



# Contribution of the new satellites to the positioning performances

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# Question

Until end-2001: 3 DORIS-equipped satellites

best positioning performances with the 3 instruments:

- station coordinates: 1 to 1.5 cm monthly repeatability
- EOP: 1 to 1.5 mas compared to IERS series

From mid-2002: 3 new instruments are flying

- dual-channel
- better OUS
- instrumental noise reduced

**Are the positioning performances improved?**

## DORIS-equipped satellites

Satellite	Launch date	Altitude (km)	Incl. (deg)	Mission end
SPOT-5	04 May 2002	800	98.7	
ENVISAT	01 Apr 2002	790	98.6	
JASON-1	07 Dec 2001	1320	66	
SPOT-4	24 Mar 1998	800	98.7	
SPOT-3	26 Sep 1993	800	98.7	09 Nov 1996
TOPEX	10 Aug 1992	1320	66	
SPOT-2	22 Jan 1990	800	98.7	

# Analysed Data 1/2

## Processing (GINS software)

- 4 months: July-October 2002 (17 weeks, 123 days)
- each satellite processed independently
- 1-day arcs (w/o common parameters)
- same dynamical parameters for Spot-n and Envisat; for Topex and Jason

## Combinations (DYNAMO software)

- unweighted
- global, monthly, weekly (daily)

## Estimated parameters:

- monthly solutions: PX, PY (unconstrained), positions (1 meter)
- weekly and daily solutions: positions (no rotation in longitude)

## Analysed Data 2/2

Notes:

SAA stations removed in Jason data processing

KRUB AREB ASDB CACB EASB HBKB HELB LIBB SANB GALA PAQB MAHB PDMB TRIB

less data for Topex in August (manoeuvres)

less data for Envisat (acquisition pbs)

# Issues

## Instruments:

- performances of the 2nd generation receivers vs 1st-generation

## Combinaison:

- 6 satellites better than 3?
- Constellations: « Old » (sp2, sp4, tpx) vs « New » (sp5, jas, env)
- Orbite: « Spots + Envisat » vs « Topex + Jason »
- Future: without sp2, without tpx

## Observation time span:

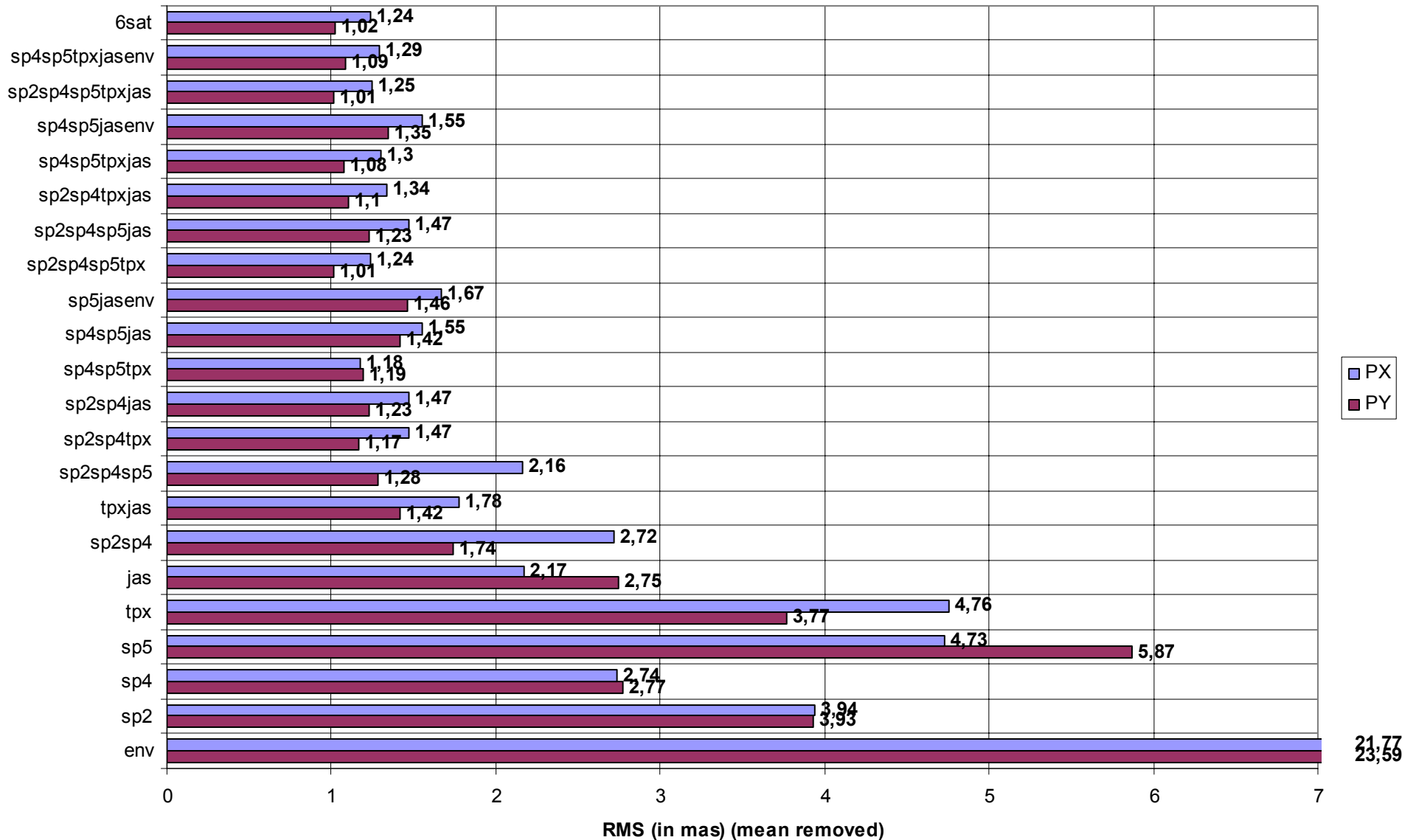
- can we obtain high-precision results over shorter periods?

# EOP

The various solutions of EOP daily values are compared to the IERS 97C04 series.

