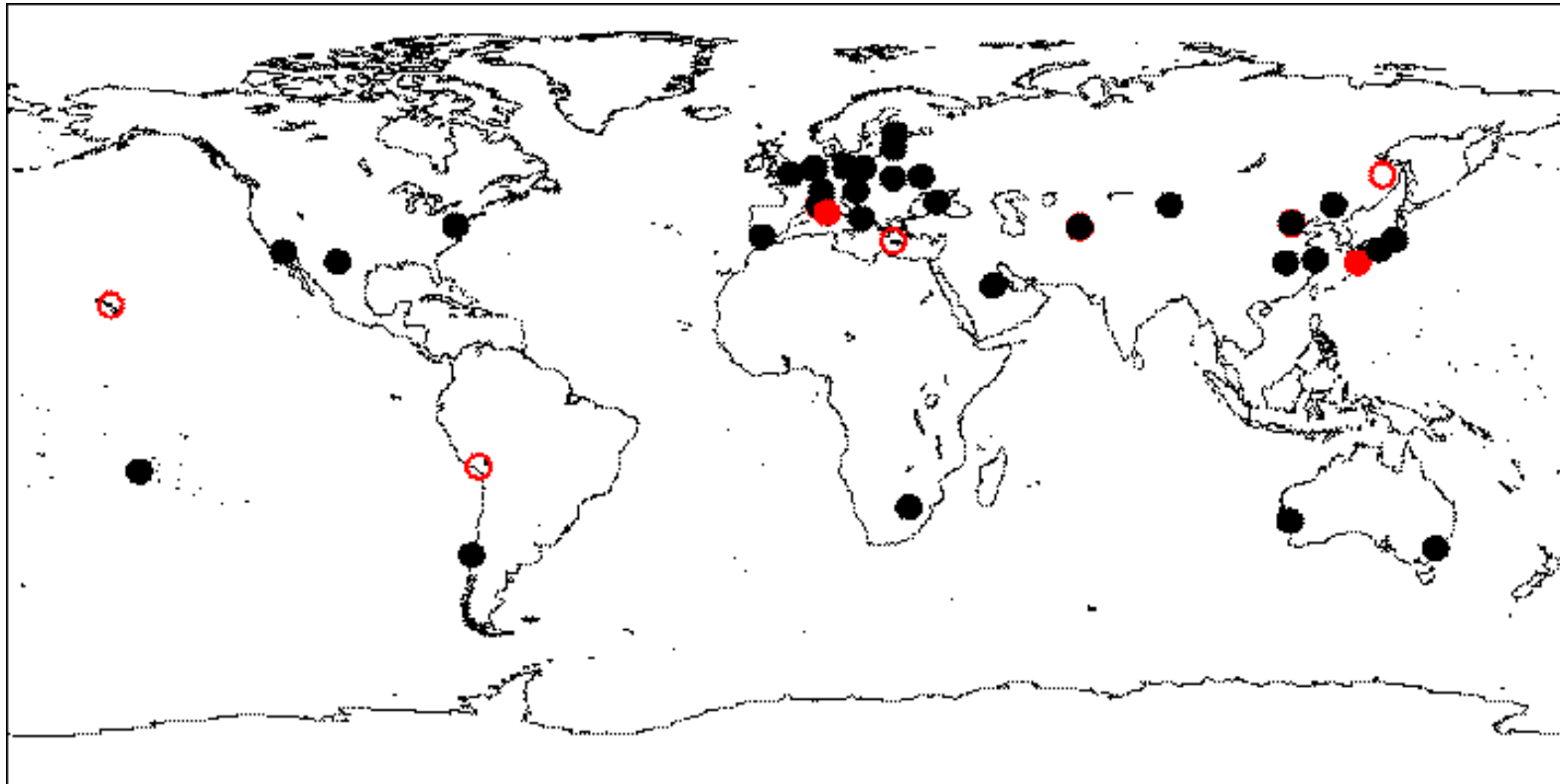
International Workshop on Laser Ranging, Canberra, Australia

