

Does the Inclusion of Regional Navigation Satellite Systems Help or Harm Global Solutions?

R. Dach¹, L. Prange¹, A. Villiger¹, D. Arnold¹, M. Kalarus¹,
S. Schaer^{1,2}, P. Stebler¹, A. Jäggi¹

- (1) *Astronomical Institute, University of Bern, Bern, Switzerland*
- (2) *Swiss Federal Office of Topography, swisstopo, Wabern, Switzerland*

American Geophysical Union
Fall Meeting 2021
13–17 December 2021, New Orleans, LA, U.S.A.

Processing chains at CODE

GNSS processing at CODE, current status

Solution type	Focus	Systems
ultra-rapid	near-real time	GPS, GLO, GAL
rapid	includes an orbit prediction (something inbetween)	GPS, GLO, GAL
final	best possible, reference frame relevant	GPS, GLO
reprocessing	best possible, long-term stability	GPS, GLO, GAL
MGEX	experimental incorporate new systems and signals	GPS, GLO, GAL, BDS, QZSS

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GNSS processing at CODE, current status (IGS14)

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Processing chains at CODE

GNSS processing at CODE, current status (ITRF2020)

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ultra-rapid	near-real time	GPS, GLO, GAL
rapid	includes an orbit prediction (something inbetween)	GPS, GLO, GAL
final	best possible, reference frame relevant	GPS, GLO, GAL
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MGEX	experimental incorporate new systems and signals	GPS, GLO, GAL, BDS, QZSS

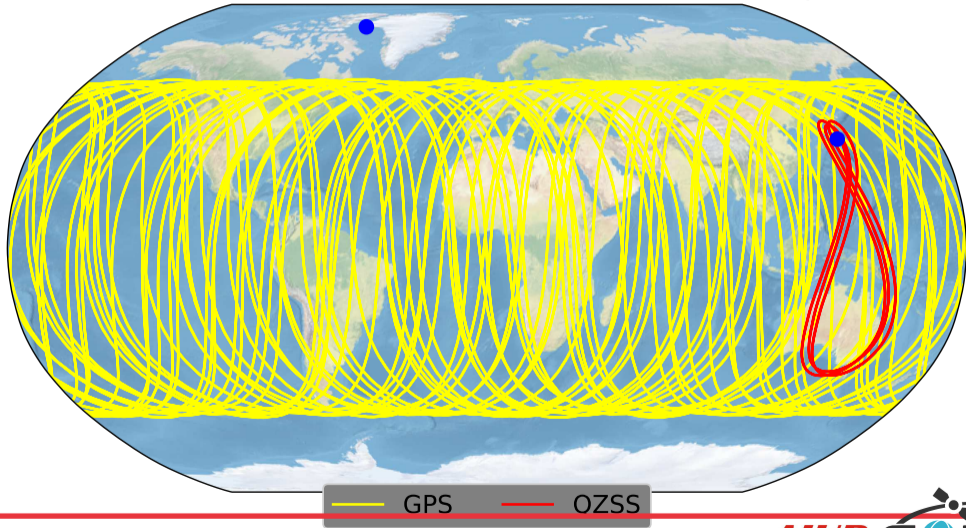
Processing chains at CODE

GNSS processing at CODE, current status (ITRF2020)

Solution type	Focus	Systems
ultra-rapid	near-real time	GPS, GLO, GAL , QZSS?
rapid	includes an orbit prediction (something inbetween)	GPS, GLO, GAL , QZSS?
final	best possible, reference frame relevant	GPS, GLO, GAL , QZSS?
reprocessing	best possible, long-term stability	GPS, GLO, GAL , QZSS?
MGEX	experimental incorporate new systems and signals	GPS, GLO, GAL, BDS, QZSS

