

Towards PPP-RTK: Rapid Ambiguity Resolution in Precise Point Positioning

Jianghui Geng, X Meng, A H Dodson, F N Teferle

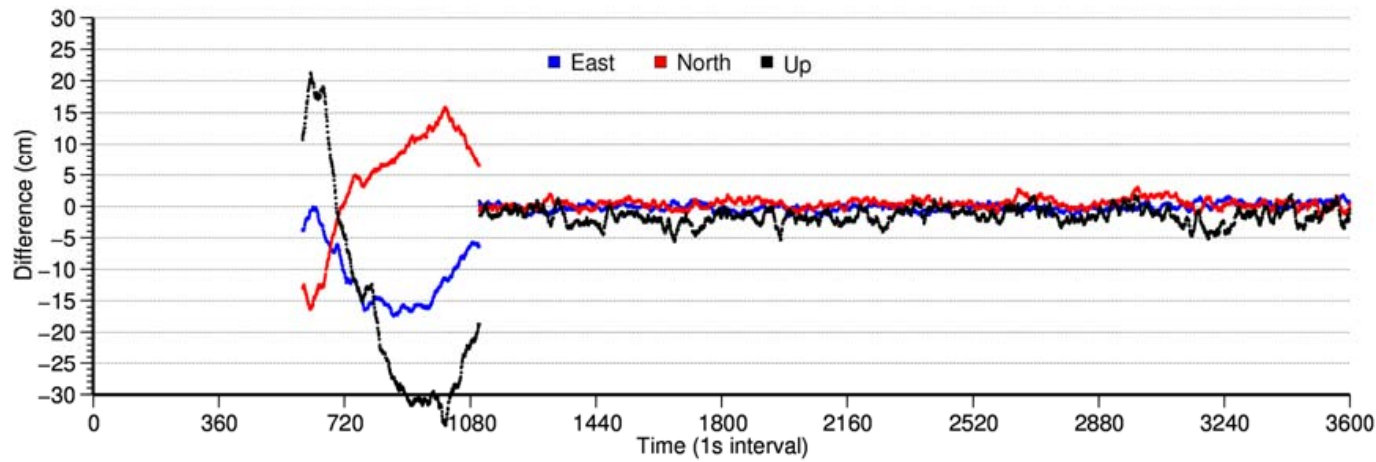
Institute of Engineering Surveying and Space Geodesy, University of Nottingham

IGS Workshop 2010, Newcastle upon Tyne, UK



Problems for Precise Point Positioning (PPP)

