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BE GE 16/3 2017

BeGeo_Event

Positioning in multi-GNSS mode

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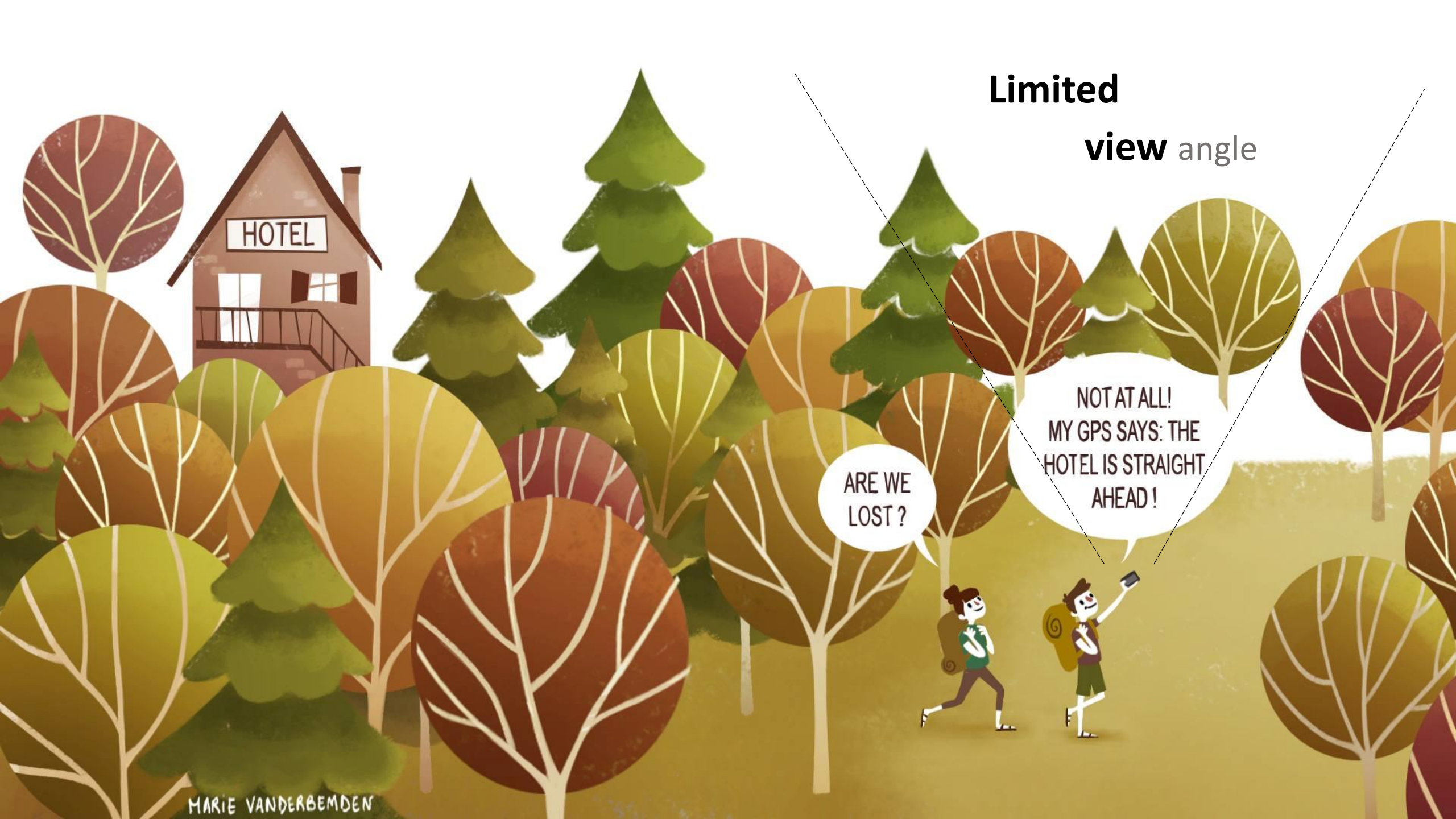
fnrs FREEDOM TO RESEARCH

