

# Operational Issues

## ILRS Central Bureau

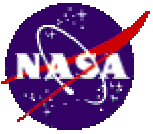
NASA/GSFC

Honeywell Technology Solutions Inc.

Harvard-Smithsonian Center for Astrophysics

Raytheon ITSS





# Questions

1. **What is limiting station performance in terms of data quality, data quantity, etc?**
2. **What things can be done to improve performance?**





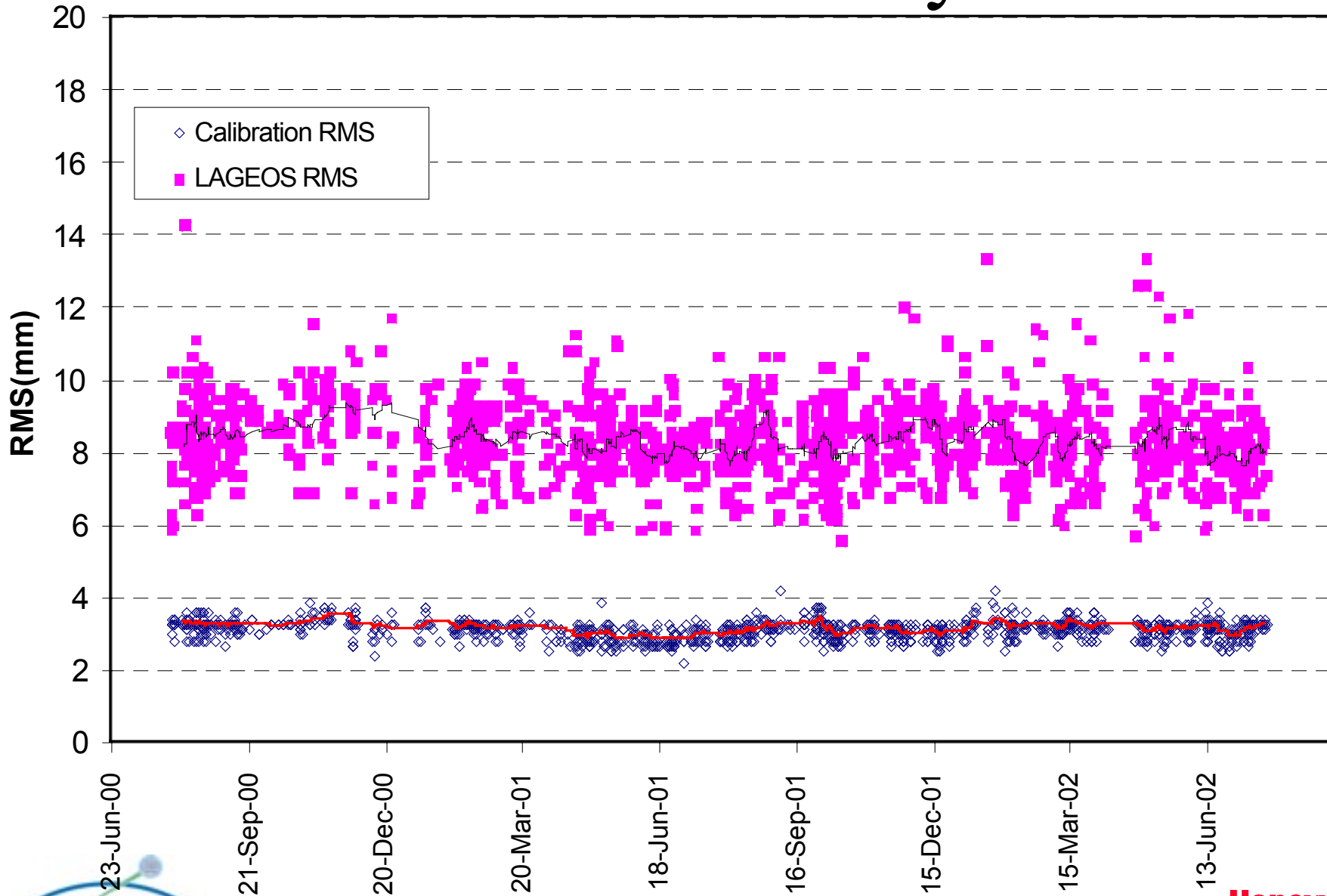
# Mundane Operational Problems

- Format
  - ftp in the wrong mode (e.g. binary vs ascii)
- Data Integrity
  - Erroneous normal points
  - Bad met. data
  - Wrong day
  - Epoch timing blunders
  - Frequency errors
  - Missing or erroneous local survey ties
- Operational Compliance
  - Wrong satellite bin size (new missions)
  - Violation of Herstmonceux algorithm (bin formation)
  - Timely updating of configuration information