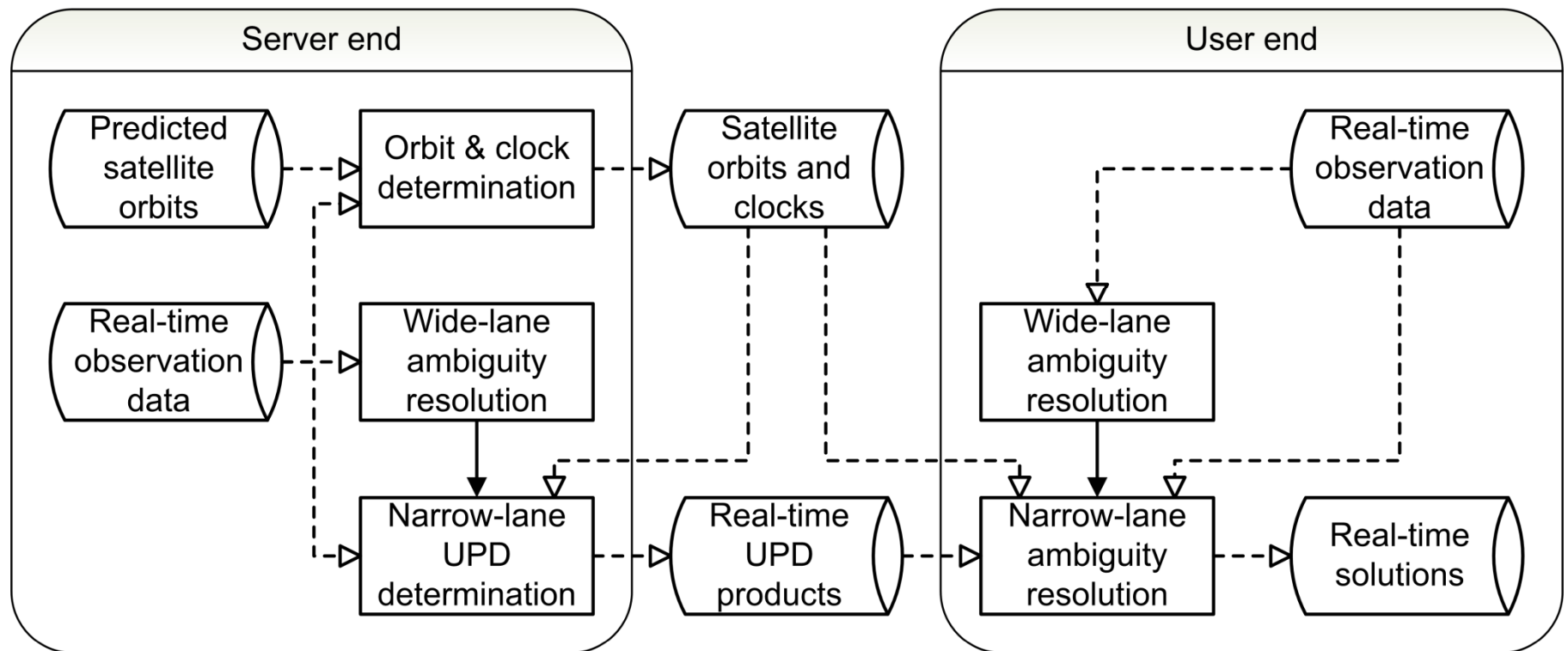
- Unresolved ambiguities
 - Undifferenced ambiguity estimates absorb the fractional-cycle biases
 - Separate fractional-cycle biases from integer ambiguities in a network solution (Collins 2008; Ge et al. 2008; Laurichesse et al. 2009)
- Slow convergence to high positioning accuracy
 - Slowly changing geometry of satellites, data quality ...
 - Ambiguity resolution to accelerate convergences: highly expected, but a few tens of minutes are required to achieve ambiguity-fixed solutions (Geng2010; Laurichesse et al. 2008)