R. Noomen

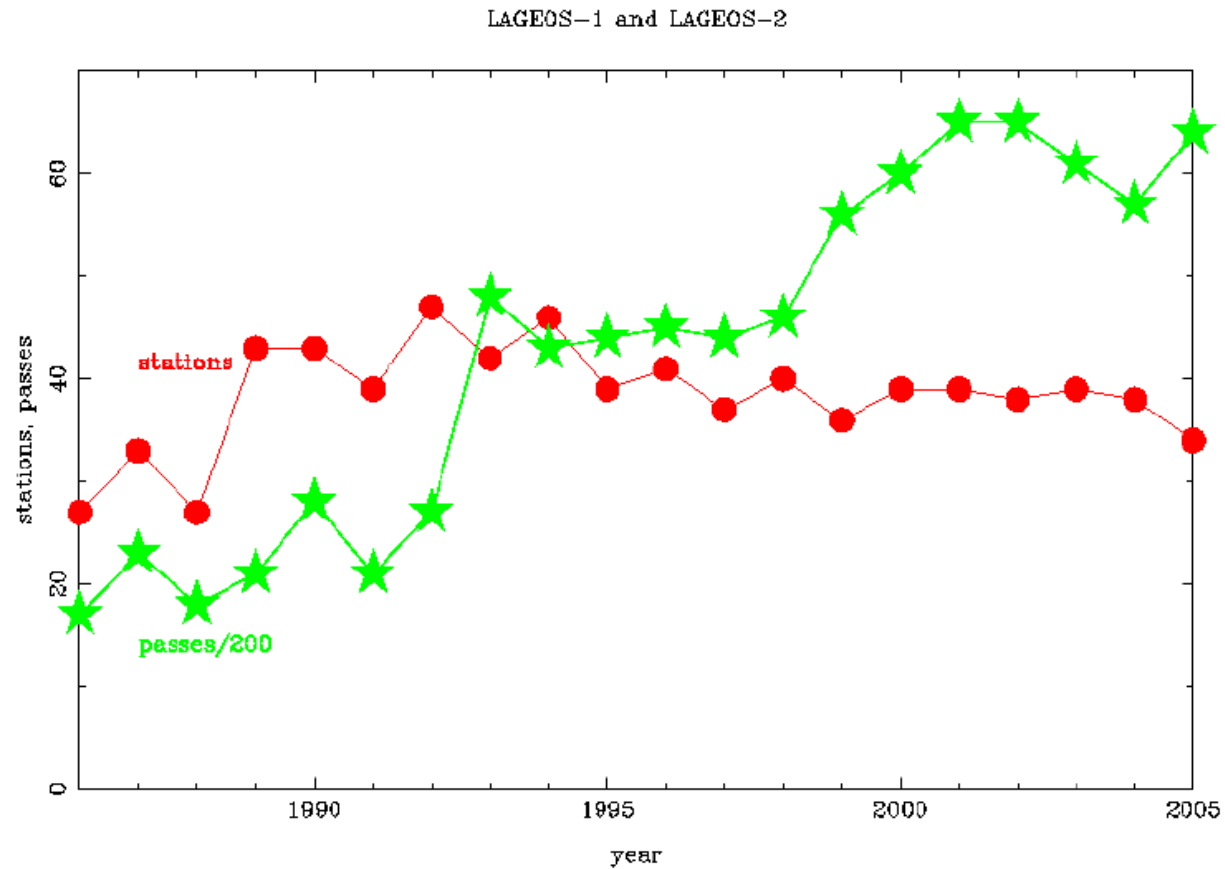
October 20, 2006

SLR Network Development (1)

situation 2005 vs 2003: black = permanent; open red = disappeared in 2005; solid red = new in 2005