# RMS Stability

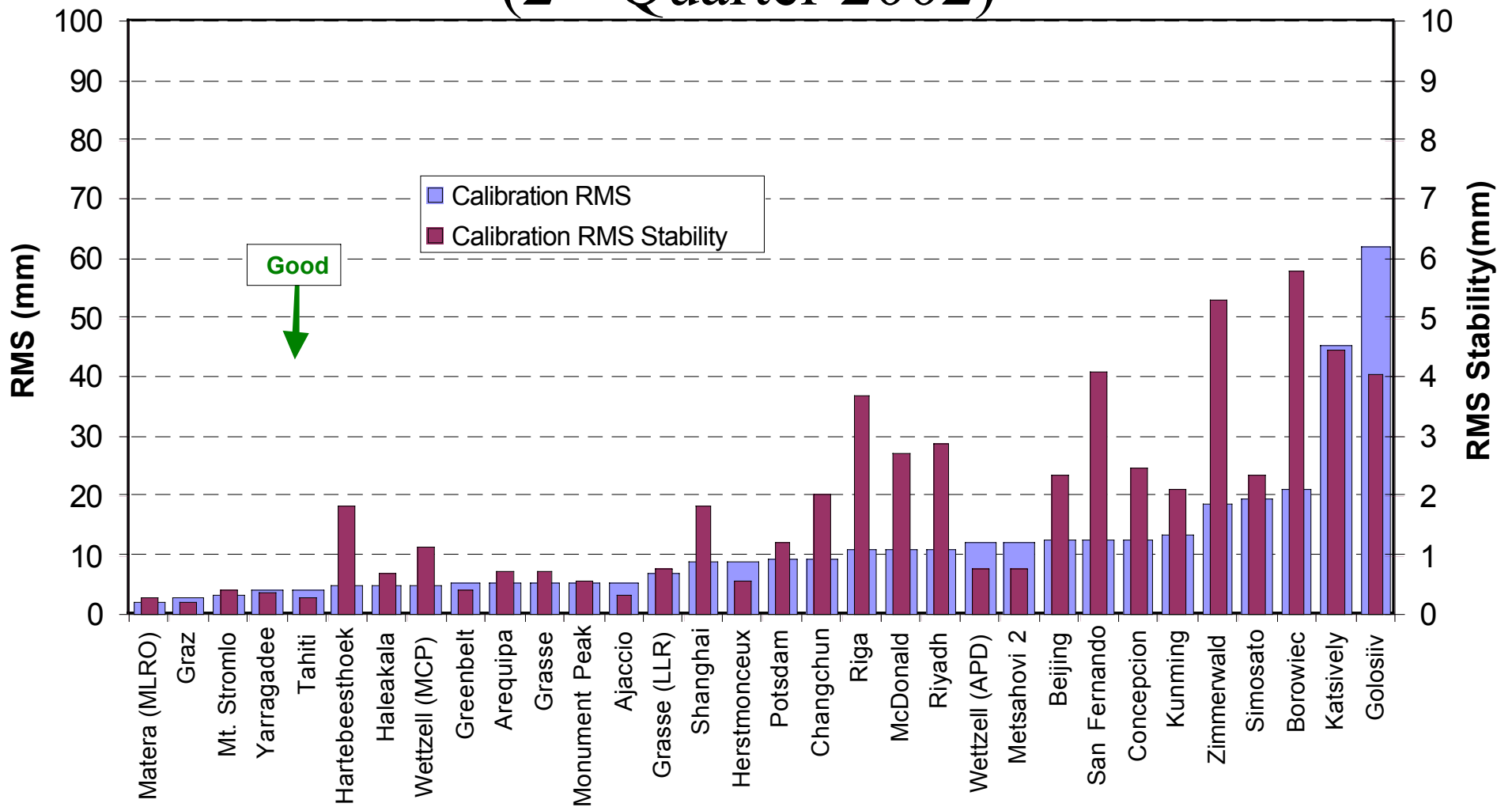


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# Network Calibration Stabilities

(2<sup>nd</sup> Quarter 2002)



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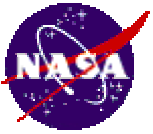
# Yarragadee Tracking Record (Feb 2002)

Satellite	Passes	Scheduled	Percent	Reason
Ajisai	149	154	97	
BEC	43	49	88	
Champ	48	48	100	Used drag function and sub-daily predicts
ERS-2	67	71	94	
Etalon-1	15	16	94	Satellite mostly available in daytime
Etalon-2	40	45	89	
GFO	70	76	92	
GLONASS-78	0	7	0	Satellite non-operational
GLONASS-80	19	59	32	
GLONASS-84	47	76	62	
GLONASS-86	1	3	33	
GLONASS-87	9	12	75	
GPS-35	47	49	96	
GPS-36	41	43	95	
Jason	87	91	96	
LAGEOS	94	117	80	
LAGEOS-2	70	115	61	Interference with the sun
LRE	3	3	100	
Reflector	60	77	78	
Starlette	97	99	98	
Starshine	5	37	14	No drag function available
Stella	58	60	97	
Topex/Poseidon	95	96	99	
<b>Totals</b>	<b>1165</b>	<b>1403</b>	<b>83</b>	