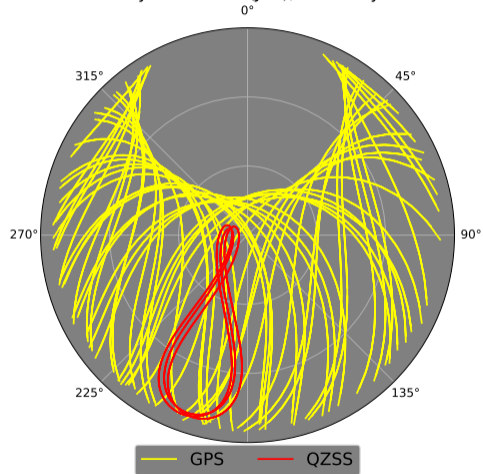
Adding a regional constellation

Ground tracks for GPS and QZSS constellations, 2021 day 300

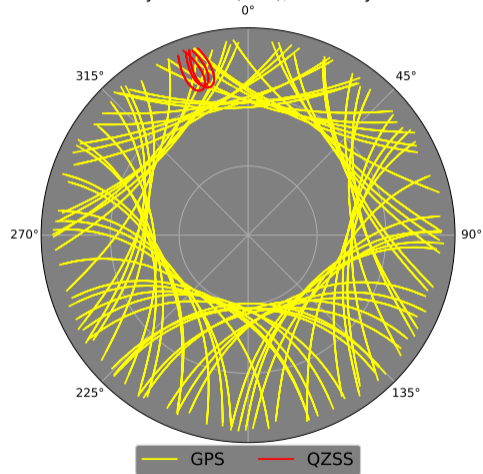


Adding a regional constellation

Visibility in Tsukuba (JAP); 2021 day 300



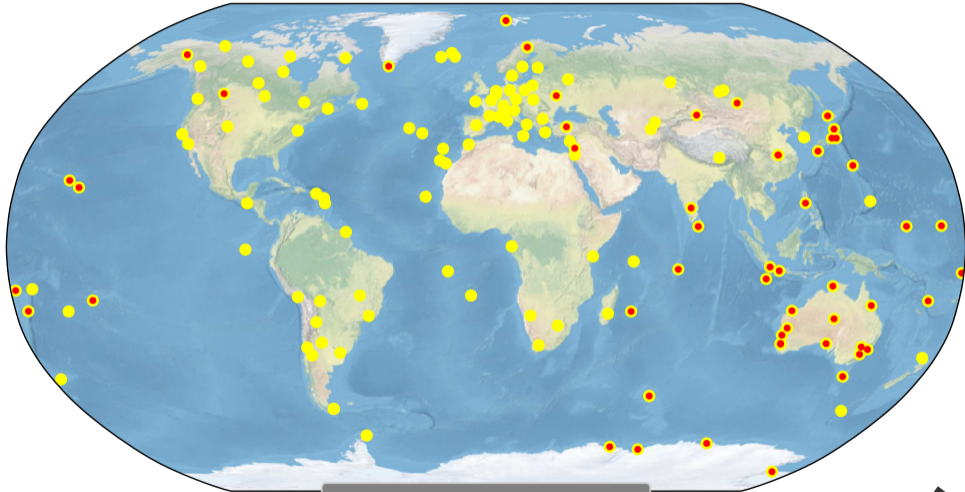
Visibility in Thule (GRL); 2021 day 300



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Adding a regional constellation

Stations with GPS and QZSS in CODE's MGEX solution, 2021 day 300



● GPS ● QZSS

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Summary

Compute GPS-only and GPS+QZSS solutions based on CODE's MGEX processing

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Compute GPS-only and GPS+QZSS solutions based on CODE's MGEX processing

- Compare these both solutions regarding

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Compute GPS-only and GPS+QZSS solutions based on CODE's MGEX processing

- Compare these both solutions regarding
 - Global parameters: ERP and GCC
 - Station coordinates: datum definition, stability
 - Orbit solution for GPS
- Does the inclusion of Regional Navigation Satellite Systems help or harm global solutions?

Summary

Compute GPS-only and GPS+QZSS solutions based on CODE's MGEX processing

- Compare these both solutions regarding
 - Global parameters: ERP and GCC
 - Station coordinates: datum definition, stability
 - Orbit solution for GPS
- Does the inclusion of Regional Navigation Satellite Systems help or harm global solutions?

Adding a Regional Navigation Satellites System (e.g., QZSS to GPS) does not degrade global parameters derived in a GNSS solution, given that the orbit modelling, the antenna calibrations and receiver behavior is sufficiently understood.

Summary

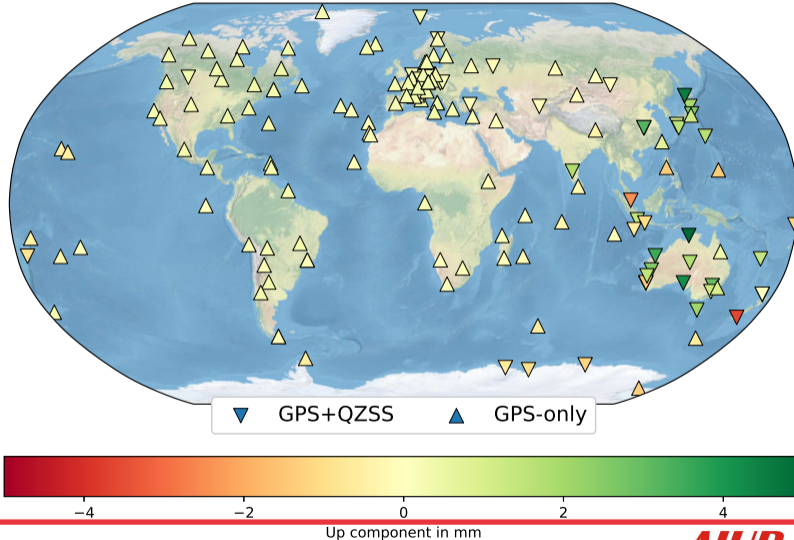
Compute GPS-only and GPS+QZSS solutions based on CODE's MGEX processing

- Compare these both solutions regarding
 - Global parameters: ERP and GCC
 - Station coordinates: datum definition, stability
check the behavior of some individual stations
 - Orbit solution for GPS
- Does the inclusion of Regional Navigation Satellite Systems help or harm global solutions?

Adding a Regional Navigation Satellites System (e.g., QZSS to GPS) does not degrade global parameters derived in a GNSS solution, given that the orbit modelling, the antenna calibrations and receiver behavior is sufficiently understood.