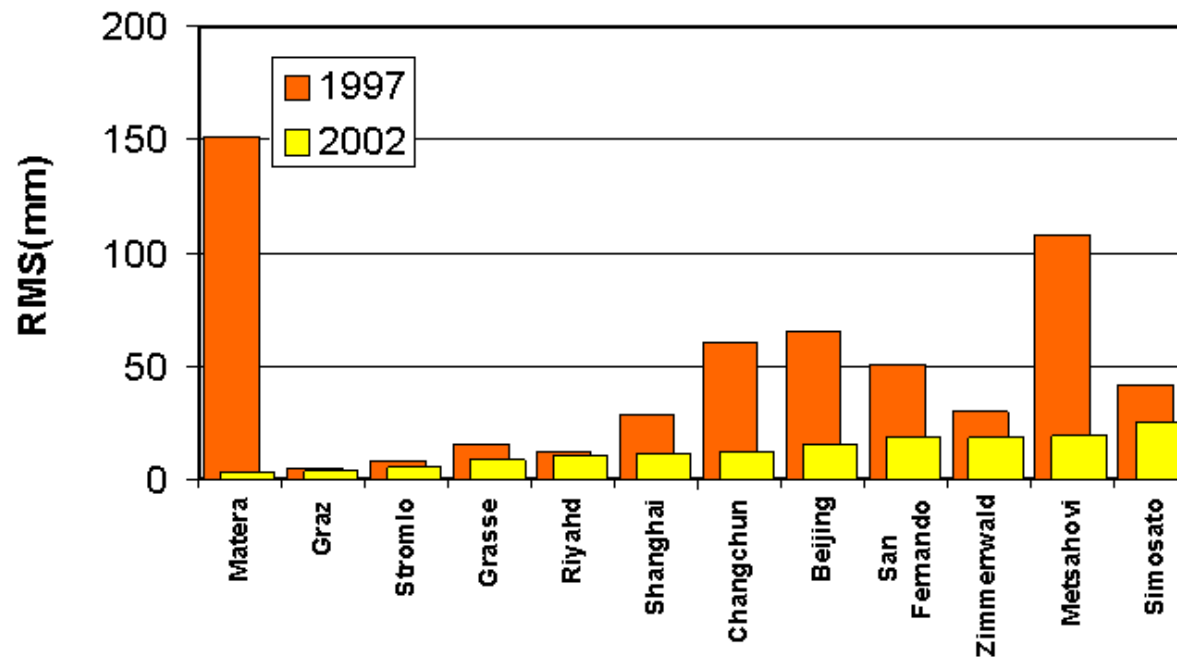


SLR Network Development (2)



SLR Network Development (3)

Improvements – Precision (Single Shot RMS)



Bias detection capability (1)

Options:

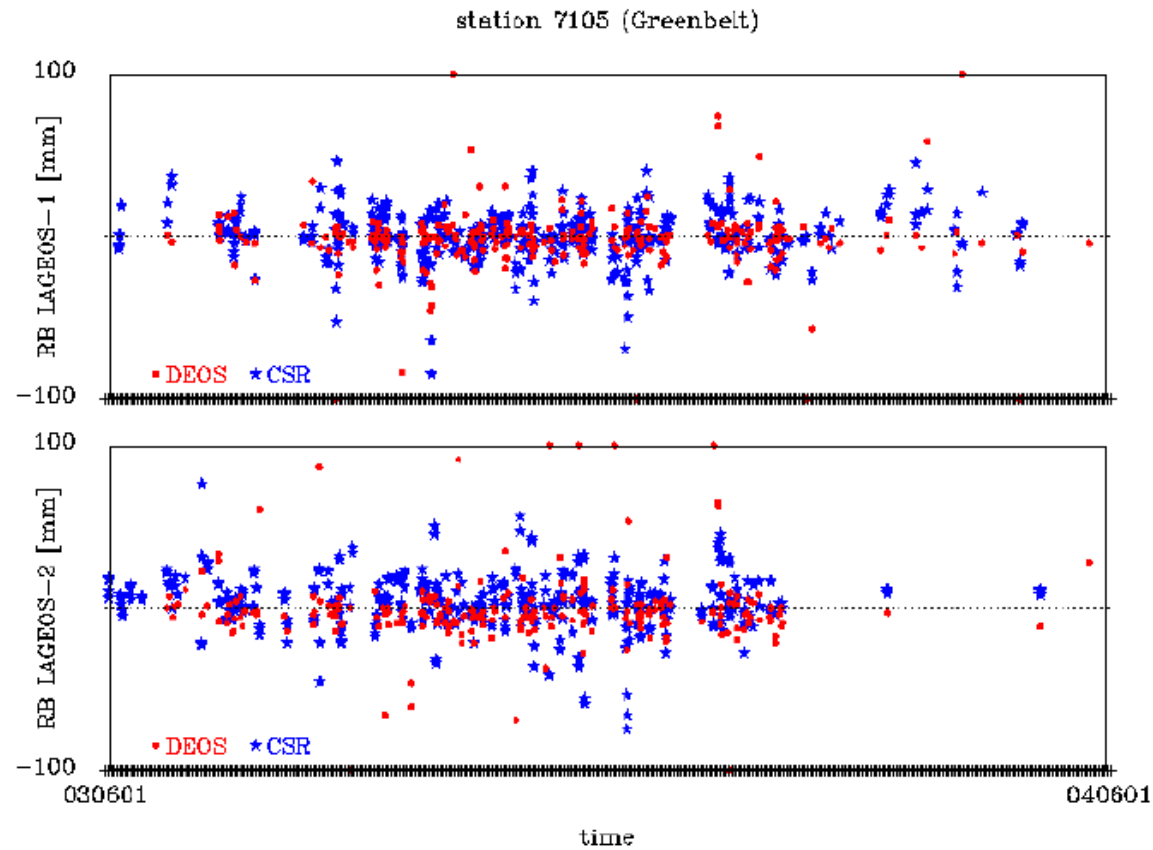
- at station
- official ILRS product
- dedicated QC analysis

