



# GNSS – InSAR collocation in Slovakia

Branislav Droščák

branislav.droscak@skgeodesy.sk

Geodetic and Cartographic Institute Bratislava

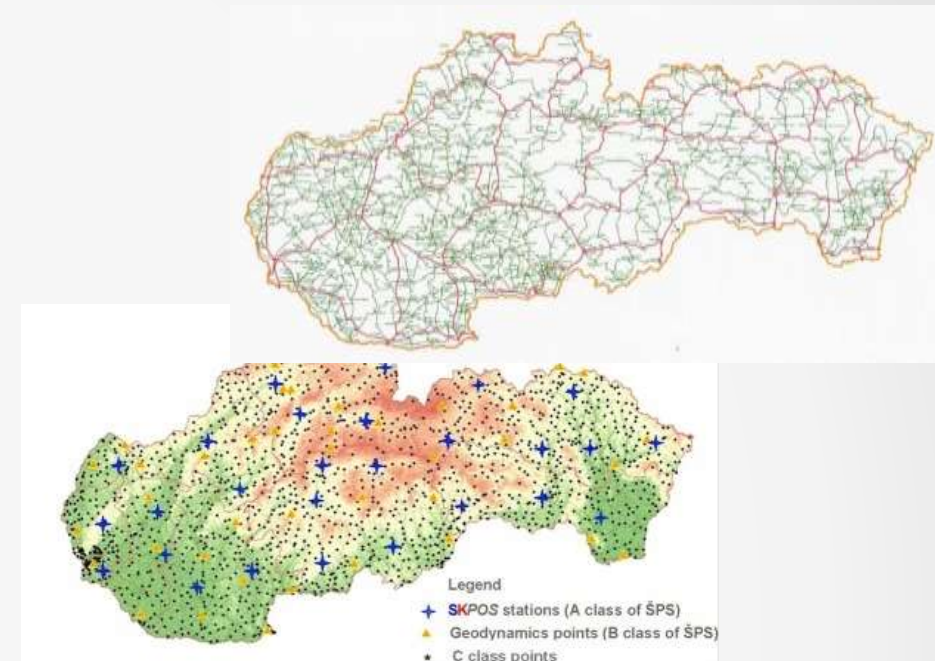


8th EUPOS Council and Technical Meeting  
November 15-16 2022, Ljubljana, Slovenia



# Geodetic networks in Slovakia

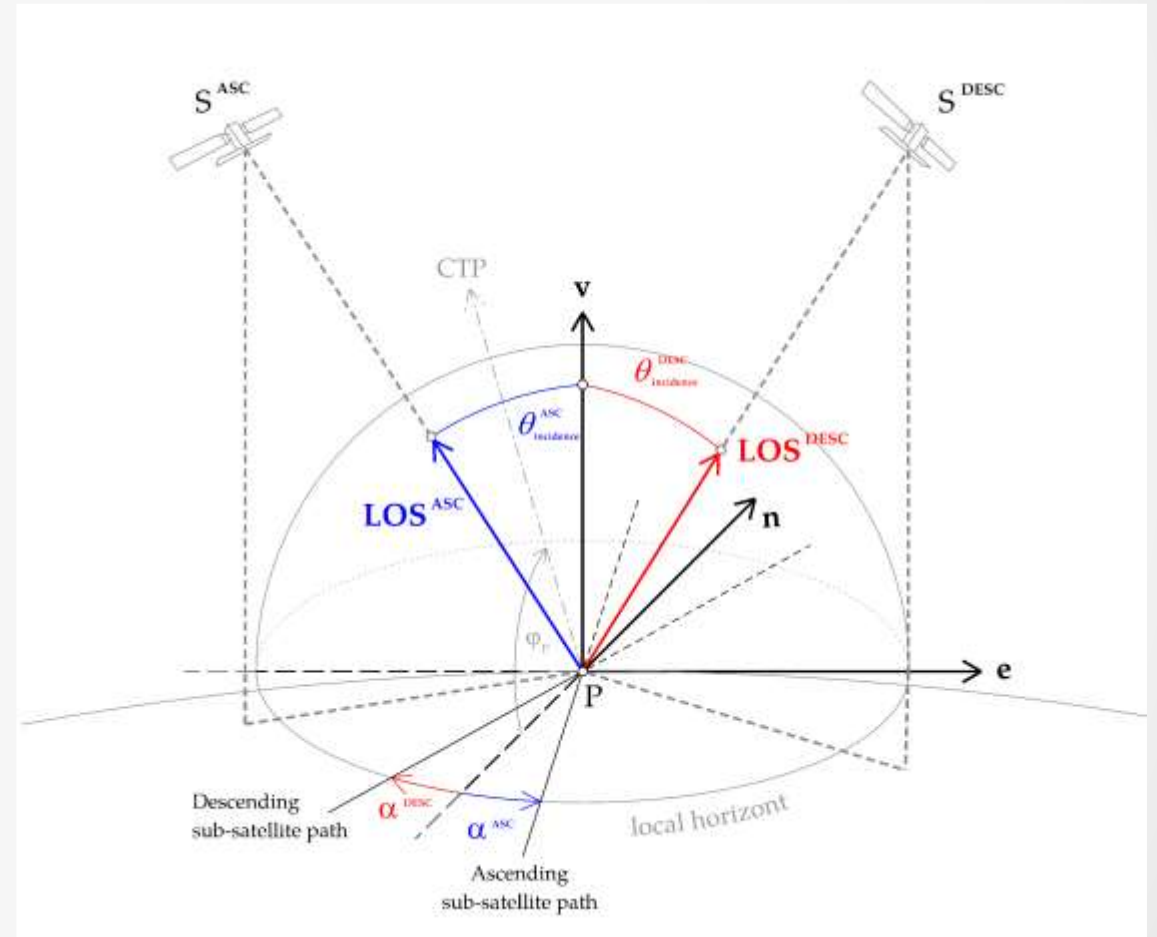
Network	Geodetic reference system representation
National spatial network	ETRS89
National trigonometric network	S-JTSK (national positioning system)
National levelling network	Balt after adjustment 1957 EVRS
National gravimetric network	S-Gr95
„National InSAR reflector network“	ETRS89 (means referencing that InSAR images to ETRS89)





