A dunai csuszamlások monitoringozási lehetőségei Sentinel-1A felvételek segítségével

Pécsi Tudományegyetem Természettudományi Kar

Kovács István Péter

http://ronczyk7.wix.com/sarpte

Fény-Tér-Kép

Konferencia

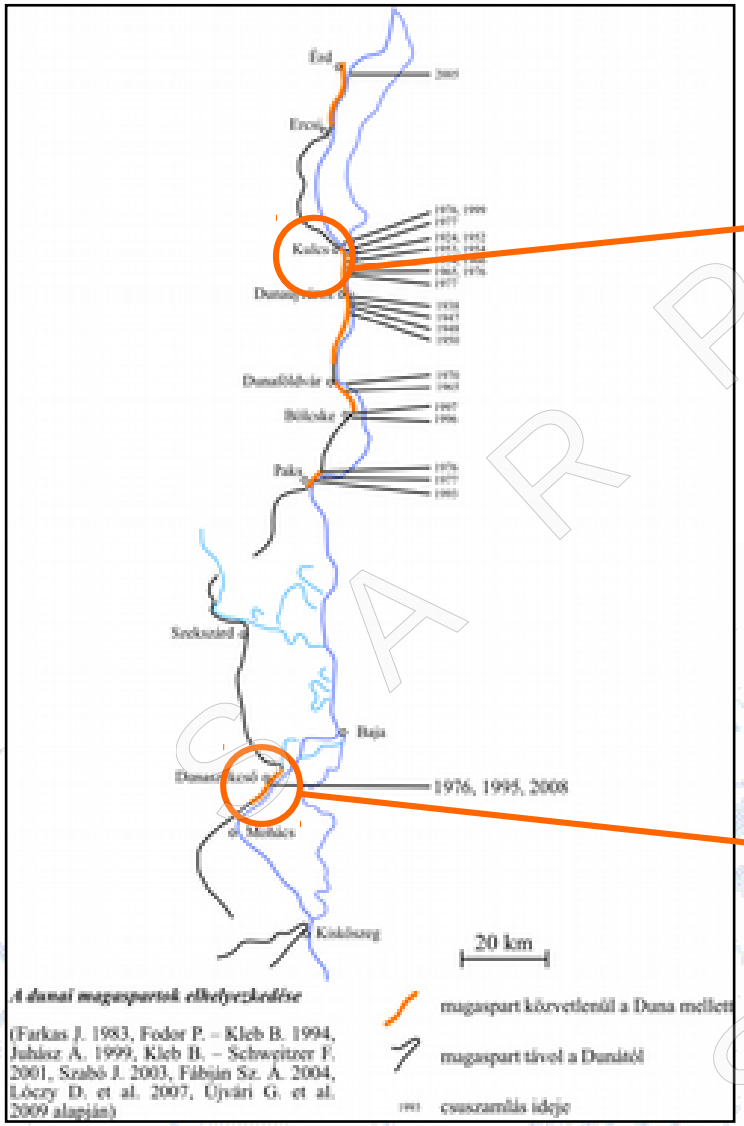
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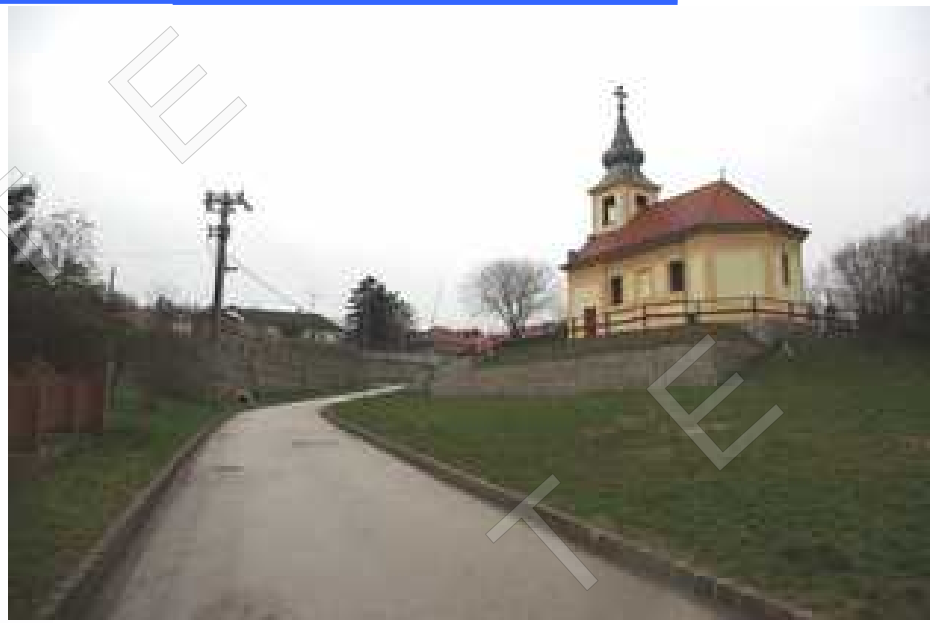
Velence

Tematika

- **Problémafelvetés**
  - Csuszamlások a Duna mentén
  - Monitoring hálózatok
- **Műholdradarok**
  - ESA és a Sentinel-1 program
  - Műholdradar Interferometria,
  - Envi Sarscape
- **Felszínmozgások detektálása SAR technológiával**
  - Technológiai limitációk és előnyök
  - Csuszamlás monitoring és térképezés