Work that is accomplished at IESSG

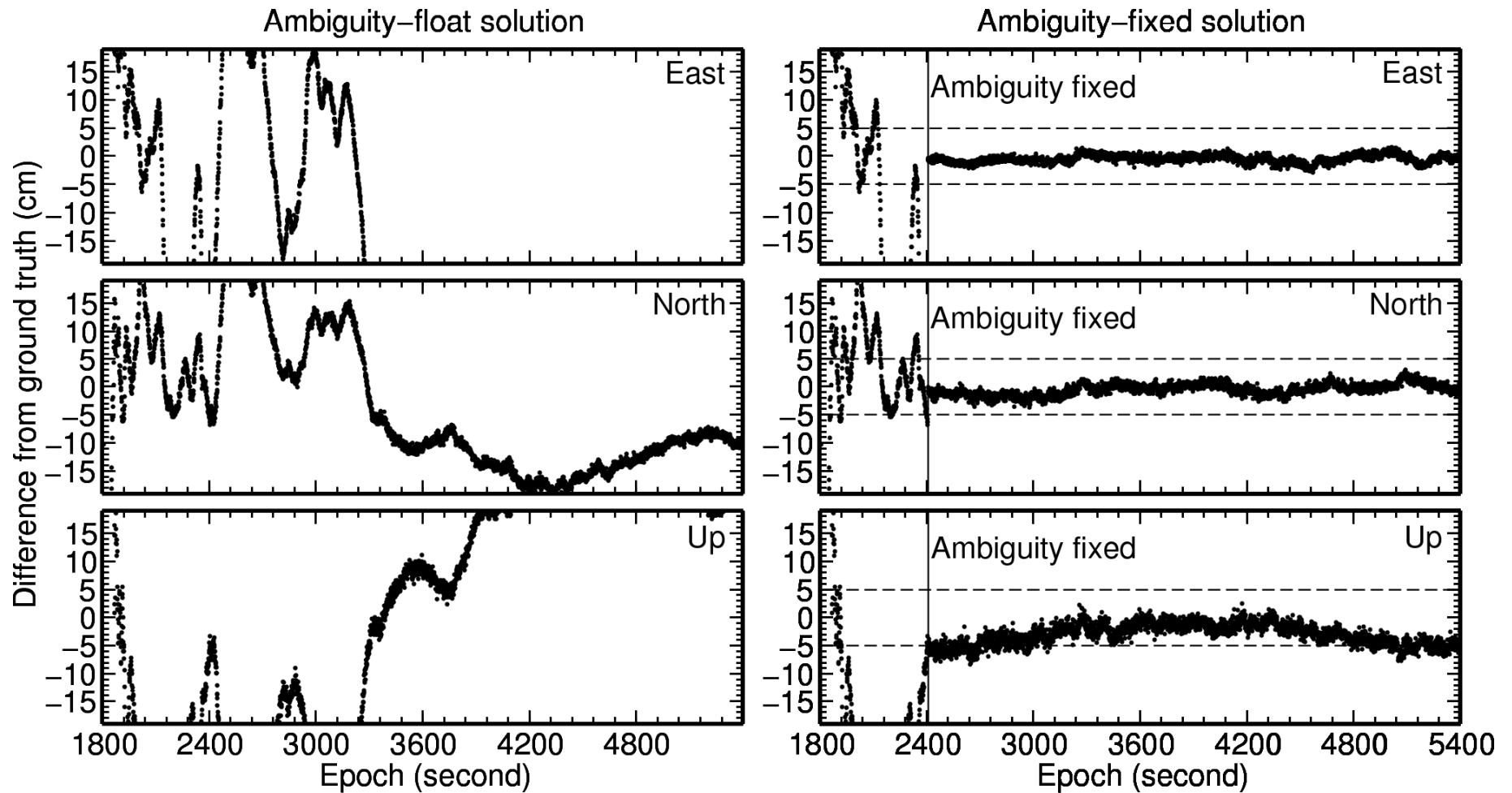
- Software development
 - Position and Navigation Data Analyst (PANDA)
 - Collaboration with Wuhan University in China