Bias detection capability (2)

Dedicated QC analysis:

- Astronomisches Institut Universität Bern
- Center for Space Research
- Deutsches Geodätisches Forschungs Institut
- Delft University of Technology
- Mission Control Center
- National Institute of Information and Communications Technology
- Shanghai Astronomical Observatory

Consistency range biases (1)



Consistency range biases (2)

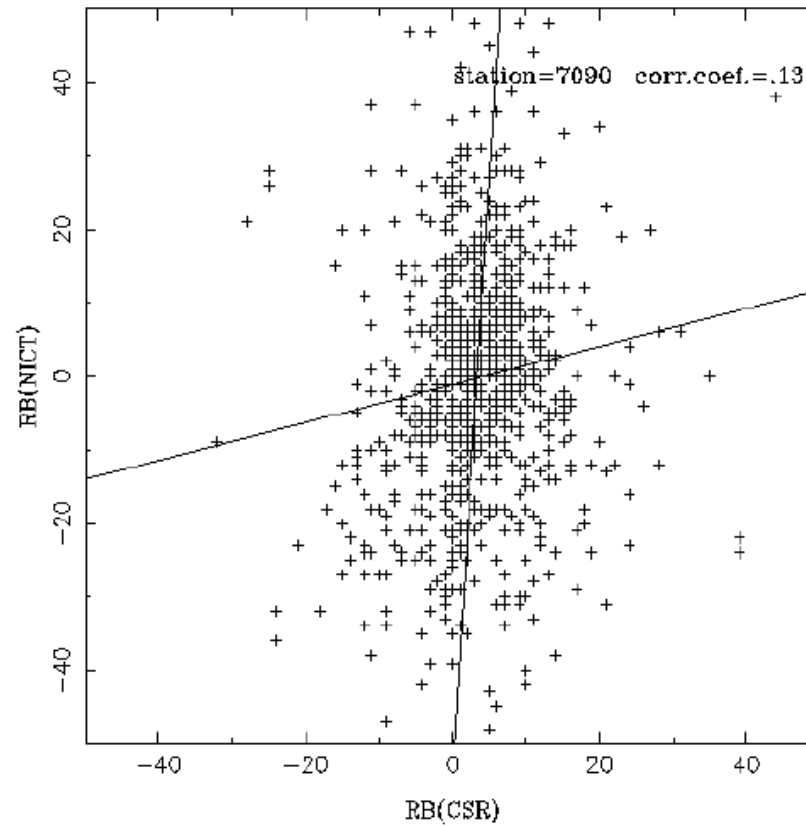
	AIUB	CSR	DEOS	DGFI	MCC	NICT	SAO
1824	532	GLSV tie fxd	DEOS est	DGFI est	MCC fxd	NICT fxd	
1831	532	DEOS fxd	DEOS fxd	DGFI est	MCC fxd	NICT fxd	
1863	532	MCC fxd					
1864	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
1870	532	MDVO tie fxd					
1873	532	ITRF fxd	ITRF fxd	DGFI est	MCC fxd	NICT fxd	
1884	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
1893	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7080	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7090	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7105	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7110	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7124	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7130	532	ITRF fxd	ITRF fxd	ITRF est		ITRF fxd	
7231	532	CSR fxd	DEOS est	DGFI est		NICT fxd	
7237	532	ITRF fxd	ITRF fxd	ITRF est	MCC fxd	ITRF fxd	
7249	532	slr.1118 fxd	ITRF est	ITRF est	MCC fxd	NICT fxd	
7308	532	ITRF fxd	ITRF fxd	DGFI est	MCC fxd	NICT fxd	
7343	532	CSR fxd					
7355	532	URUM tie fxd	DEOS est	DGFI est		NICT fxd	
7356	532	LHAS tie fxd					
7357	532	DEOS fxd	DEOS est	DGFI est		NICT fxd	
7358	October 20, 2006		DEOS est	DGFI est		NICT fxd	8
7403	532	ITRF fxd	ITRF est	ITRF est		NICT fxd	
7405	424	site log fxd	DEOS est	DGFI est	MCC fxd	NICT fxd	
7405	847	site log fxd	DEOS est	DGFI est	MCC fxd	NICT fxd	
7501	532	ITRF fxd	ITRF fxd	DGFI est	MCC fxd	NICT fxd	

Consistency range biases (3)