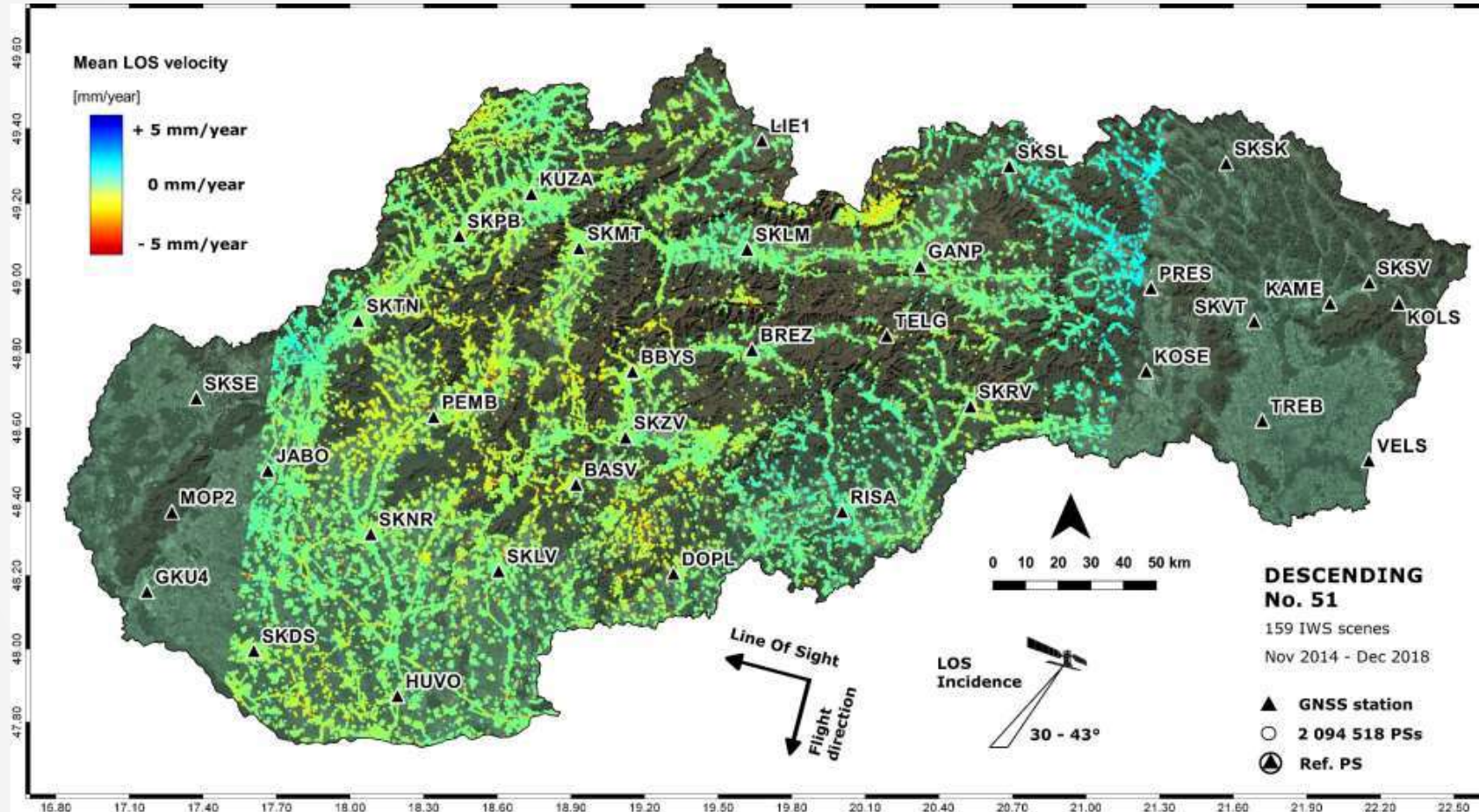
# Why „National InSAR reflector network“?