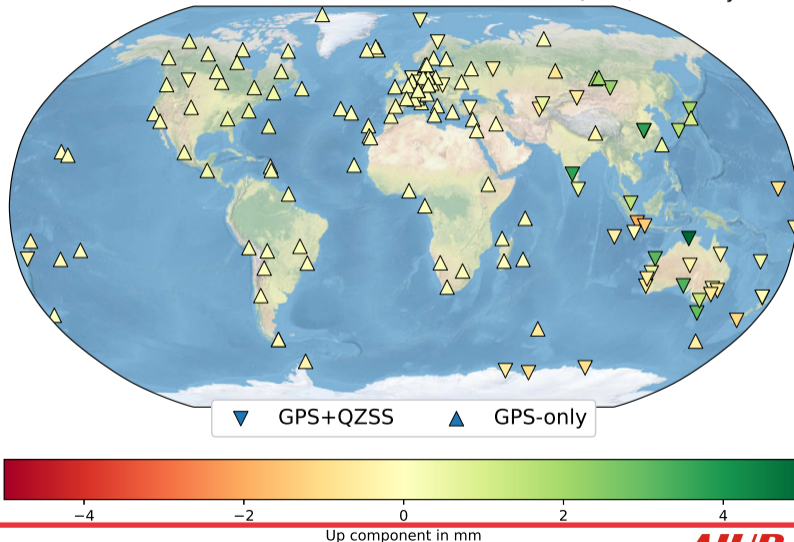
Station coordinates

Coordinate differences between solution GPS - GPS&QZSS, 2018 day 250



Station coordinates

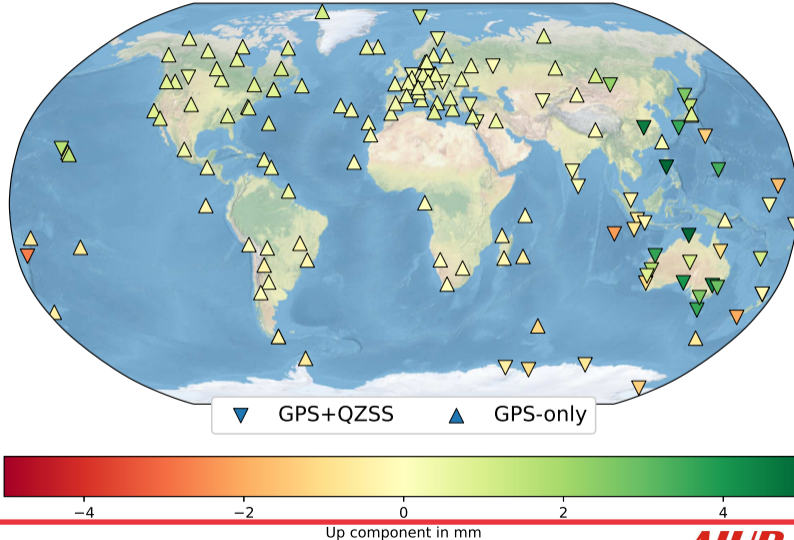
Coordinate differences between solution GPS - GPS&QZSS, 2018 day 300



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Station coordinates

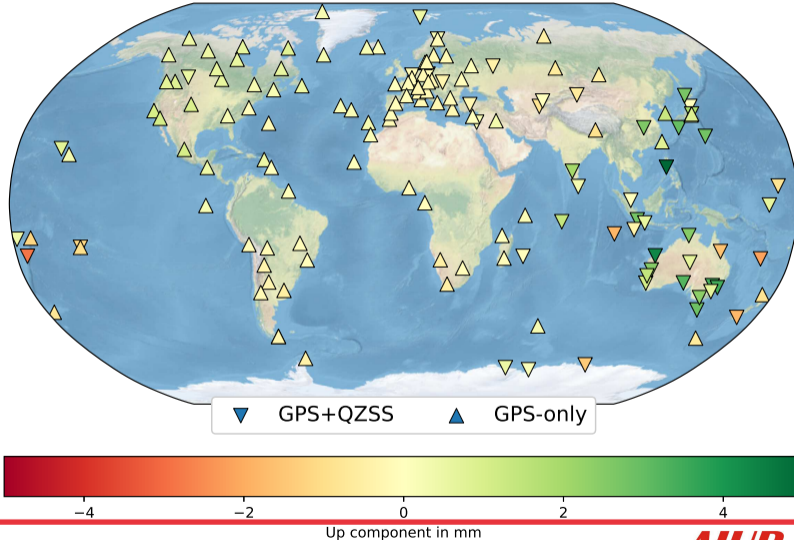
Coordinate differences between solution GPS - GPS&QZSS, 2018 day 350



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Station coordinates

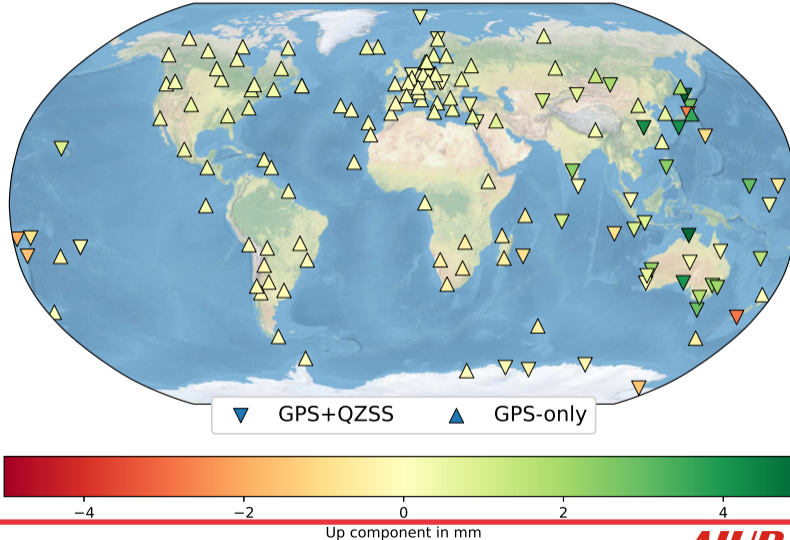
Coordinate differences between solution GPS - GPS&QZSS, 2019 day 050