Unité de Géomatique Geomatics Unit

LIÈGE université


HOTEL
MARIE VANDERBEMDEN


Limited
view angle
HOTEL
ARE WE LOST ?
NOT AT ALL! MY GPS SAYS: THE HOTEL IS STRAIGHT AHEAD !
MARIE VANDERBEMDEN

16/3
2017

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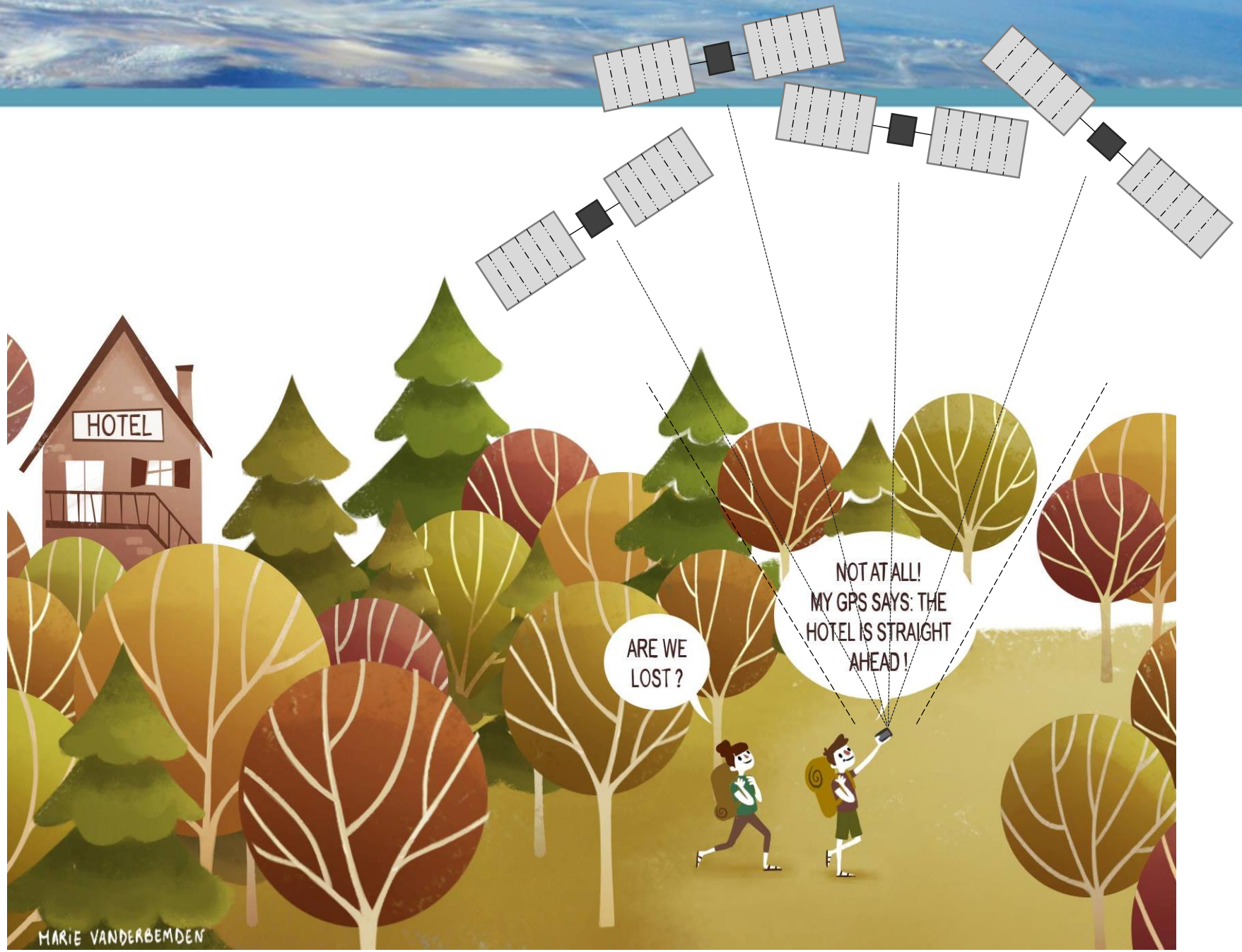
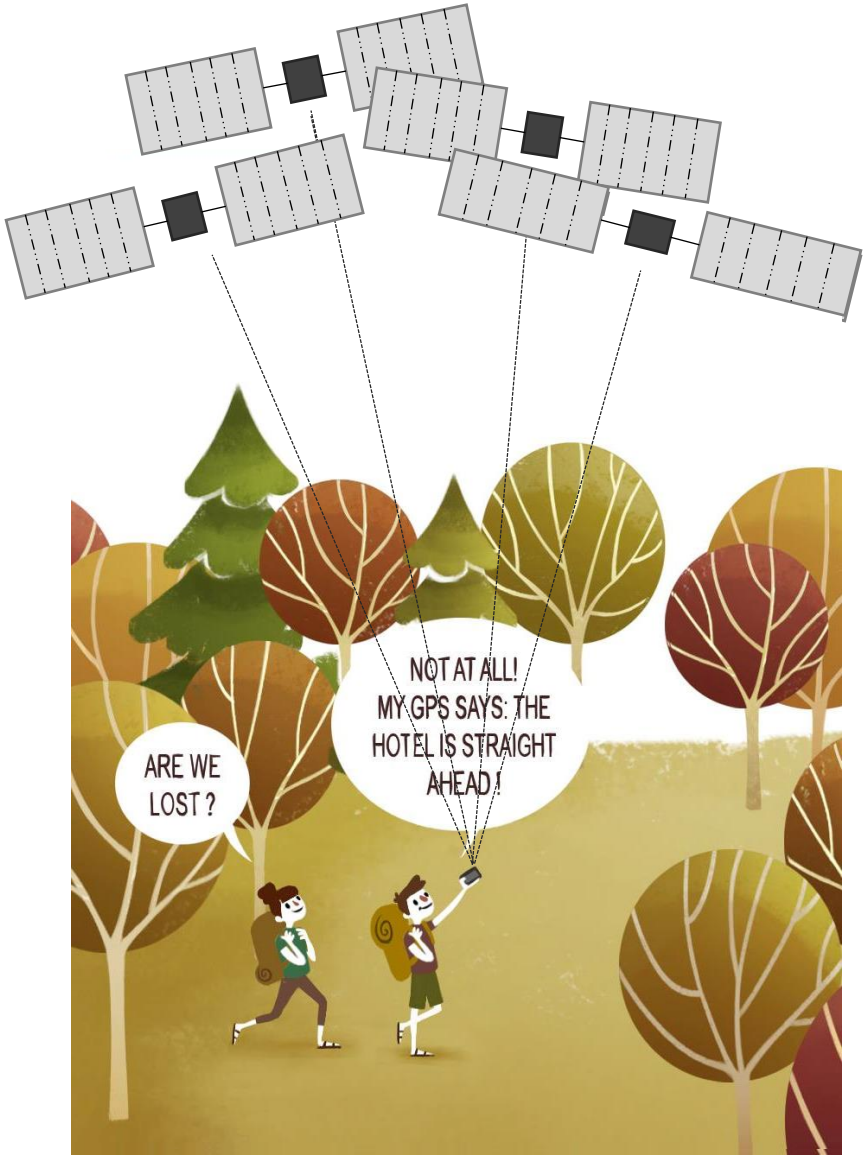
1