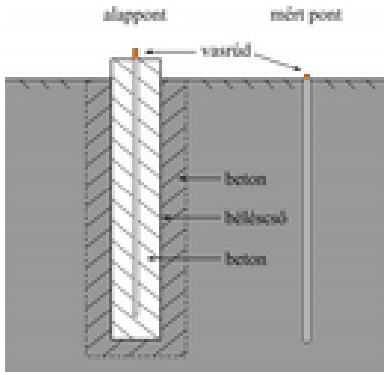
Csuszamlások a Duna mentén





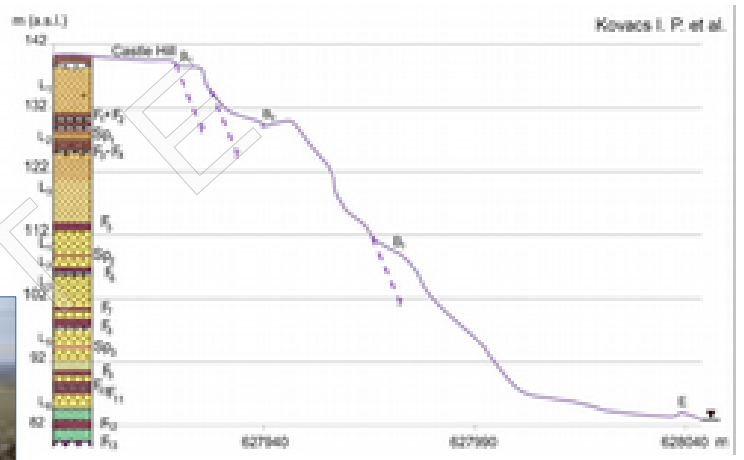


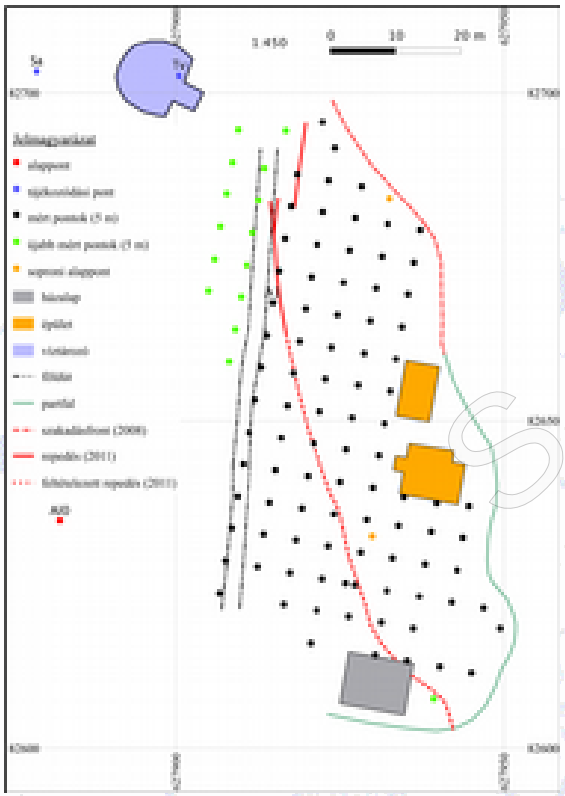
Monitoring hálózatok

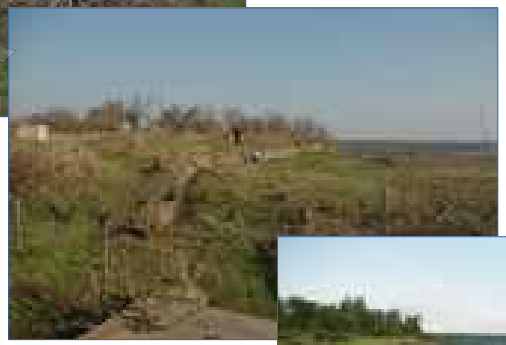


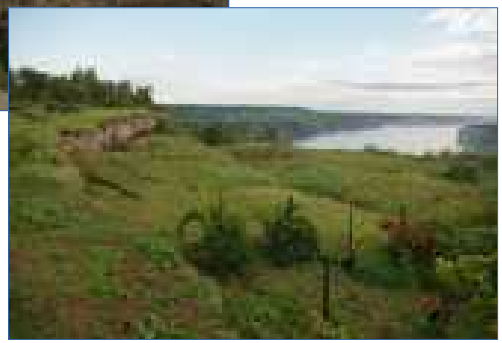






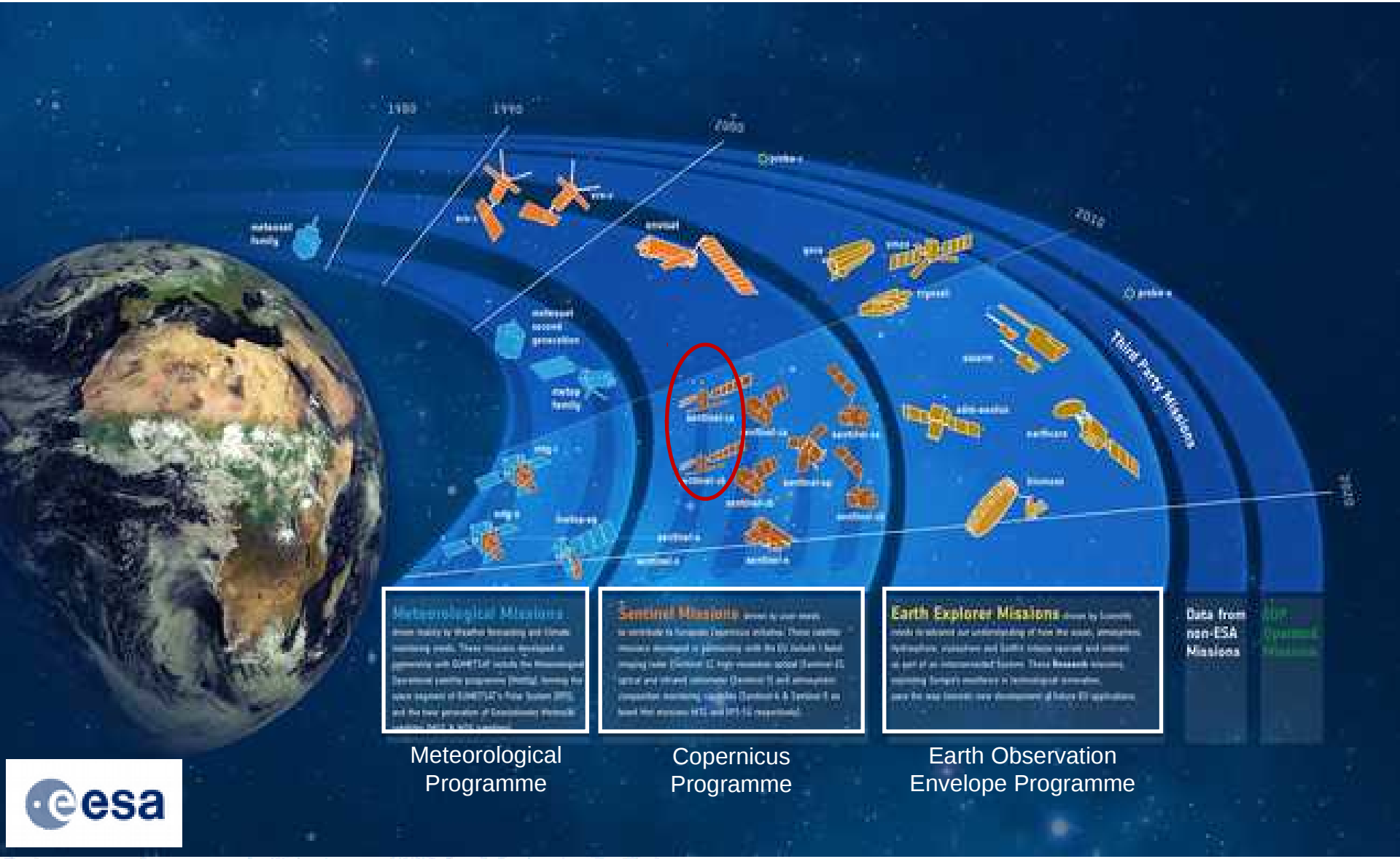






TEST

ESA programok



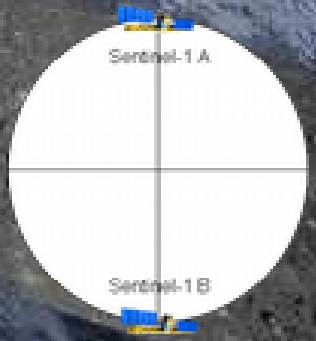
Meteorological Programme

Copernicus Programme

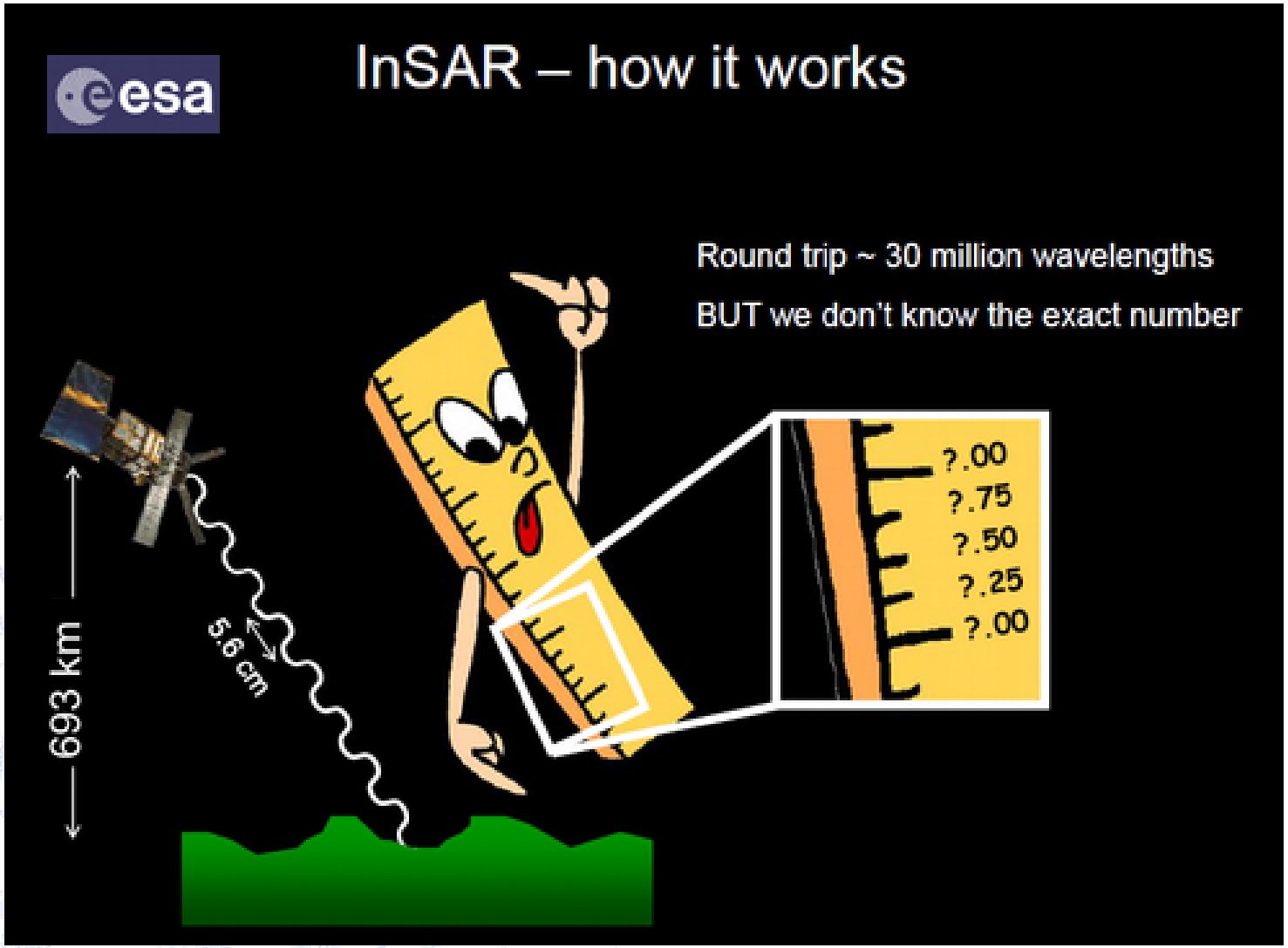
Earth Observation Envelope Programme

Sentinel-1

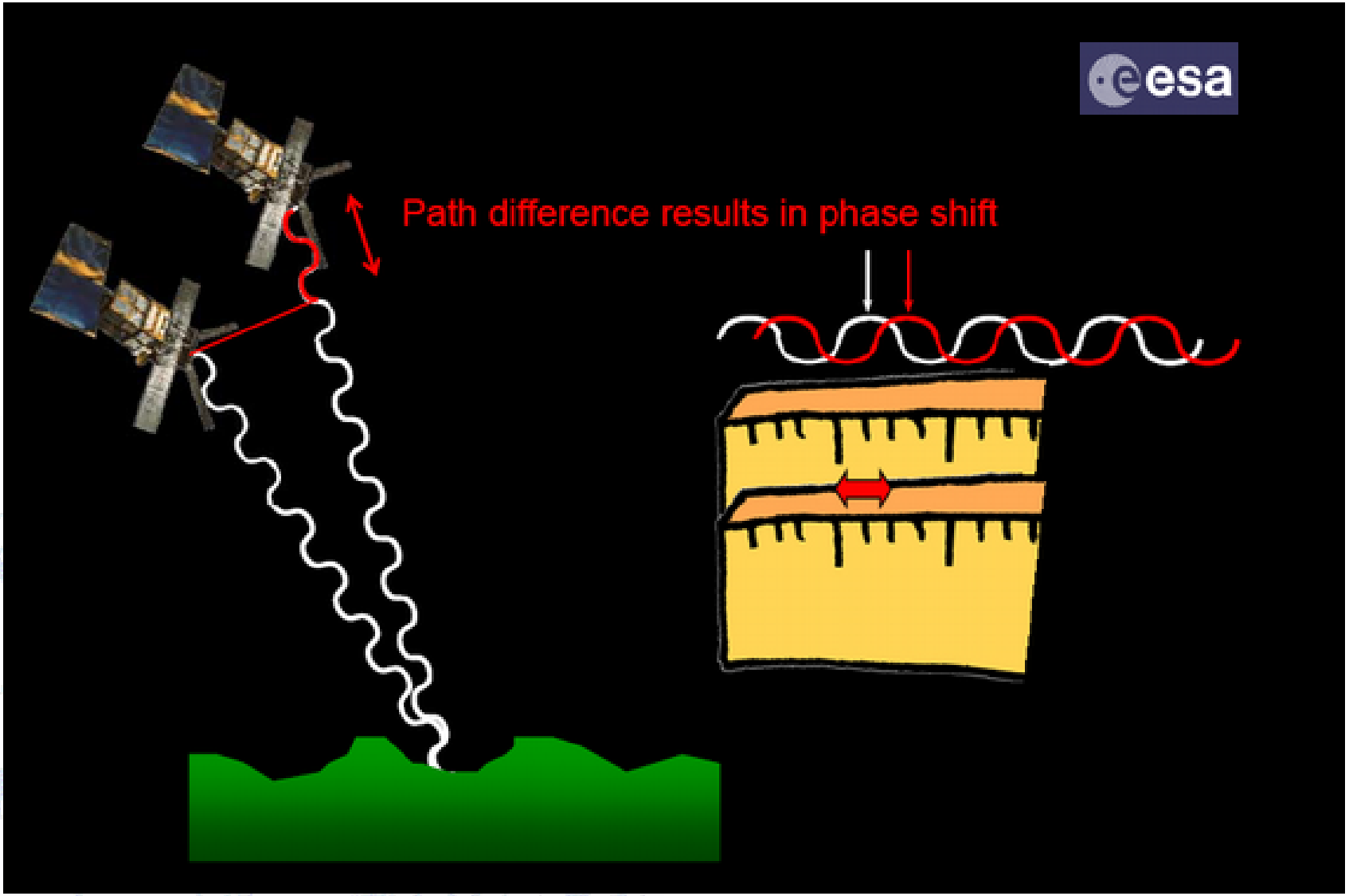
- A Sentinel-1 program jelenleg 2 műholdból áll (A/B)
- C-sávban felvételez (5,6 cm hullámhossz),
- 693 km magas napszinkron pályán kering,
- 7 évre tervezték,
- 12 napos visszatérési idő (6 nap két műhold esetén),
- 2014. okt. 3. óta elérhetők a felvételek,
- Egy felvétel mérete a 8 Gbyte-ot is elérheti (ca. 8 GB / SLC).