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Station coordinates

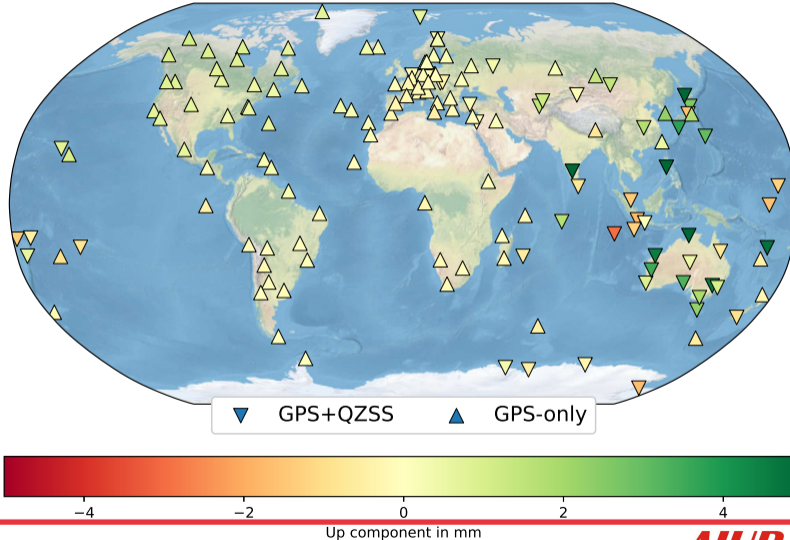
Coordinate differences between solution GPS - GPS&QZSS, 2019 day 100



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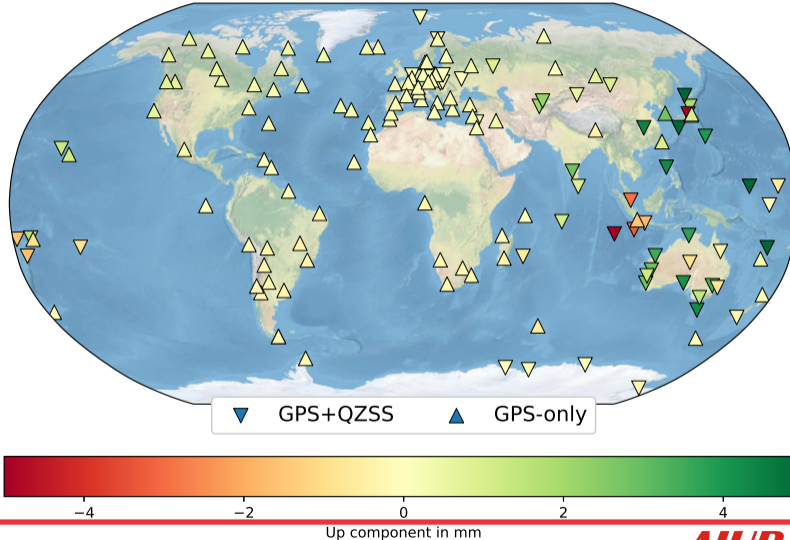
Station coordinates

Coordinate differences between solution GPS - GPS&QZSS, 2019 day 150



Station coordinates

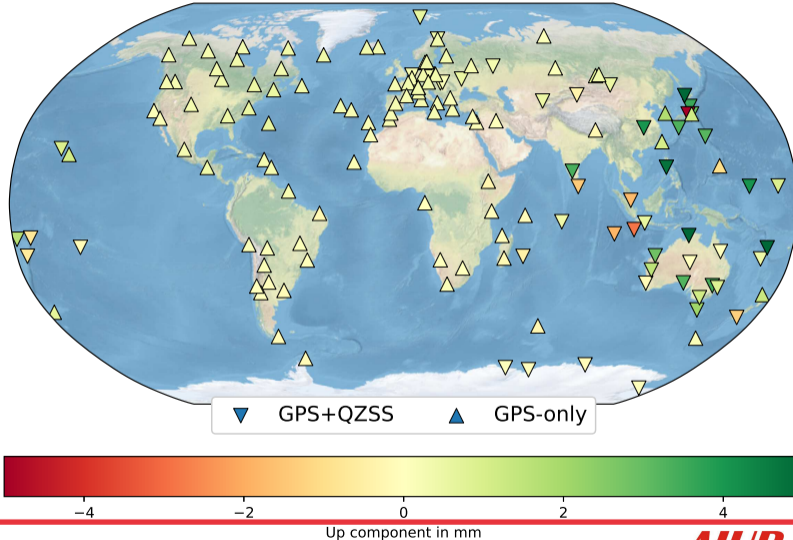
Coordinate differences between solution GPS - GPS&QZSS, 2019 day 200



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Station coordinates

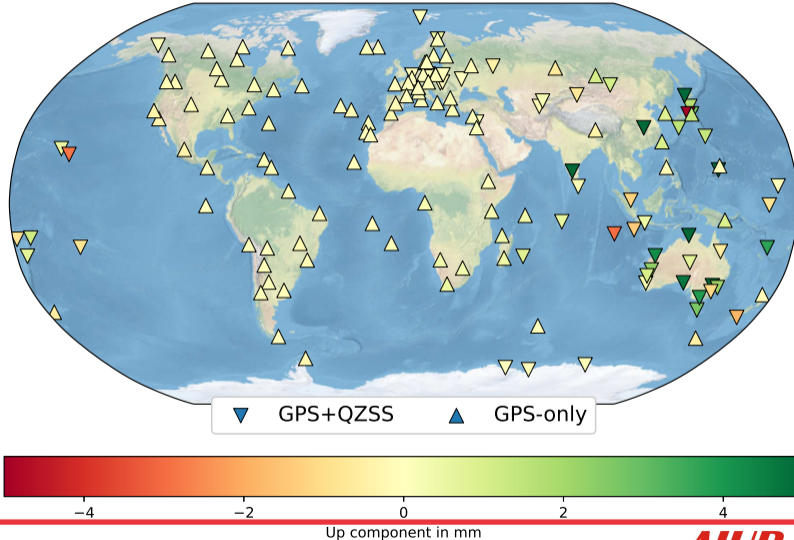
Coordinate differences between solution GPS - GPS&QZSS, 2019 day 250



