

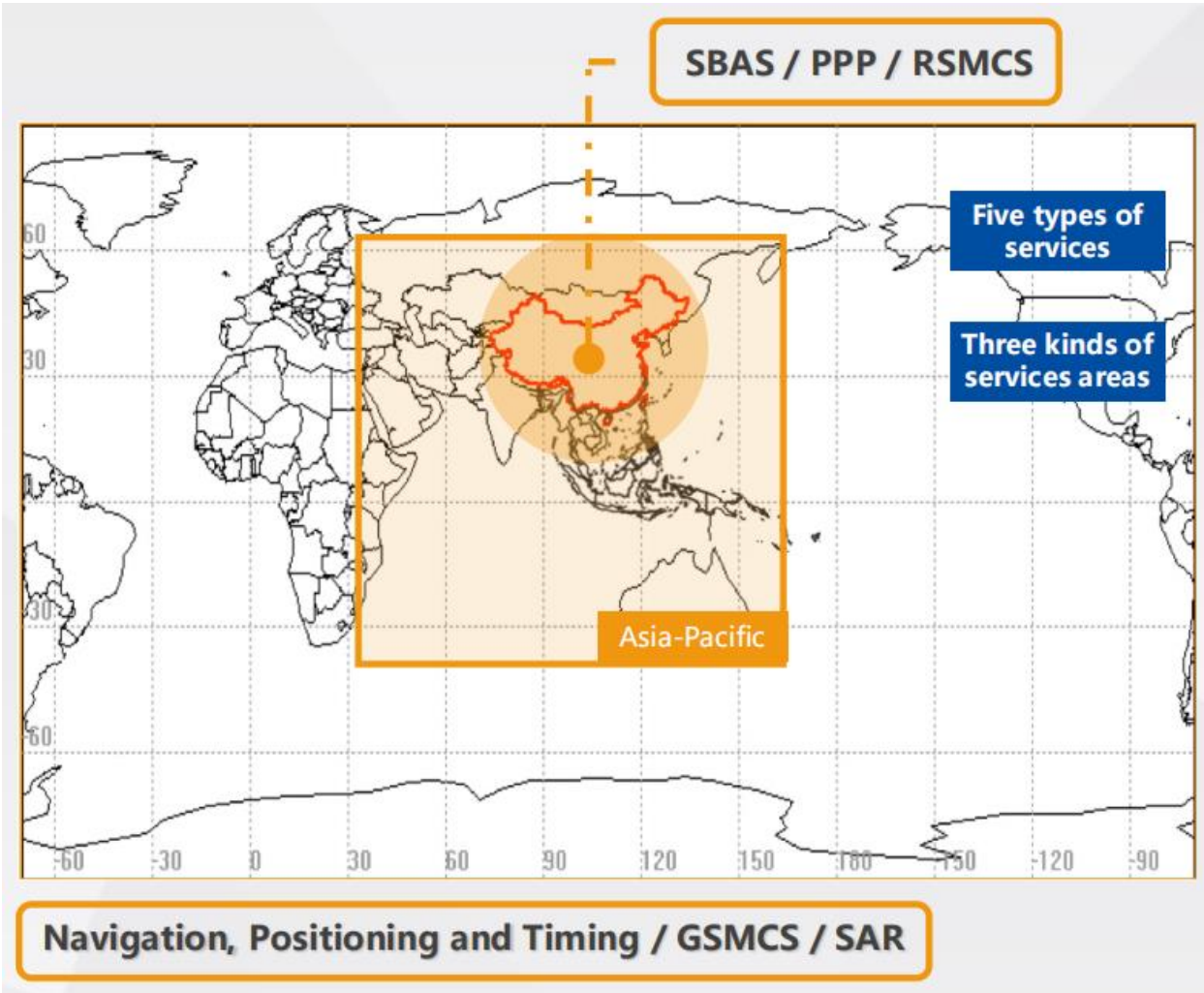
# **New development in GNSS Sensors with Beidou 3 brings new application**



# CONTENT

1. What's new and advantages for BDS-3 system
2. GNSS applications - combinations

# 1. What's new and advantage for BDS-3 constellation - 7 services of BDS



**SBAS: Satellite-Based Augmentation System**

**PPP: Precise Point Positioning**

**RSMCS/GSMCS: Regional/Global Short Message Communication Service**

**SAR: Search And Rescue**



# 1. What's new and advantage for BDS-3 constellation - How many BD satellites now?

Now already 55 BD satellites in the sky.