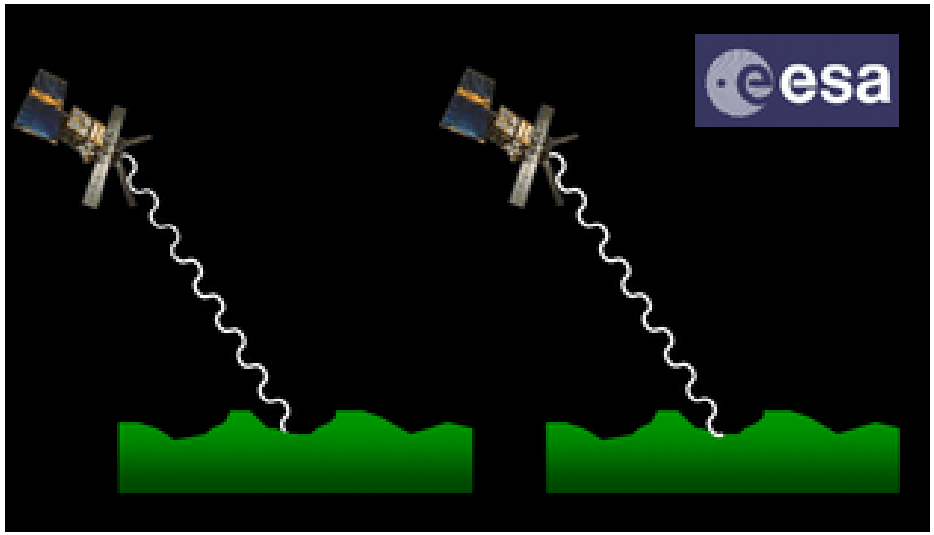
InSAR

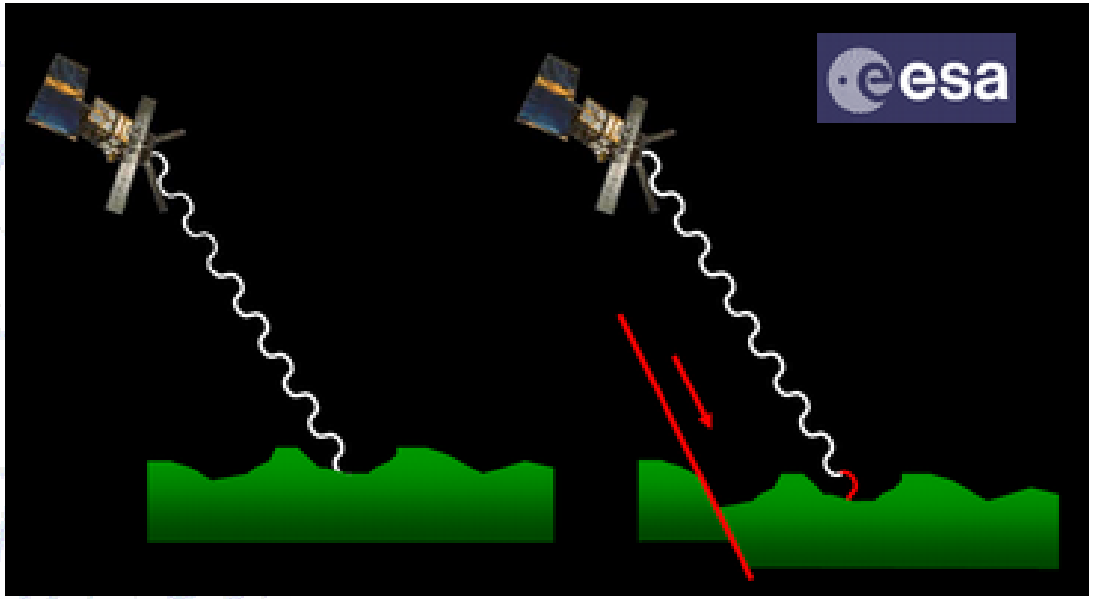

esa
InSAR – how it works
Round trip ~ 30 million wavelengths
BUT we don't know the exact number
693 km
5.6 cm
?.00
?.75
?.50
?.25
?.00