Performance of real-time ambiguity resolution

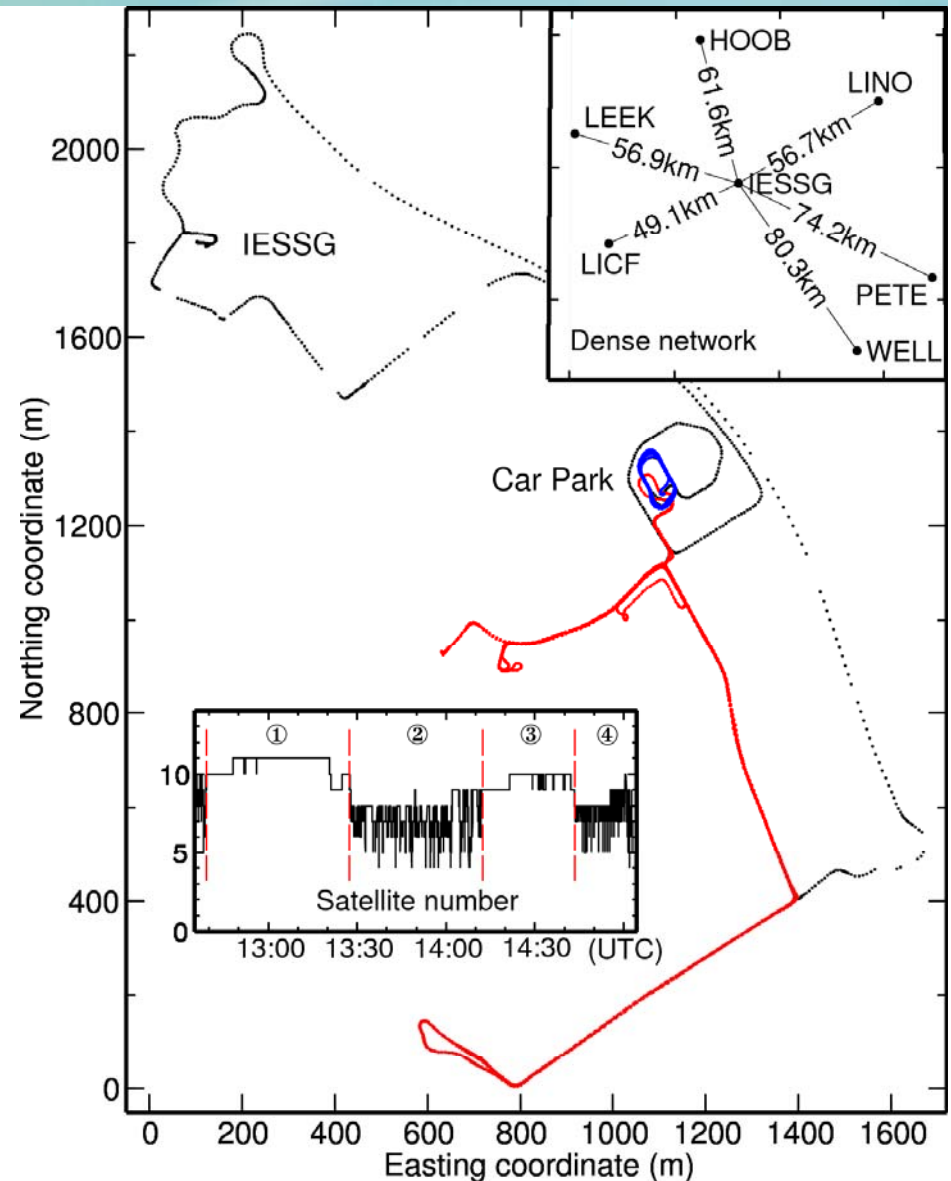
Ambiguity-float solutions (cm)			Ambiguity-fixed solutions (cm)		
East	North	Up	East	North	Up
13.7	7.1	11.4	0.8	0.9	2.5