BDS-1: from No. 1 to 16

BDS-2: from No. 17 to 23

BDS-3: from No. 24 to 55

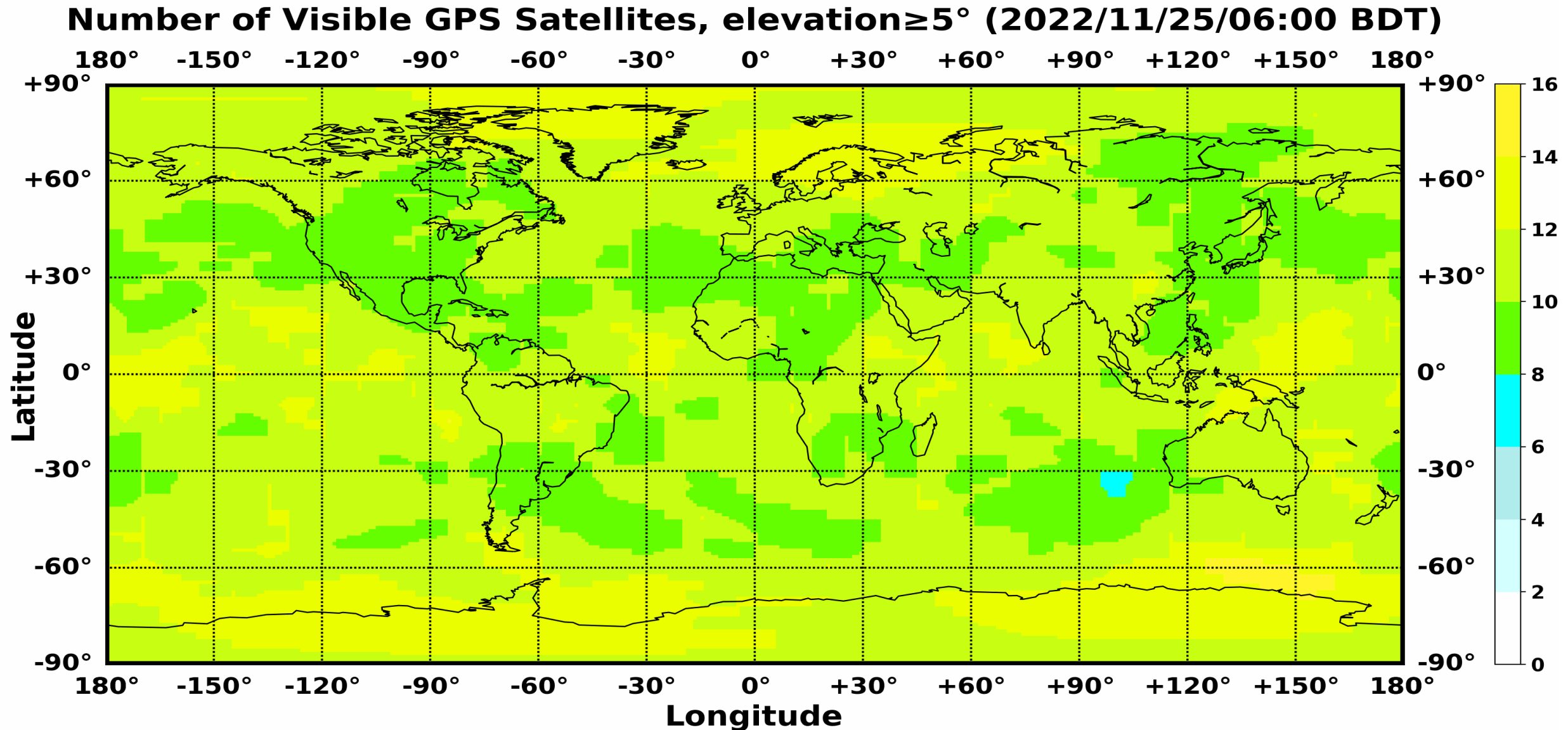
No.4 and No.14 now out of service

No.32 and No.45 are reserve satellites

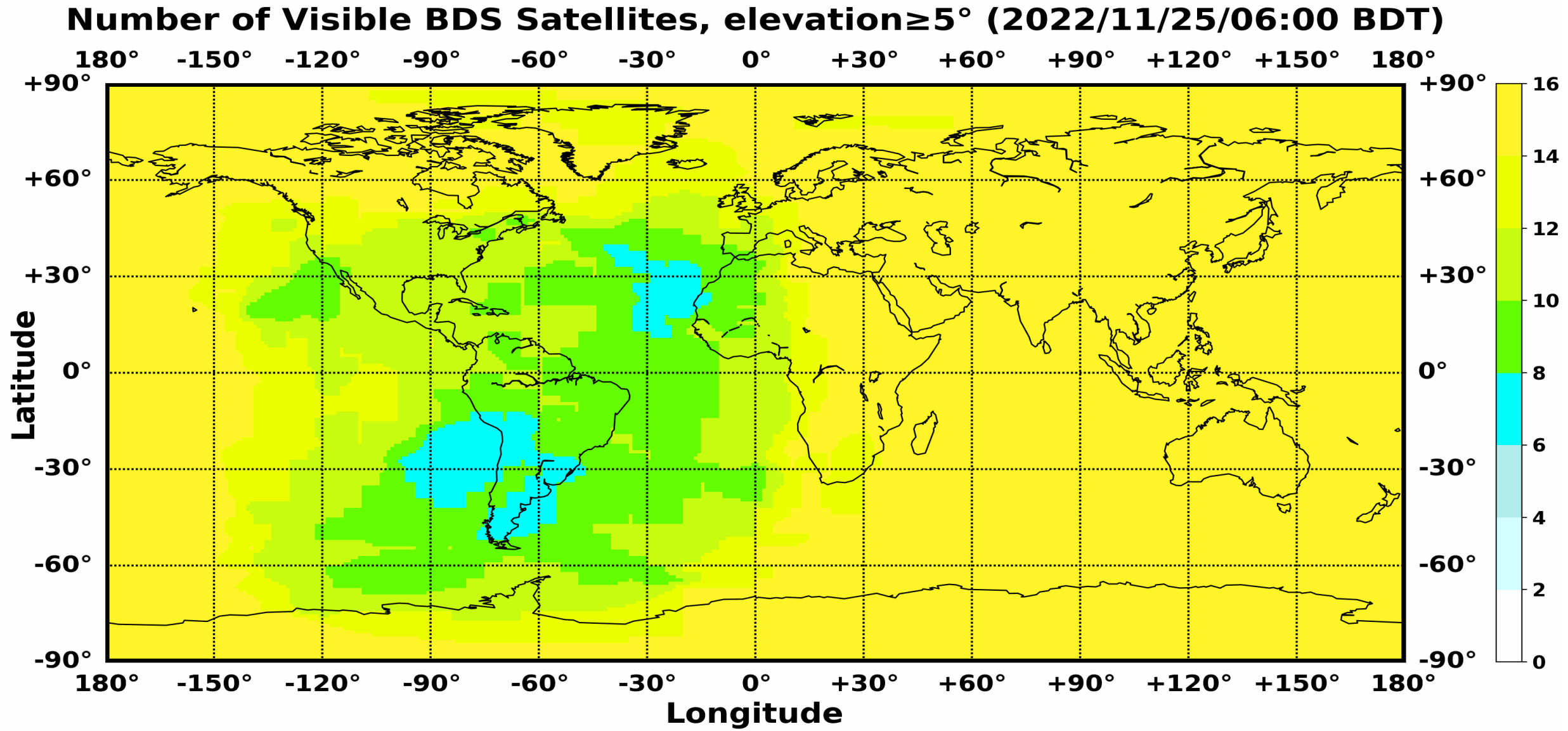
In the next few years, BD satellites is the best navigation system in HK