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Station coordinates

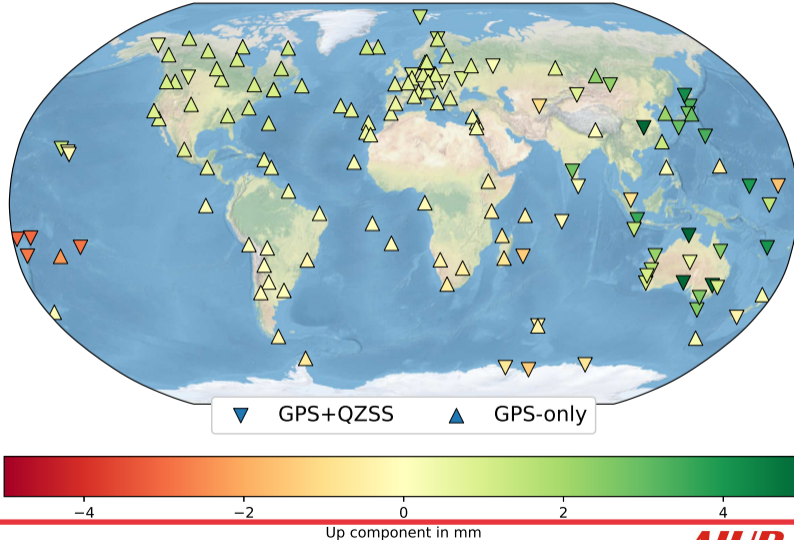
Coordinate differences between solution GPS - GPS&QZSS, 2019 day 300



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Station coordinates

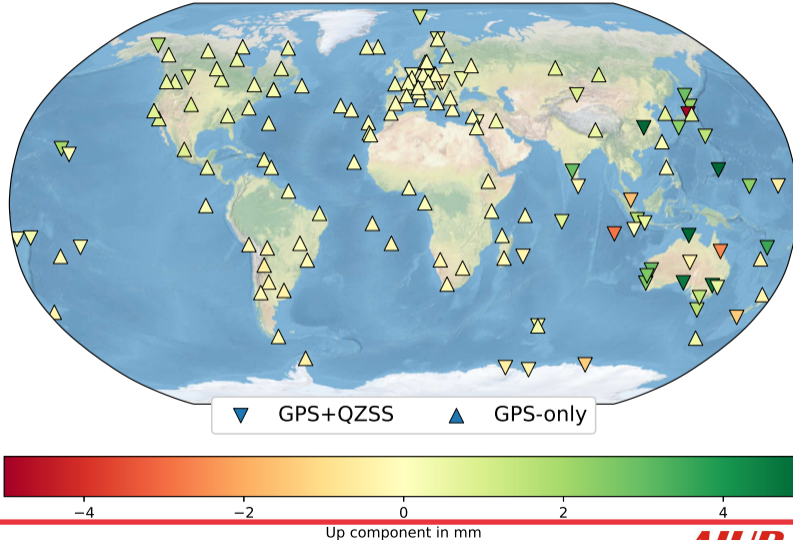
Coordinate differences between solution GPS - GPS&QZSS, 2019 day 350



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Station coordinates

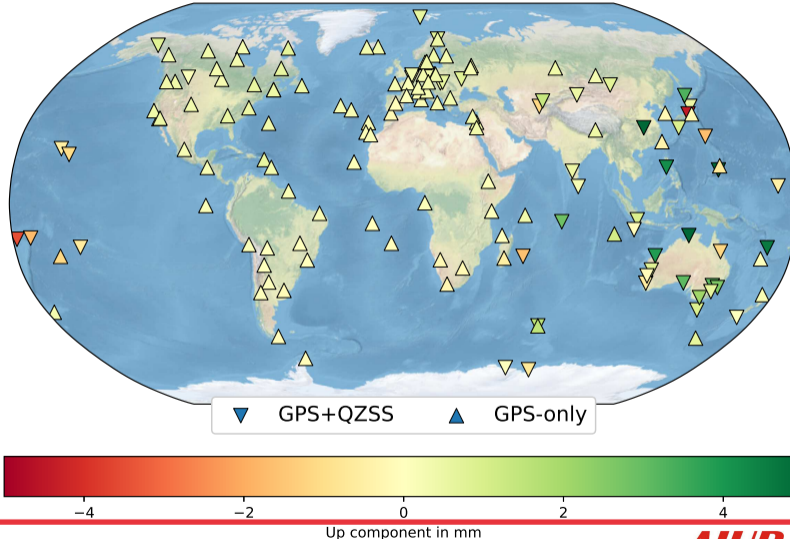
Coordinate differences between solution GPS - GPS&QZSS, 2020 day 050