- **InSAR** (Interferometric Synthetic Aperture radar) is:
  - new geodetic technique
  - as a technique has ability to detect and provide submillimeter information about HZ and V changes of natural or artificial reflectors (in LOS geometry)
  - InSAR is „relative“ technique - to provide changes in absolute values needs geodetic referencing
  - accurate coordinates of artificial InSAR reflector will enable to do correct absolute referencing of InSAR images to ETRS89
- national InSAR reflector network
  - will consist of set of artificial reflectors with known precise coordinates of its phase centers
  - results from referenced InSAR image processing will be used e.g. for vertical monitoring of Slovakia

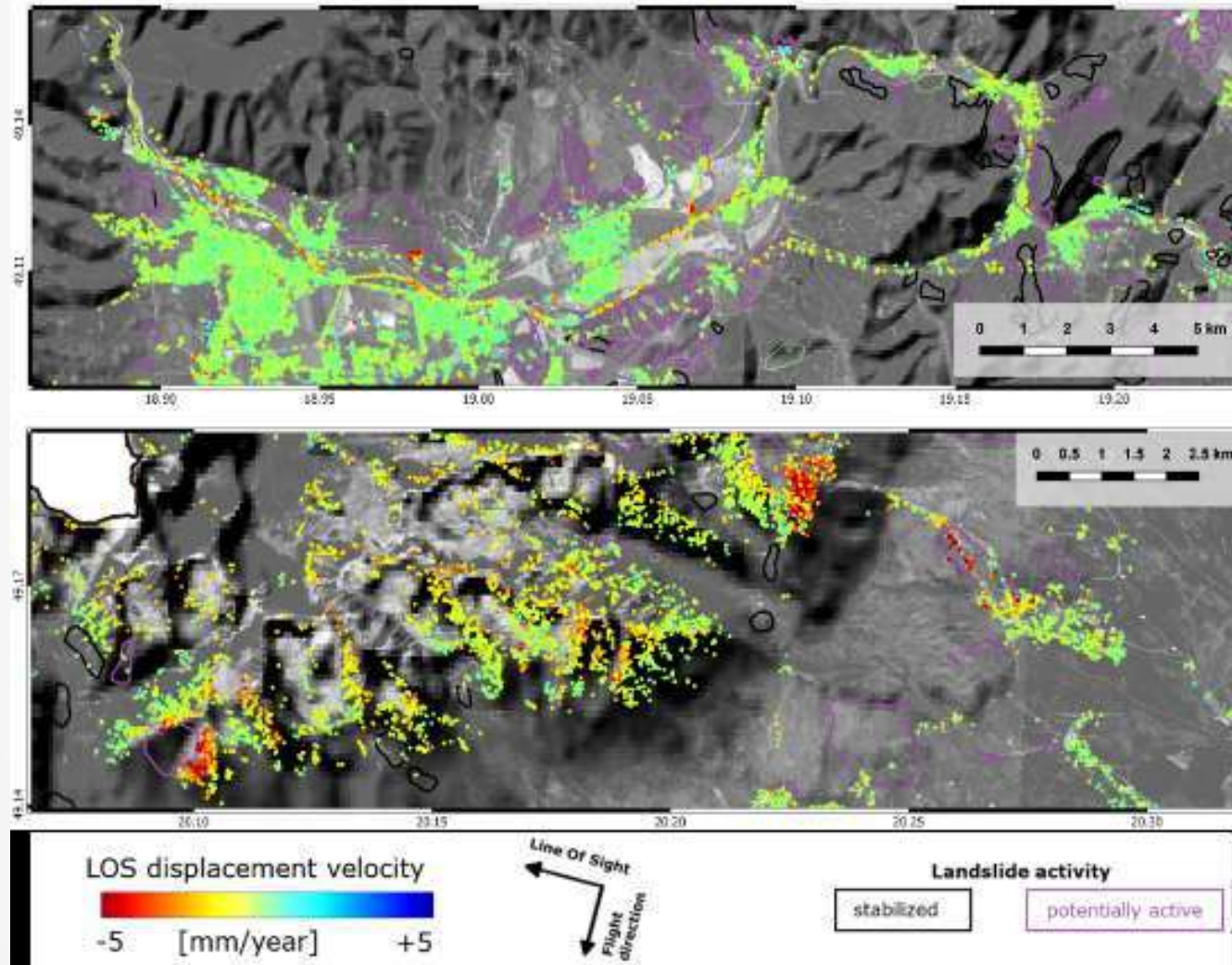


# Why „National InSAR reflector network“?

State wide monitoring = levelling only where it will be needed



# Why „National InSAR reflector network“? Regional monitoring = e.g. for geologists





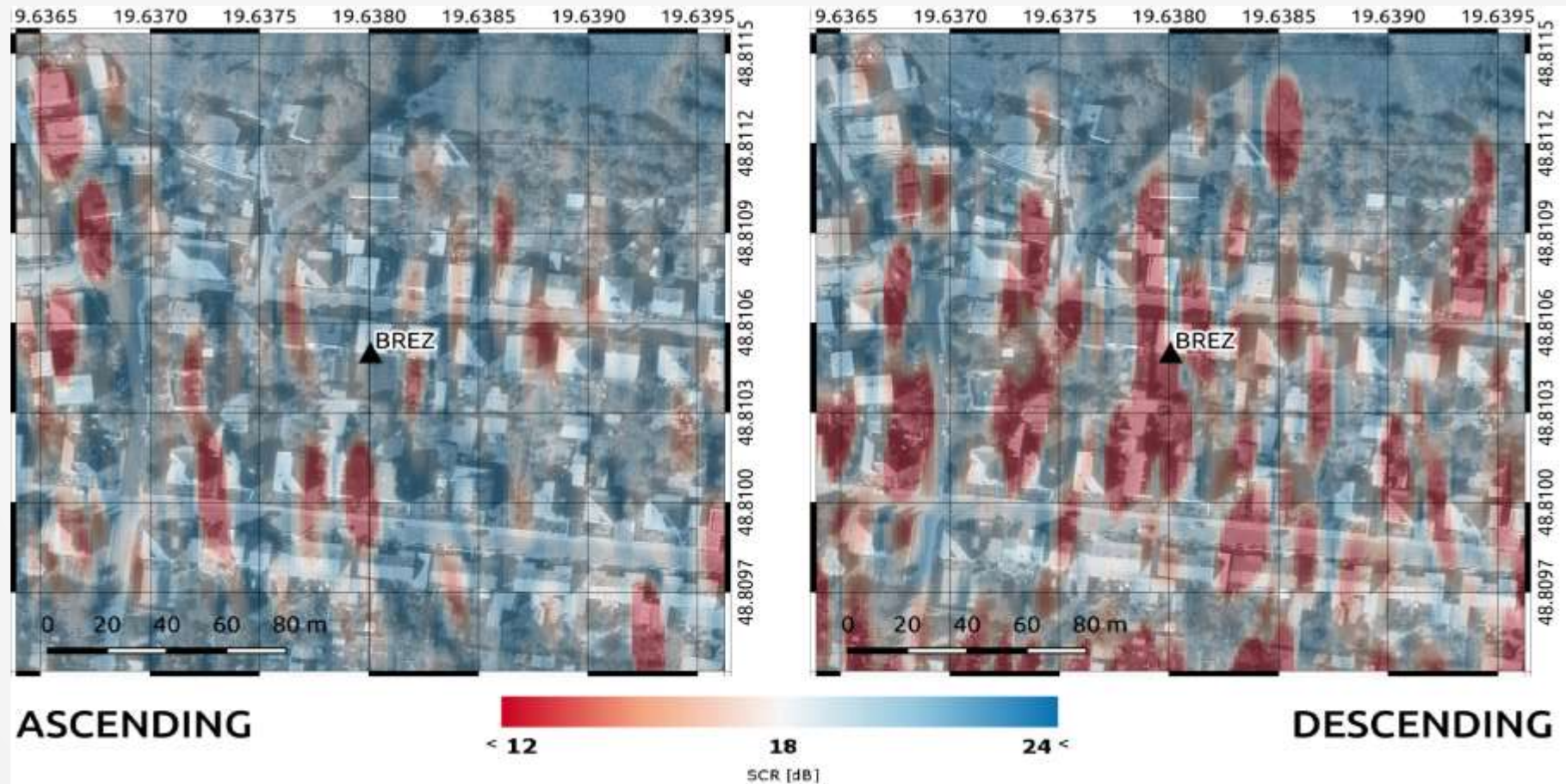
# Slovakian decision = To collocate InSAR with GNSS on SKPOS stations