1. What's new and advantage for BDS-3 constellation - How many BDS and GPS satellites we can observe?

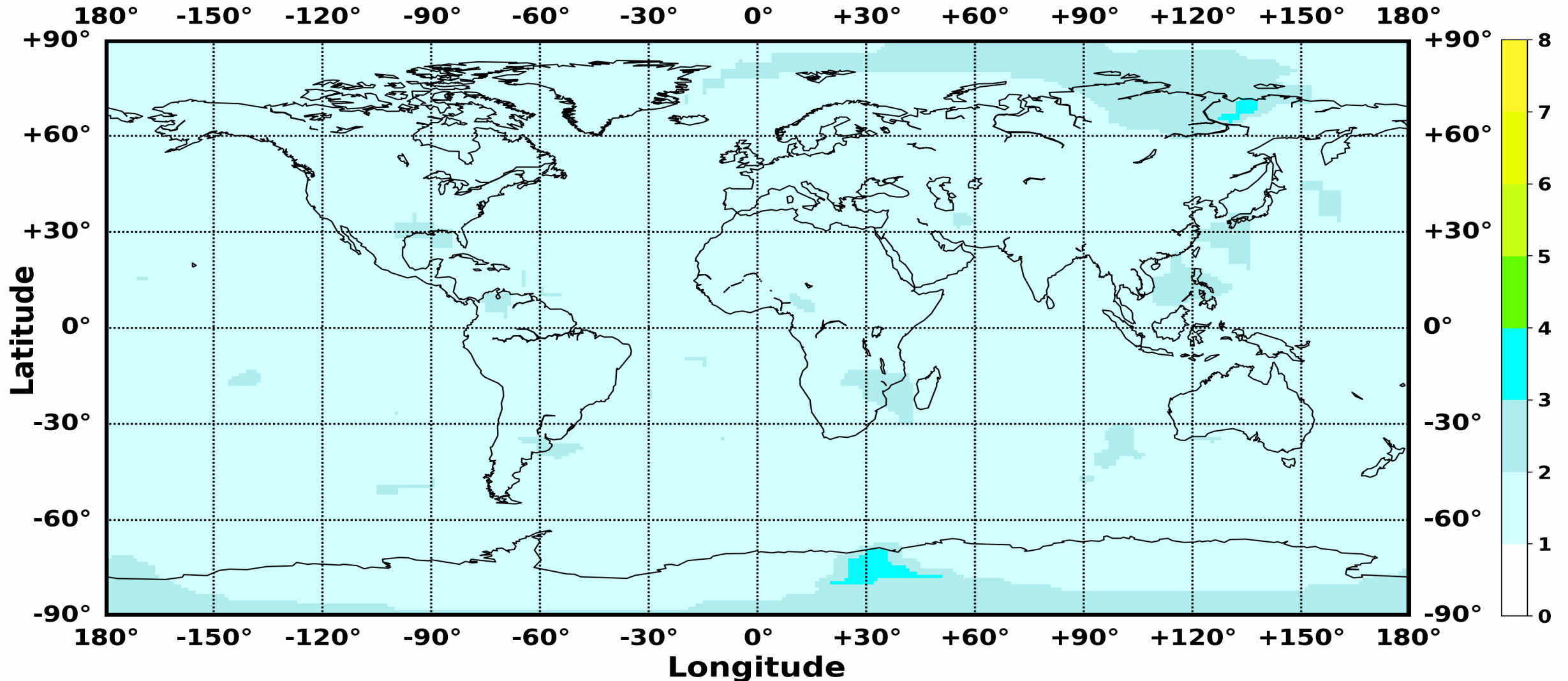


1. What's new and advantage for BDS-3 constellation - How many BDS and GPS satellites we can observe?

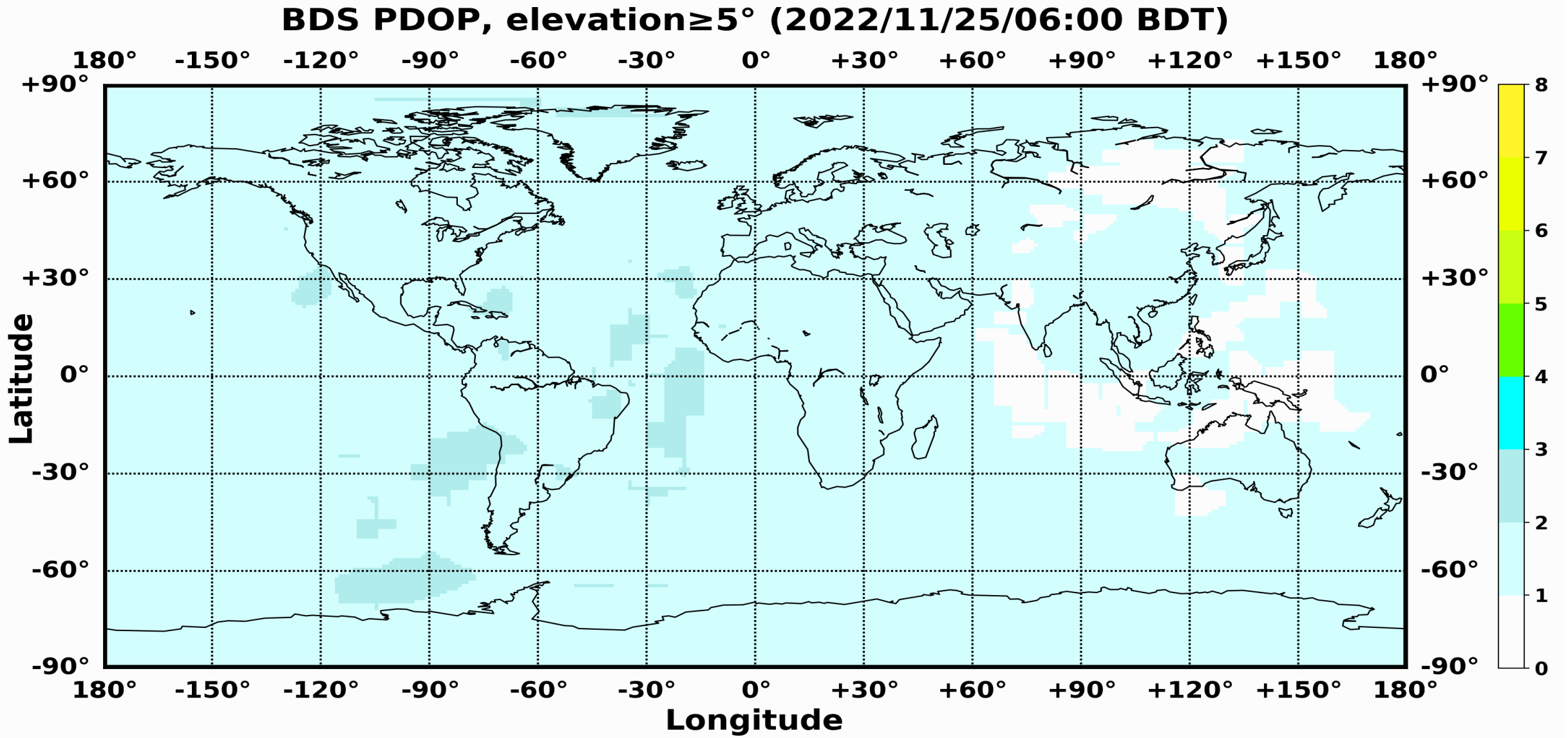


1. What's new and advantage for BDS-3 constellation - How is the PDOP between BDS and GPS satellites?

**GPS PDOP, elevation  $\geq 5^\circ$  (2022/11/25/06:00 BDT)**

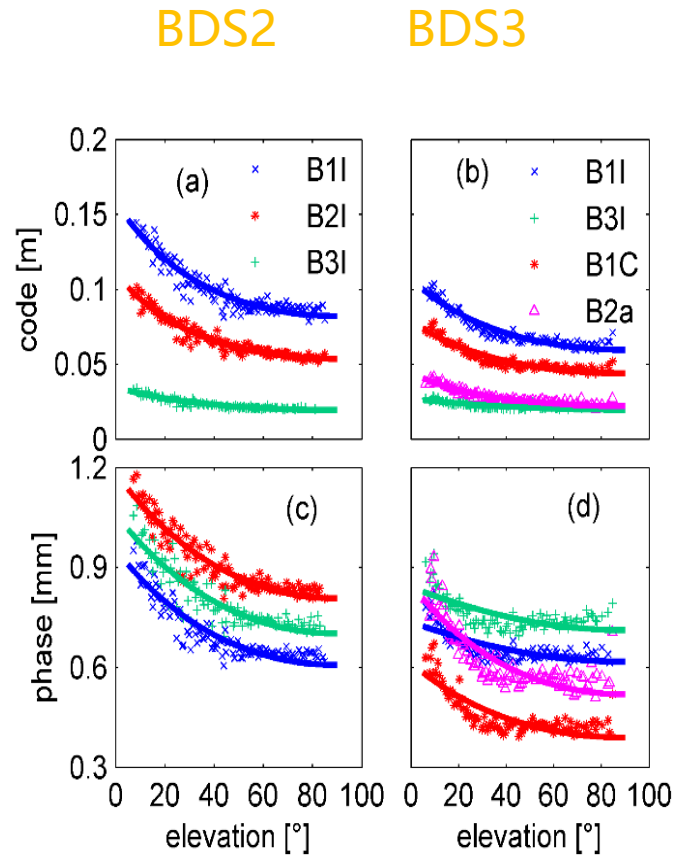


1. What's new and advantage for BDS-3 constellation - How is the PDOP between BDS and GPS satellites?





# 1. What's new and advantage for BDS-3 constellation - The new signal of BDS-3 is higher accuracy than BDS-2

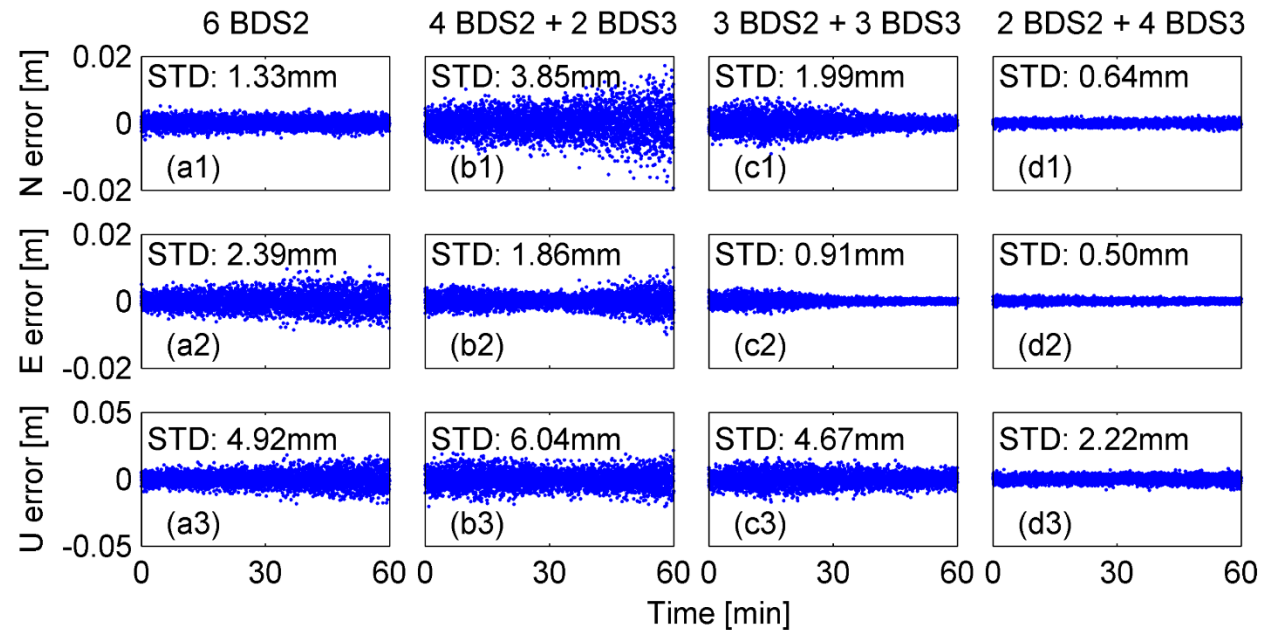


BDS-2 and BDS-3 signal accuracy (**Zero baseline**)