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Station coordinates

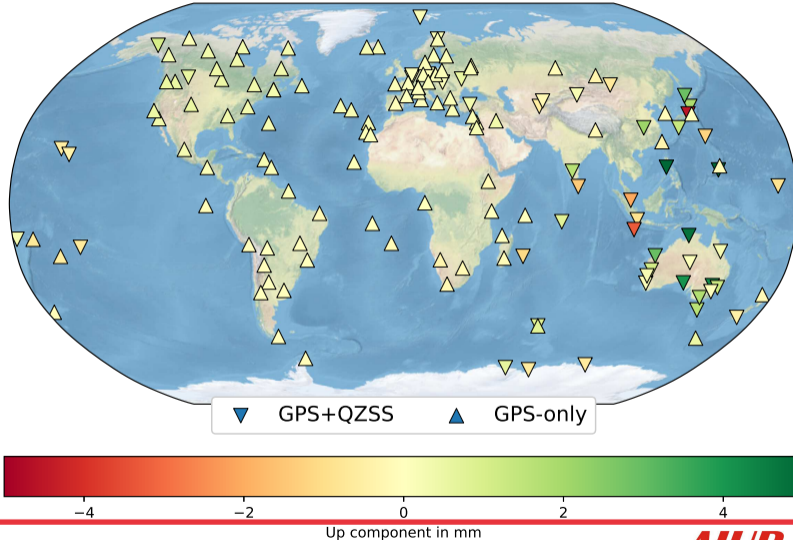
Coordinate differences between solution GPS - GPS&QZSS, 2020 day 100



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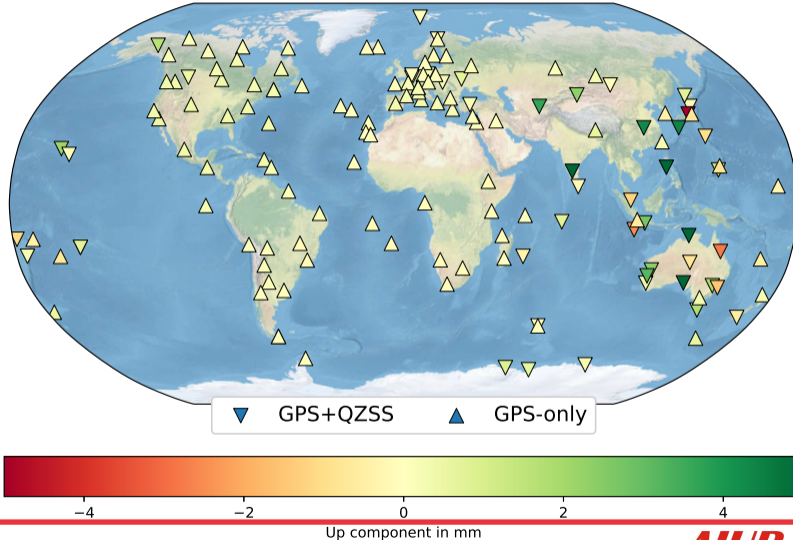
Coordinate differences between solution GPS - GPS&QZSS, 2020 day 150



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Station coordinates

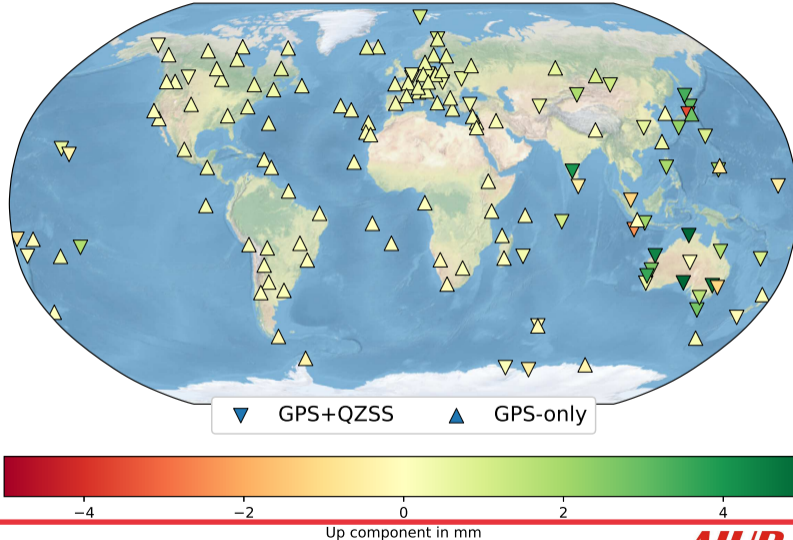
Coordinate differences between solution GPS - GPS&QZSS, 2020 day 200



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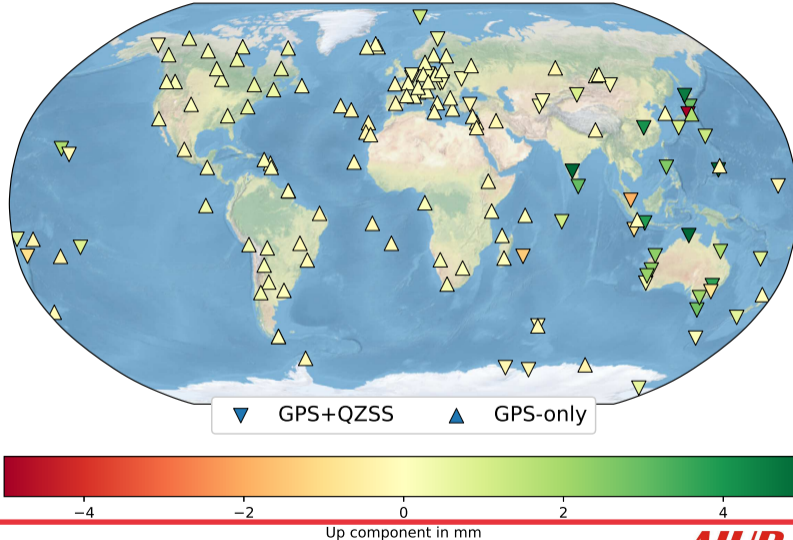
Coordinate differences between solution GPS - GPS&QZSS, 2020 day 250