- Why?
  - there are enough and well distributed SKPOS stations across whole country
  - we can compare precise (mm) HZ or V changes got from both techniques (GNSS and InSAR)
- Final decision:
  - to built up InSAR network in collocation with SKPOS
  - inspiration was from Netherlands (EUREF symposium Amstredam 2018)
  - Study first: GKU ordered study (in Slovak university of technology experts) for checking of SKPOS stations suitability for InSAR reflectors installation



# Checking of SKPOS stations suitability for InSAR reflector installation

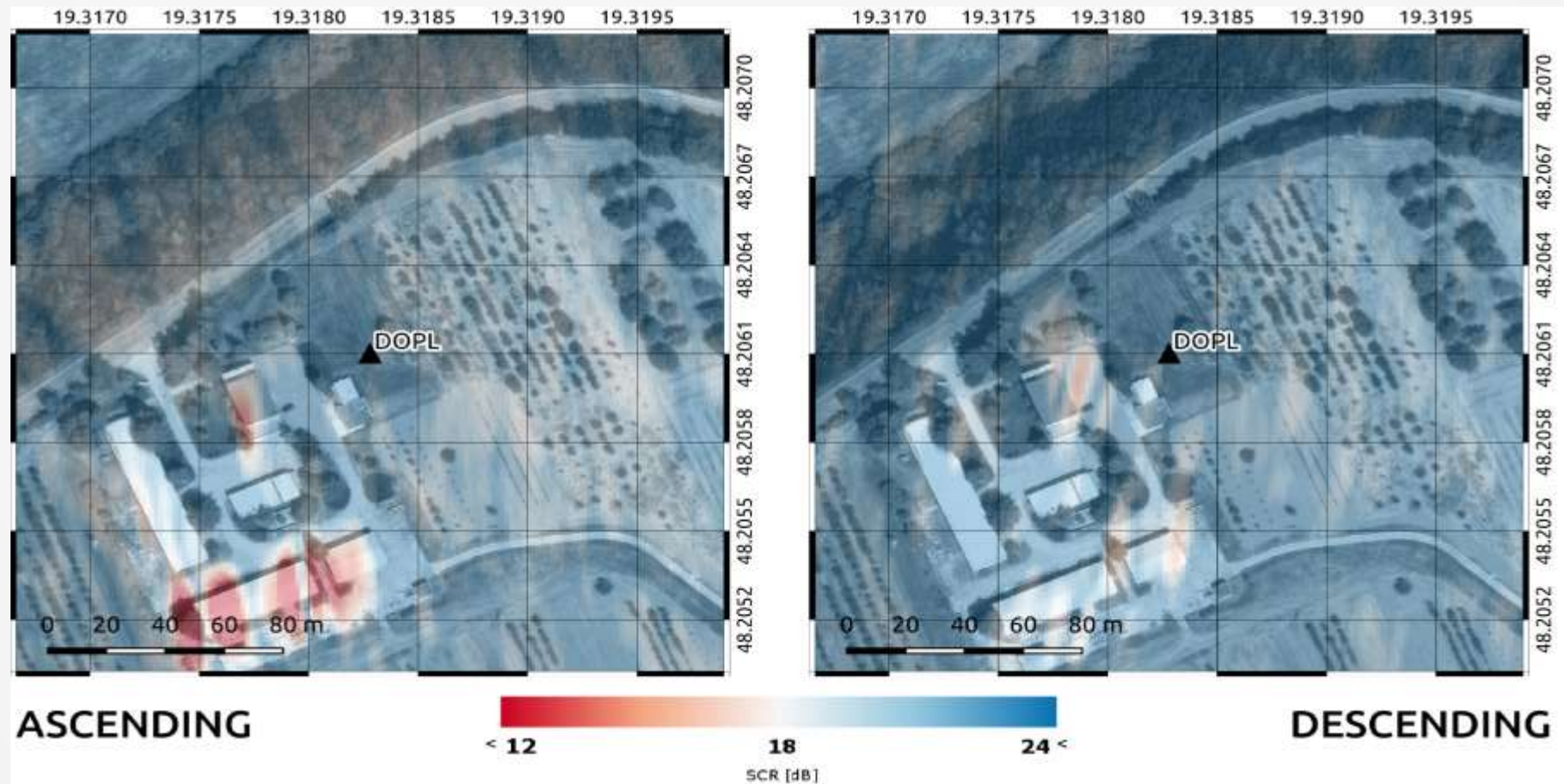
- checking of SCR (signal to clutter ratio) on SKPOS station- example of bad station