Observation	System	Accuracy (Code:m, Phase: mm)				
		B1I	B2I	B3I	B1C	B2a
Code	BDS2	0.08	0.05	0.02		
	BDS3	0.06		0.02	<b>0.04</b>	<b>0.02</b>
Phase	BDS2	0.61	0.71	0.70		
	BDS3	0.61		0.71	<b>0.38</b>	<b>0.51</b>

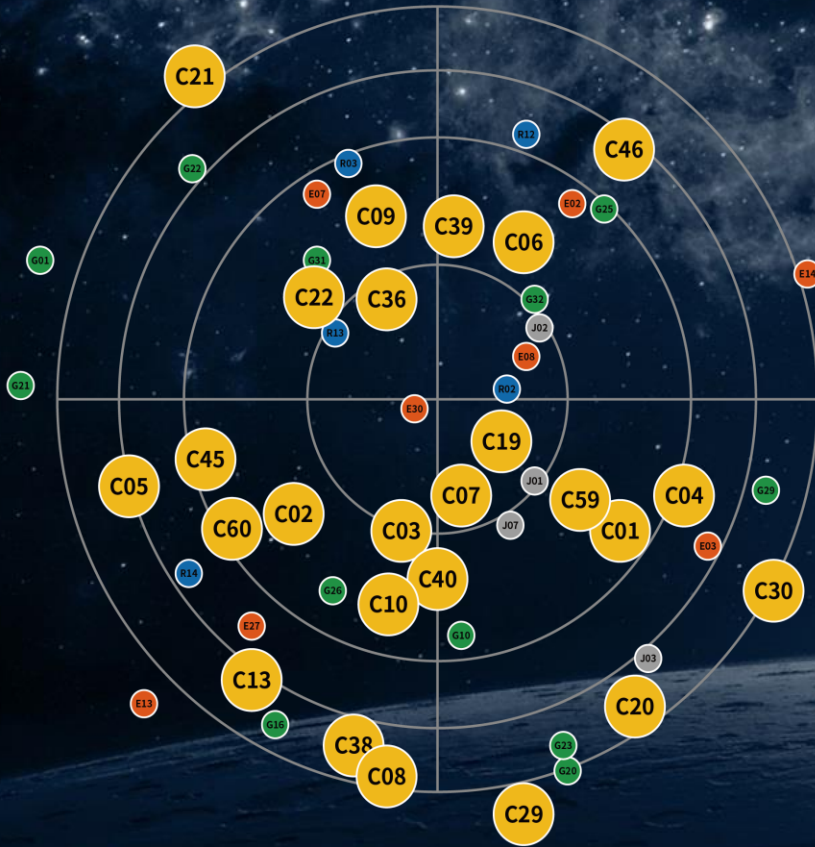
**The signal accuracy comparison between BD-2 and BD-3 system**

# 1. What's new and advantage for BDS-3 constellation - The RTK accuracy between BDS-2 and BDS-3



**When we use B1C and B2a signal for RTK, we can see the position accuracy is better than BDS-2**

# 1. What's new and advantage for BDS-3 constellation - More satellites and fixed in seconds



● 中国 BDS   ● 美国 GPS   ● 俄罗斯 GLONASS   ● 欧洲 Galileo   ● 日本 QZSS

Over 50 satellites available in opening area

Over 50% satellites are BD satellites

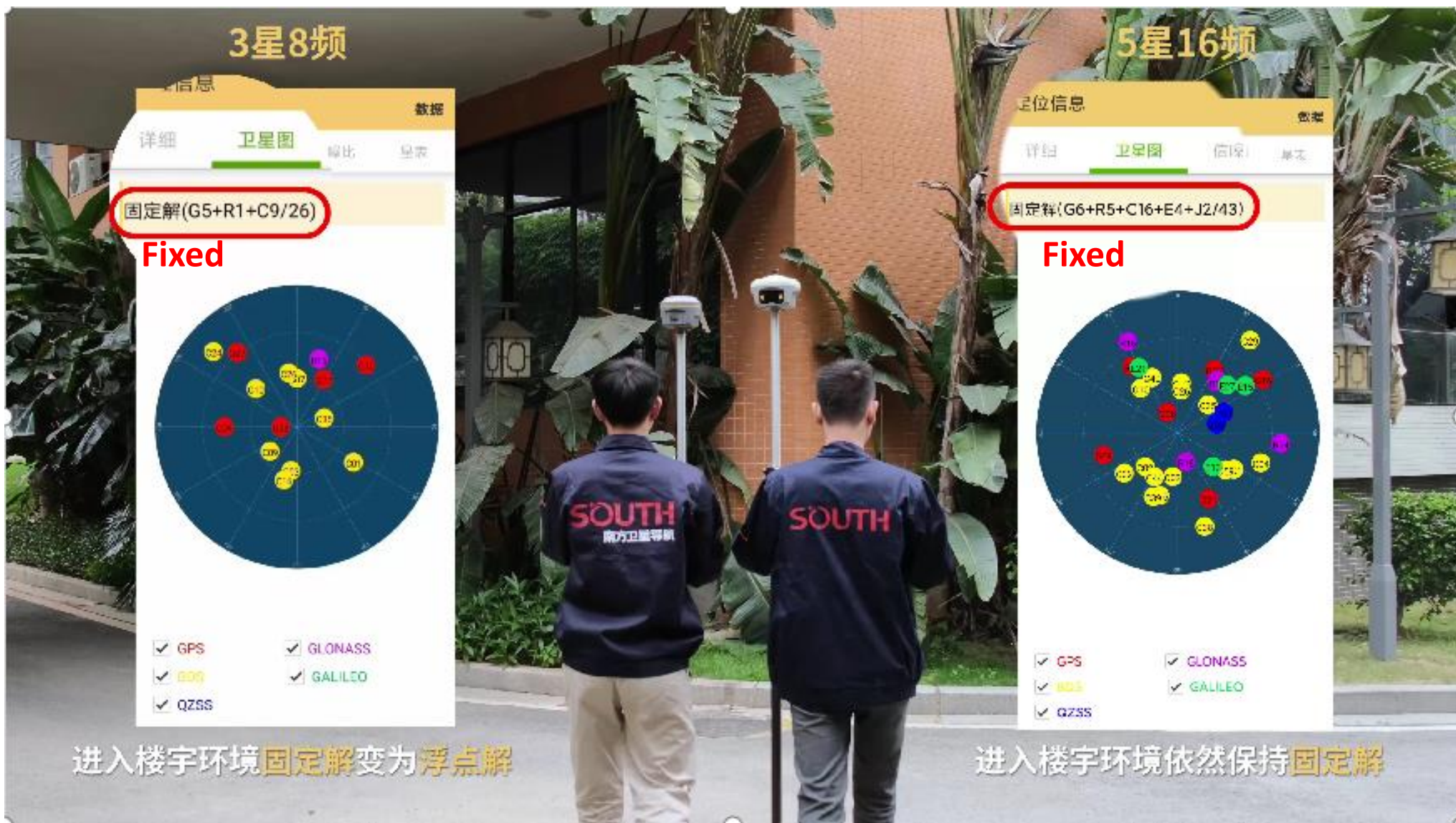
✓ SOUTH RTK Support all the current satellite constellations