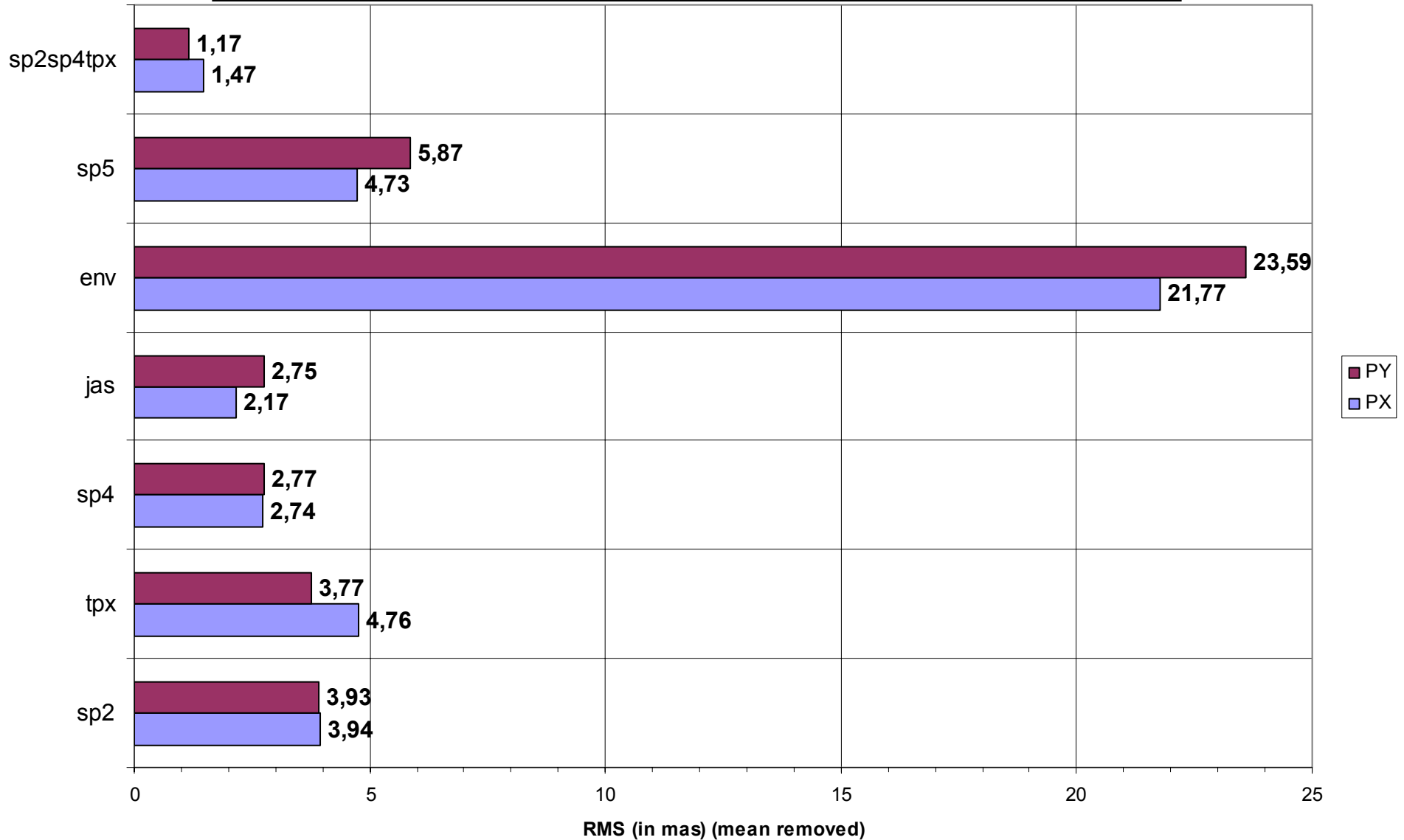
Results are presented as RMS (in mas; mean removed) of the series differences for the X and Y components