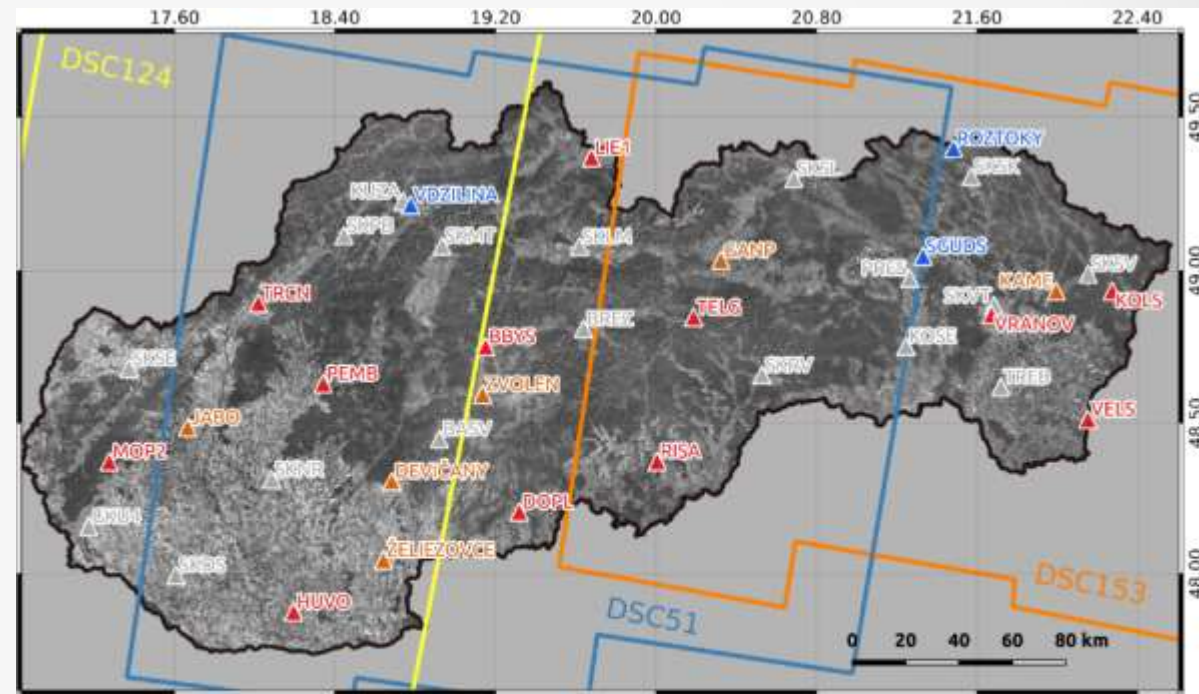
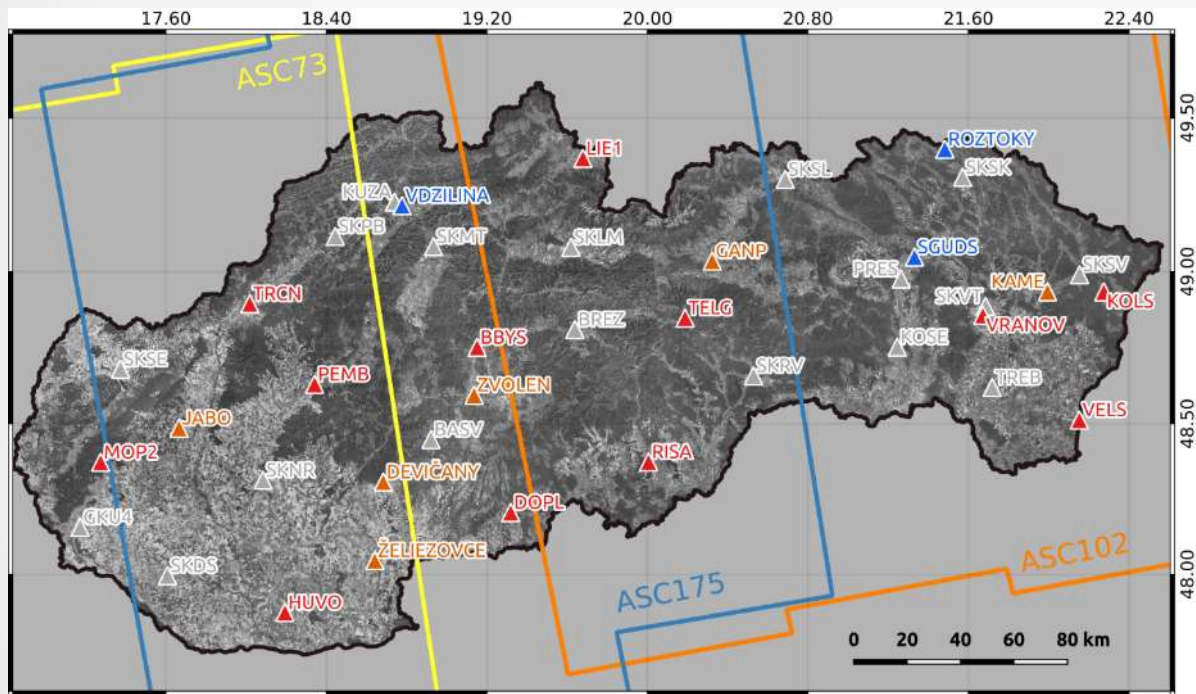
# Checking of SKPOS stations suitability for InSAR reflector installation