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Station coordinates

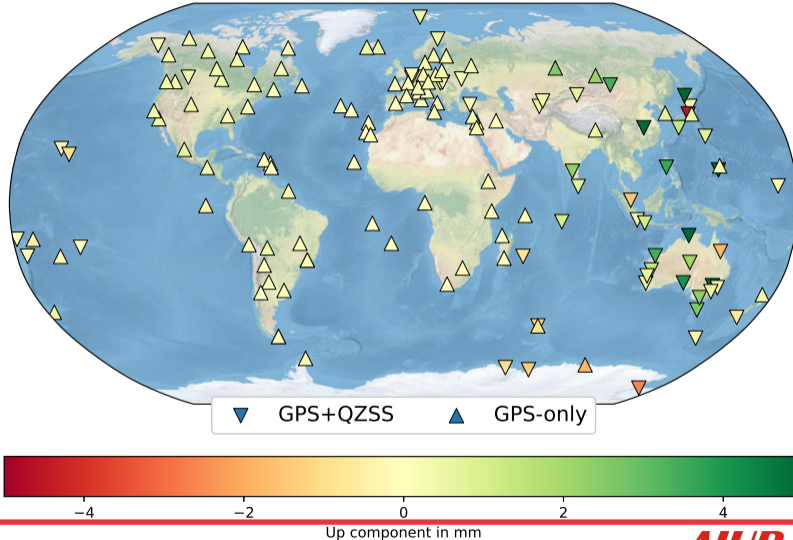
Coordinate differences between solution GPS - GPS&QZSS, 2020 day 300



