



Assessment of Kinematic Integer Precise Point Positioning Performances

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MOTIVATIONS

Single epoch/Single receiver PPP more and more popular for:

- Geosciences (seismology, oceanography, altimeter Cal/Val, loading effects...)
- The monitoring of the troposphere/ionosphere
- Time Transfer applications
- Precise mobile tracking
- Applications on "isolated" areas
- This study focuses on:
 - 1) Impacts of ambiguity fixing
 - 2) Correlations between parameters
 - 3) Effects of satellite geometry



- Quantify the PPP accuracy from the user's point of view
- Understanding single epoch processing could improve static one
- Method:
 - Single epoch processing of static sites
 - Check repeatability



AMBIGUITY FIXING FOR PPP AT CNES-CLS IGS AC

GRG products from a global network (see http://igsac-cnes.cls.fr/)





Loyer et al. (2012) in J. of Geod; igs-ac@cls.fr

Users: methodology for « Integer » PPP (IPPP)



PROCESSING STRATEGY

# Stations	~120
# Days	15
Session batch	24h; Independent Station Solutions
Estimates	Every 30s
Weighting	Code: 0.3m Phase: 3mm
Constraints	None
Orbits/Sat. Clocks	GRG
Cutoff	10°
Troposphere	2h piecewise model
	GPT+GMF
	No Gradient
Models	IERS2010







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GLOBAL PERFORMANCE OF IPPP

CORRELATION TIME VARIATIONS

- How the correlations between parameters change over time?
- We computed the correlation matrix derived from a 24h Kalman Filter using an SP3 orbit file
- Positions, Rec. clocks and ZWDs estimated every 30s. Constraint of 5mm/h^0.5 applied on ZWD estimates



- Strong correlation between Up and ZWD estimates.
- But, no significant variations despite evolutions of sat. geometry.

Cnes



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dN/E/U

dZWD

dClock

Cones

- Horizontal errors are dominated by satellite geometry
- DPPP vs Single/Double differences present similar performances for horizontal components
- Up/Clocks errors suffer from:
 - Differences in tropospheric estimates
 - The correlation between Up/Clocks and ZWDs



CONCLUSIONS ON SINGLE EPOCH PPP PERFORMANCES

- Fixing ambiguities to integer values:
 - reduces spurious slopes
 - + guarantees continuity of time series
- Current RMS of single epoch IPPP using GRG products is:
 - + ~1.0/1.5cm for North and East components
 - ~3.5cm for the Up component
- Horizontal component errors mainly dominated by satellite geometry
- Up/Clock components limited by:
 - Correlations between Up, Receiver Clock, and ZWD estimates: >90% and ratio from ~1/3 to ~1
 - + Errors on tropospheric estimate errors propagates into the Up component
 - And induce long period signatures (>1h)
- Additional consistent constraints with the expected signal are needed to improve the Up component.