✓ In HK, SOUTH RTK receive 50+ satellites in opening area.

✓ Fixed in seconds



# 1. What's new and advantage for BDS-3 constellation - BDS-3 performance





# 1. What's new and advantage for BDS-3 constellation - BDS-3 performance





# 1. What's new and advantage for BDS-3 constellation - BDS-3 performance



1. What's new and advantage for BDS-3 constellation - BDS-3 performance (something other people not tell you)

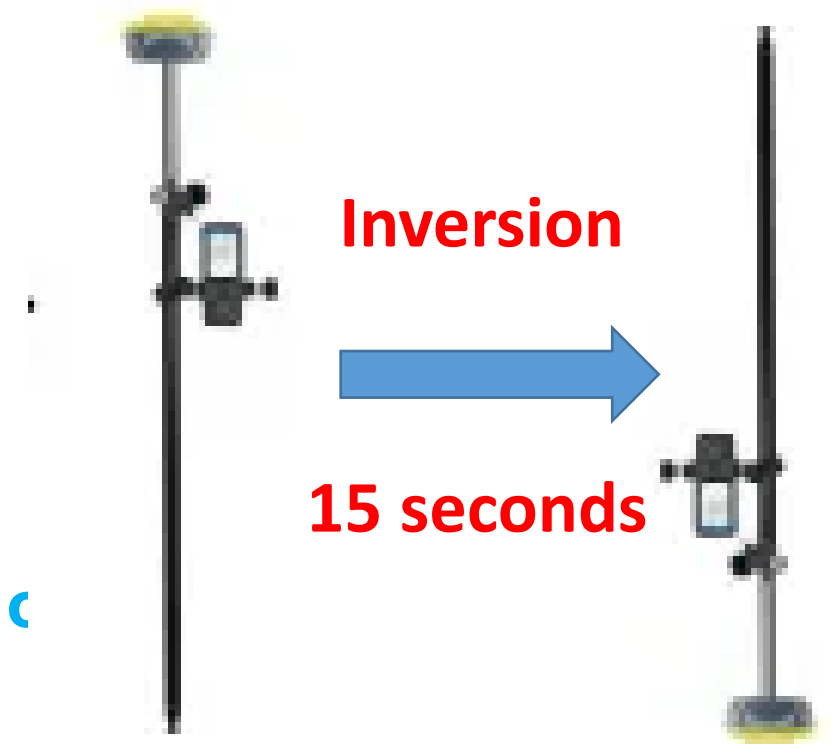
## How to improve the Reliability in bad environment even RTK display fixed

The reliability for 3 times reinitialise RTK receiver

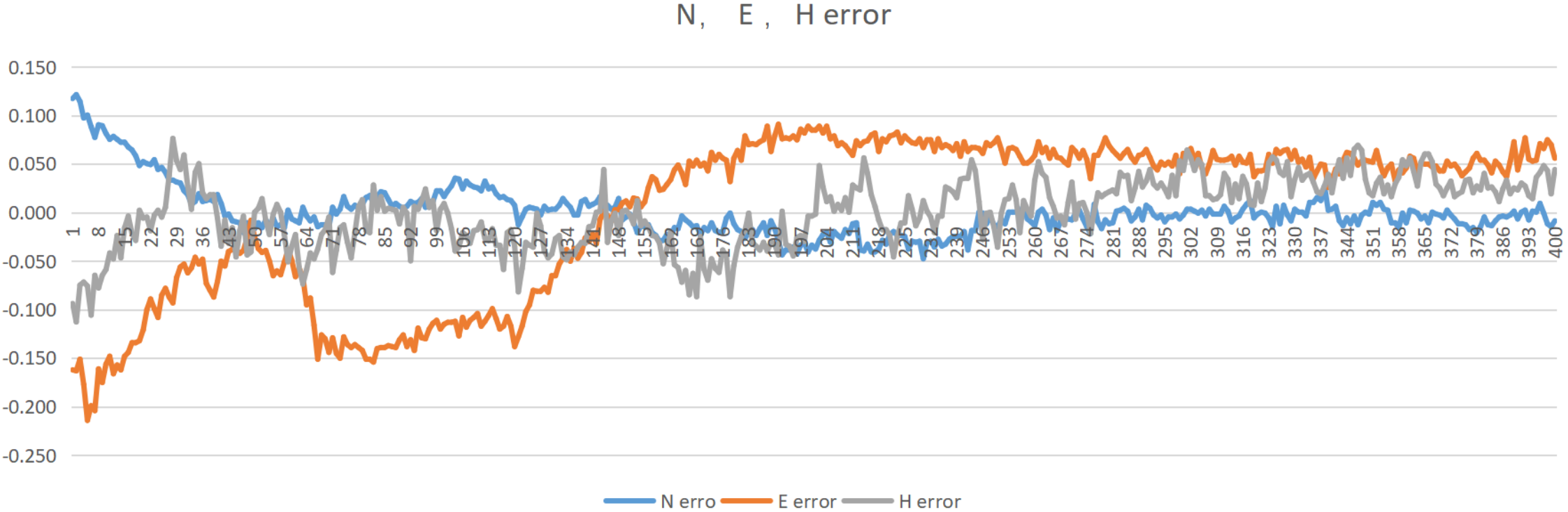
$1 - (1-0.9)^3 = 99.9\%$  (50% sky is blocked by buildings, get fixed in 1 minutes)

$1 - (1-0.8)^3 = 99.2\%$  (Under some trees, get fixed around 2 minutes)

$1 - (1-0.7)^3 = 97.3\%$  (Both side are buildings & trees, get fixed around 3 minutes)