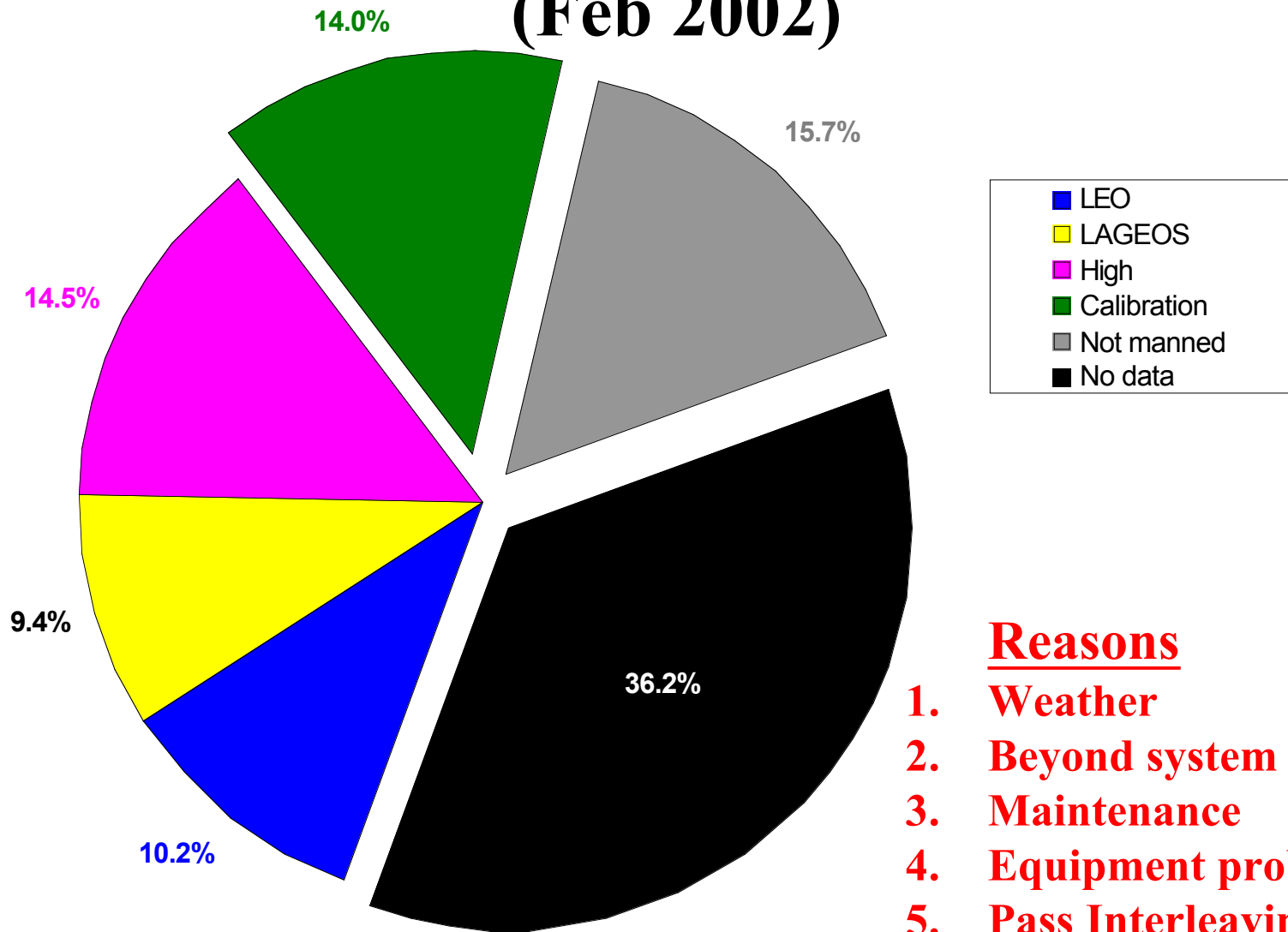
**>41 passes/day**

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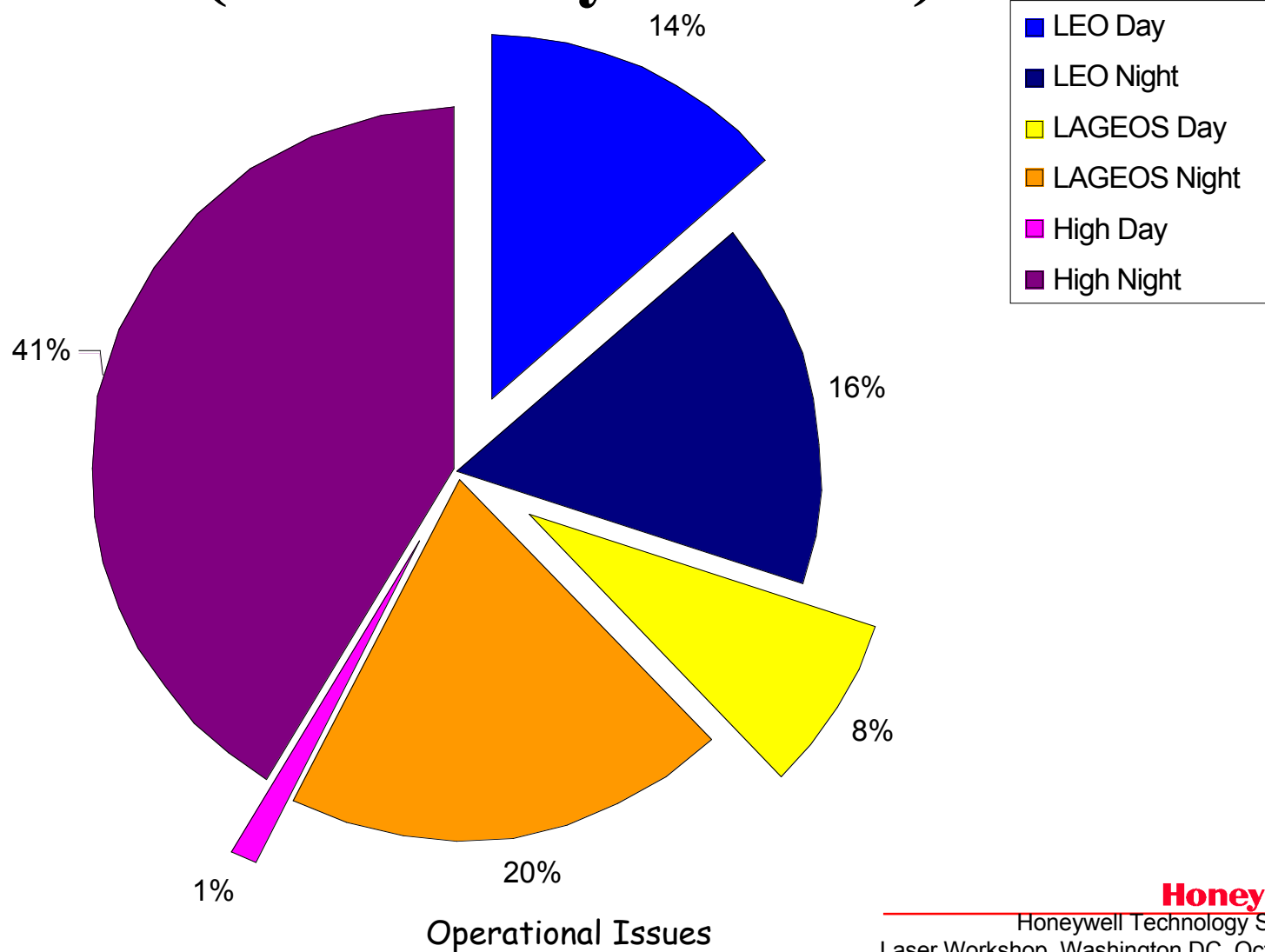
# Yarragadee Tracking Results (Feb 2002)