- checking of SCR (signal to clutter ratio) on SKPOS station - example of good station





# Proposal of SKPOS - GNSS InSAR collocation sites

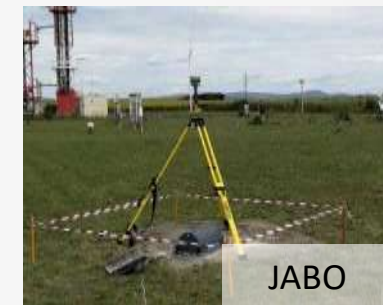
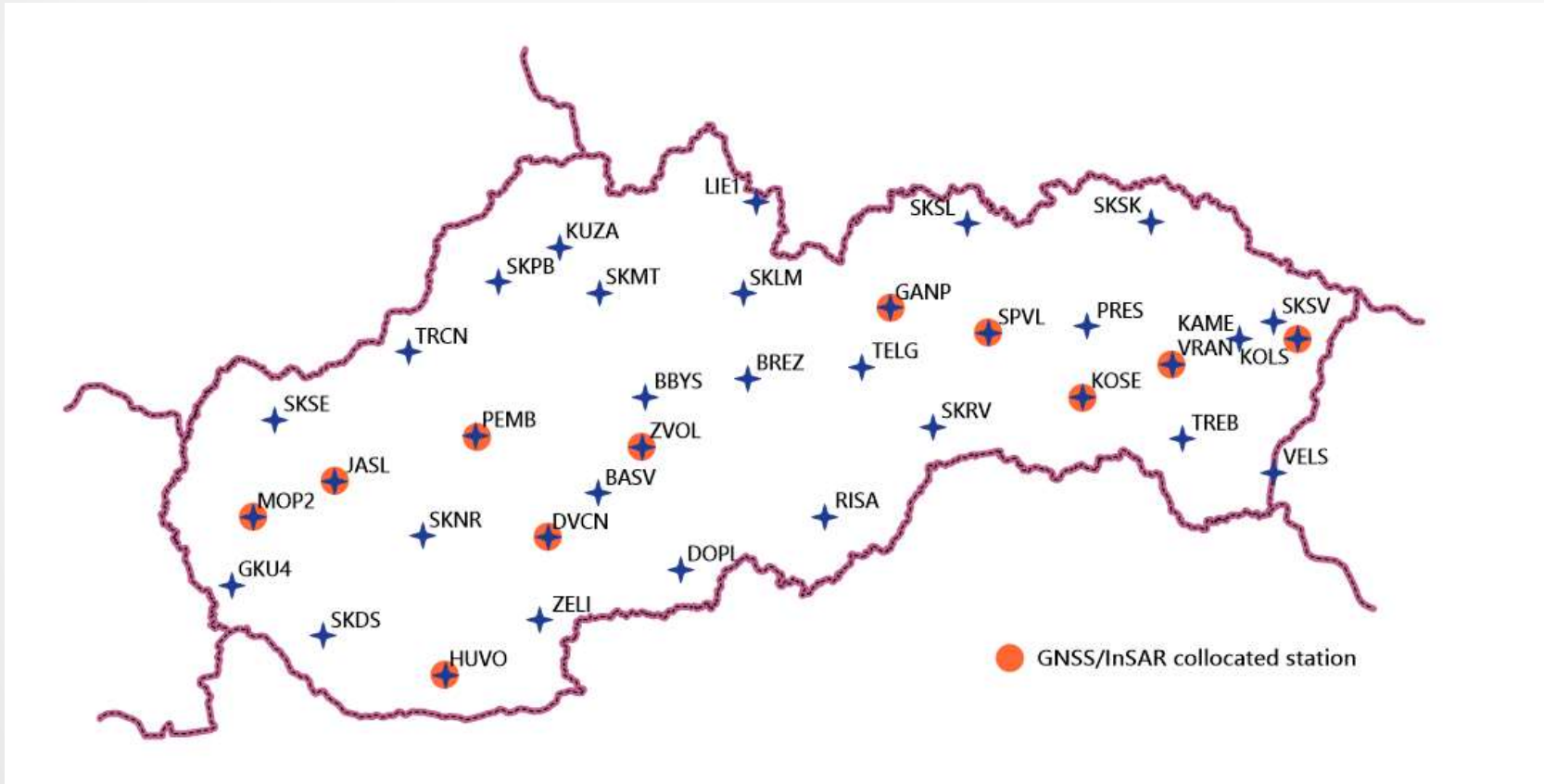