InSAR

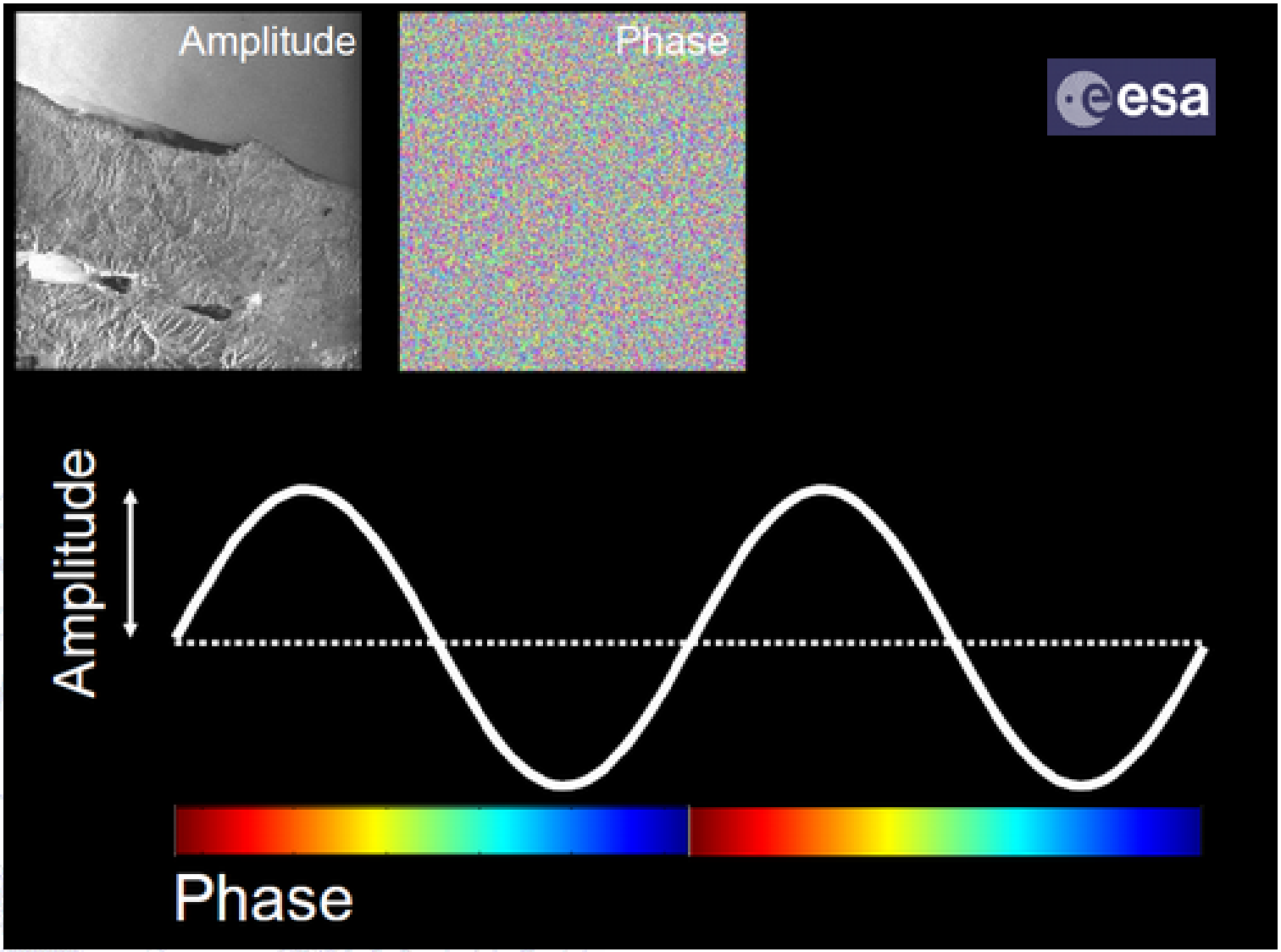


InSAR

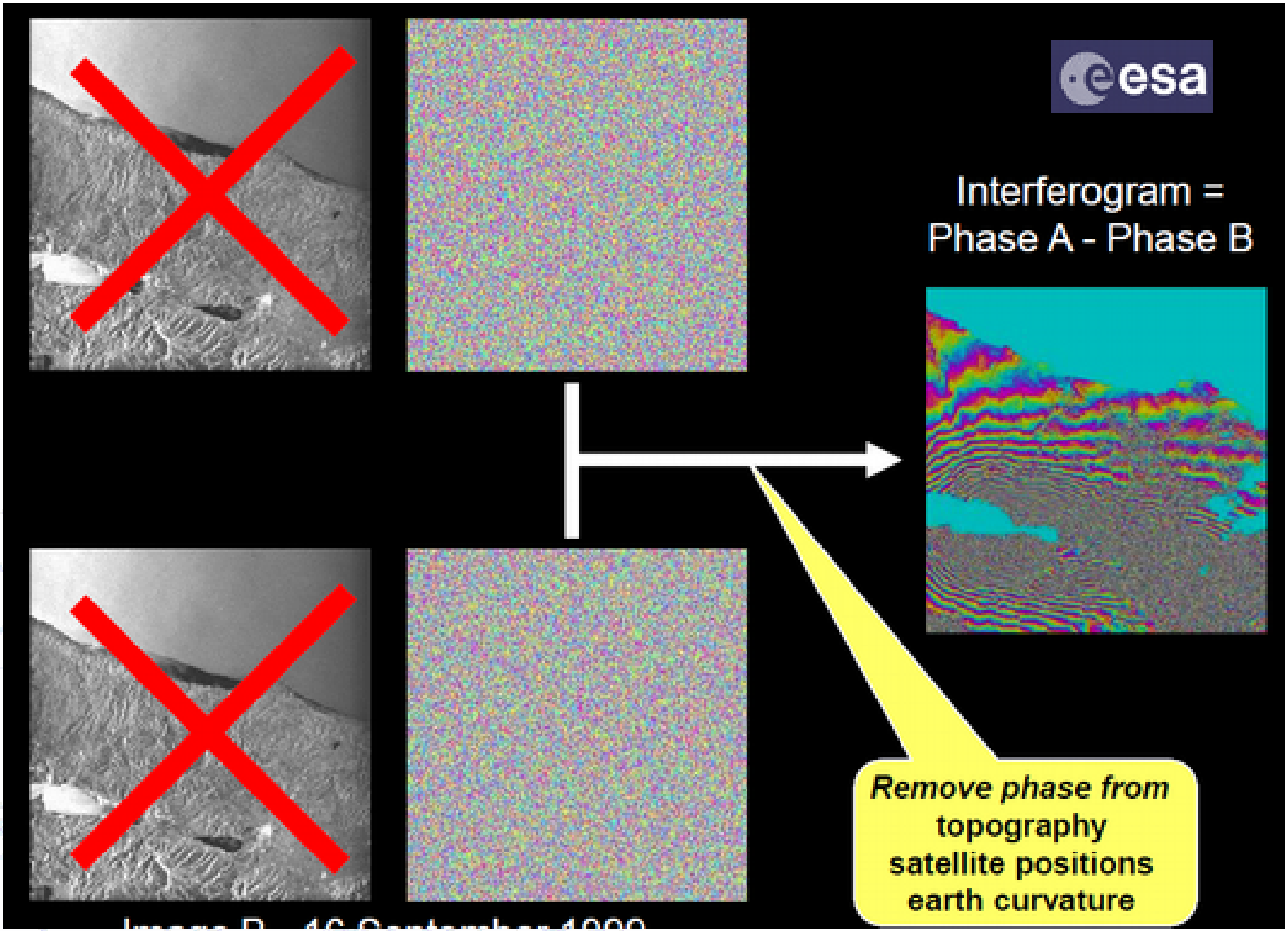




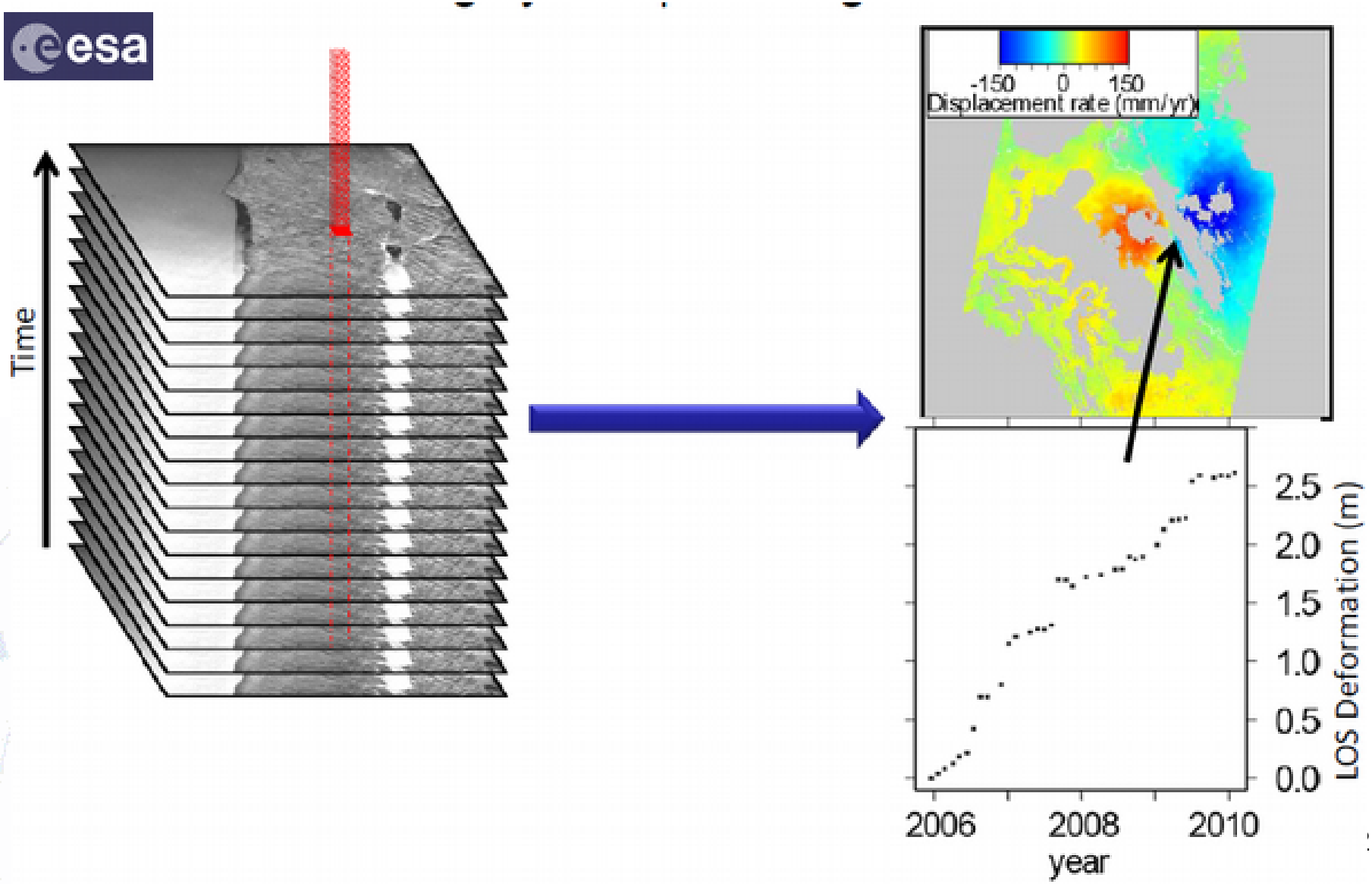
InSAR



InSAR


esa
Interferogram =
Phase A - Phase B
Remove phase from
topography
satellite positions
earth curvature

DInSar (Stacking)



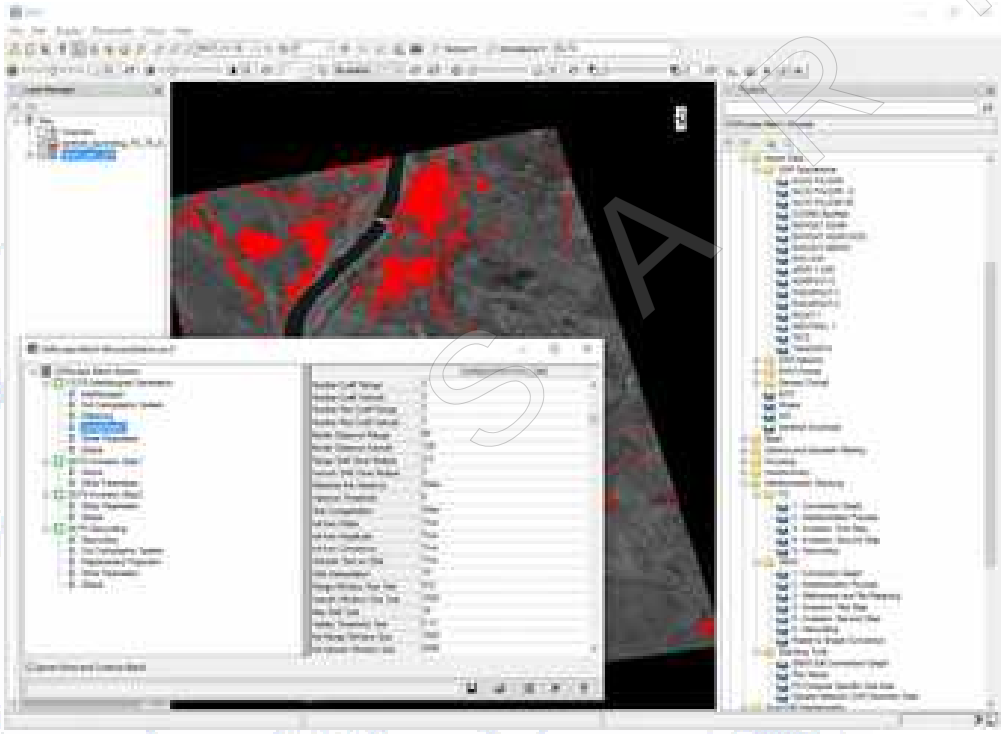
Szoftver

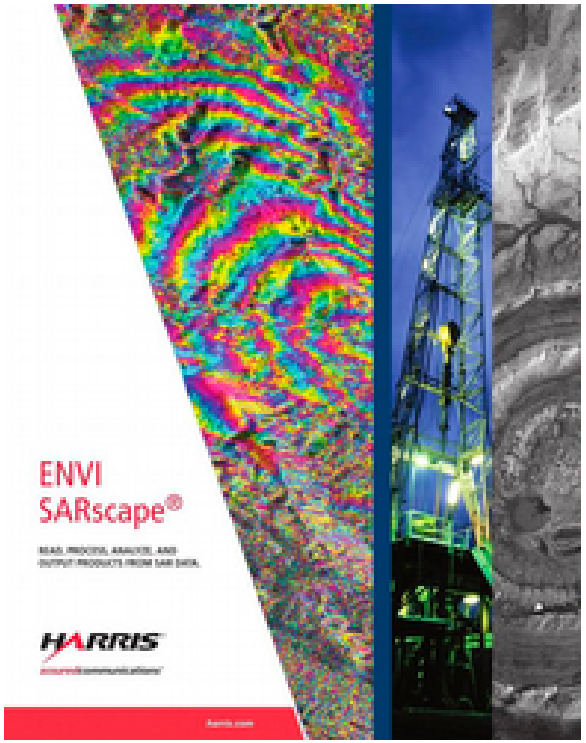
sarmap
your information gateway

sarmap

GeoIQ

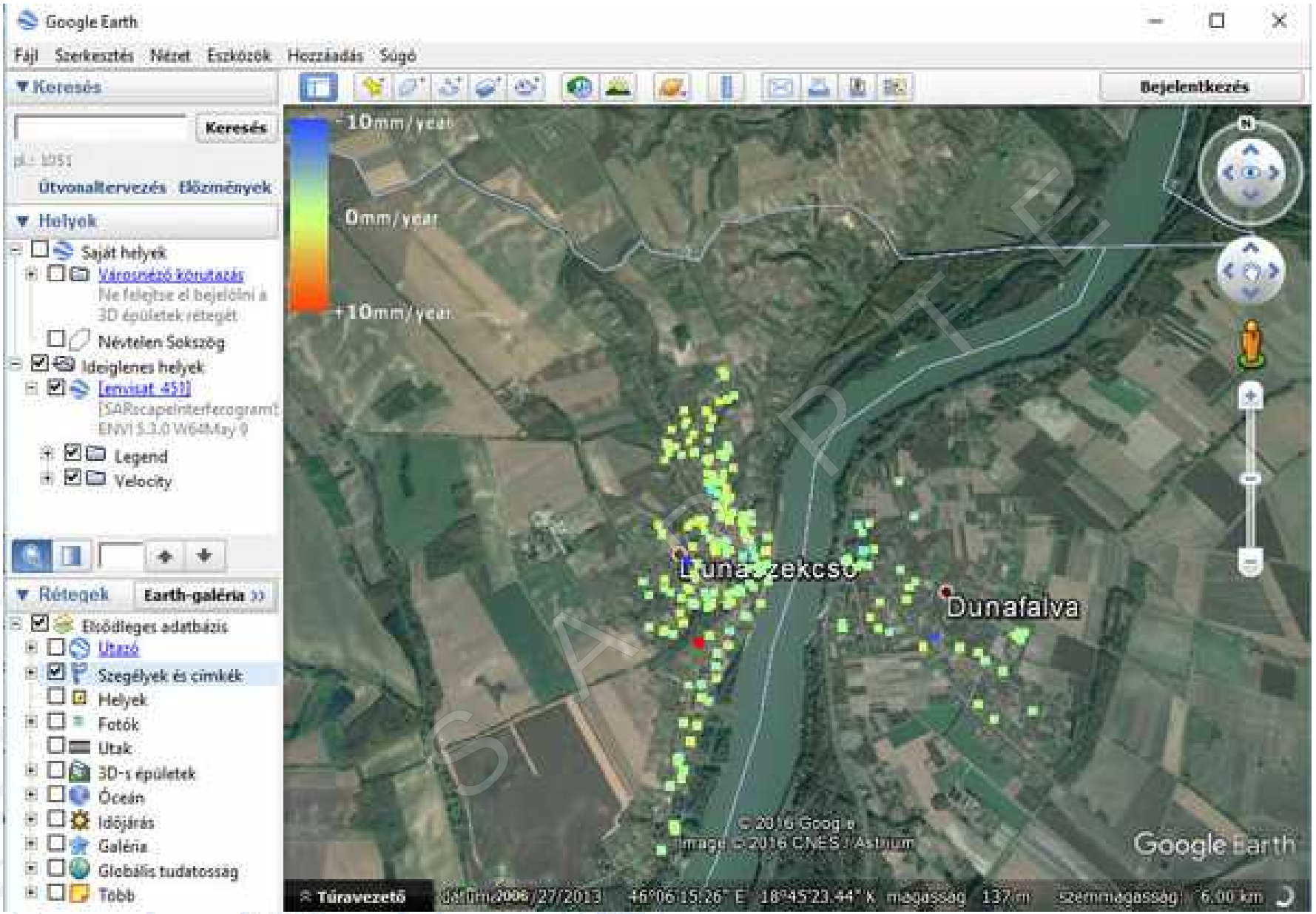






SARPE

Sarscape


Google Earth
Fájl Szerkesztés Nézet Eszkösök Hozzáadás Súgó
Keresés
Útvonaltervezés Előzmények
Helyek
Saját helyek
Városnéző körutazás
Ne felejtse el bejelölni a 3D épületek réteget
Névtelen Sokszög
Ideiglenes helyek
[envisat 451]
[SARscapeInterfecogram]
ENVI 5.3.0 W64 May 9
Legend
Velocity
Rétegek
Earth-galéria
Elsődleges adatbázis
Utazás
Szegélyek és címkék
Helyek
Fotók
Utak
3D-s épületek
Óceán
Időjárás
Galéria
Globális tudatosság
Több
Bejelentkezés
-10mm/year
0mm/year
+10mm/year
Dunaszekcső
Dunafalva
© 2016 Google
Image © 2016 CNES / Astrium
Google Earth
Túravezető
46°06'15.26" E 18°45'23.44" K magasság 137 m szemmagasság 6.00 km