# EOP results: from 1 to 6 satellites

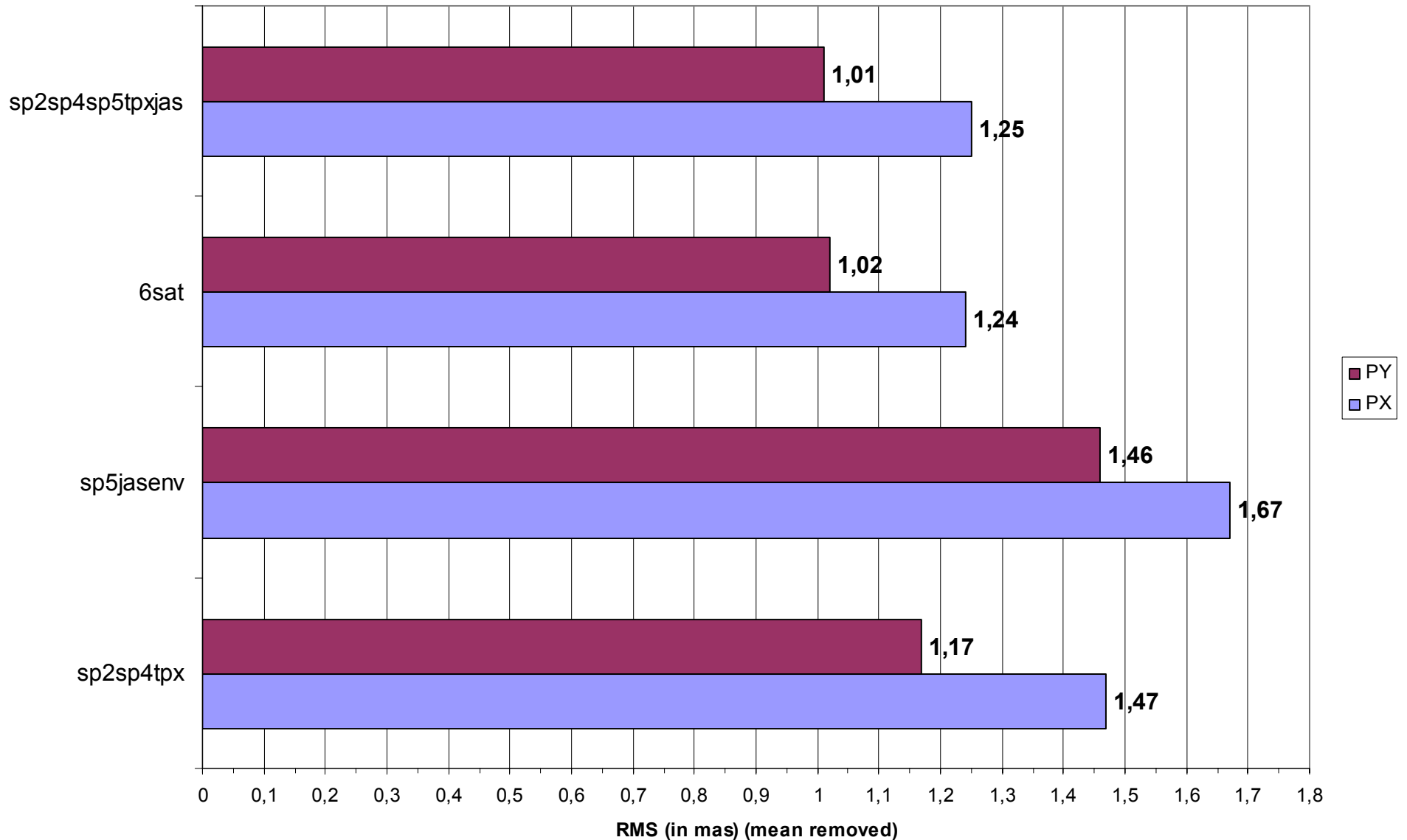




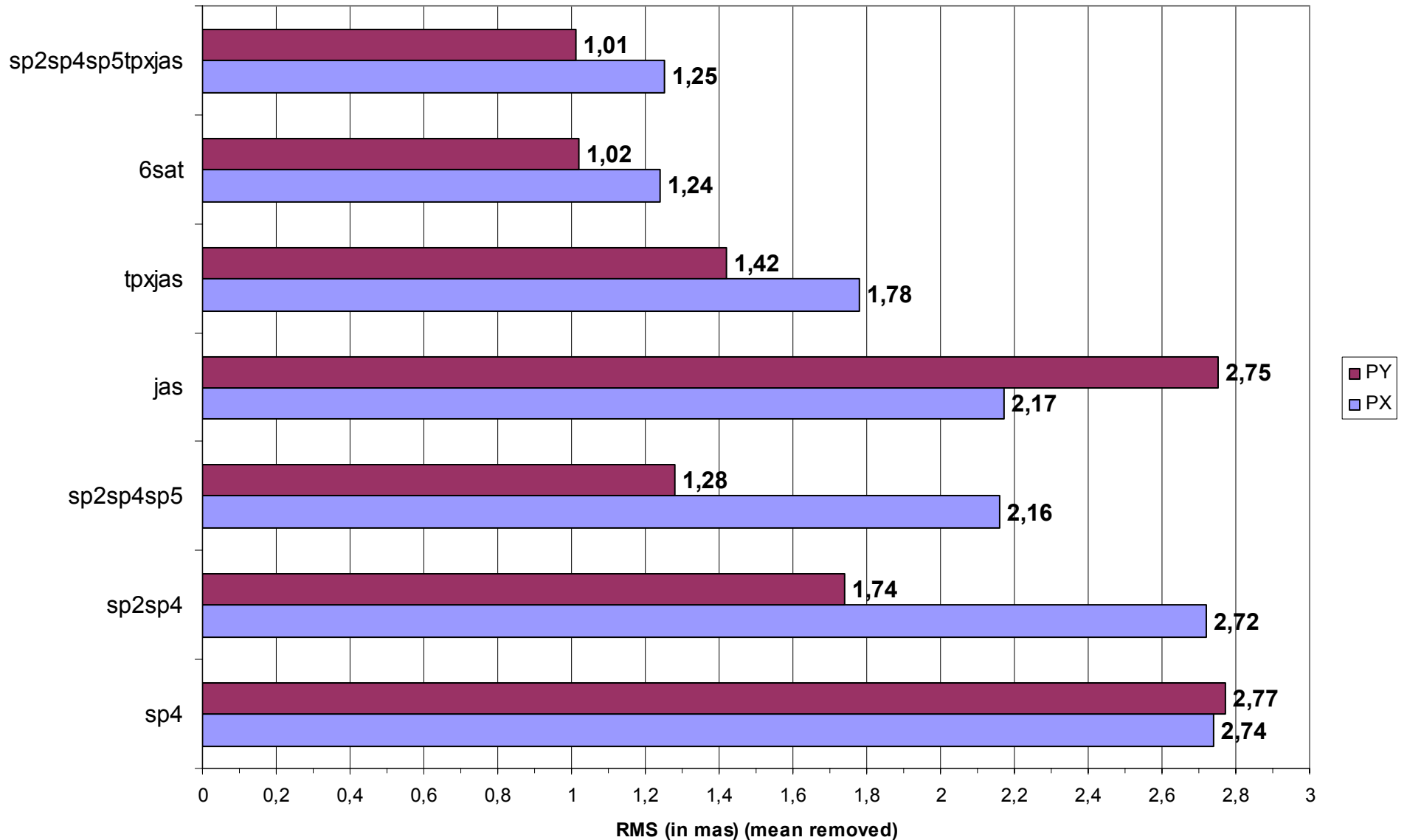