A low number

of **visible** satellites

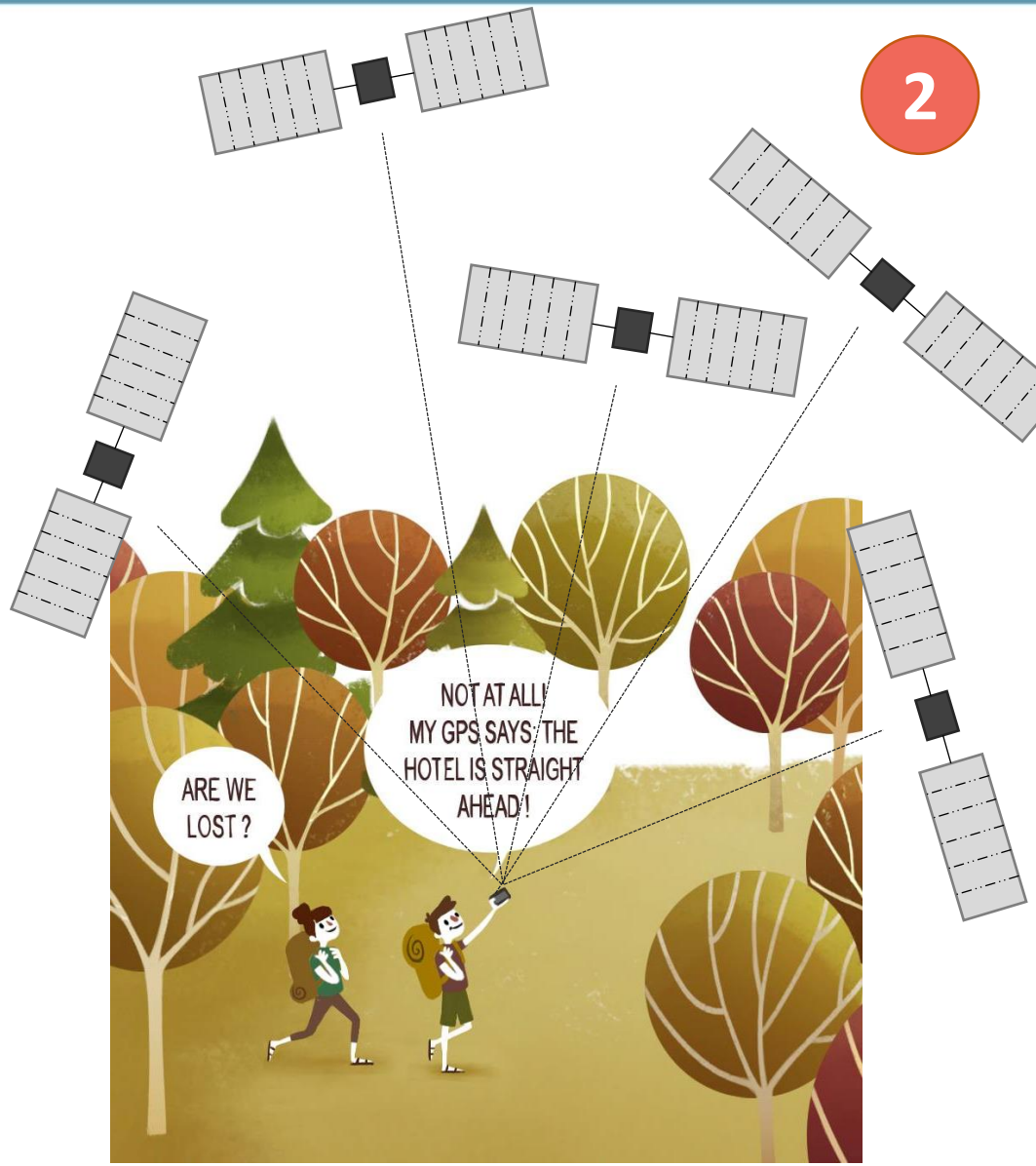
reduces the quality of the positioning





The **geometry** of the satellites affects the position precision

Position
Dilution
Of
Precision



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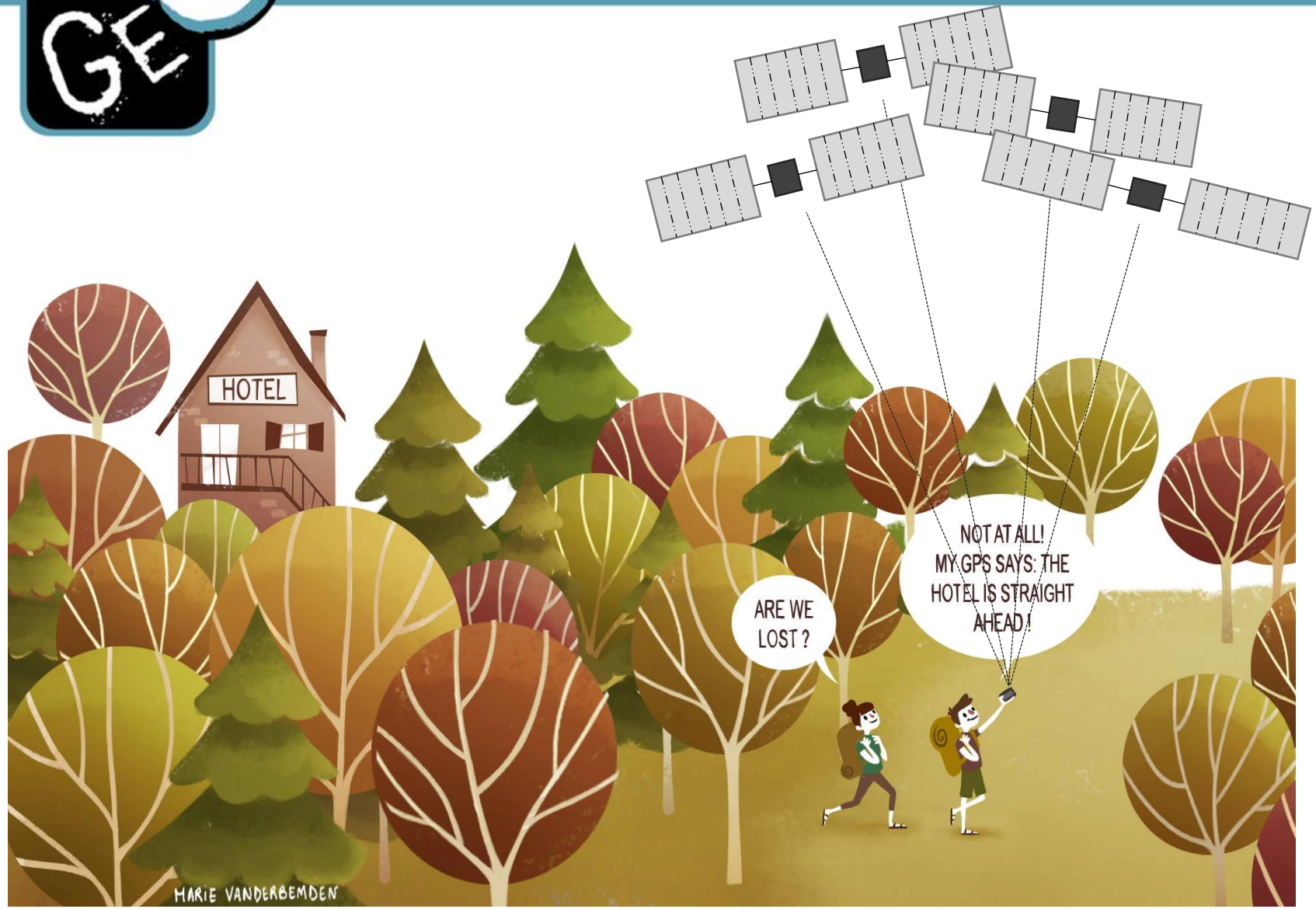
2