Felszínmozgások

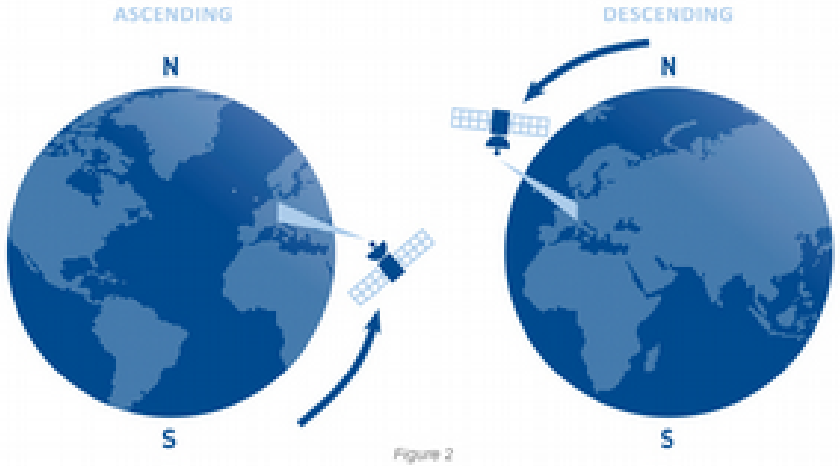
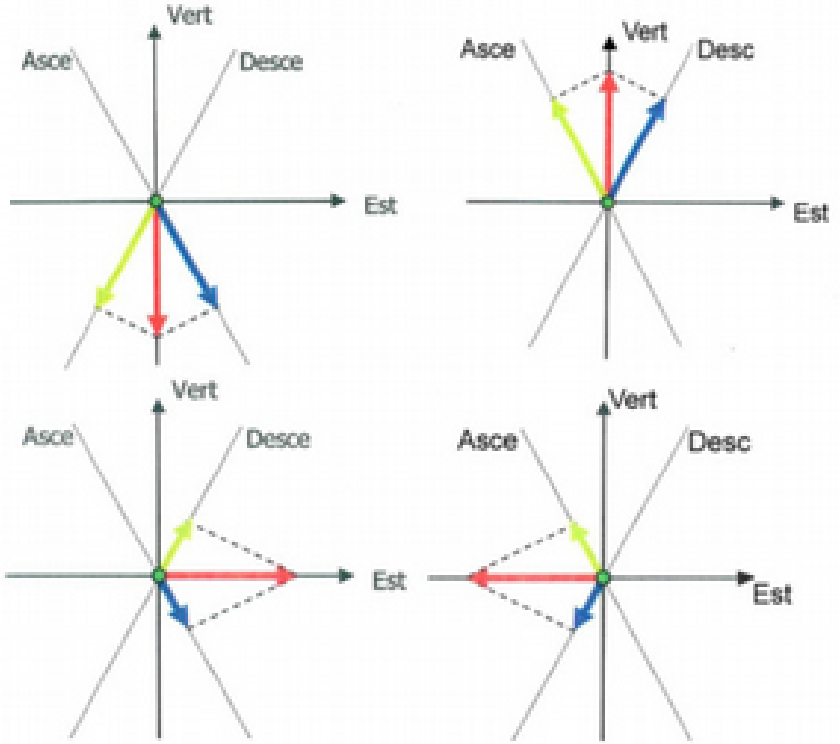
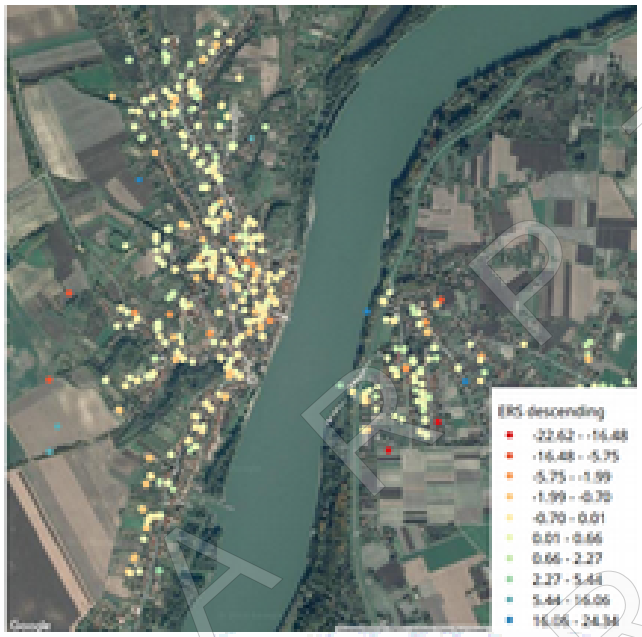
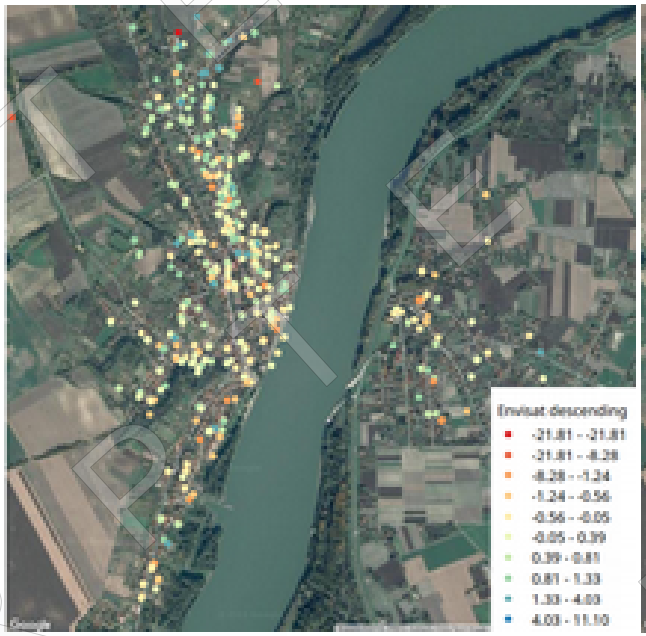


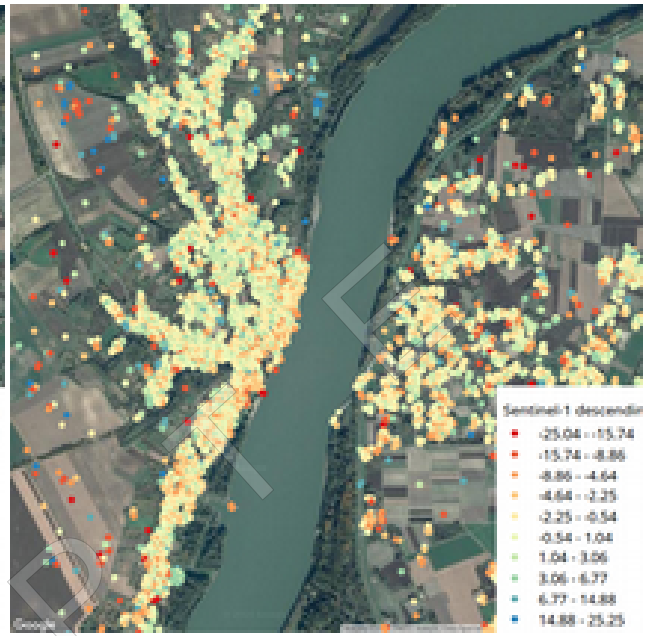
Figure 2



Felbontás: ERS-1, Envisat, Sentinel-1









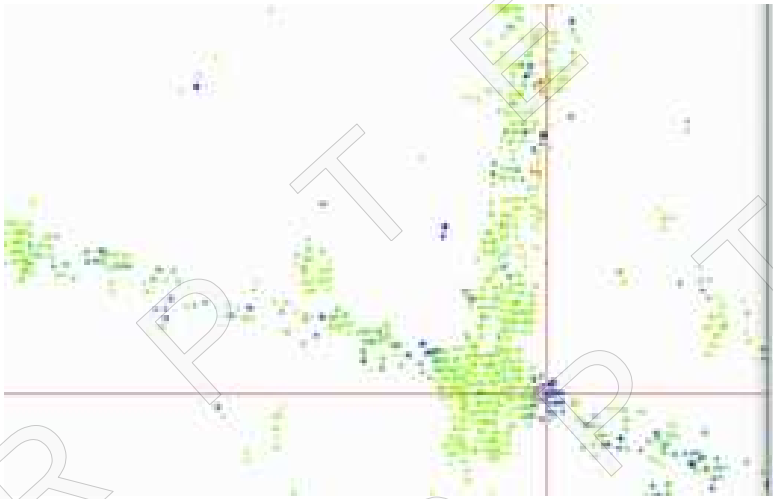


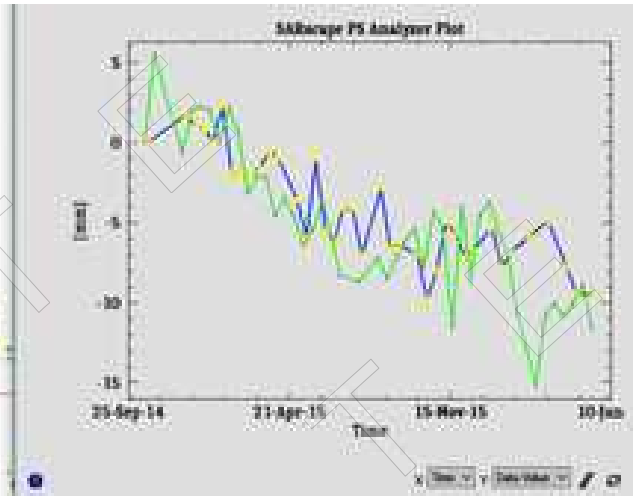


Felbontás: Sentinel-1

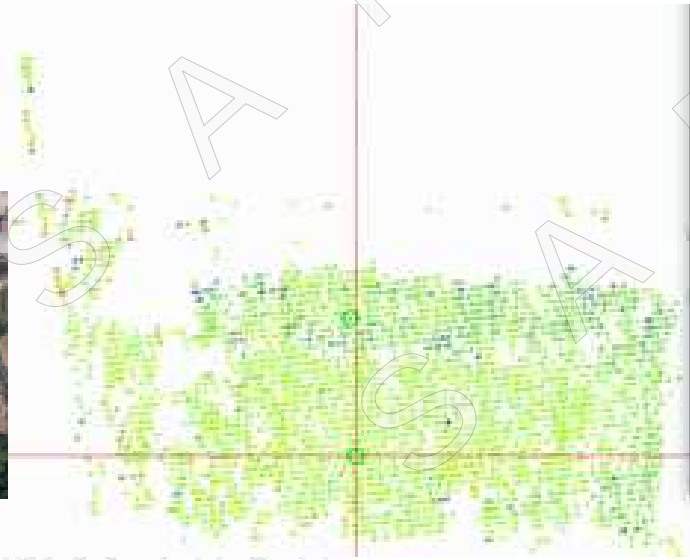
Dunai csuszamlások | Műholdradar | Eredmények