# EOP results: 1-satellite solutions



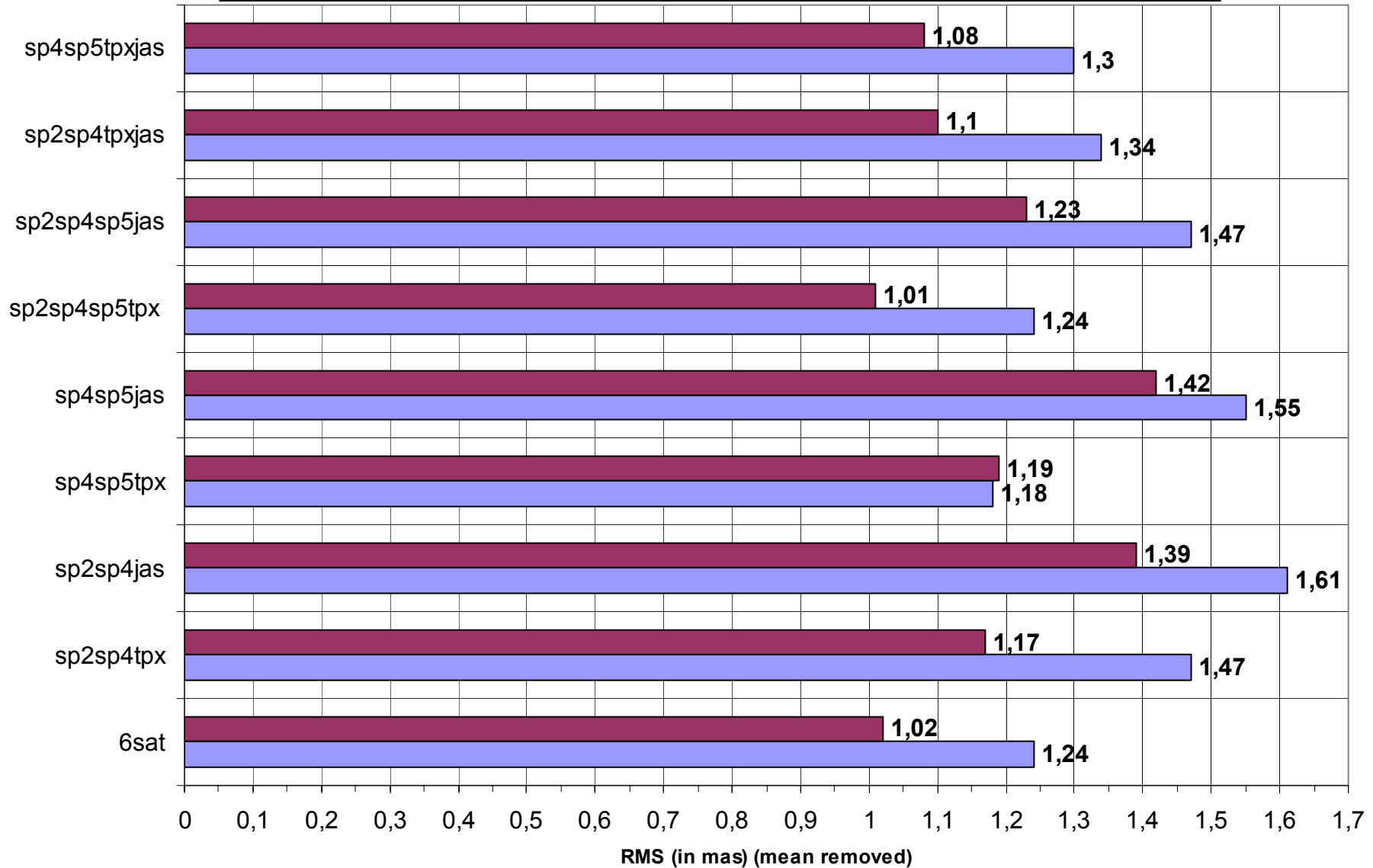
# EOP results: «old», «new», global constellations