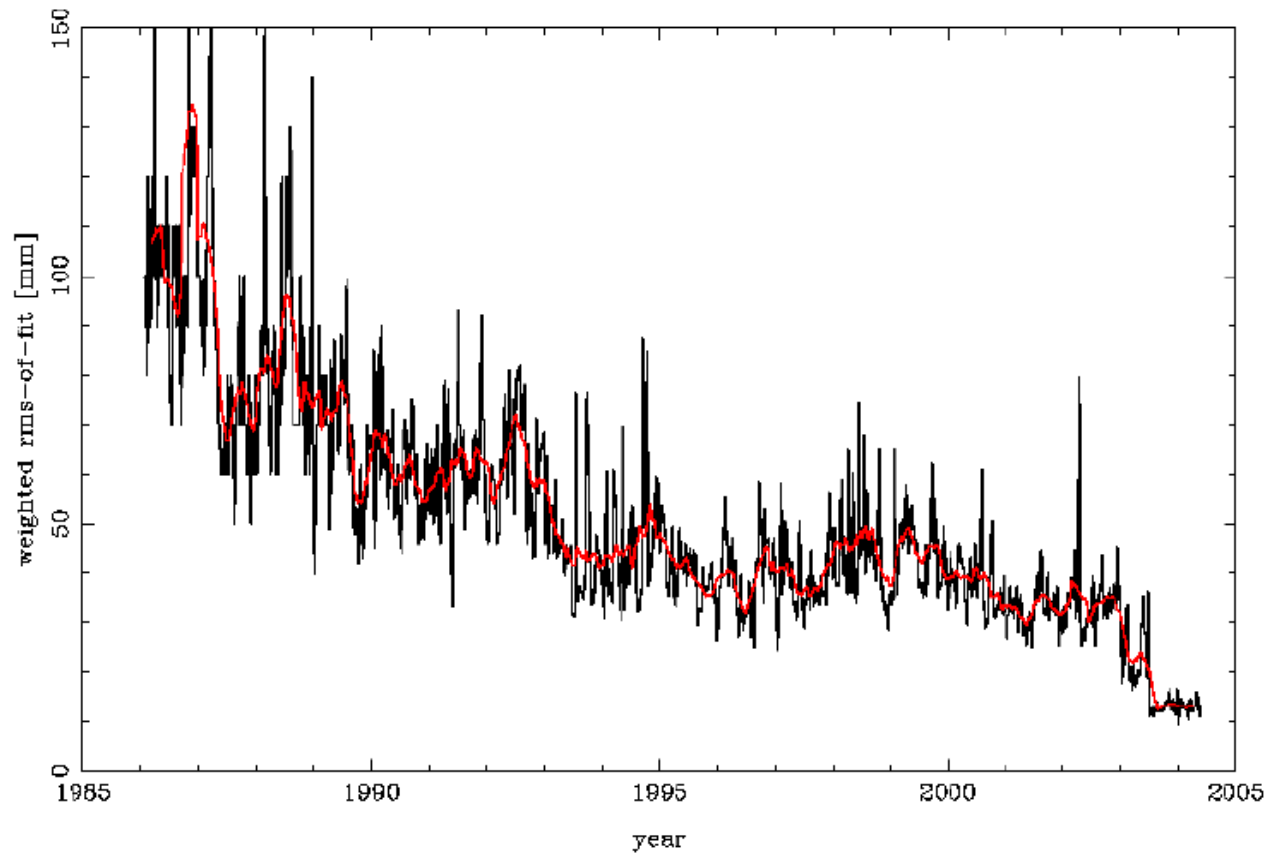
Options for comparisons:

- Direct comparison
- Covariance analysis

Consistency range biases (4)



Analysis development – quality



Input

ILRS Combined Range Bias Report

2006-09-13 00:00 UT - 2006-09-26 00:00 UT

Compiled by: SLR Observatory Zimmerwald
Date : 2006-09-27 12:30 UT
E-Mail : Werner.Gurtner@aiub.unibe.ch

1864	MAIL	Maidanak	CSR		DGFI		DUT		MCC		NICT		SAO	
			sc	wl	rb	pr	rb	pr	rb	pr	rb	pr	rb	pr

1864	2006-09-13	15:38	L2	532			-73	18			-82	18	94	16
1864	2006-09-16	18:07	L2	532			-53	17			-68	5	-47	5
1864	2006-09-20	14:54	L2	532			-72	11			-104	14		
1864	2006-09-25	17:16	L2	532							-42	9		

1864	Average			532			-66	15			-74	11	23	10

RMS differences (1)

2004 (all stations)