High **PDOP** value

decreases

the **precision**
of positioning

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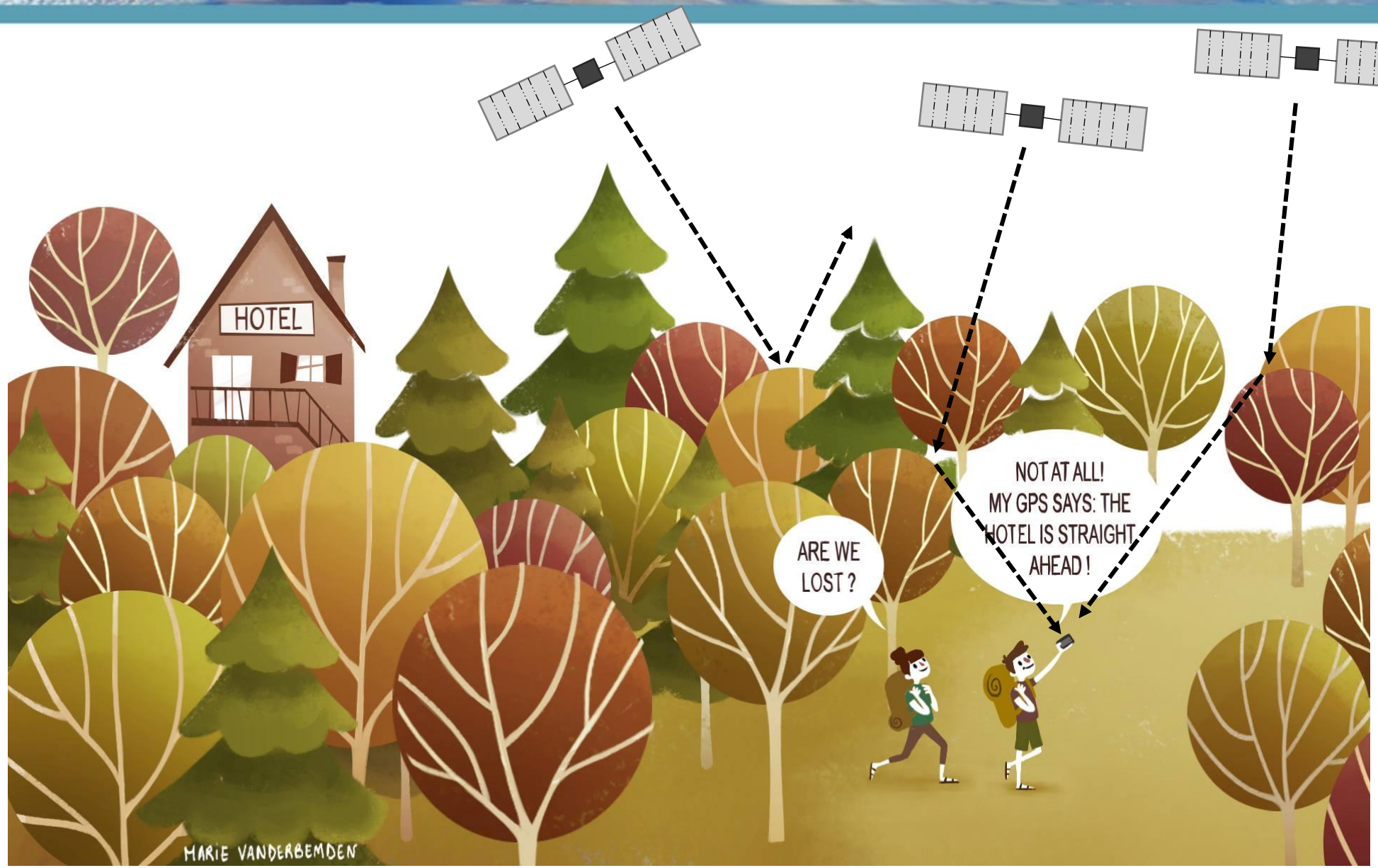
3

Multipath

highly **degrades**

positioning



Mass market receivers

are **less precise**

than high-end receivers

Could **Multi-GNSS** solutions

improve this situation?