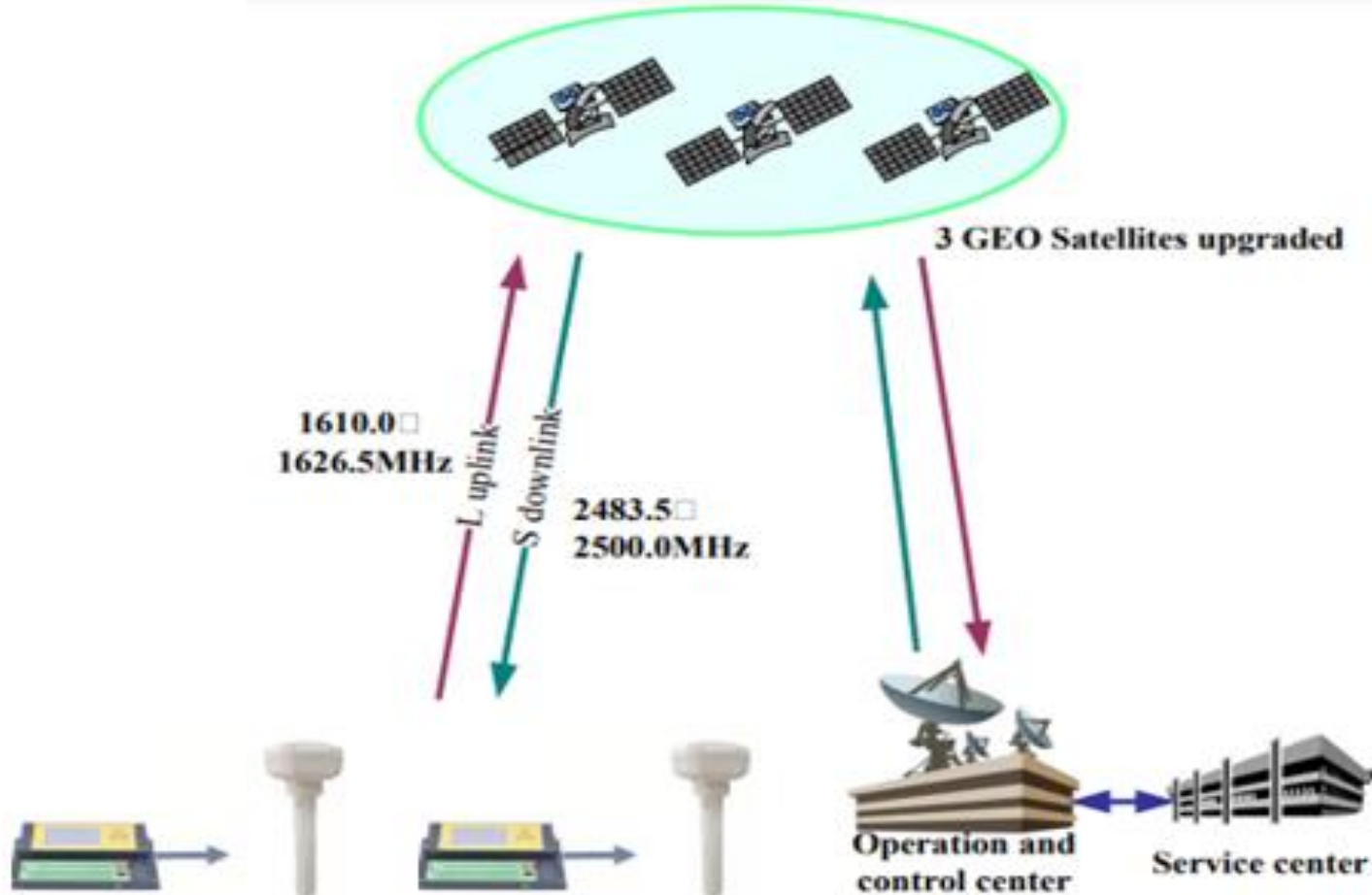
# 1. What's new and advantage for BDS-3 constellation - BDS-PPP performance



After 10 minutes BDS-PPP process, the NEH accuracy as above.