# EOP results: Spot/Envisat orbit vs Topex/Jason orbit

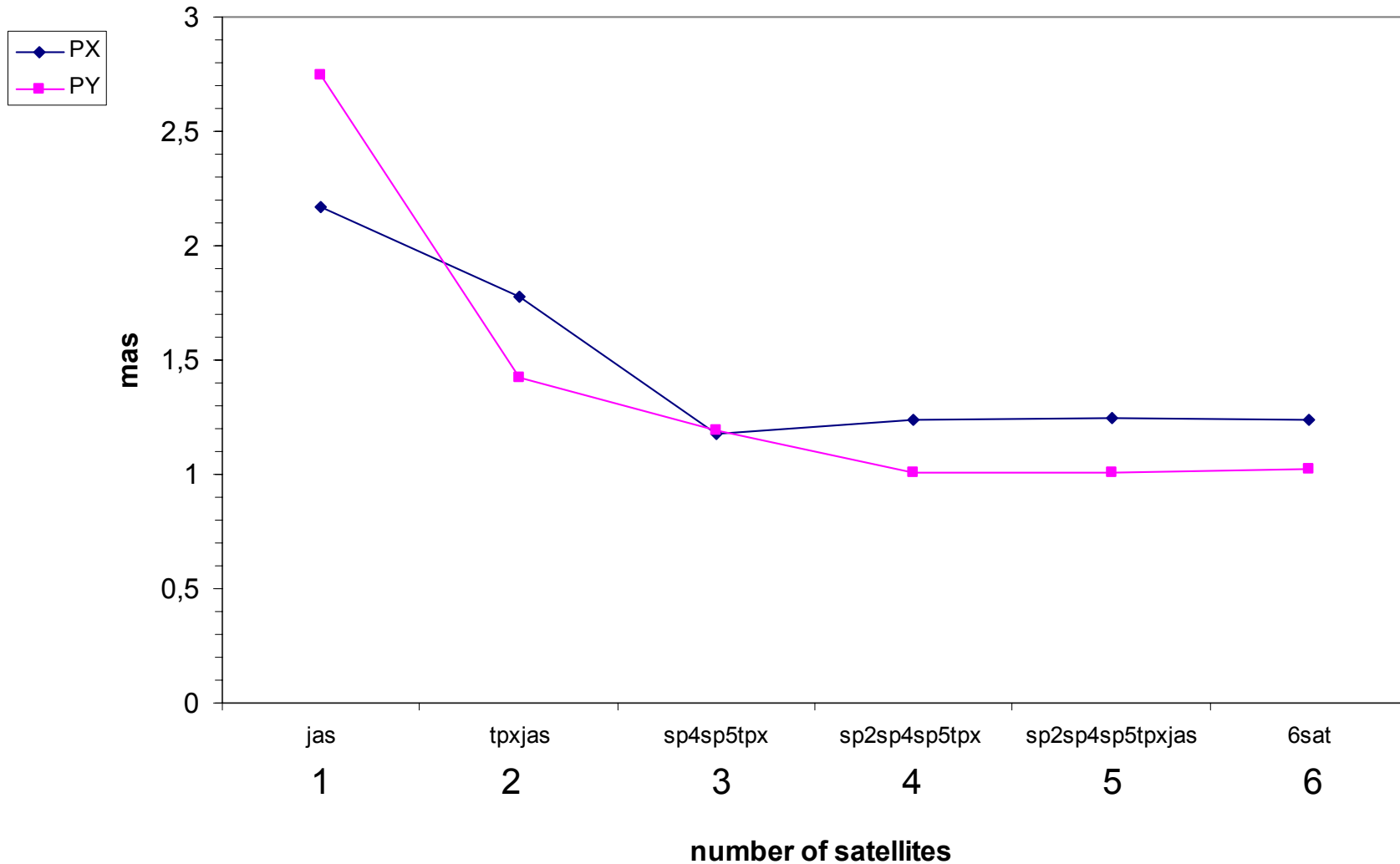


# EOP results: various combinations



# EOP results

Pole results as a function of the number of satellites

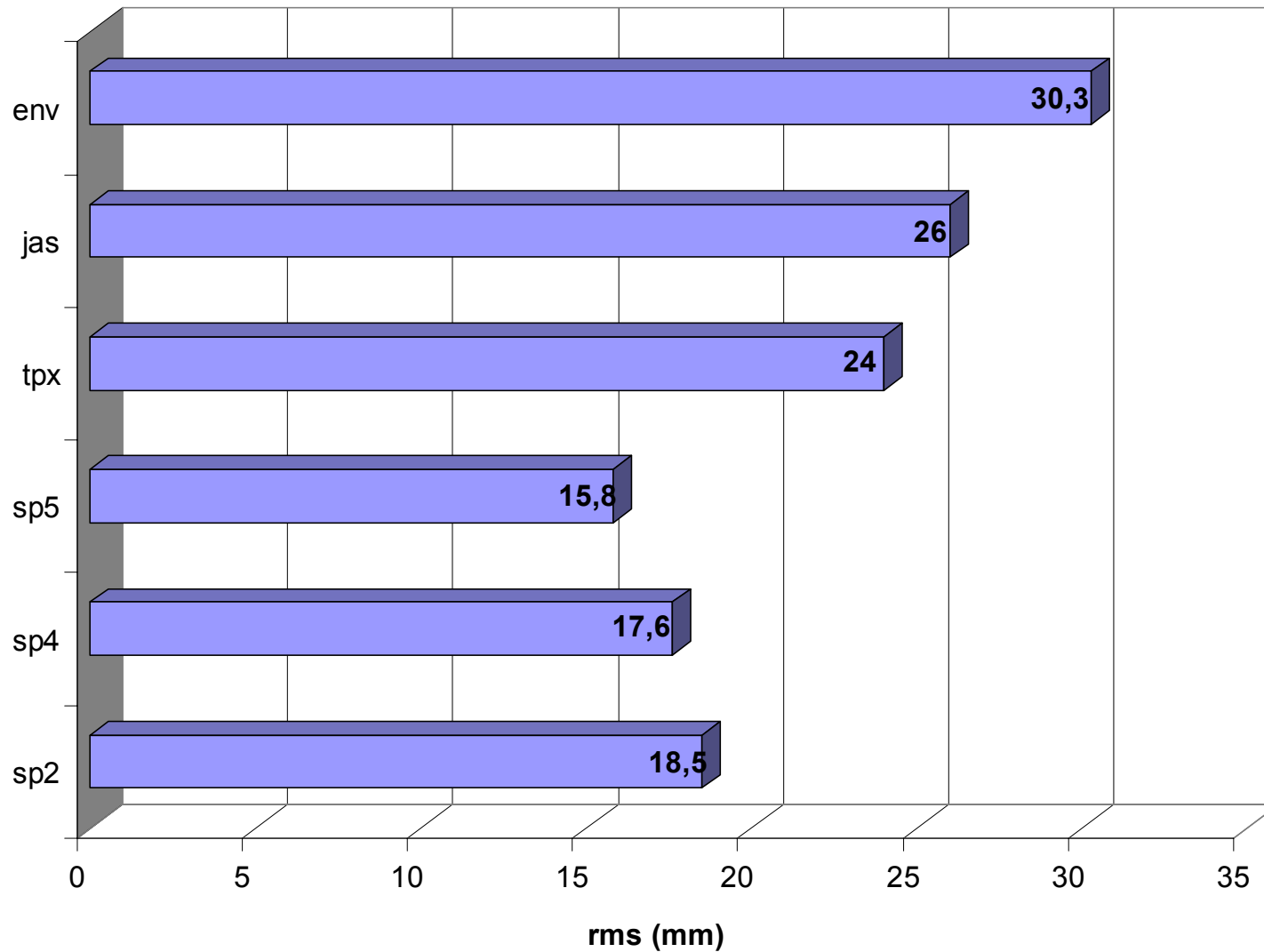


## Station position

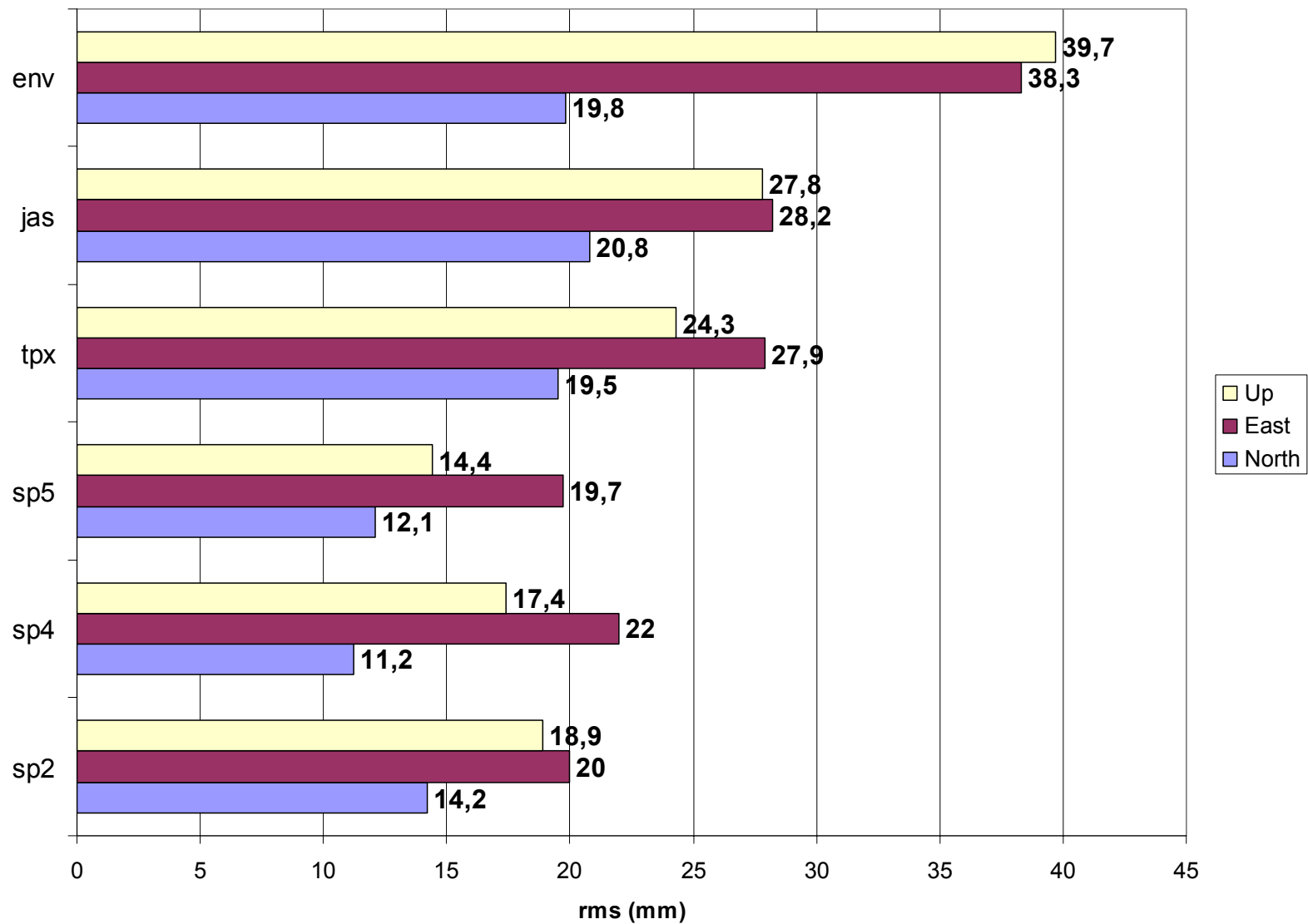
The various monthly, daily or weekly solutions of the network coordinates are compared to a same type 4-month solution (ex: the 4 monthly combined Spot2/Spot4/Topex solutions are compared after a 7-parameter transformation to the 4-month combined Spot2/Spot4/Topex solution).

Results are presented as 3-D residuals rms and rms for the north, east and up components.