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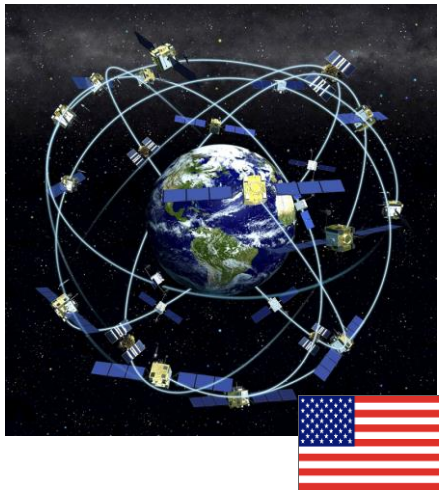
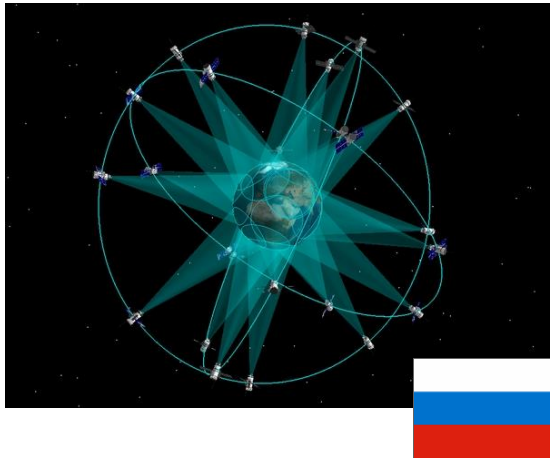
GPS

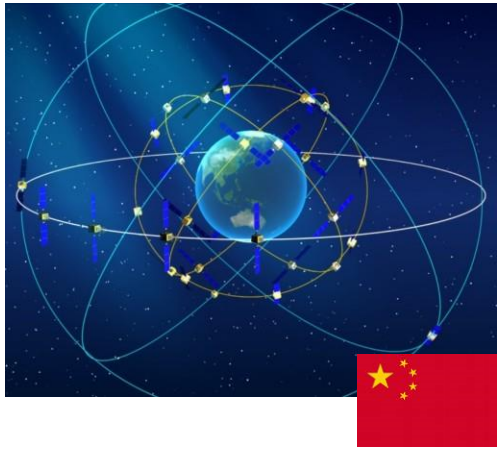


GLONASS

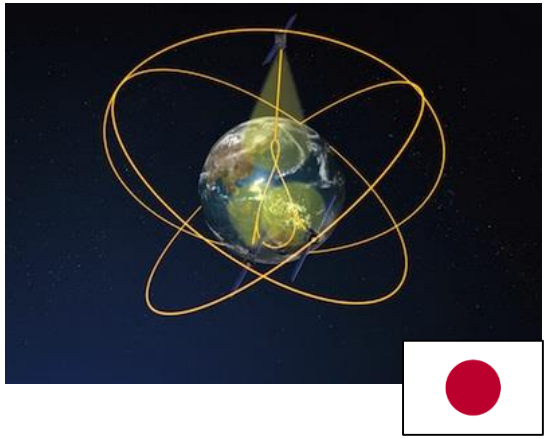


Galileo

BeiDou



QZSS



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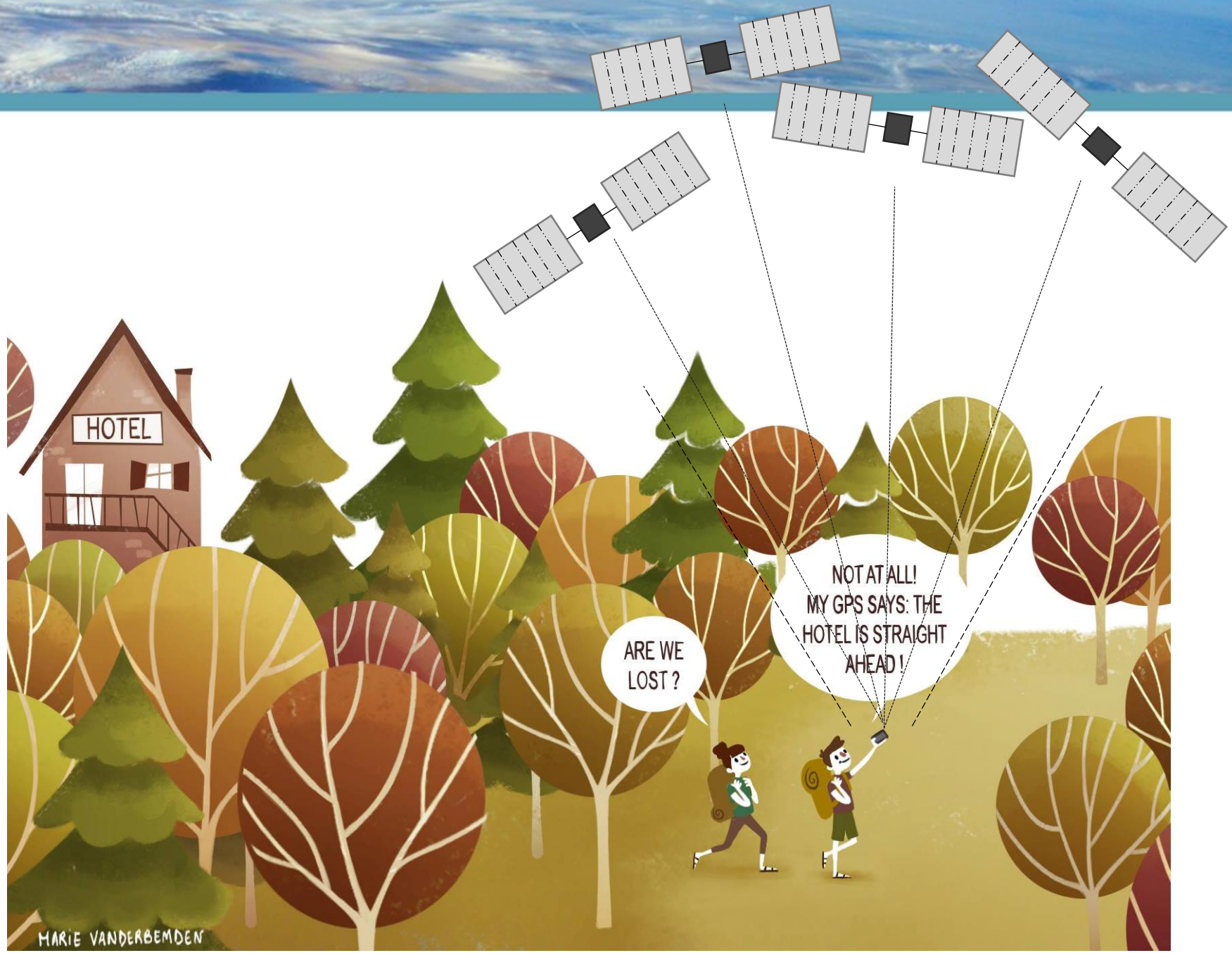
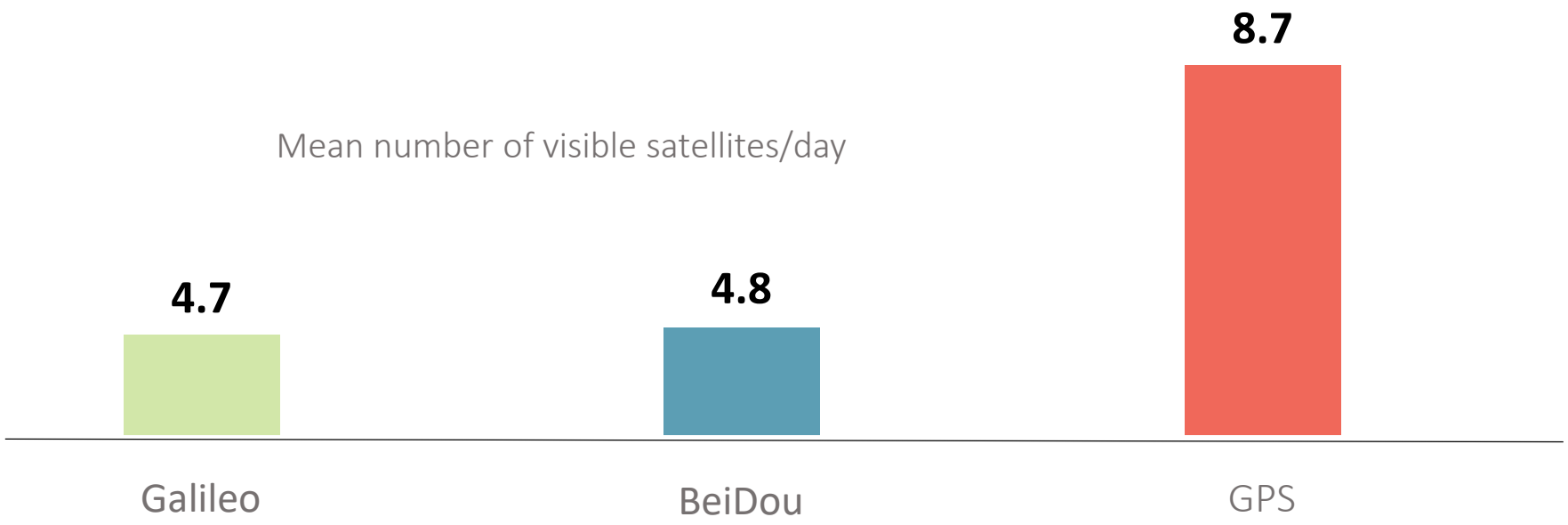
1 **Low number**