# 1. What's new and advantage for BDS-3 constellation - BDS-3 RSMCS



BD RSMC users

## 2. GNSS applications - Combinations

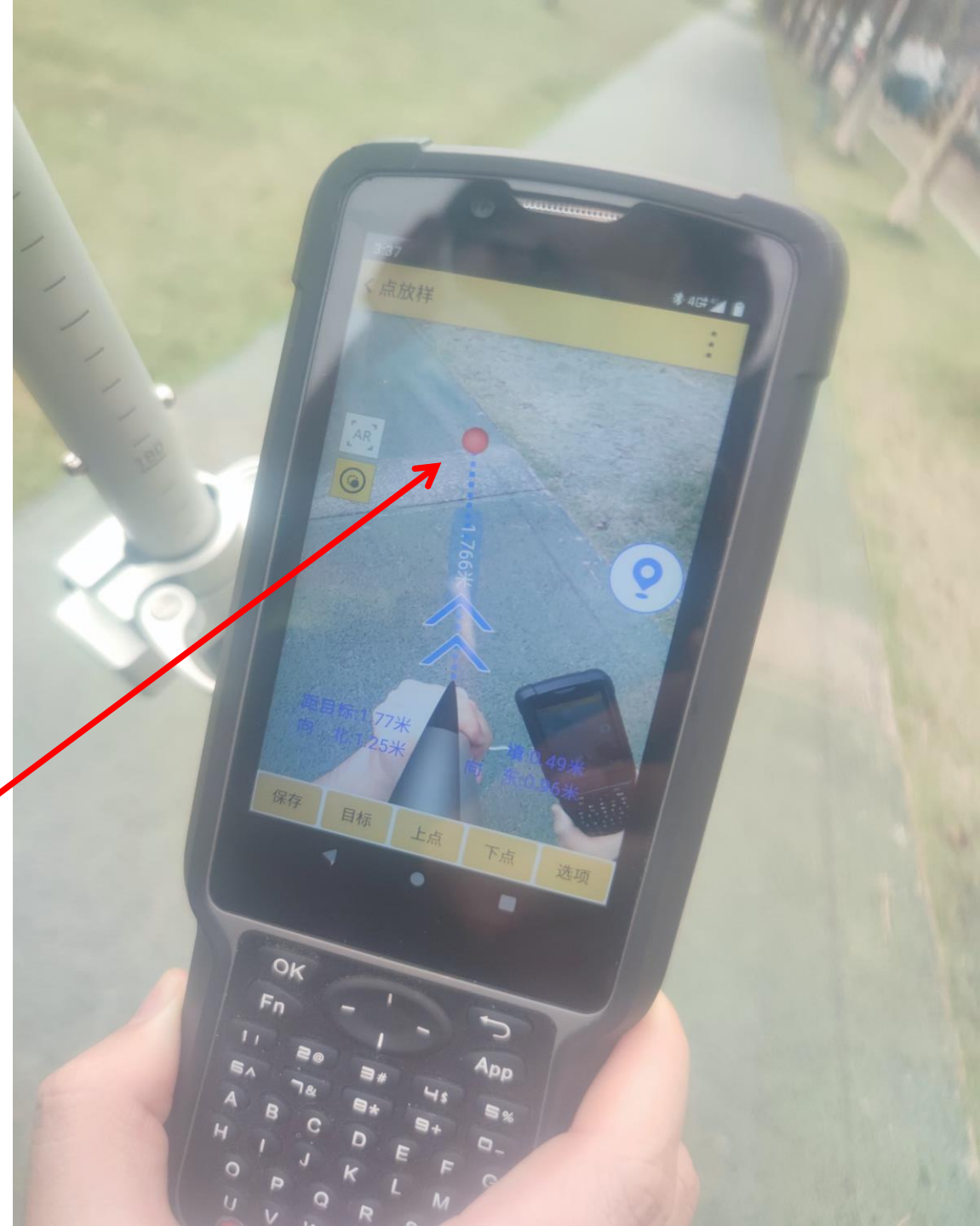


## 2. GNSS applications - combinations

GNSS + imu + photogrammetry  
Apply in land survey



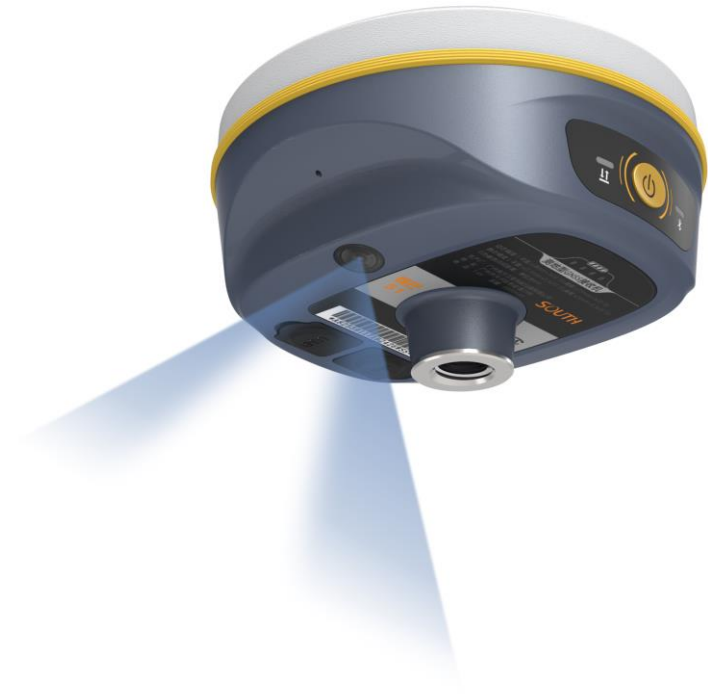
Mark the stake out point on the screen





## 2. GNSS applications - combinations

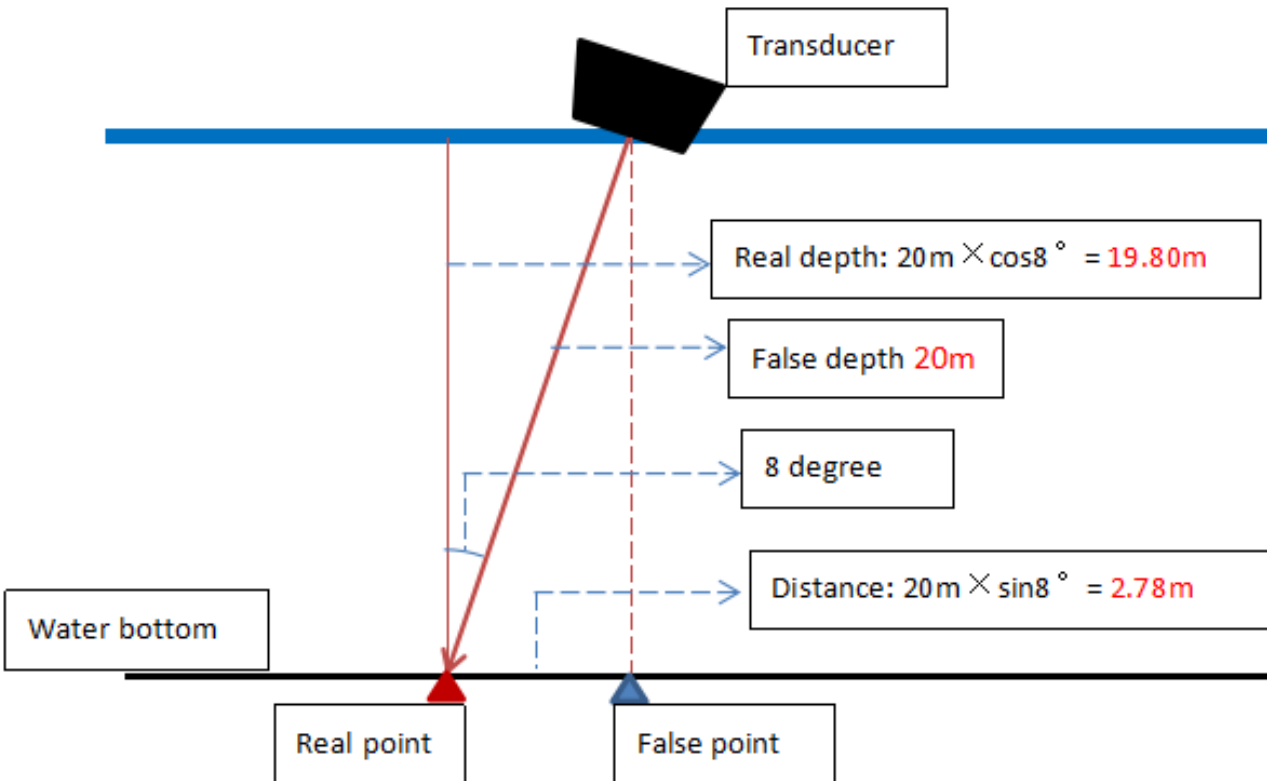
GNSS + imu + photogrammetry  
Apply in land survey





## 2. GNSS applications - combinations

GNSS + IMU apply in hydro survey



Depth		8 degree	15 degree
False Measured 10 m	Depth error	10cm	35cm
	Offset distance	1.39m	2.58m
False measured 20 m	Depth error	20cm	69cm
	Offset distance	2.78m	5.17m
False measured 40 m	Depth error	39cm	136cm
	Offset distance	5.56m	10.35m
False measured 80 m	Depth error	78cm	272cm
	Offset distance	11.13m	20.70m

## 2. GNSS applications - combinations

GNSS + tilt or accelerated sensor in monitoring industry



SOUTH MR2

integrated GNSS receiver and antenna,  
accelerated and tilt sensor and  
network board all in one design.

Robit total station : visibility limitation, weather limitation,  
distance limitation

GNSS only : time resolution limitation

Tilt sensor : not support offset movement

Accelerated sensor : can not measure a tiny movement in  
a long time duration

## 2. GNSS applications - combinations

GNSS + tilt or accelerated sensor in monitoring industry

So, MR2 advantagement:

**GNSS 24 hours data for mm level**, or longer time data proess to get highe accuracy

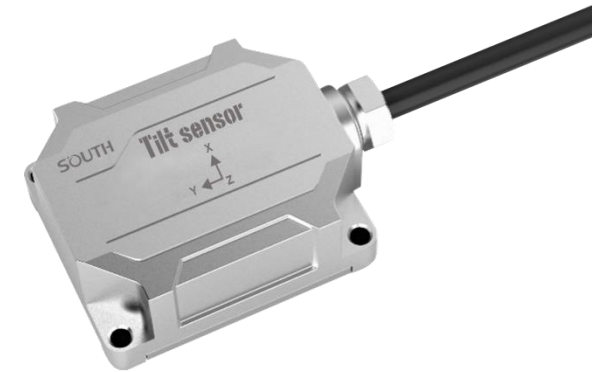
**Tilt and acceleration get real-time movement in short duration time**

We can consider that, for the deformation monitoring

GNSS: longer time higher movement accuracy

Acceerated sensor, shorter time higher movement accuracy.