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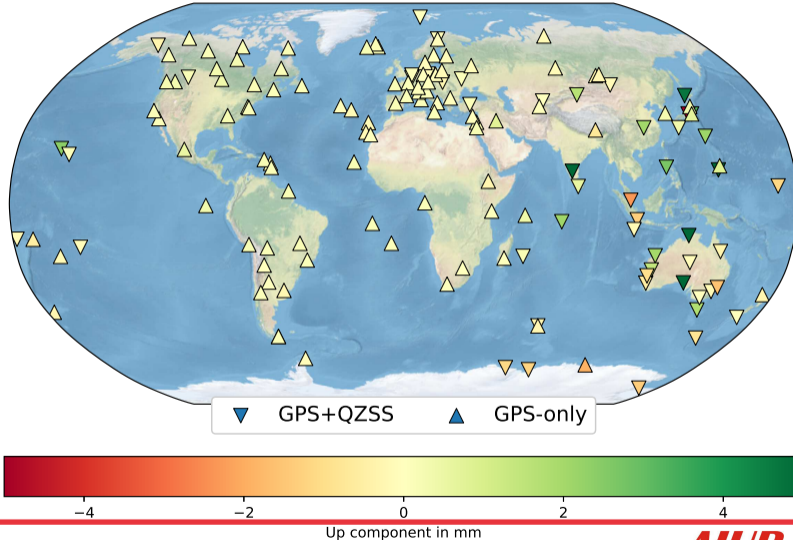
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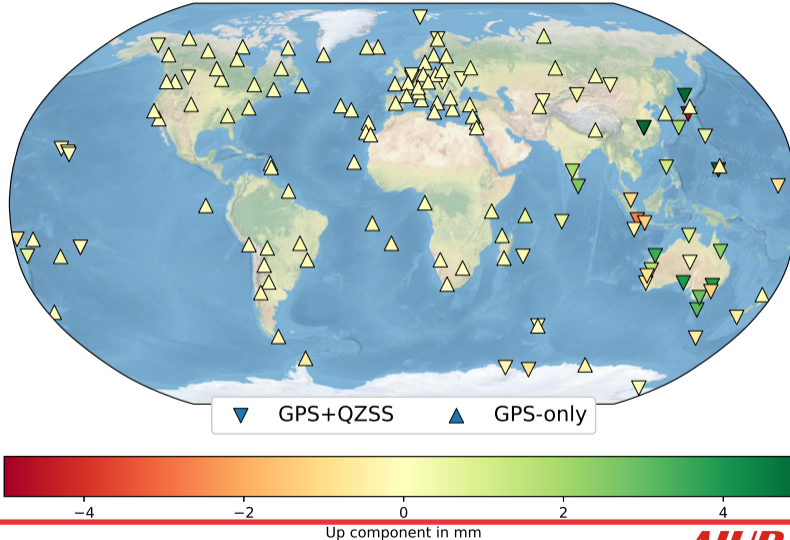
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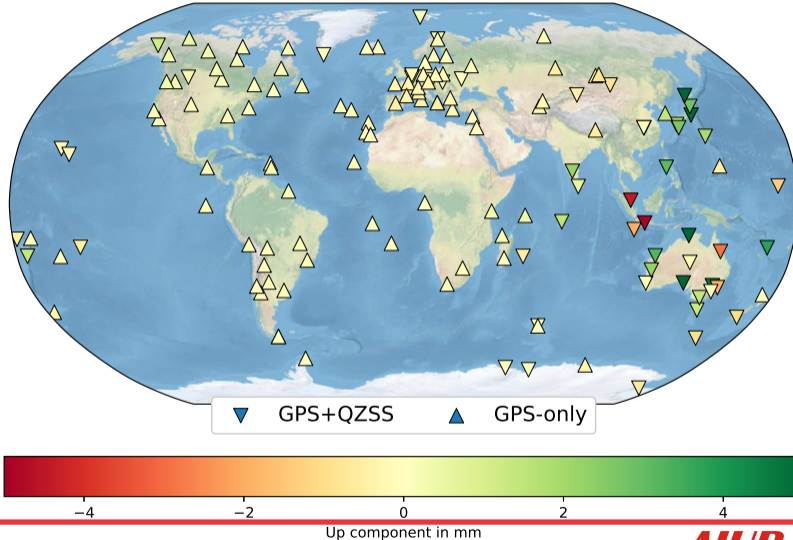
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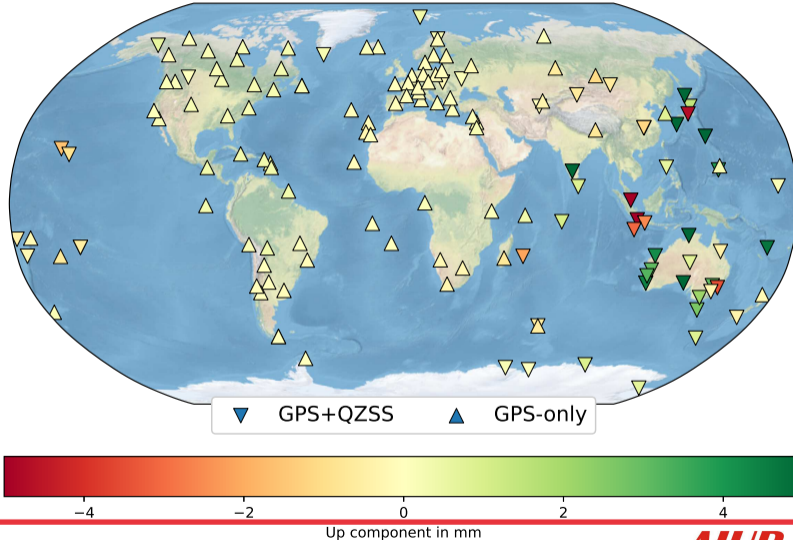
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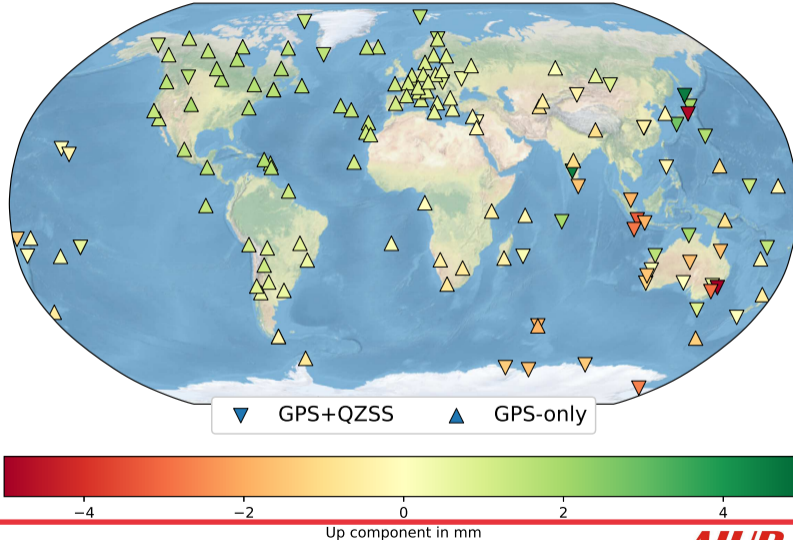
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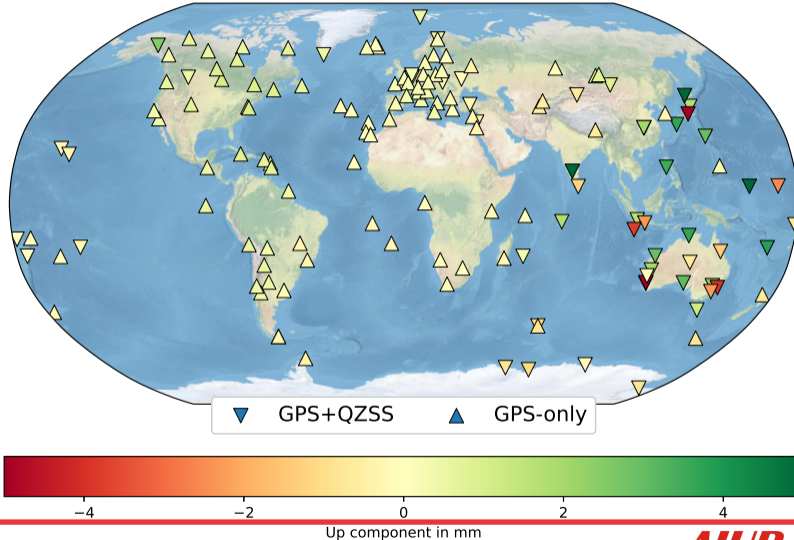
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Coordinate differences between solution GPS - GPS&QZSS, 2021 day 250



Station coordinates

Coordinate differences between solution GPS - GPS&QZSS, 2021 day 300



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