Návrh kolokačnej siete

SKPOS®

- ▲ primárny kandidát
- ▲ sekundárny kandidát
- ▲ navrhnutá dodatočná stanica

# SKPOS GNSS/InSAR collocation sites (status in November 2022 = 11 sites)





# Passive reflector – slovakian type

Instalation during process of the new pillar stabilisation



# Passive reflector – slovakian type

## Instalation of reflector on the existing pillar





Active transponder (electricity needed)

Eccentric placement = not very comparable with GNSS





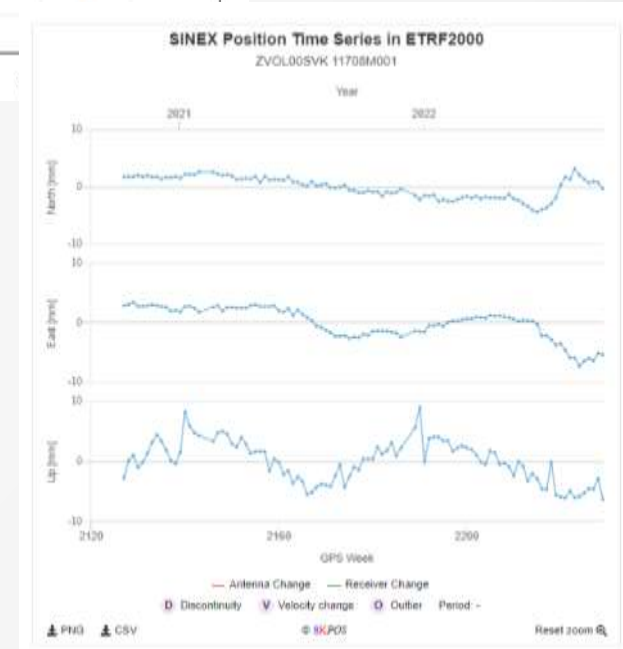
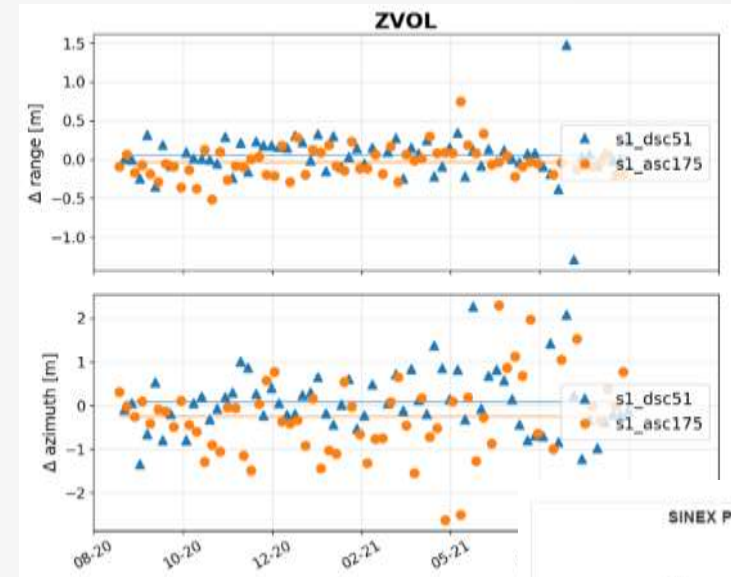
Determination of coordinates of reflector phase center is very important





# Near future plans (in cooperation with SUT colleagues = InSAR experts)

- finish „National InSAR reflector network“ and start provide phase center coordinates for referencing
- compare results from GNSS and InSAR
- creation of state wide InSAR maps
- set monitoring





**SKPOS®**

**Thank you for your attention**

**Branislav Droščák**

branislav.droscak@skgeodesy.sk



8th EUPOS Council and Technical Meeting  
November 15-16 2022, Ljubljana, Slovenia