	DGFI	DUT	MCC	NICT	SAO
CSR	-	25	28	29	34
DGFI		-	-	-	-
DUT			22	25	24
MCC				26	28
NICT					32

RMS differences (2)

2005 (all stations)

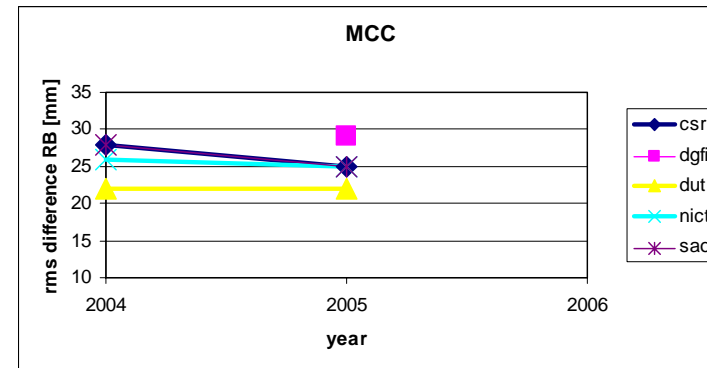
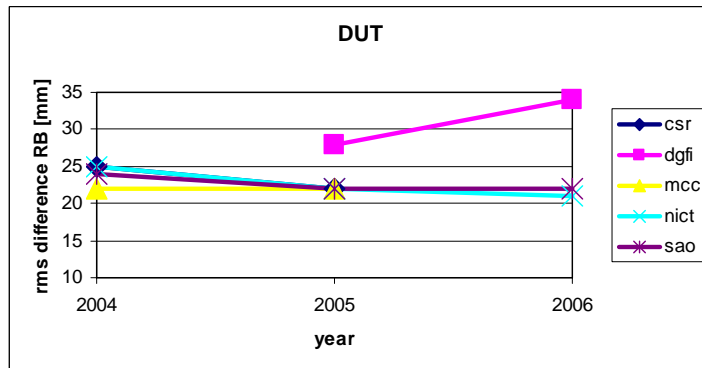
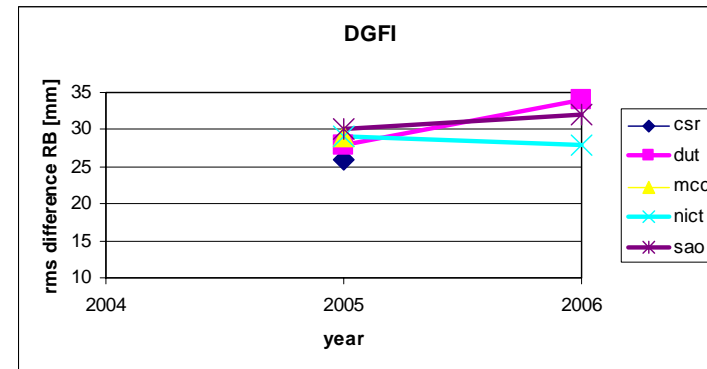
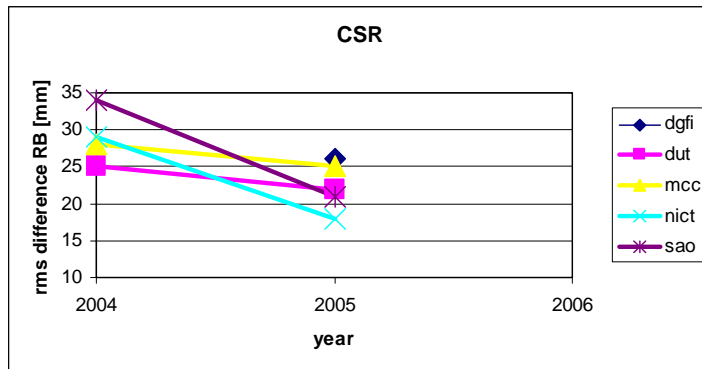
	DGFI	DUT	MCC	NICT	SAO
CSR	26	22	25	18	21
DGFI		28	29	29	30
DUT			22	22	22
MCC				25	25
NICT					26

RMS differences (3)