# 1-satellite monthly precision: 3D rms

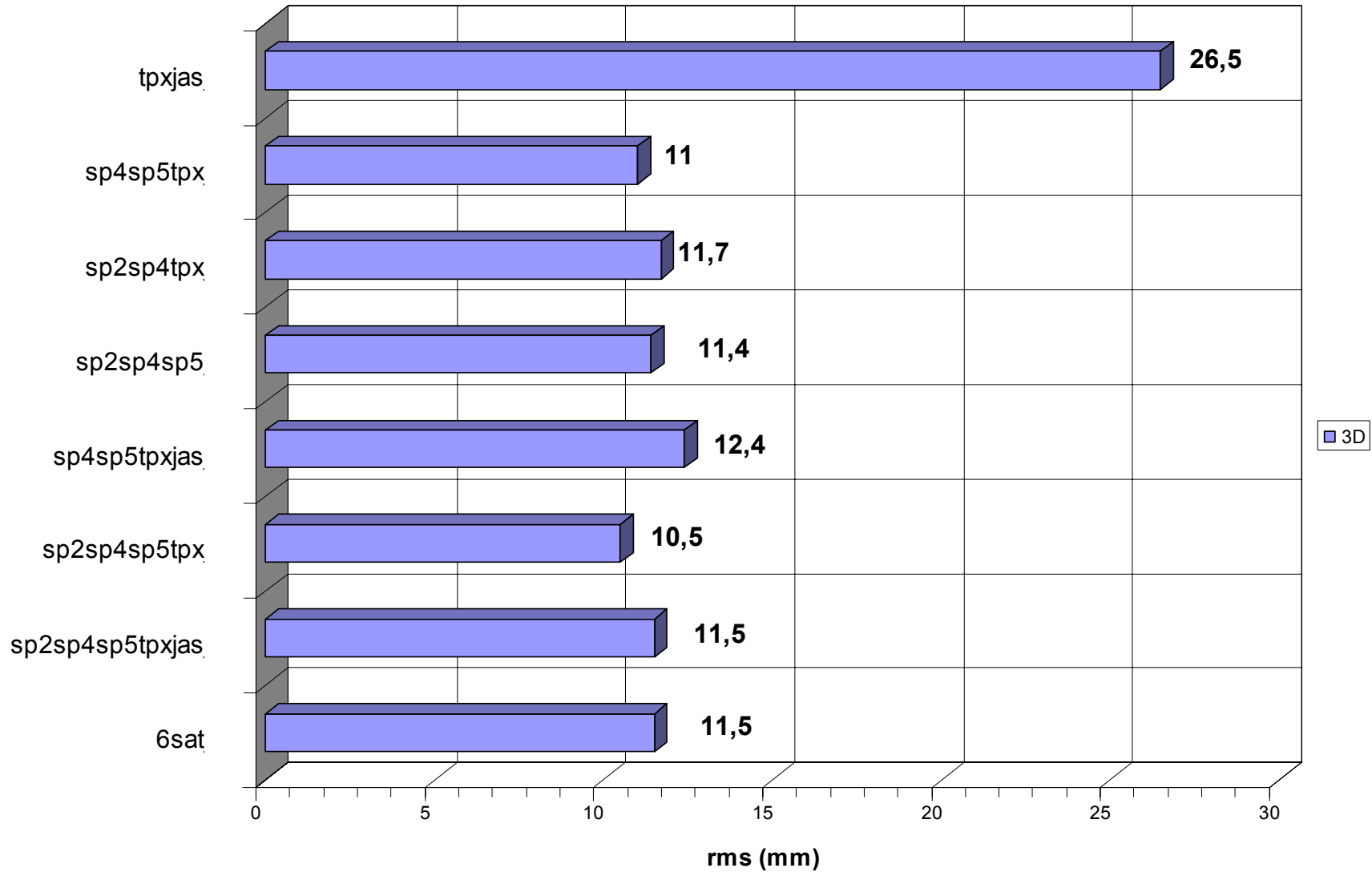


# 1-satellite monthly precision

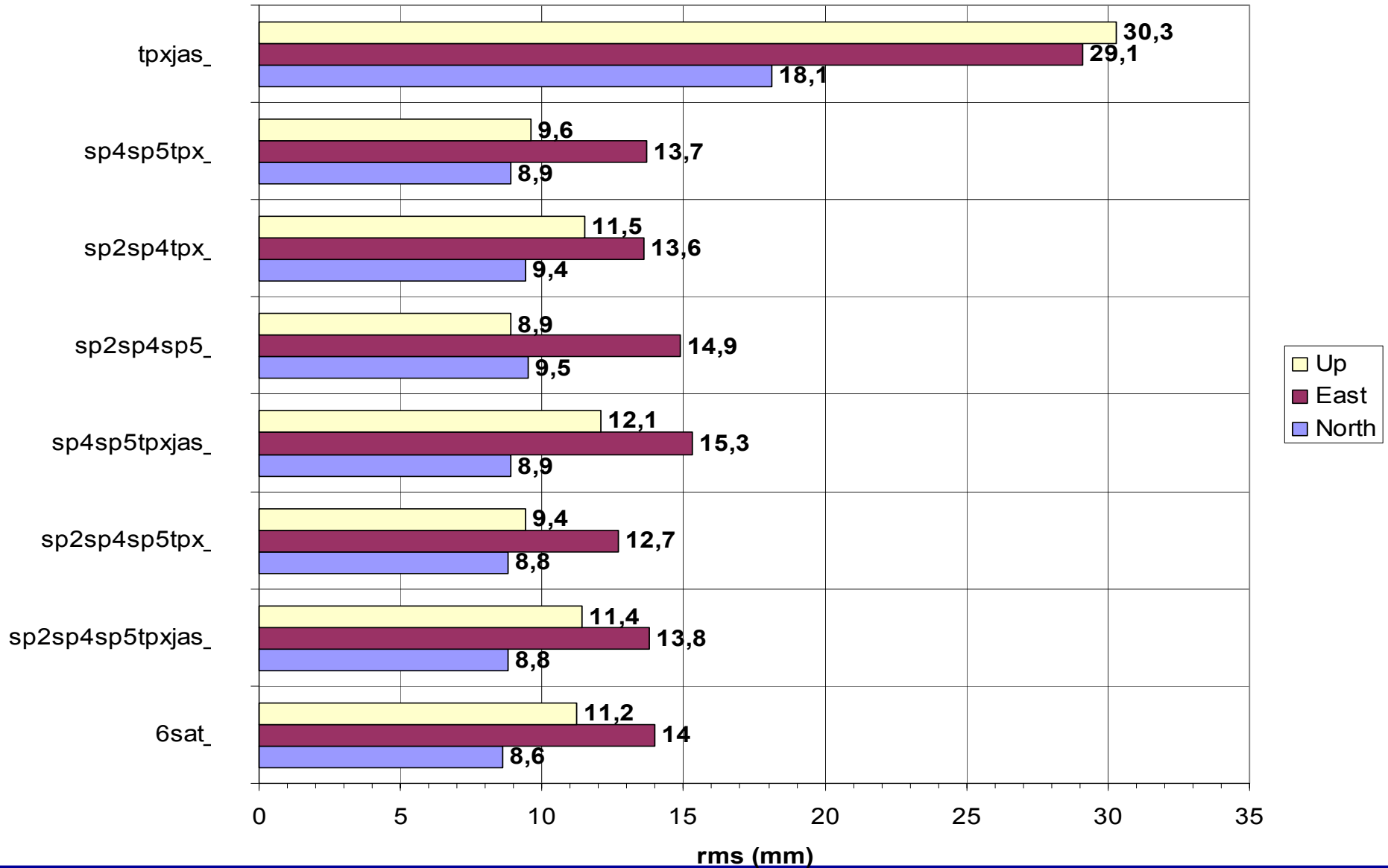




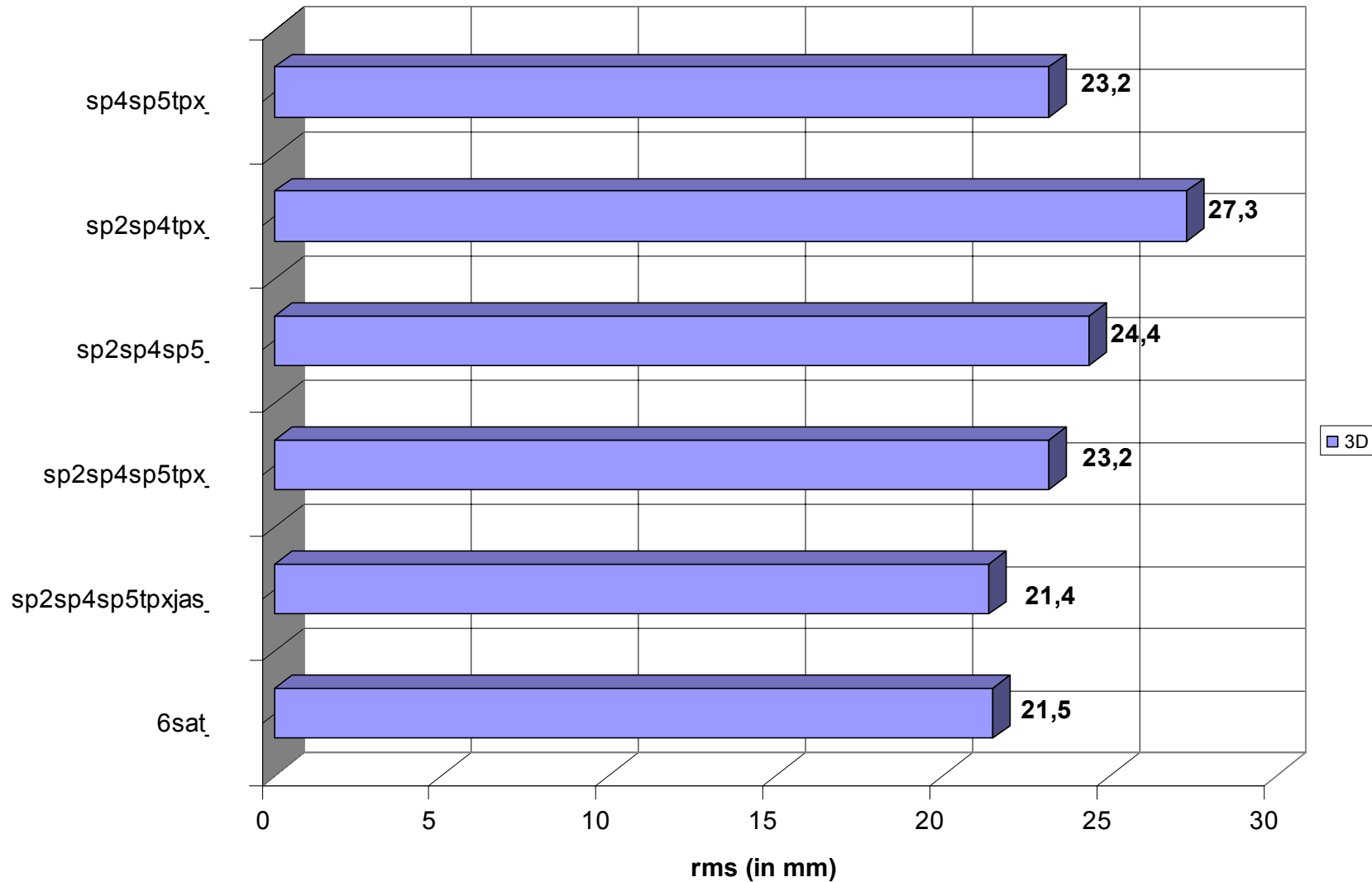