Operational Issues



# Yarragadee Feb 2002 Tracking Analysis (minutes by satellite)

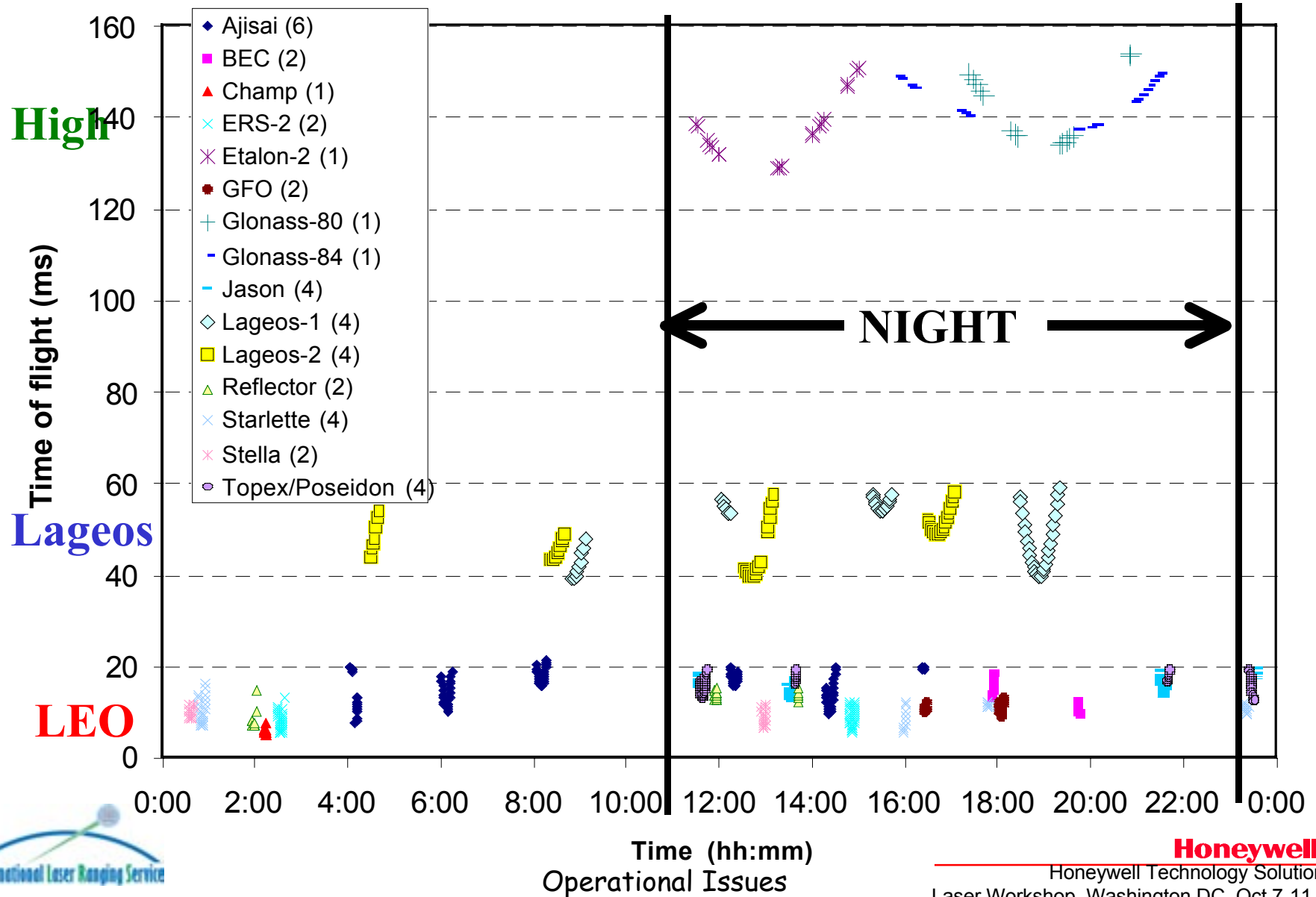