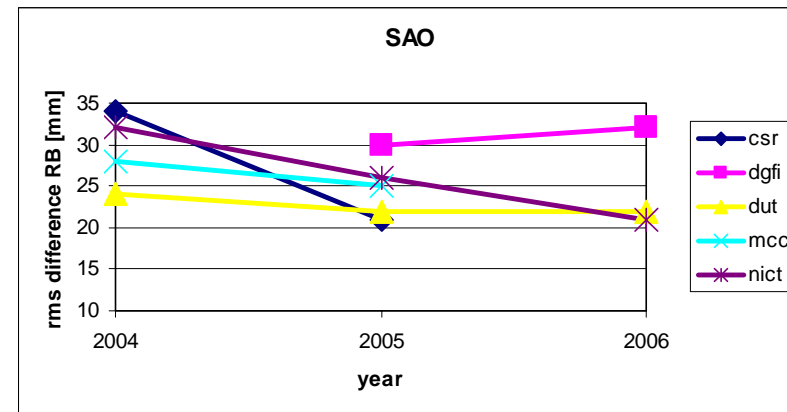
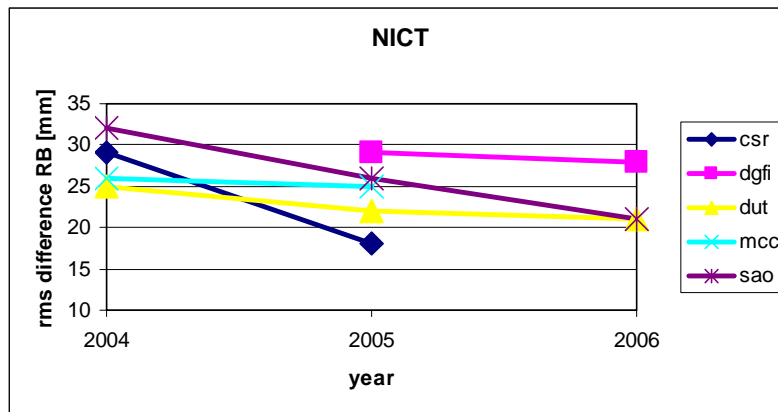
2006 (all stations)

	DGFI	DUT	MCC	NICT	SAO
CSR	-	-	-	-	-
DGFI		34	-	28	32
DUT			-	21	22
MCC				-	-
NICT					21

RMS differences (4)



RMS differences (5)



RMS differences (6)

AWG core stations

McDonald

Mount Stromlo

Yarragadee

Riyadh

Greenbelt

Graz

Monument Peak

Herstmonceux

Hartebeesthoek

Wettzell

Zimmerwald

RMS differences (7)

2004 (AWG core stations)

	DGFI	DUT	MCC	NICT	SAO
CSR	-	20	20	25	29
DGFI		-	-	-	-
DUT			17	22	22
MCC				23	22
NICT					29

RMS differences (8)

2005 (AWG core stations)

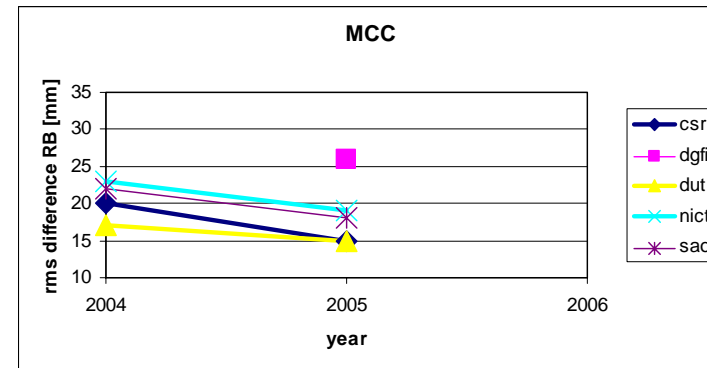
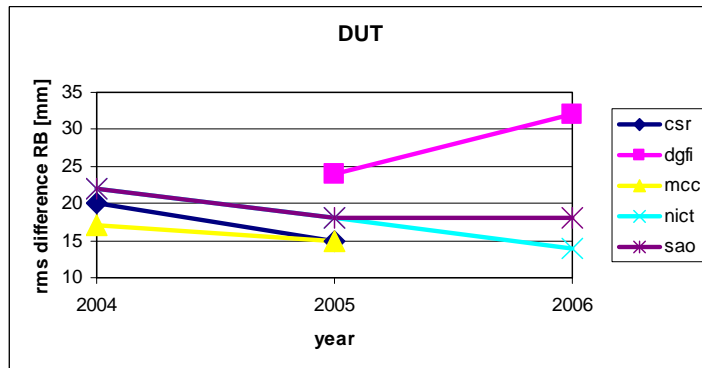
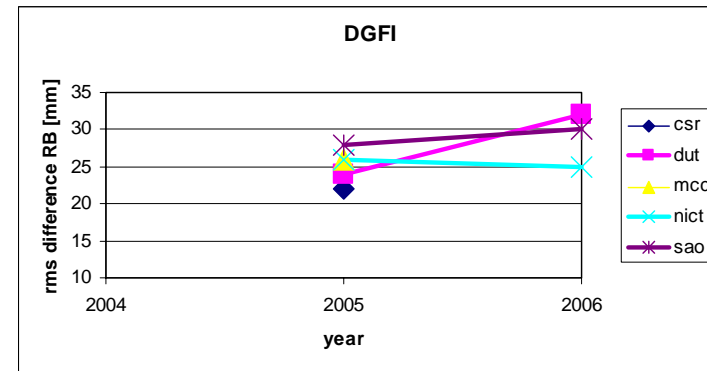
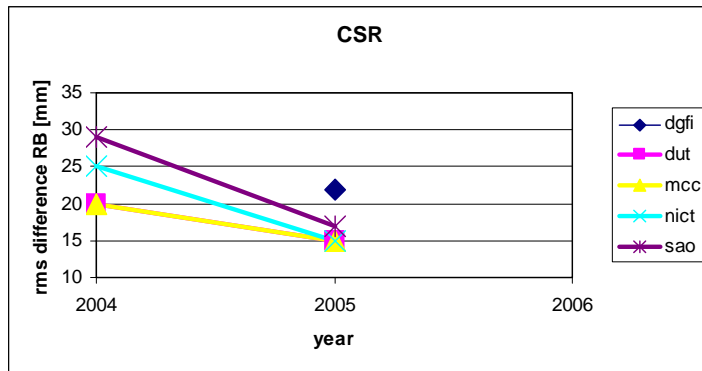
	DGFI	DUT	MCC	NICT	SAO
CSR	22	15	15	15	17
DGFI		24	26	26	28
DUT			15	18	18
MCC				19	18
NICT					23