So, they are the best partner



SOUTH Tile and Acceleration sensor

## 2. GNSS applications - combinations

BDS RSMCS with sensors in monitoring solution

Data link without network signal for many remote regions





## 2. GNSS applications - combinations

GNSS with customized softwares - Cases share: Forest inspection

Some traditional paper work:

四、每木检尺记录																					
样木号	立木类型	检尺类型	树种		胸径		采伐管理类型	林层	跨角地类序号	样木位置										备注	
			名称	代码	前期	本期				测站	经度	纬度	椭球高	X	Y	H	方位角	倾斜角	斜距		水平距
226	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	6.3	6.3	11 林 业部 门 管理 林木	0									92.0			1.9	
227	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	5.5	5.5	11 林 业部 门 管理 林木	0									91.0			4.3	
228	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	5.0	5.0	11 林 业部 门 管理 林木	0									85.0			4.3	
229	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	6.8	6.8	11 林 业部 门 管理 林木	0									88.0			6.8	
230	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	14.0	14.0	11 林 业部 门 管理 林木	0									86.0			9.4	
231	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	9.1	9.1	11 林 业部 门 管理 林木	0									87.0			12.3	
232	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	17.1	17.1	11 林 业部 门 管理 林木	0									159.0			3.0	
233	11 乔木 林地中 林木	14 采 伐木	阔叶林	5501	13.4	13.4	11 林 业部 门 管理 林木	0									127.0			4.6	

观测点号	GPS 坐标		树种											
			树种名称			树种名称			树种名称			树种名称		
	经度	纬度	胸径	树高	每公顷 断面积	胸径	树高	每公顷 断面积	胸径	树高	每公顷 断面积	胸径	树高	每公顷 断面积

表 2-1 森林标准地因子调查记录表

调查员: \_\_\_\_\_ 调查日期: \_\_\_\_\_ 年 \_\_\_\_\_ 月 \_\_\_\_\_ 日

项目	记录内容
样地号	
地理范围	_____ 省 _____ 市 (自治州) _____ 县 _____ 乡 (林场) _____ 村 (林区) 经度: E _____ ° 纬度: N _____ ° (格式: XX.XXXXXX° 用度格式, 小数点后六位)
模型所属分区	植被区域植被类型: _____ 地类: _____
样地面积及形状	面积: _____ 规格 (方形、矩形或圆形): _____
环境因子	地貌地形
	地貌: _____ 海拔: _____
	坡度: _____ 坡向: _____ 坡位: _____
	群落类型: _____
	优势树种: _____
	郁闭度 (盖度): _____ 林分密度: _____
	平均树高: _____ 平均胸径: _____
龄组: _____ 林龄 (可选): _____	
起源: _____ 树种组成: _____	
土壤	土类: _____
干扰情况	干扰类型: _____ 干扰程度: _____ 枯落物和腐殖质损失程度: _____
经营管理措施	
备注	

表 2-11 灌木林标准地 (5m×5m) 调查基本情况表

样地号: \_\_\_\_\_ 调查员: \_\_\_\_\_ 调查日期: \_\_\_\_\_ 年 \_\_\_\_\_ 月 \_\_\_\_\_ 日

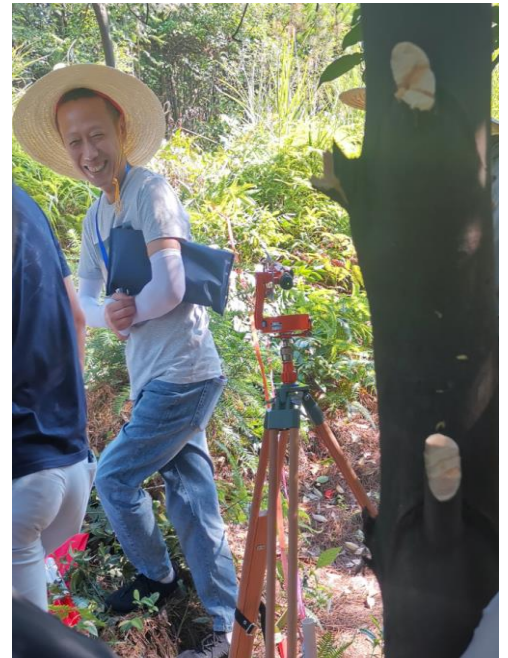
样方号	优势种	西南角坐标	灌木型 (单株/丛生)	盖度	株数/丛数	平均高, m	备注

注: 灌木填写灌木株数; 丛状灌木填写灌木丛数。

## 2. GNSS applications - combinations

### GNSS with customized softwares - Cases share: Forest inspection

Traditional field work: TS or magnetic theodolite + tape + record





## 2. GNSS applications - combinations

### GNSS with customized softwares - Cases share: Forest inspection

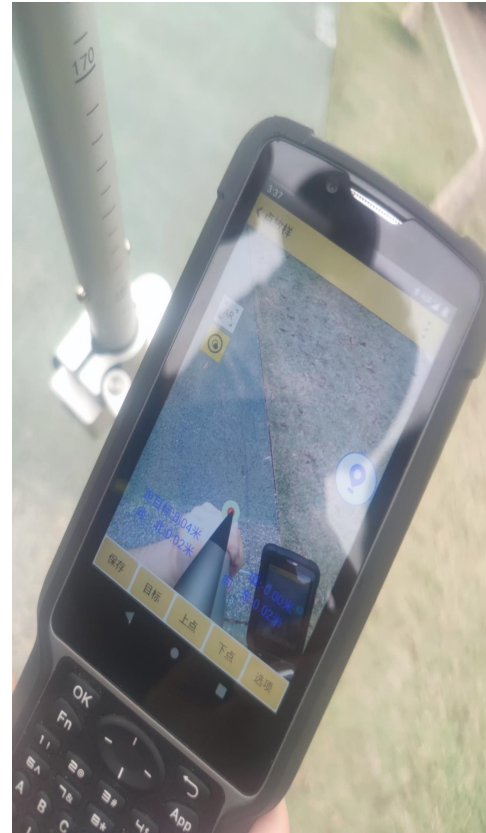
SOUTH clients field work: RTK + Forest star software



样木测量

样木号	3	北	2545943.217
东	705085.135	高程	13.000
差分延时:1s	PDOP:1.03		
时间:19:18:22	H:0.000 V:0		
固定解	S:32/40		

保存 偏移 平滑 查看 选项



保存测量点

样木号	4
立木类型	11 乔木林 林木
检尺类型	14 采伐木
树种名称	尾叶桉
树种代码	5501
采伐管理类型	11 林业部门管理林木
胸径前期	2.0
胸径本期	2.0
备注	H

取消 确定

文件导出

文件名称	20210802192100
文件类型	每木检尺记录表(*.xlsx)
/storage/emulated/0/WLStar/Export	
返回根目录	
返回上一层	
样木位置示意图.png	

取消 确定

## 2. GNSS applications - combinations

### GNSS with customized softwares - Cases share: Pipeline survey and inspection

Customized software - Pipeline Star

Survey:

1. connect the RTK or TS, pipeline detector together
2. Customized data report and format output.



## 2. GNSS applications - combinations

### GNSS with customized softwares - Cases share: Pipeline survey and inspection

Customized software - Pipeline Star  
Inspection

1. Inspection with the download mission for GIS  
system

2. Collect different types of data, then upload to GIS  
system.

< 任务详情

正在巡检

黄埔长平村、岭头村巡检  查看地图

admin 创建于2022-08-12 08:51:52

黄埔长平村、岭头村维护巡检

工单编号 XJ20220812085151824

巡检人员 xj01

位置描述 请输入具体位置信息

开始时间 2022-08-12 08:53:40

结束时间 任务结束后自动生成

完成巡检

< 任务详情

结束时间 任务结束后自动生成

漏水区域

报修人

报修人电话

维修点主要问题为设备老化，后续需要对该区域设备进行全面检查。



完成维修





THANK YOU !