of **visible** satellites



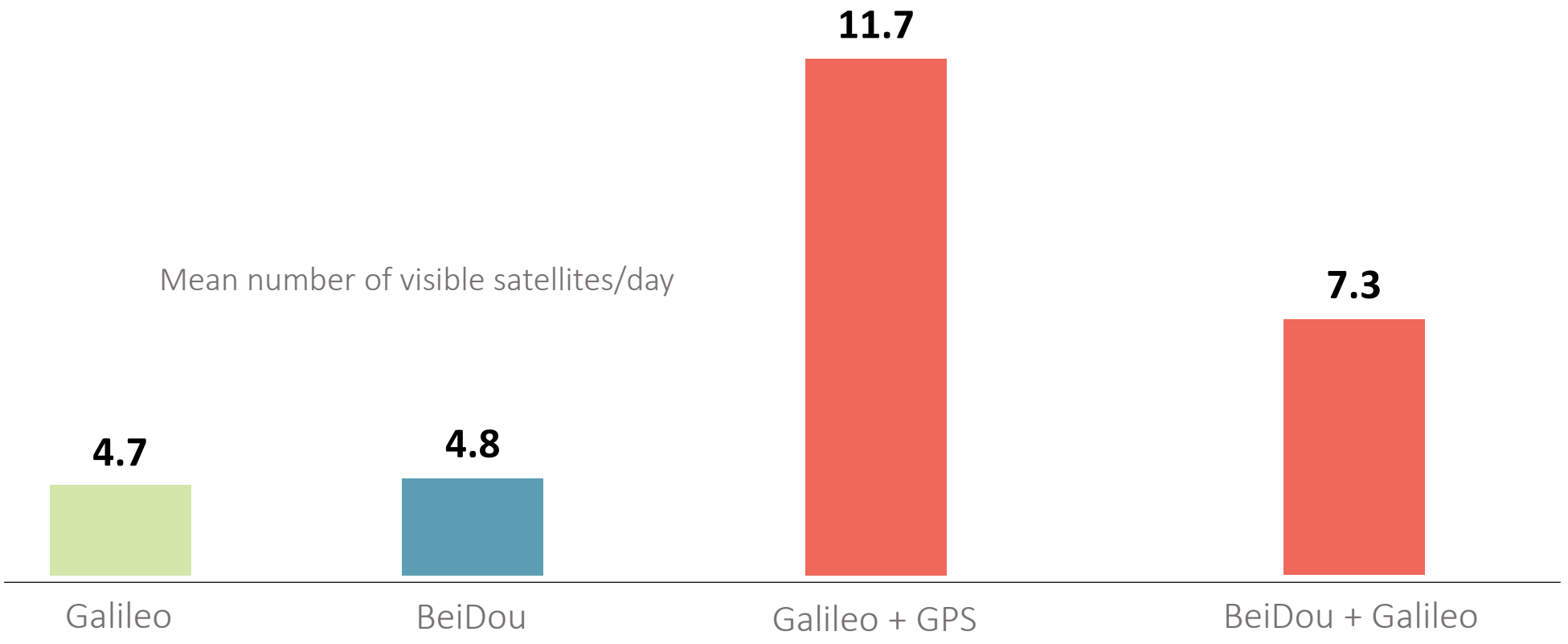
1 New constellations

show a **low number** of visible **satellites**



1 The combination of GNSS

rises the number of visible satellites



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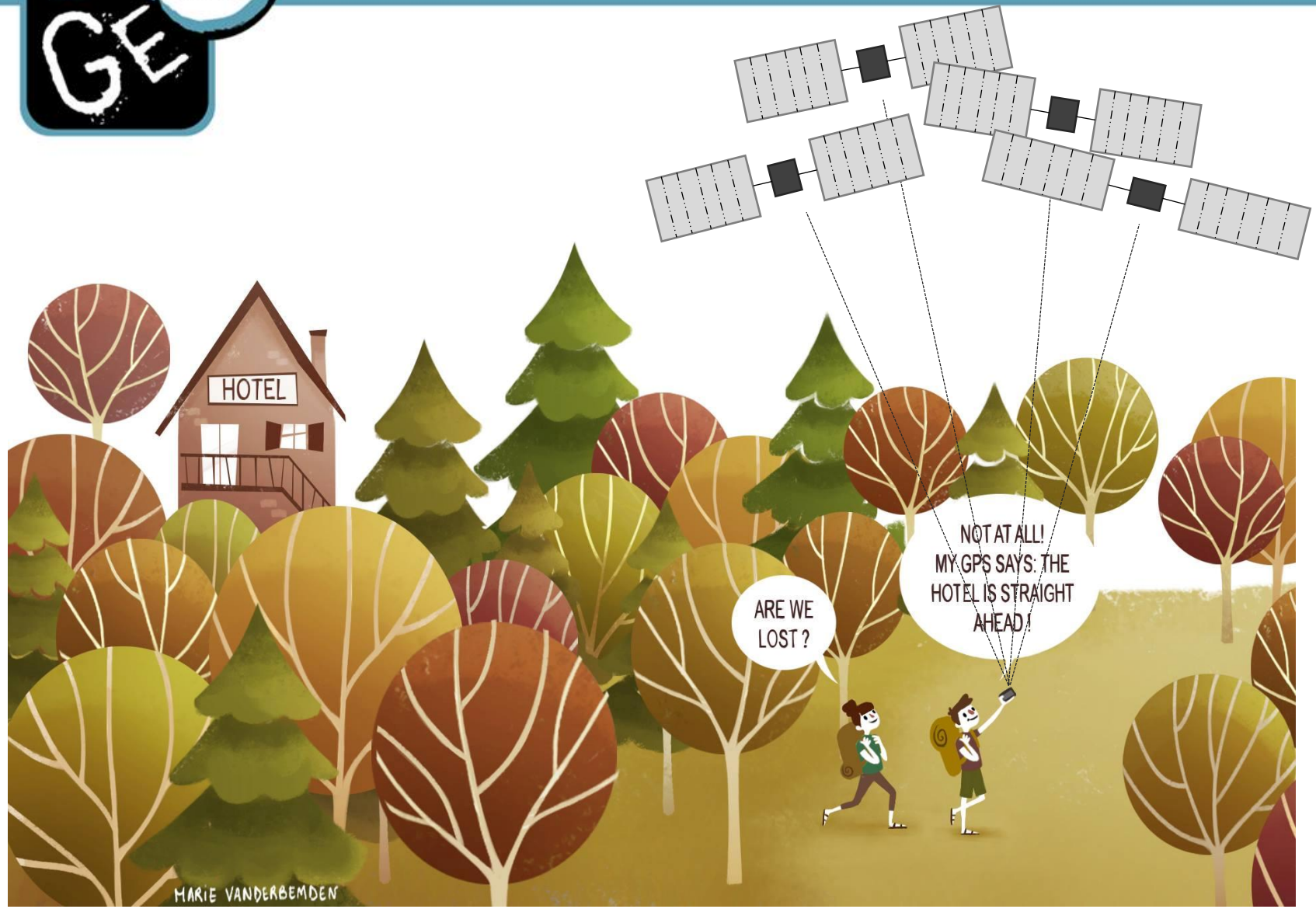
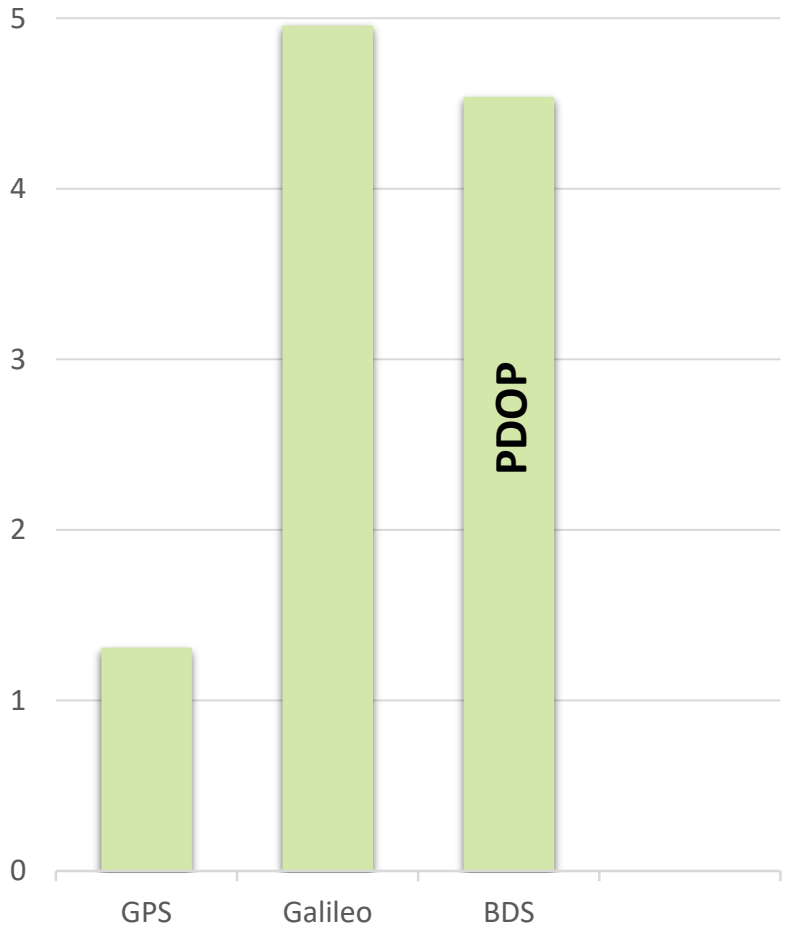