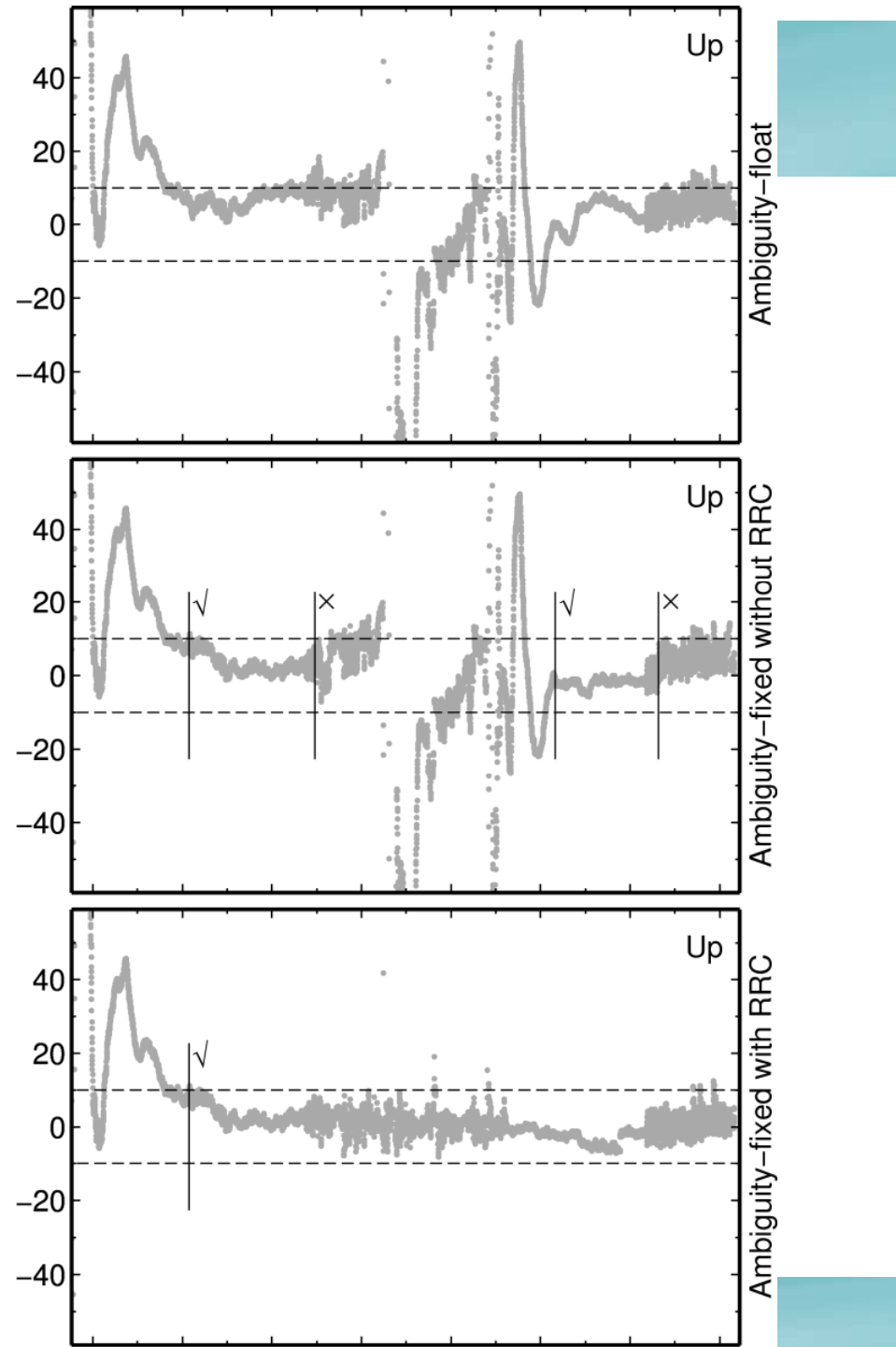
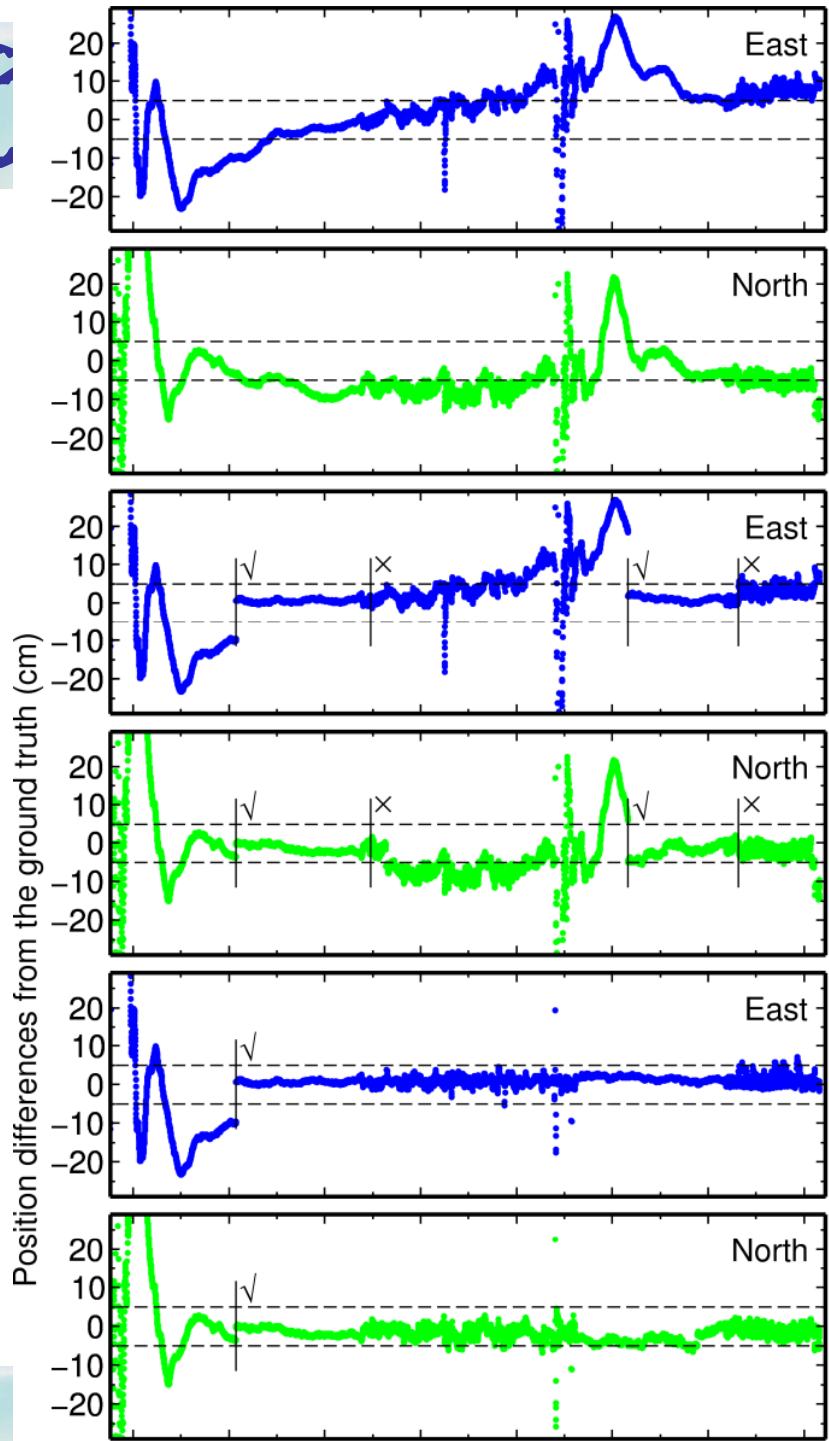