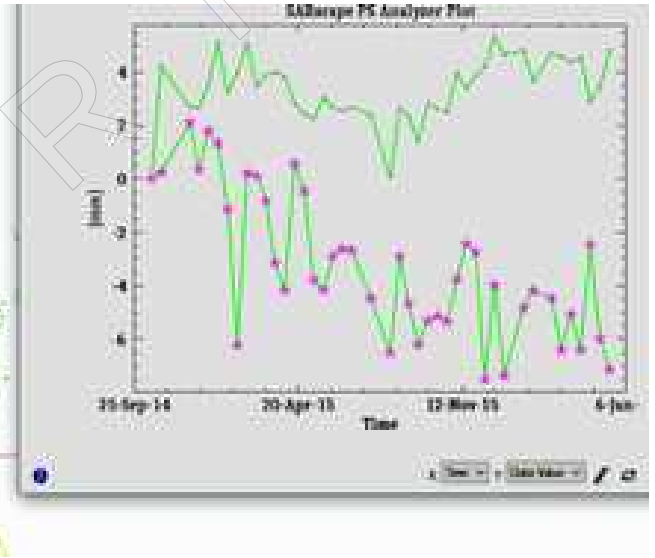






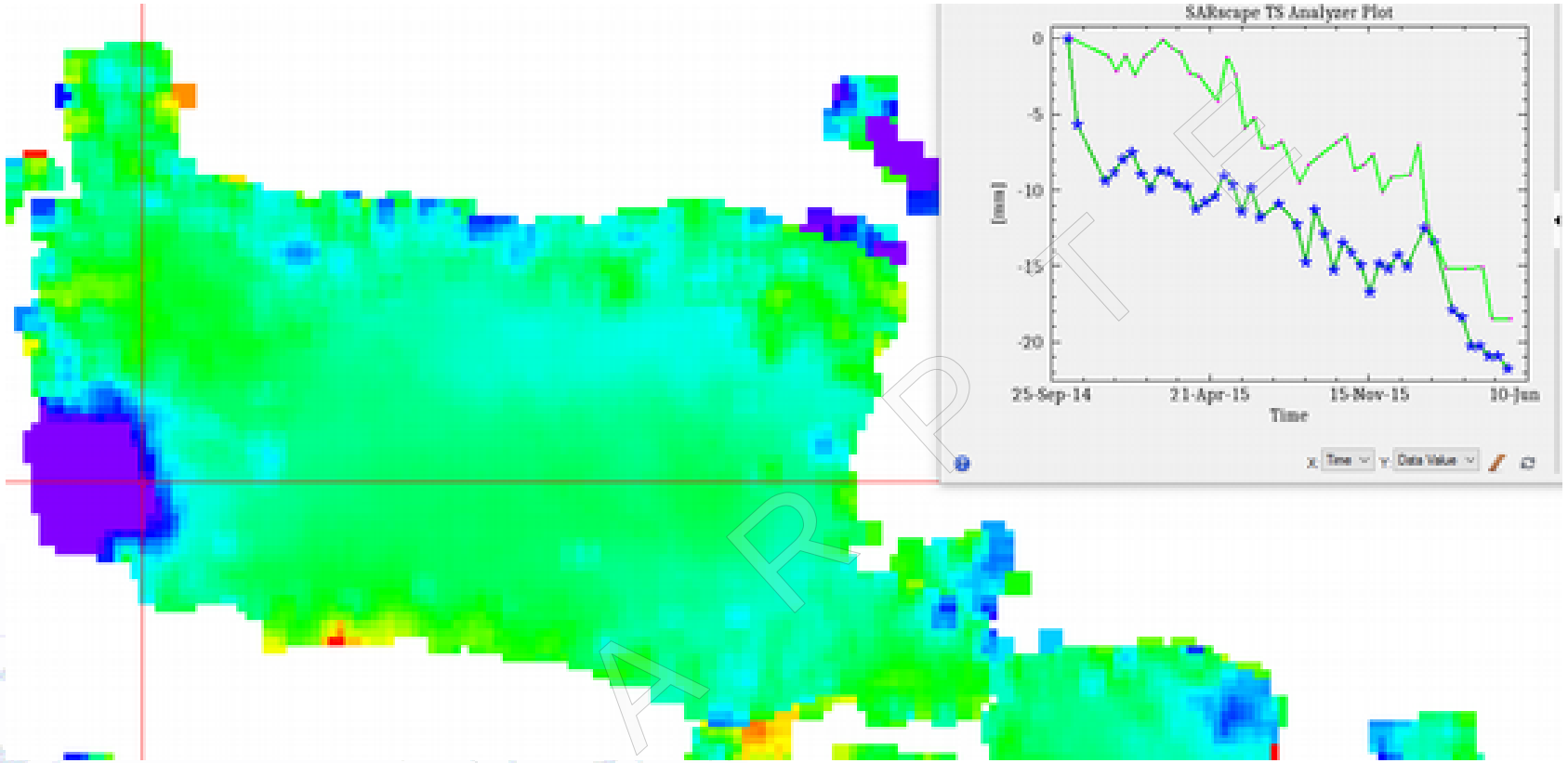






UNIVERSITÉ SARRE

Felbontás: Sentinel-1

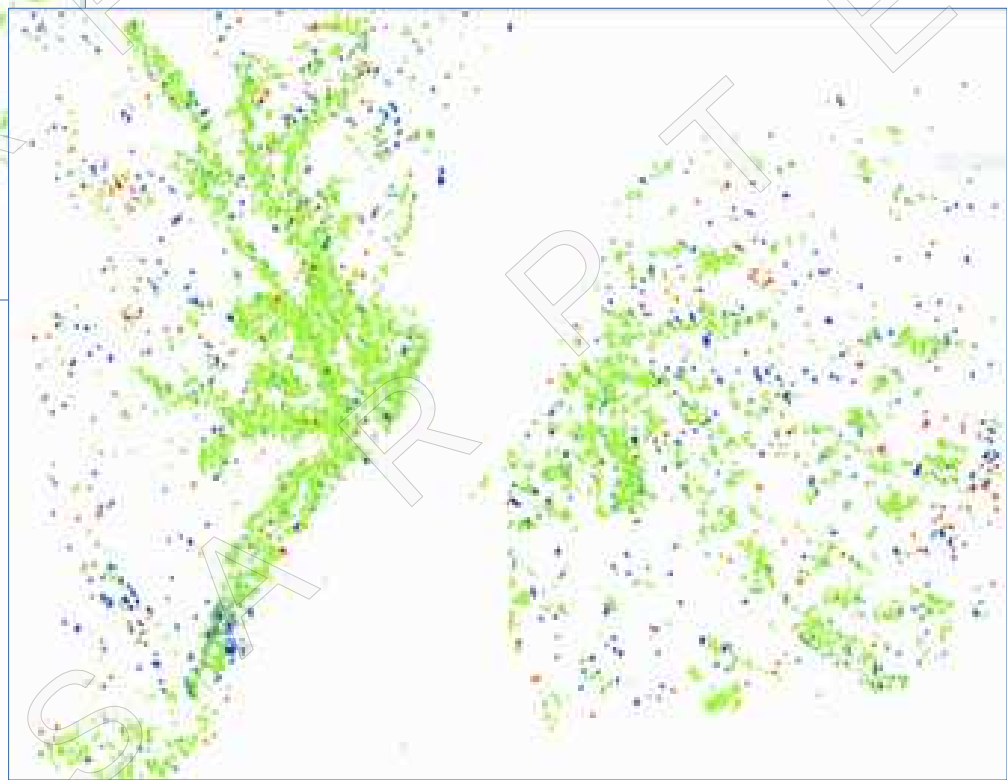




DRAFT

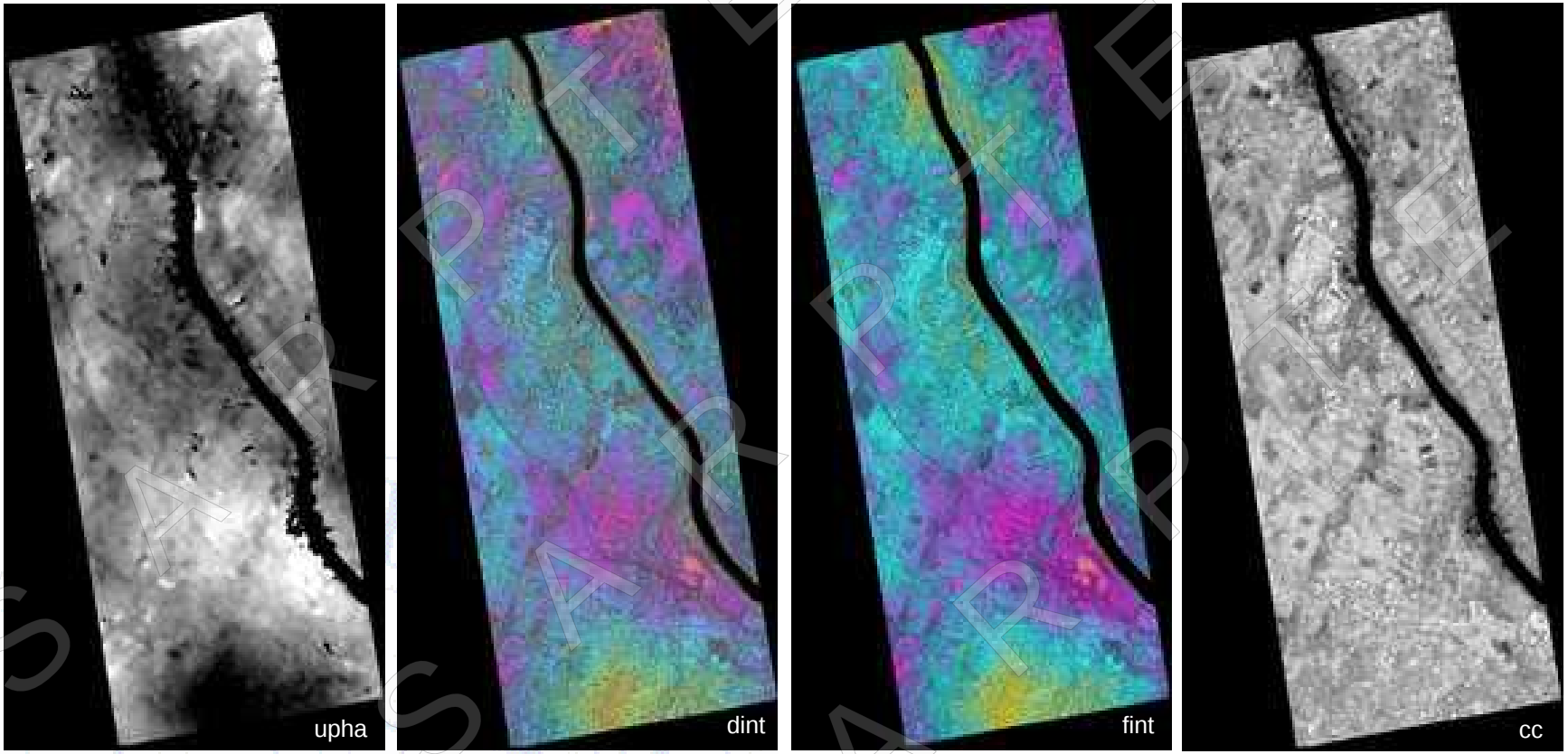
Zaj: Sentinel-1





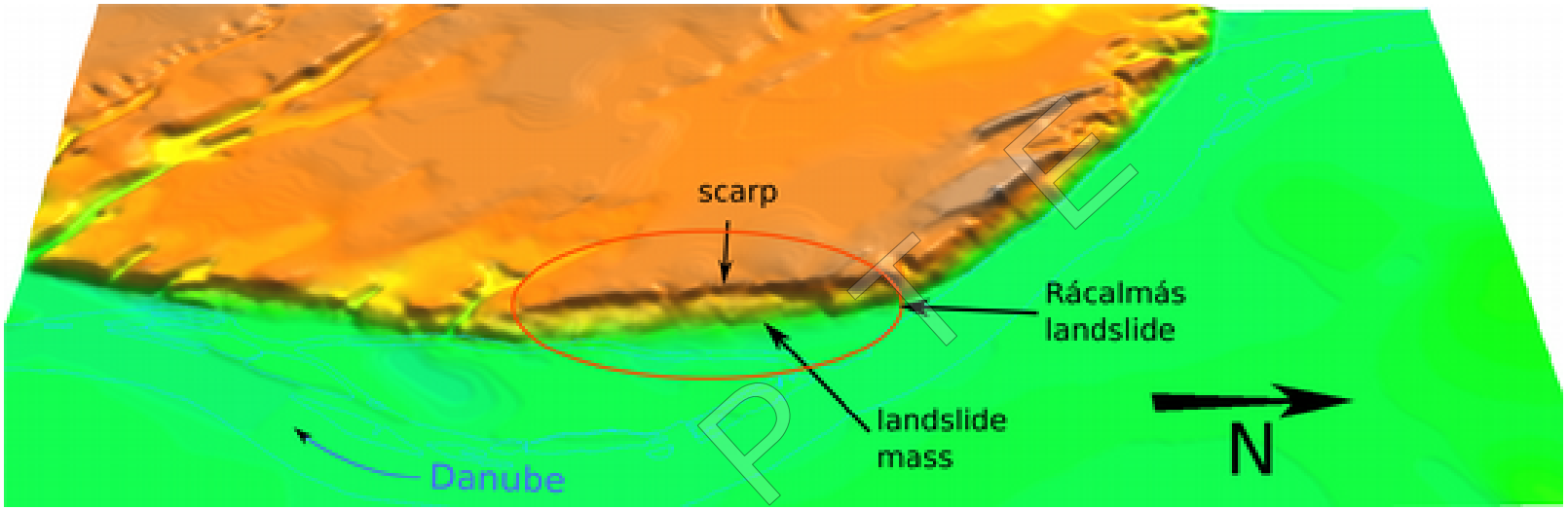
SARPTE

Zaj: Sentinel-1



$$\Delta\varphi = \Delta\varphi_{geom} + \Delta\varphi_{topo} + \Delta\varphi_{atm} + \Delta\varphi_{noise} + \Delta\varphi_{def}$$