# Monthly precision: 3-D rms



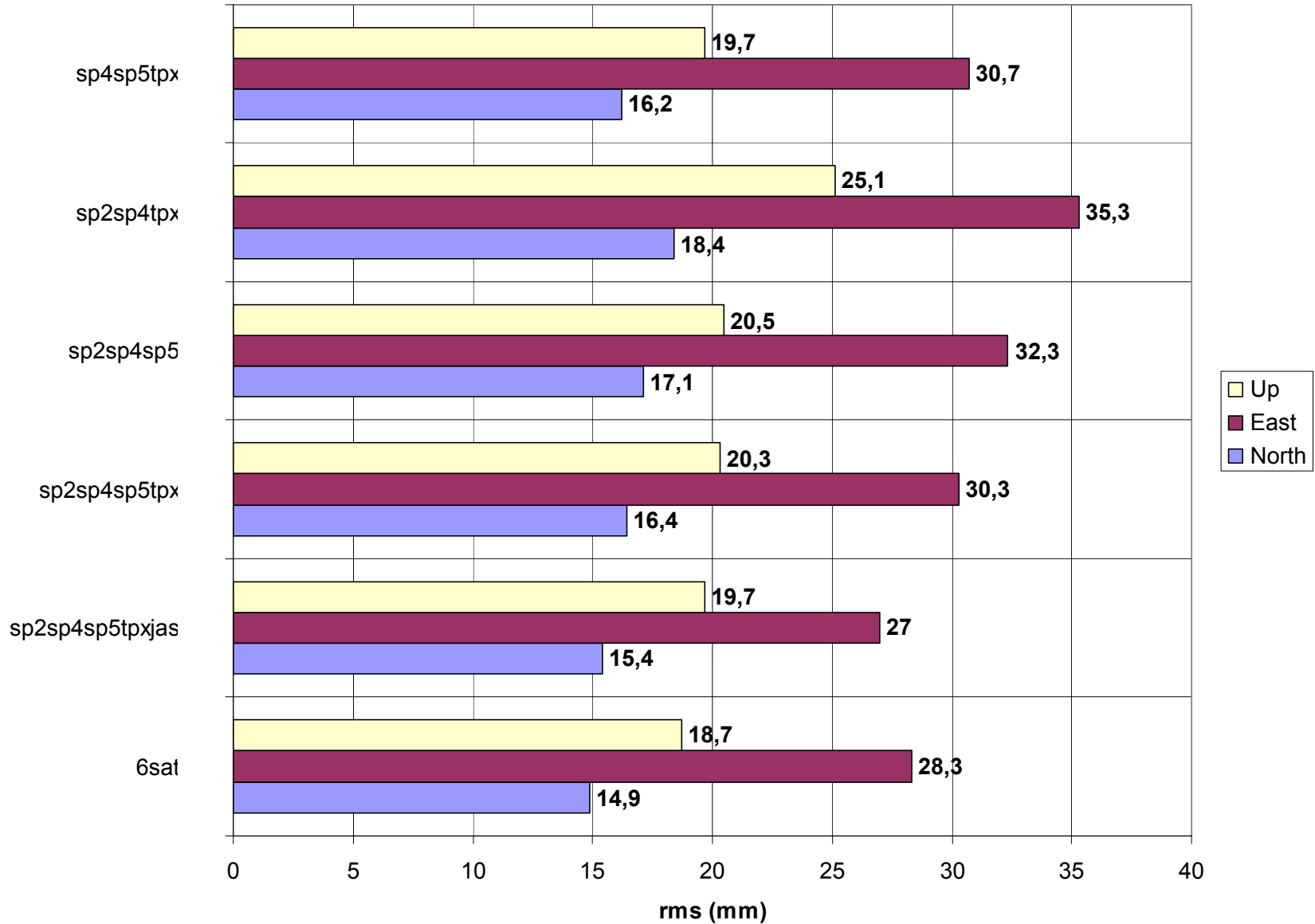
# Monthly precision



# Weekly precision: 3-D rms



# Weekly precision



# 6-satellite precision

Monthly, daily, weekly precision with 6 satellites