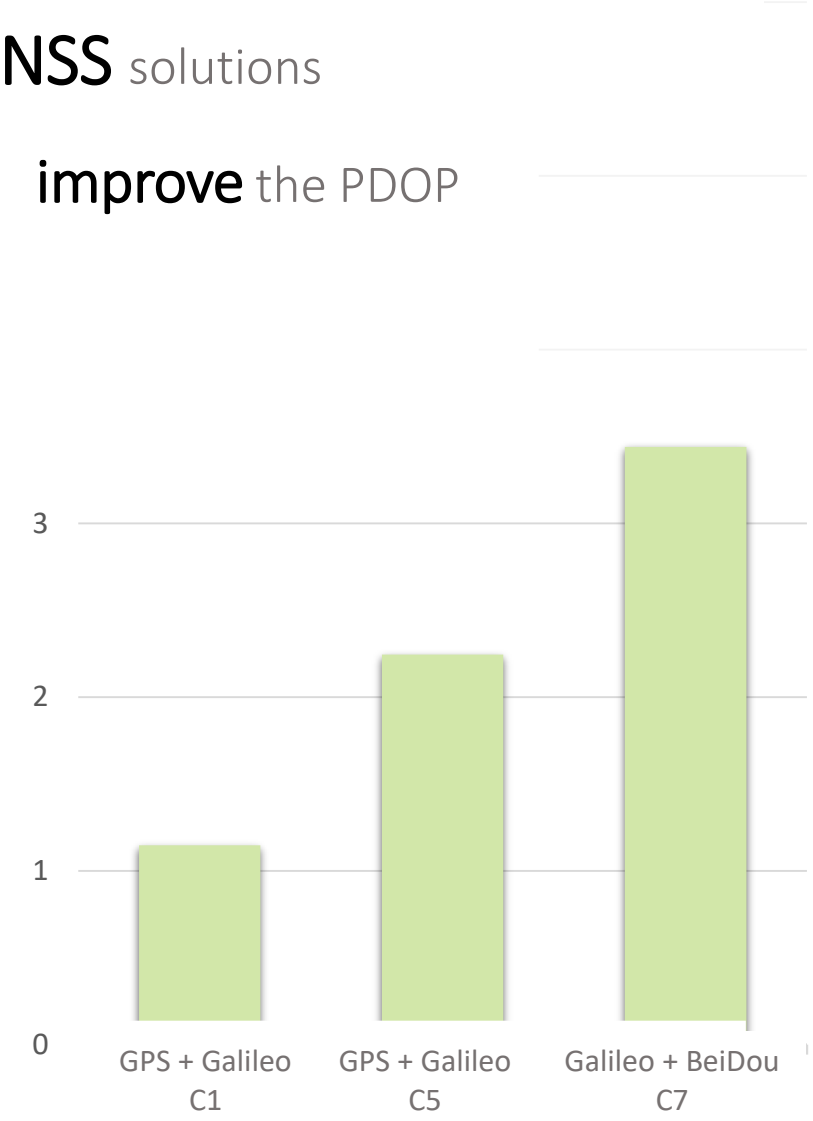
2

High **PDOP** value

2 Multi-GNSS solutions

improve the PDOP





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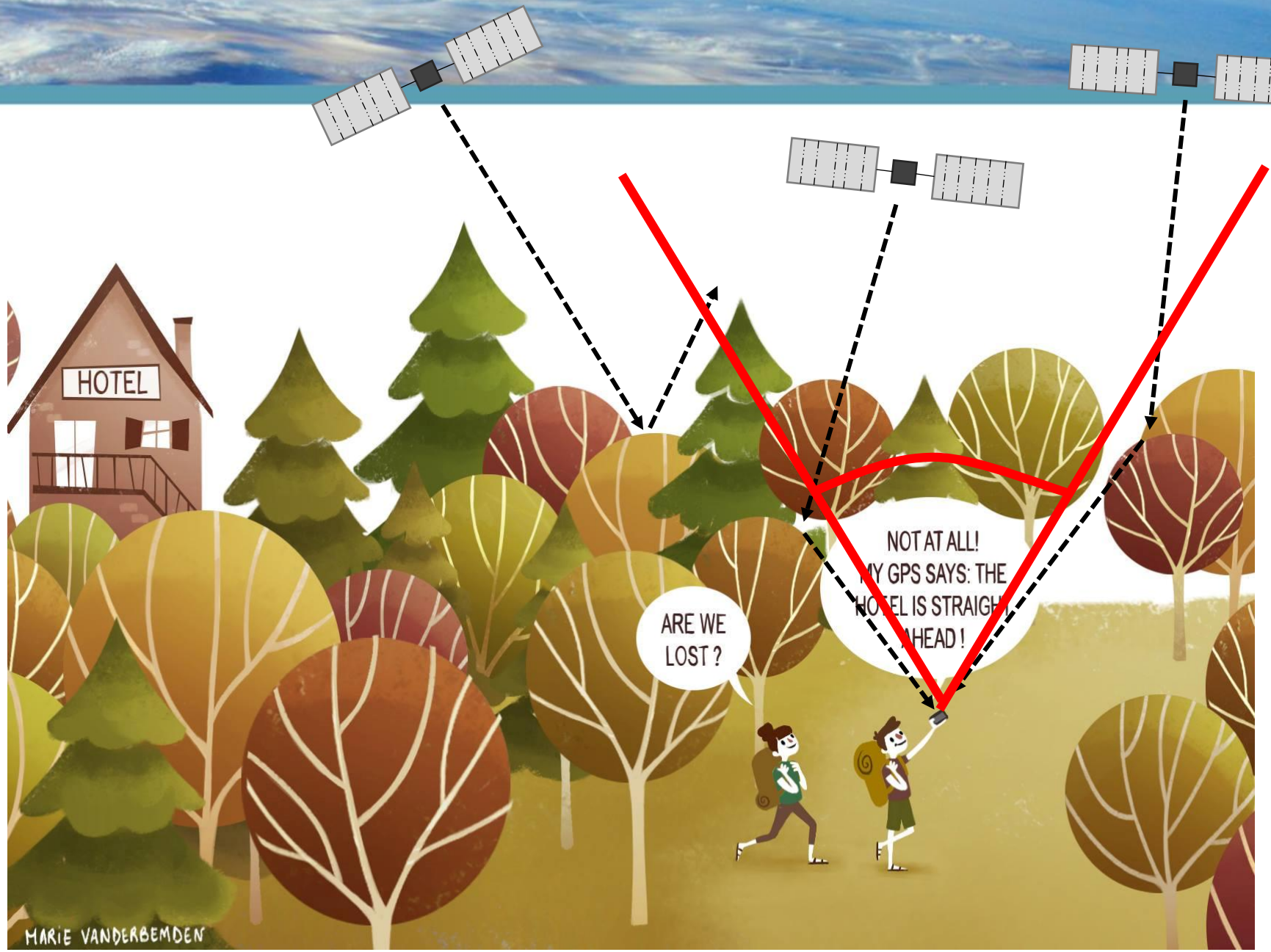
3

A high mask of elevation

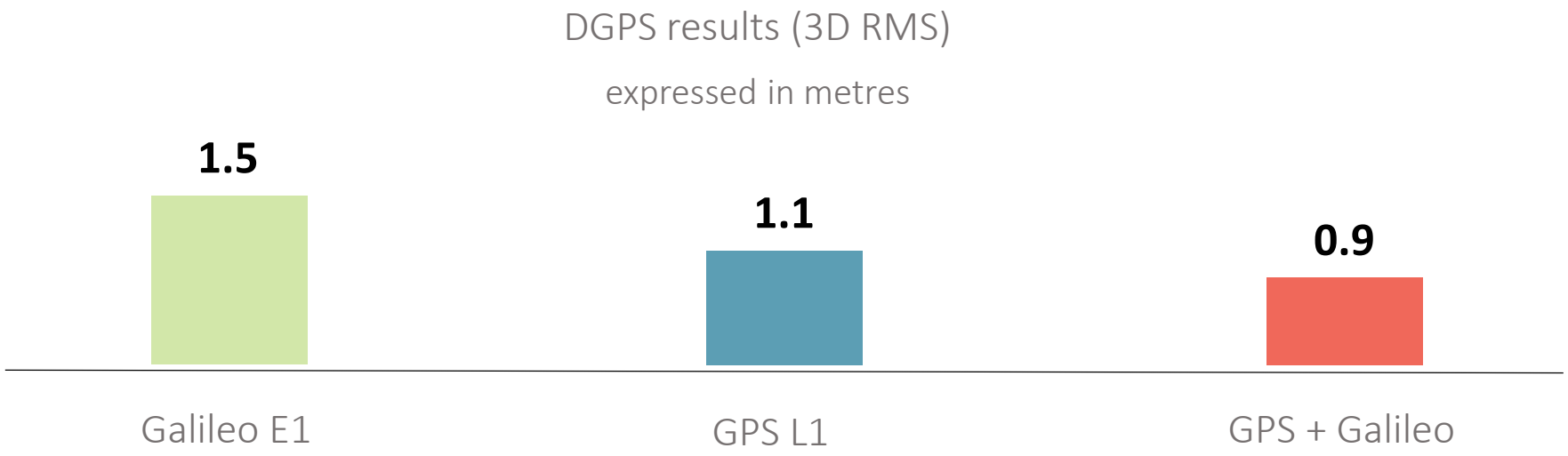
allow reducing

the multipath effect

! Increases PDOP



3 **Multi-GNSS** solutions are **more precise** than single-GNSS solutions at **high elevation mask**