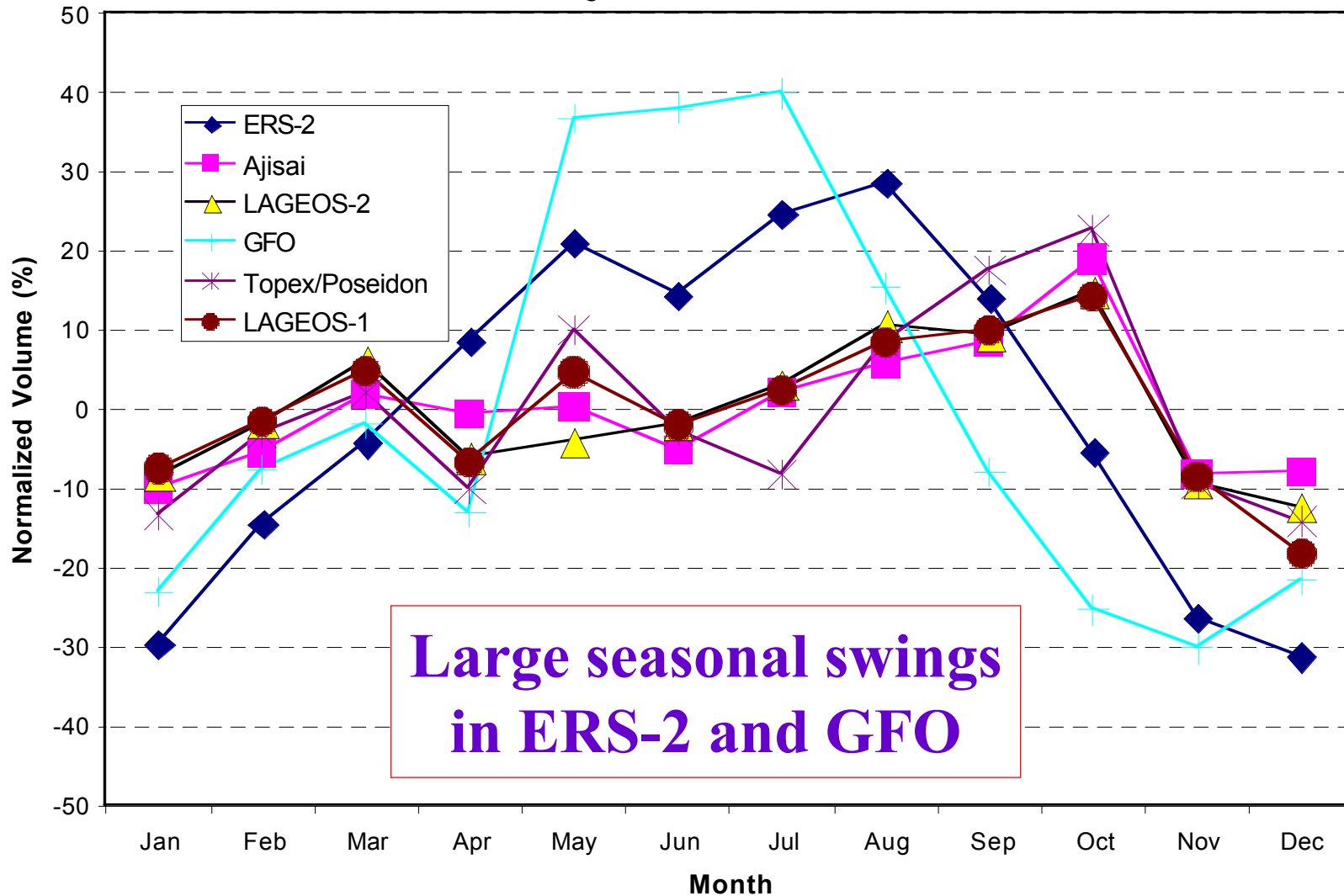
# Yarragadee Tracking

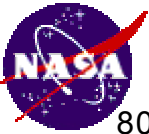
(40 passes from 15 satellites on Feb 8<sup>th</sup>, 2002)