Rácalmás

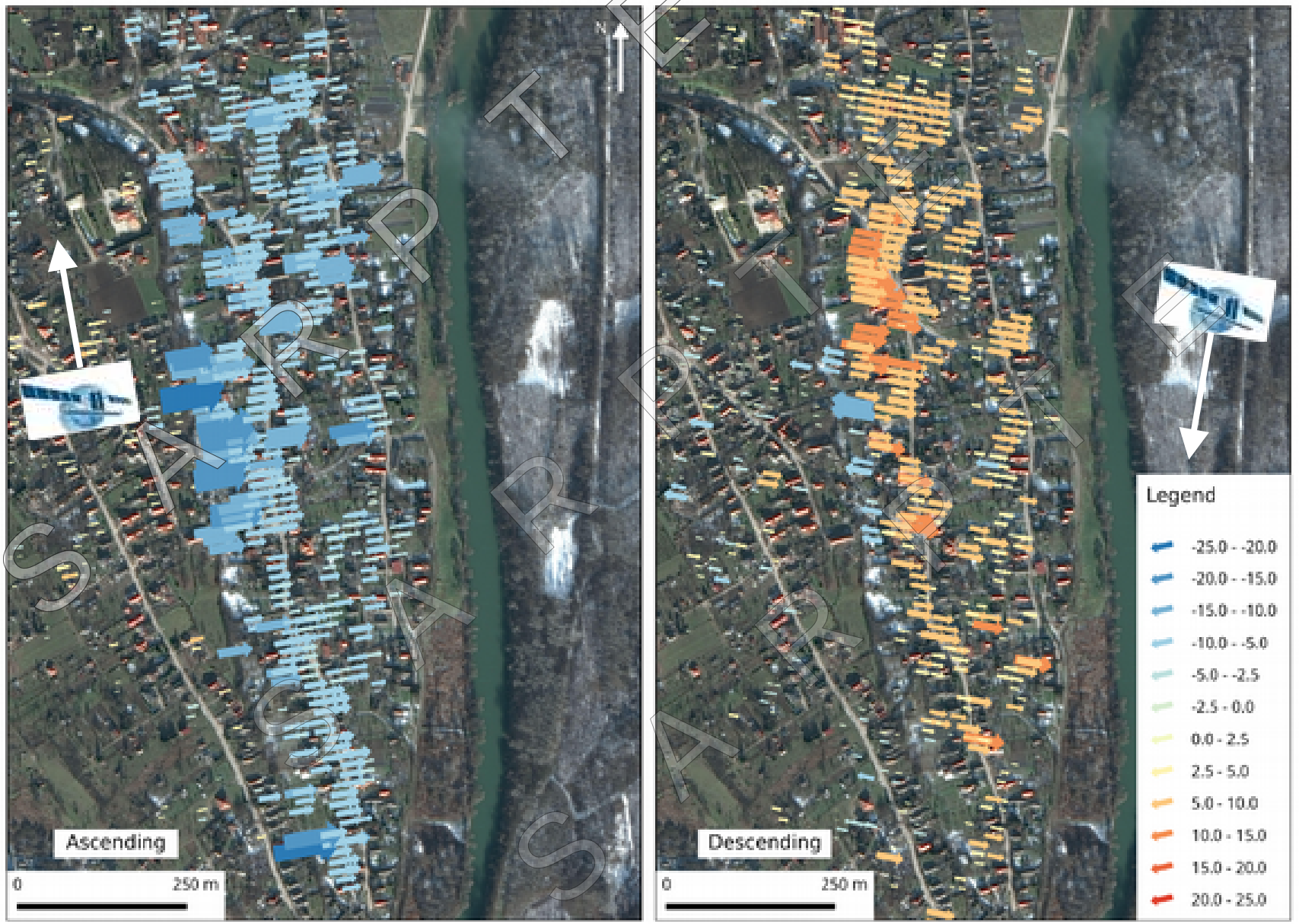






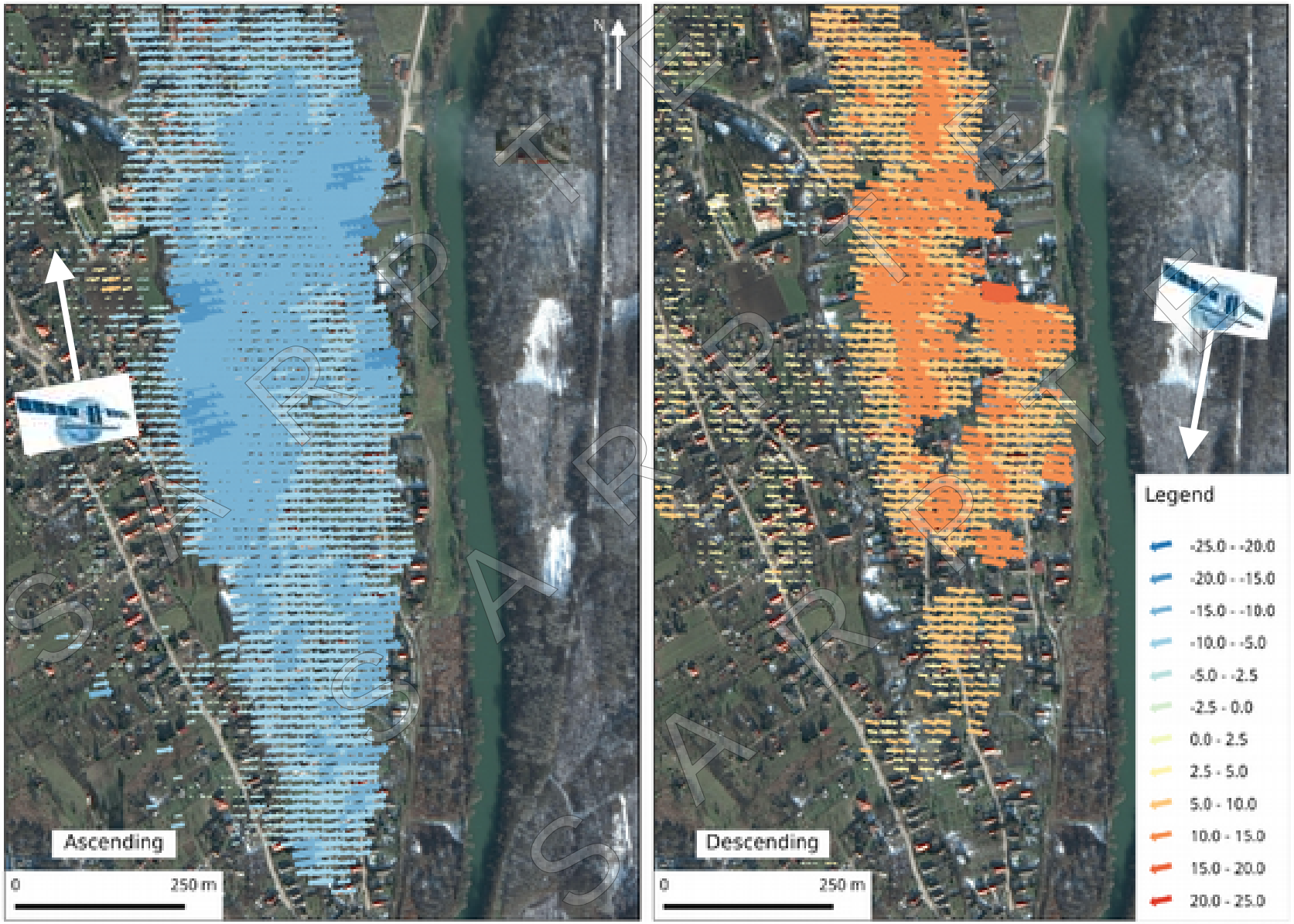
SARPTE

PS: Rácalmás



SARPTECH SARPTECH

SBAS: Rácalmás



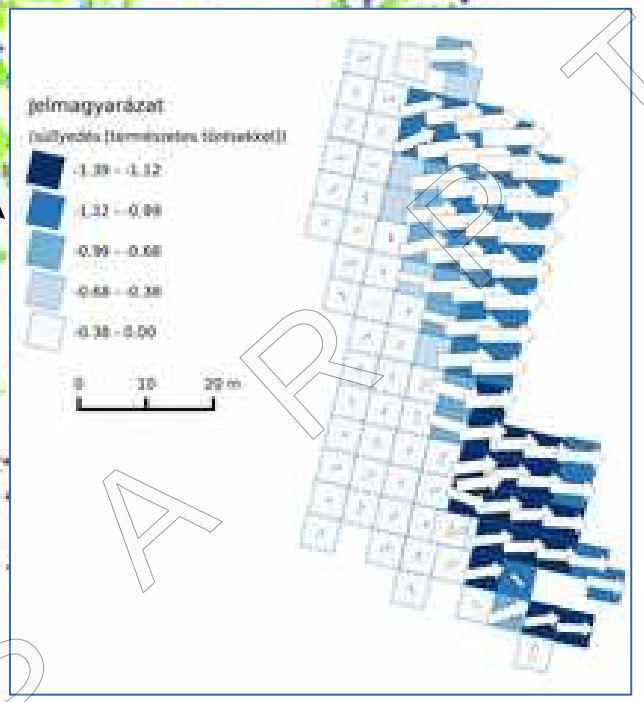
SHAPE SBAS

Dunaszekcső



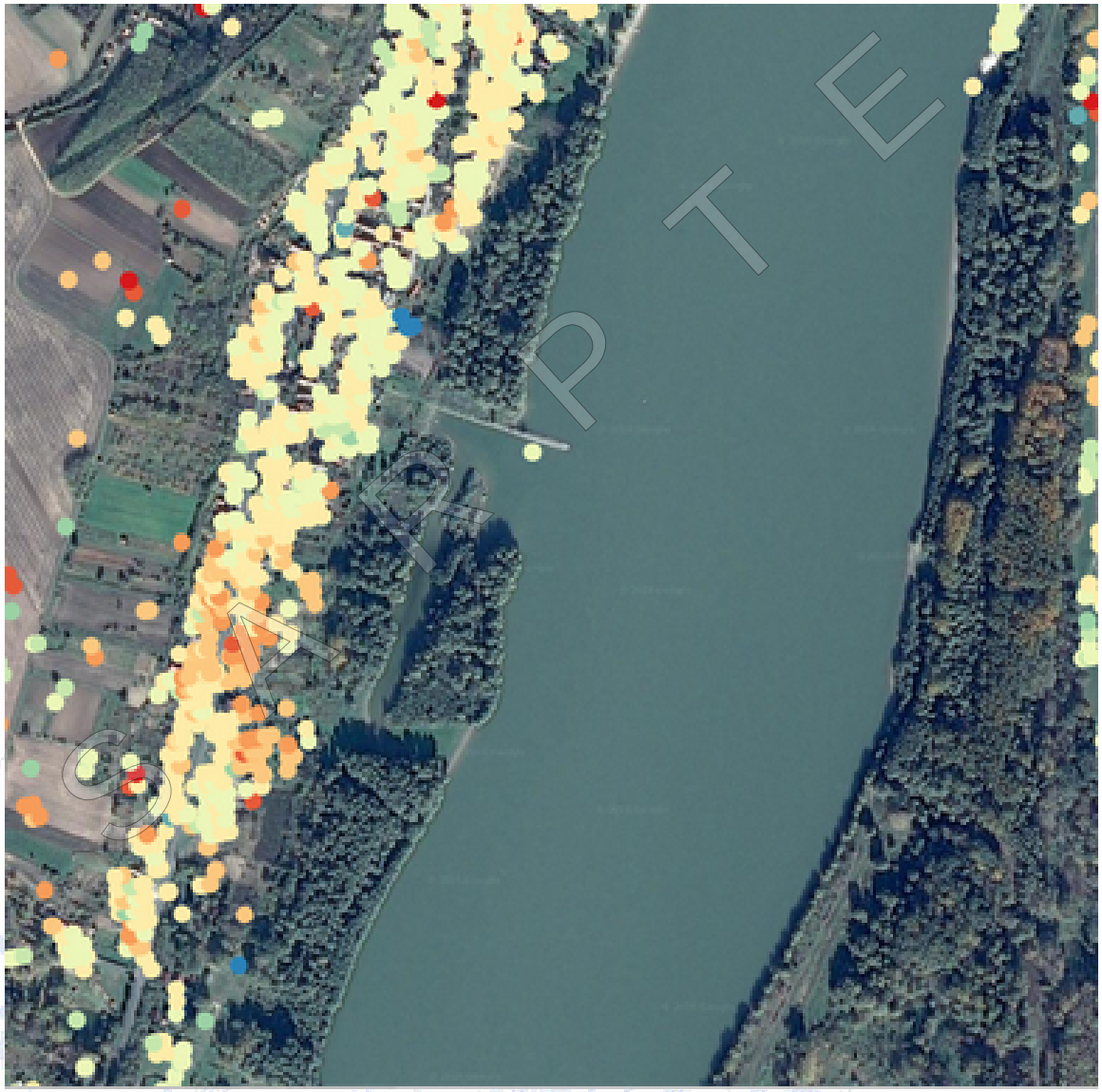
Dunaszekcső





SARPTER

Dunaszekcső

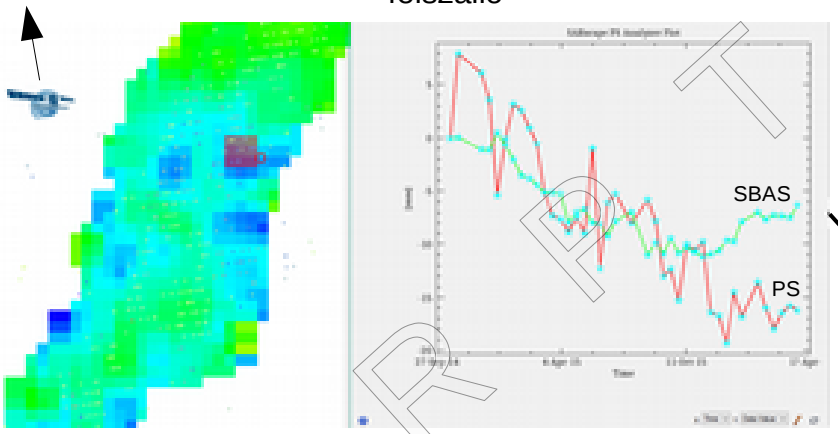




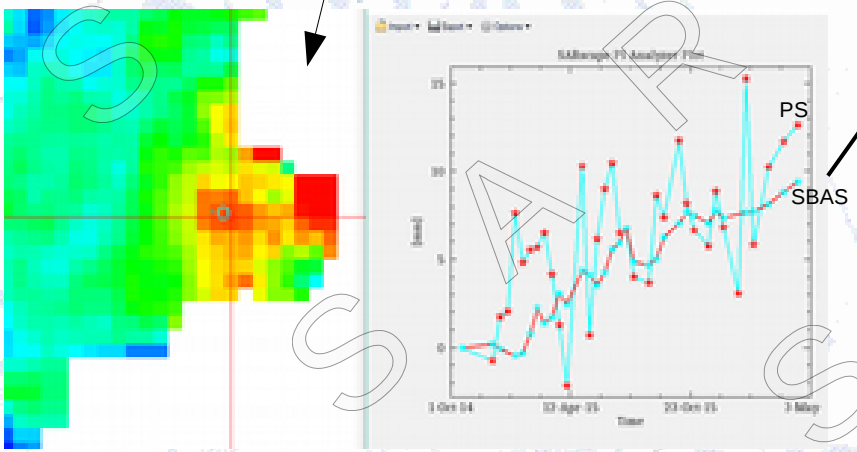


SBAS vs. PS