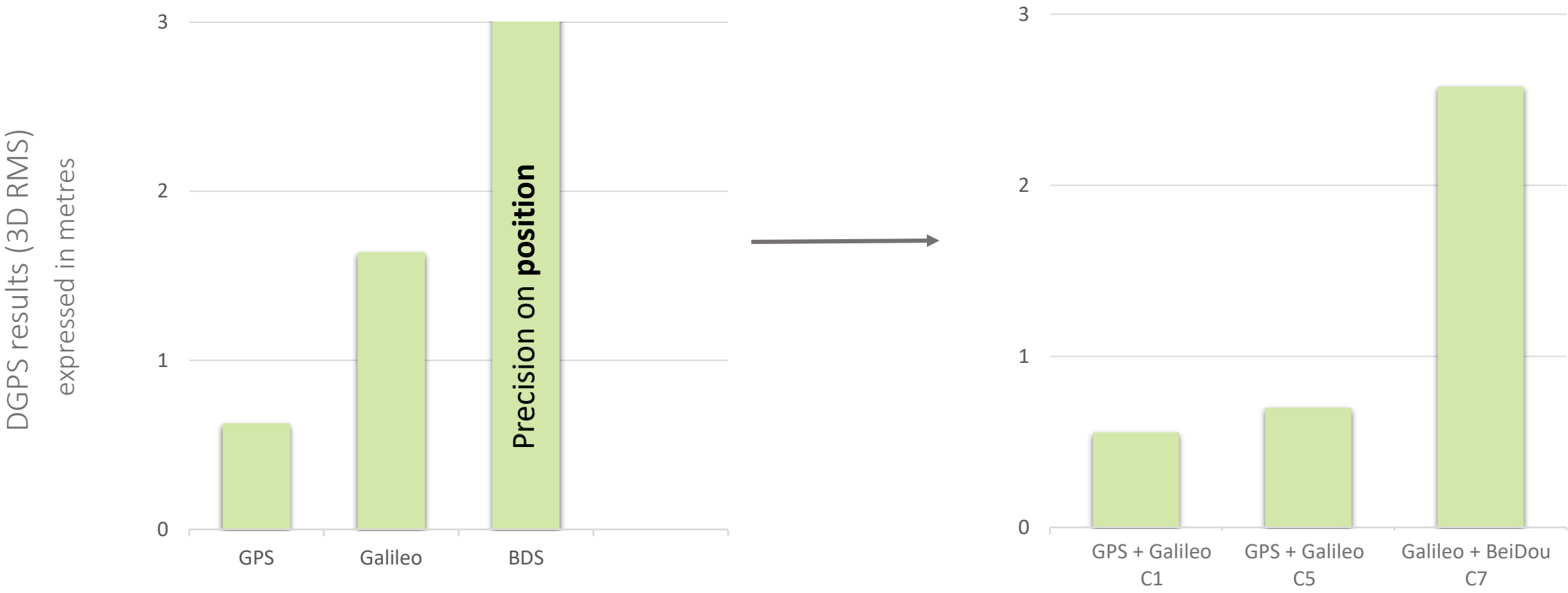
Elevation mask: 30°

Mass market receivers

are **less precise**

4 Multi-GNSS solution leads to more precise positions

regardless of the type of receiver used



Drawbacks of multi-GNSS positioning

Differences

between GNSS

Time systems

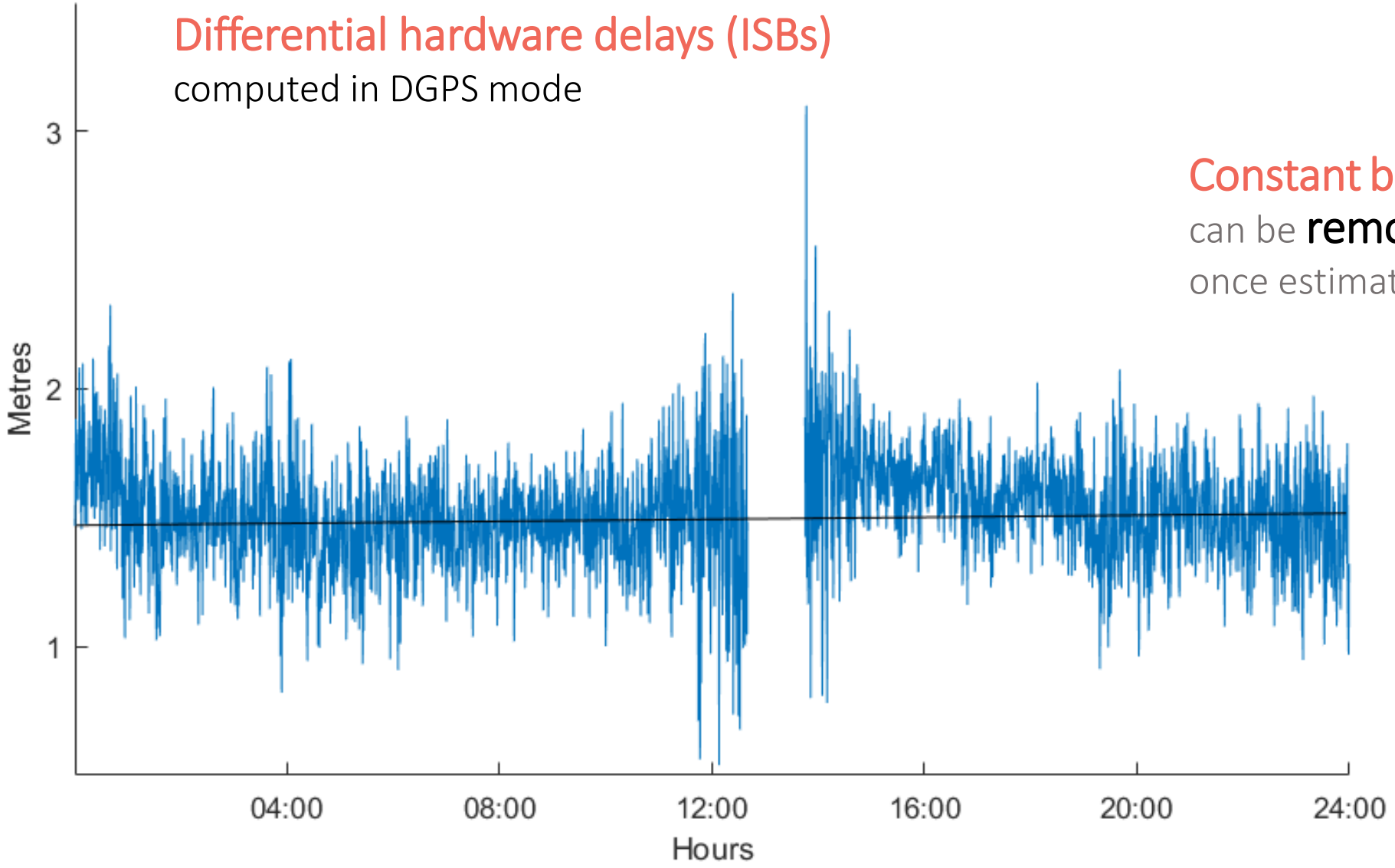
Coordinate systems

Hardware delays

lead to **additional biases!**

Differential hardware delays (ISBs)

computed in DGPS mode



Constant biases:

can be **removed**

once estimated!

Conclusions

Multi-GNSS positioning improves solutions computed with Galileo-only and BeiDou-only satellite systems by reducing the PDOP and increasing the number of visible satellites

In challenging environments with high multipath, multi-GNSS allow the use of higher masks of elevation, thus leading to more precise positioning results

In DGPS, the **biases** introduced by the multi-GNSS mode **are constant** with high-end receivers, and may be removed.

Contacts

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