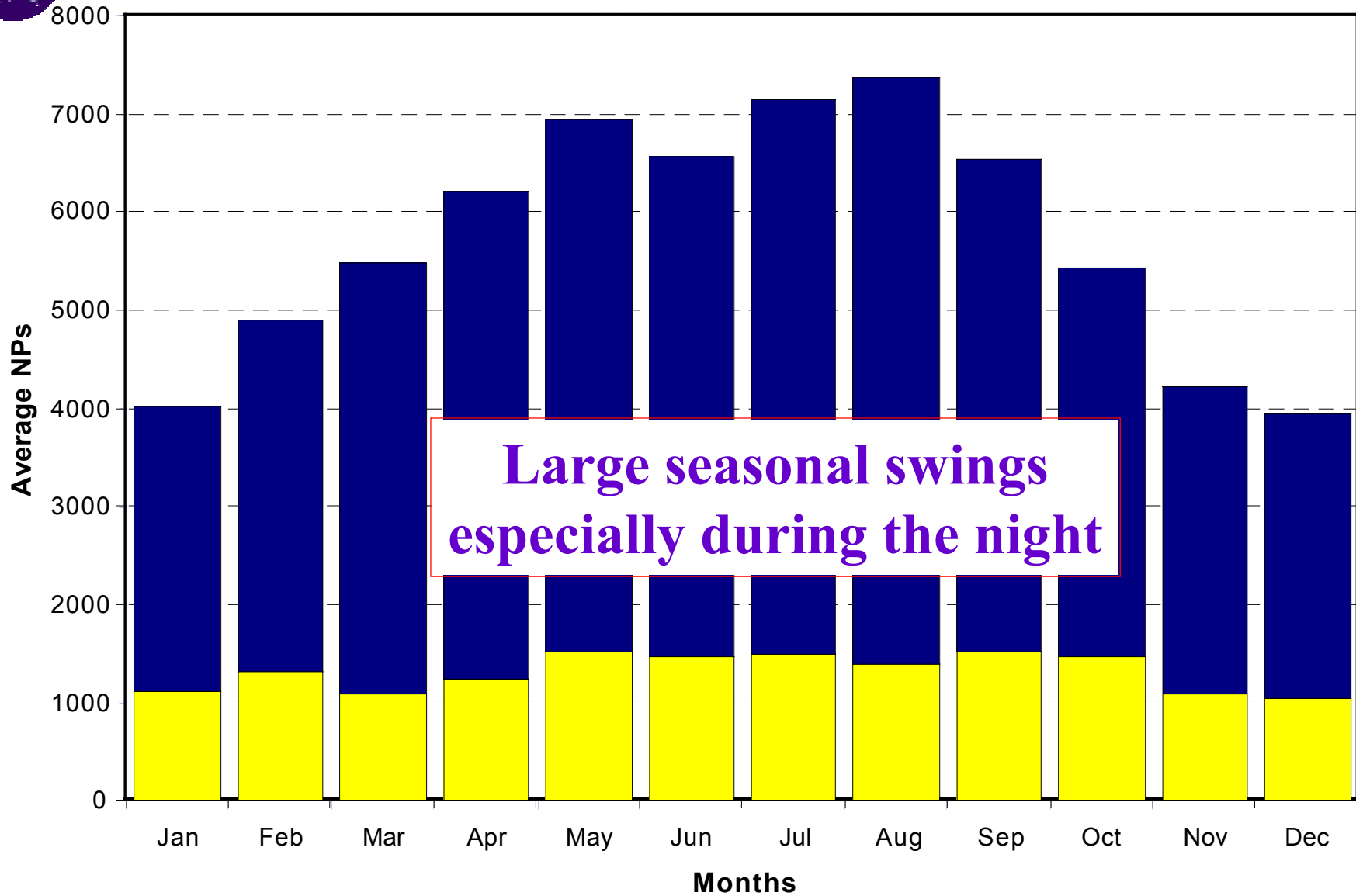


# ILRS Normal Points Production (by Month)



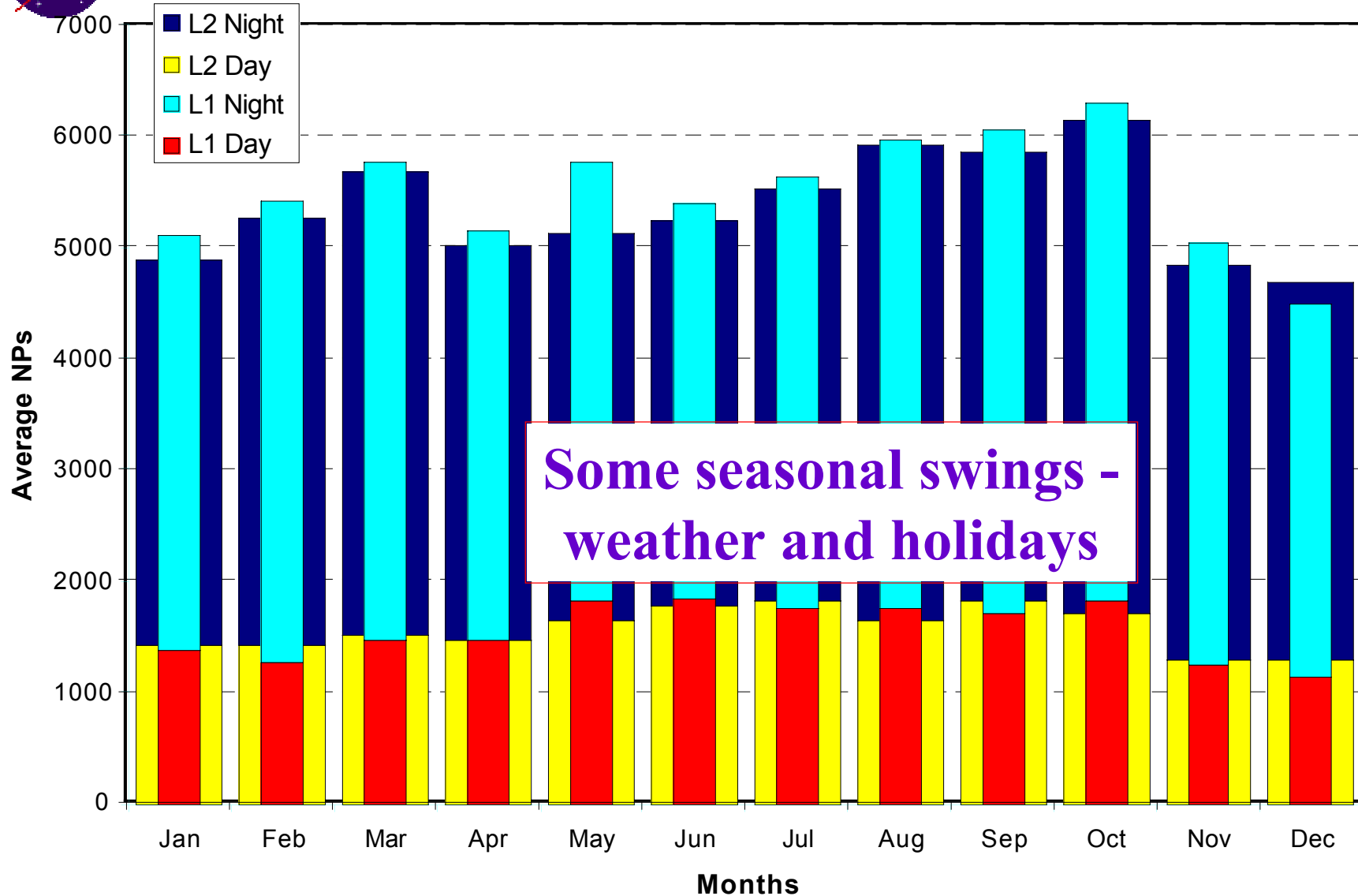


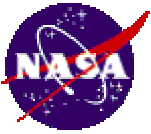
# ERS-2 Normal Points



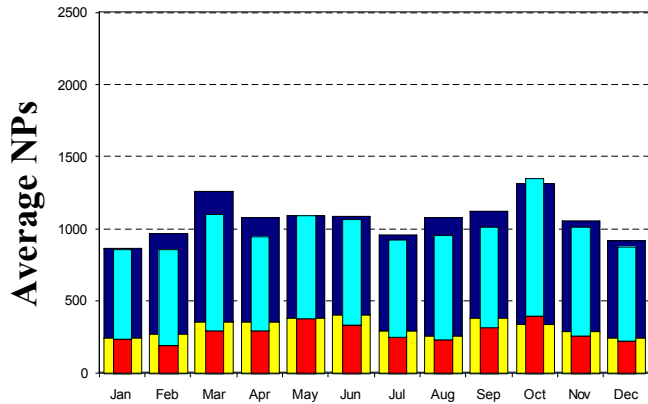


# LAGEOS Normal Points

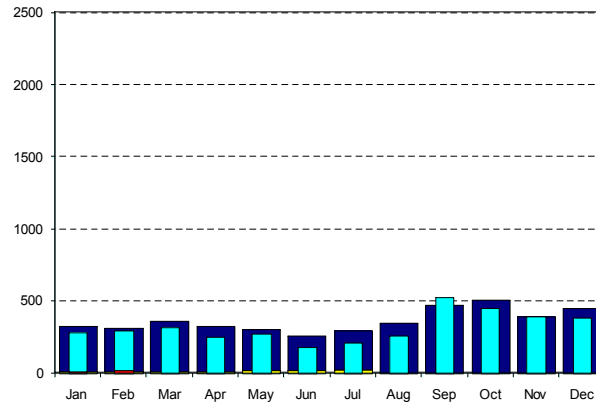




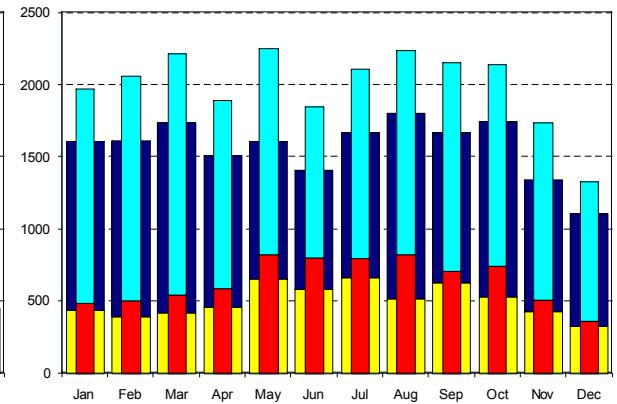
# LAGEOS Normal Points by Region



North America, 3 sites

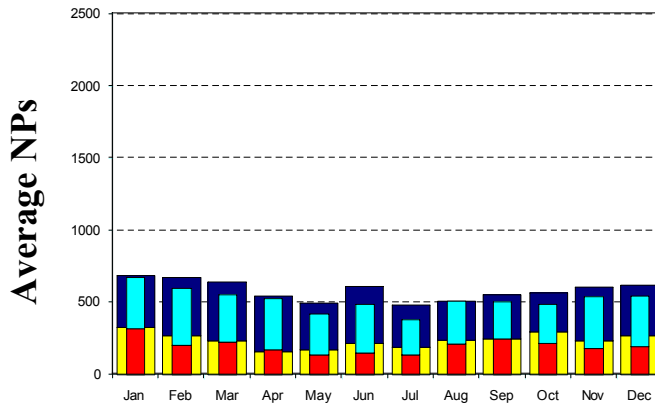


China, 5 sites

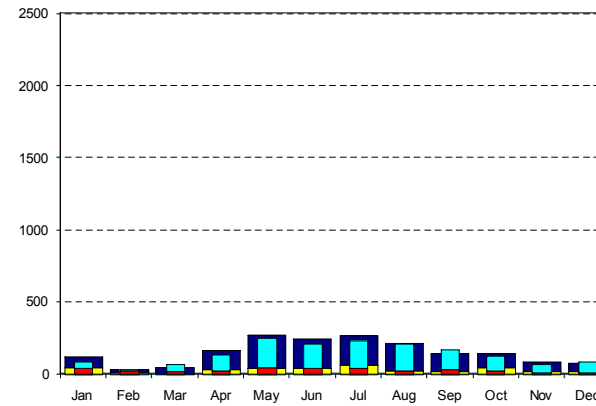


Europe, 8 sites

- L2 Night
- L2 Day
- L1 Night
- L1 Day



Australia, Yarragadee



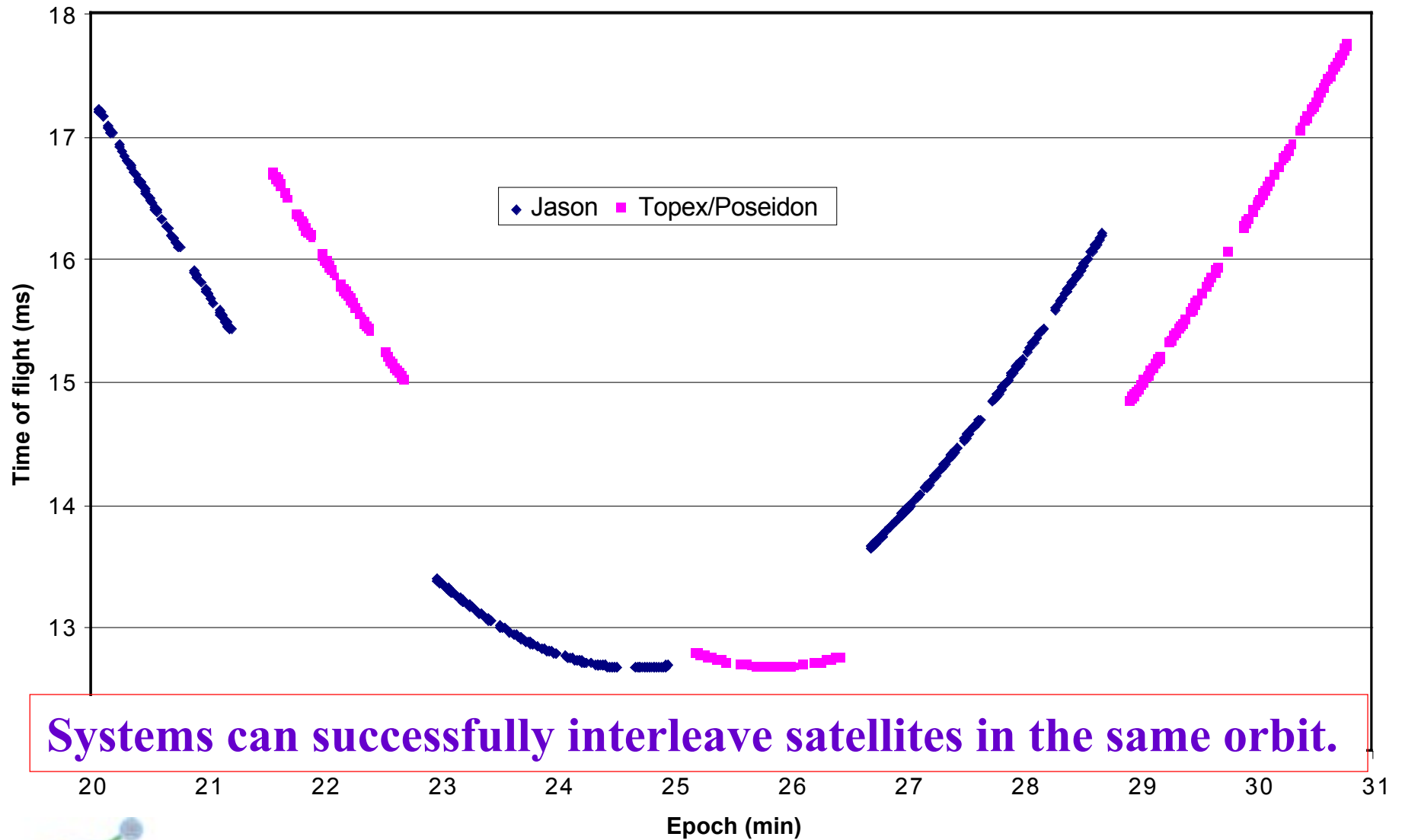
South America, Arequipa