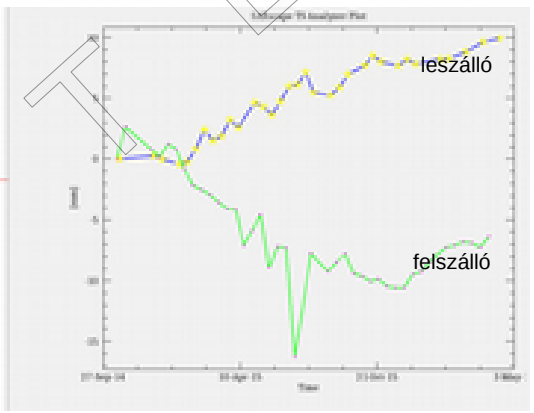
felszálló



leszálló



Fel- és leszálló pálya kombinációja



SARPTEL SARPTEL

Összefoglalás



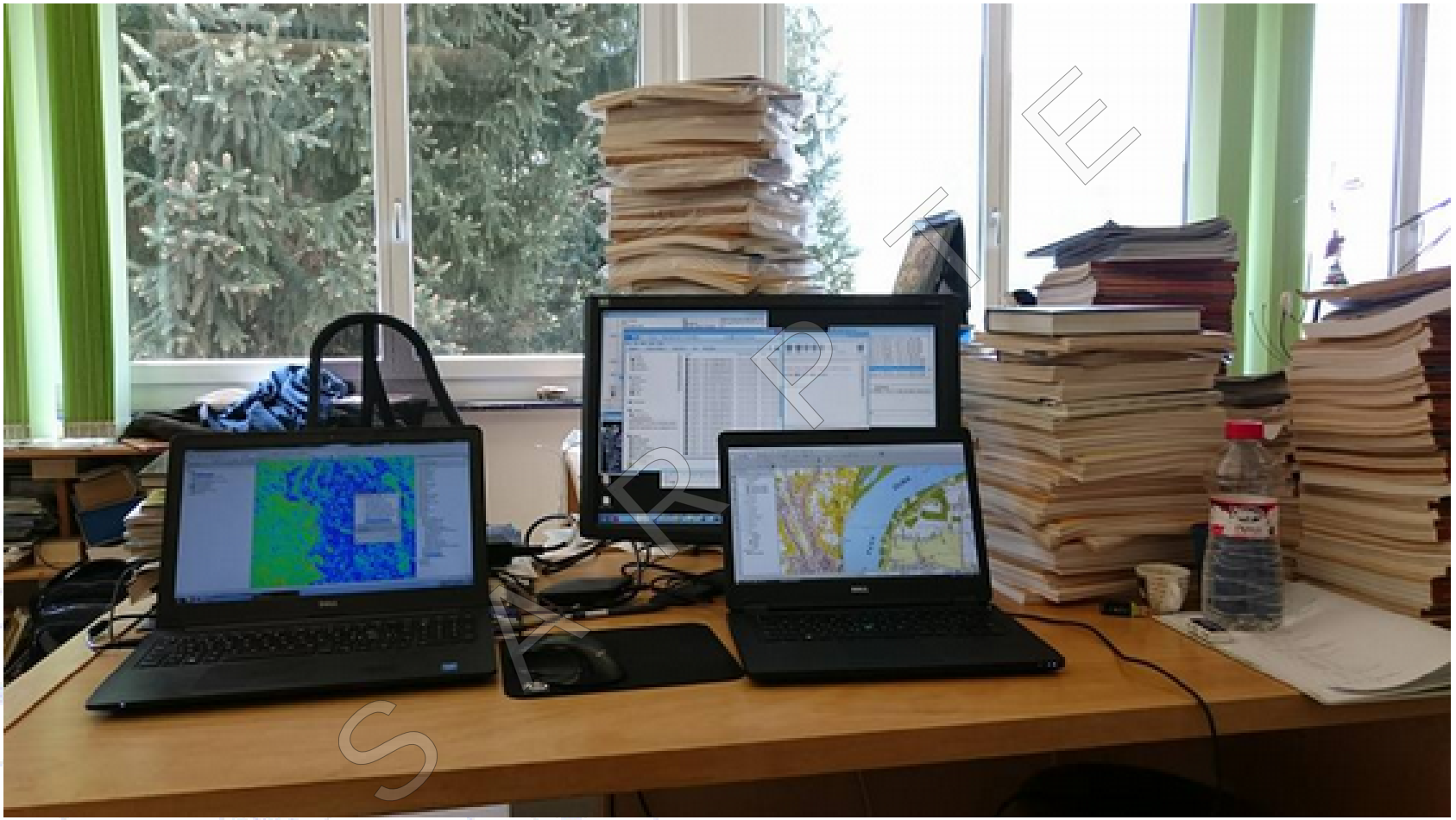
Pro:

- ingyenes, jó temporális és térbeli felbontású adatok
- mozgásdetektálás, térképezés
- monitoring!

Kontra:

- adattárolás (?) 8 GB/db (slc)
- átmeneti technikai probléma: zaj

Köszönöm a figyelmet!



SKRIPTE