Rapid re-convergence to ambiguity-fixed solutions

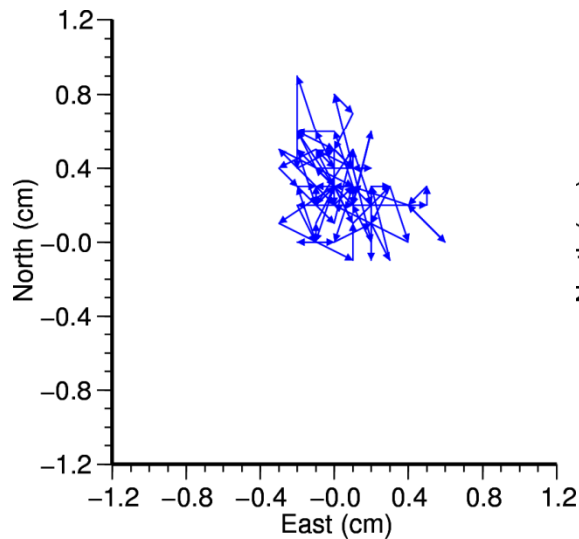
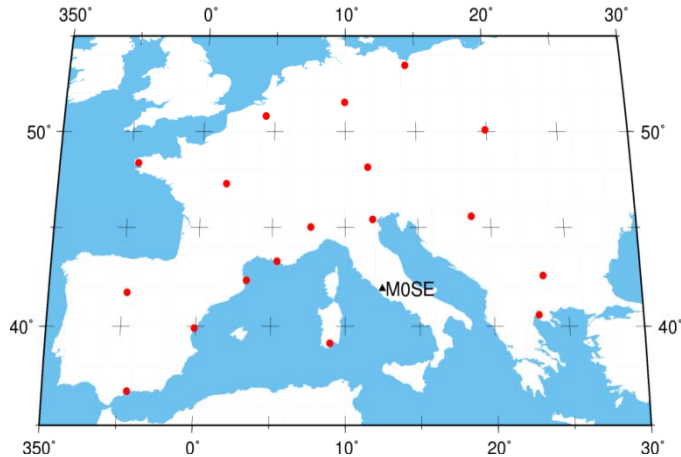
- Speed up ambiguity resolution by constraints from self-generated predicted atmospheric delays. Hence, this strategy only applies to re-convergences to ambiguity-fixed solutions
- Experiment
 - Stage 1: Van stopped on the car park (open area)
 - Stage 2: Van repeatedly moved along a busy road (red line). Buildings, large trucks, etc. obstructed signals
 - Stage 3: Van stopped again on the car park
 - Stage 4: Van moved on the car park (blue line)