RMS differences (9)

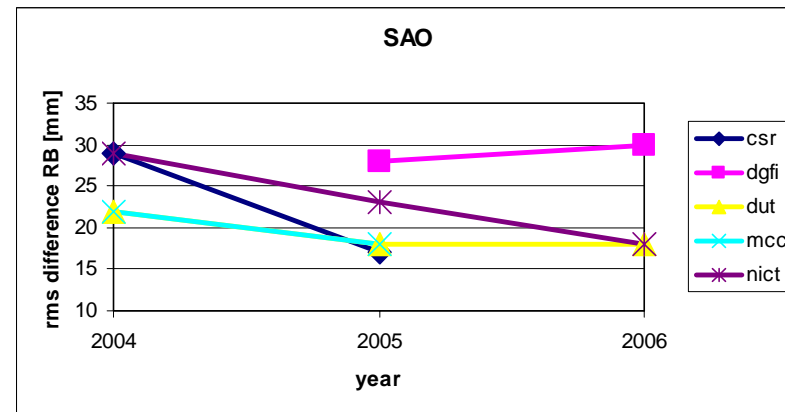
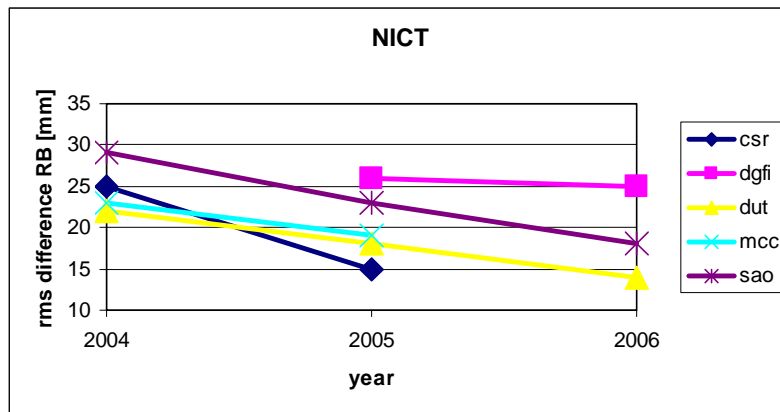
2006 (AWG core stations)

	DGFI	DUT	MCC	NICT	SAO
CSR	-	-	-	-	-
DGFI		32	-	25	30
DUT			-	14	18
MCC				-	-
NICT					18

RMS differences (10)



RMS differences (11)



Conclusions

- SLR network continuous point of attention
- Dedicated QC analysis point of attention
- Consistency of range bias values improves with time
- status 2006: range biases values consistent at 20-25 mm (global stations), 15-20 mm (AWG core stations)
- status 2006: 1-sigma uncertainty range bias $rms_difference_value / \sqrt{2}$ mm