**Seasonal swings vary by region.**  
**different weather patterns, satellite visibilities, and site capabilities**



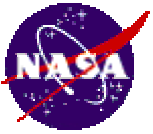


# Pass Interleaving - Zimmerwald



**Systems can successfully interleave satellites in the same orbit.**





# Site Performance Issues

- Develop better understanding of your system
  - Aggressively investigate calibration instabilities
  - Closely monitor performance after a equipment or configuration change
- Share BEST system practices between systems and operators
- Implement minimum observation criteria for normal point creation
- Evaluate manual processes for possible process improvement
- Collocate with at least one other geodetic technique
- Provide accurate site tie information





# Tracking Issues

- **Very Low LEOs (<500Km)**
  - **Fresh predicts** using an alternate data source (i.e. GPS)
  - **Drag function** (depends upon solar activity)
- **LAGEOS**
  - **Daytime ranging** capabilities
- **High**
  - **Weak link/daytime ranging**
  - Investigate feasibility of **transponders**
- **General**
  - **Low elevation** tracking (i.e. < 20 degrees)





# ILRS Site Support Enhancements

- Develop a **single consolidated bias report**
- Provide on-site **data integrity algorithms**
- Improve **communication** from missions
  - Signal strength
  - Non-functioning satellites
  - RRA masking
  - Maneuvers notifications
  - Regular mission requirement assessment
- **Develop satellite 'WORTH' functions** based on scientific value