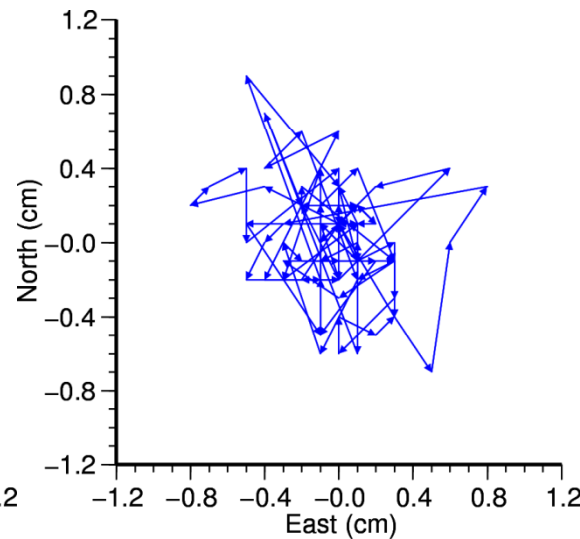




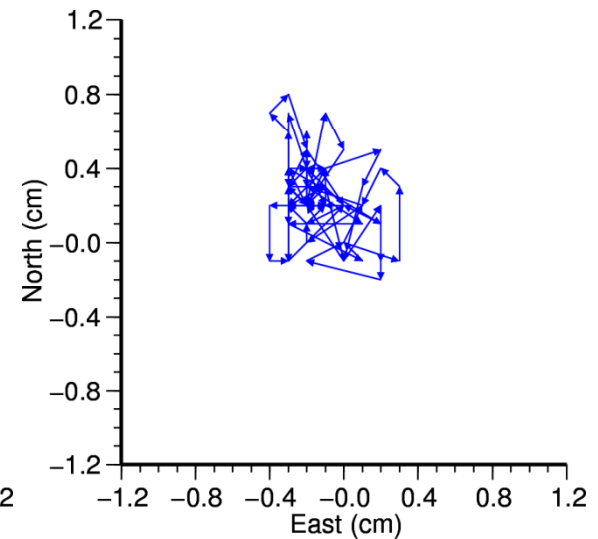
A case study for the L'Aquila earthquake



Before Earthquake



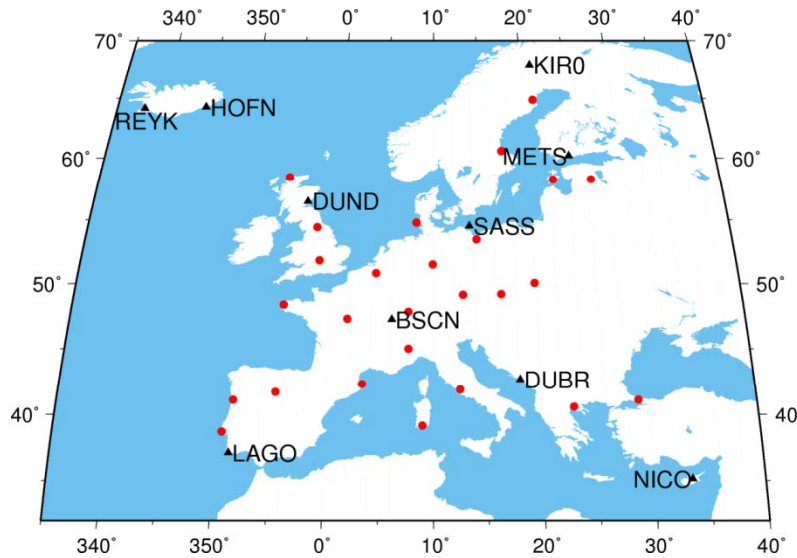
During Earthquake



After Earthquake



A case study for simulated tsunami monitoring



Name	Distance from network
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KIRO	334.3 km
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NICO	764.4 km
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HOFN	959.0 km
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REYK	1208.4 km
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