Euroopa Liit
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Eesti tuleviku heaks

# LAINEPARAMEETRITE MÄÄRAMINE LÄÄNEMERES RADARIANDMETE PÕHJAL

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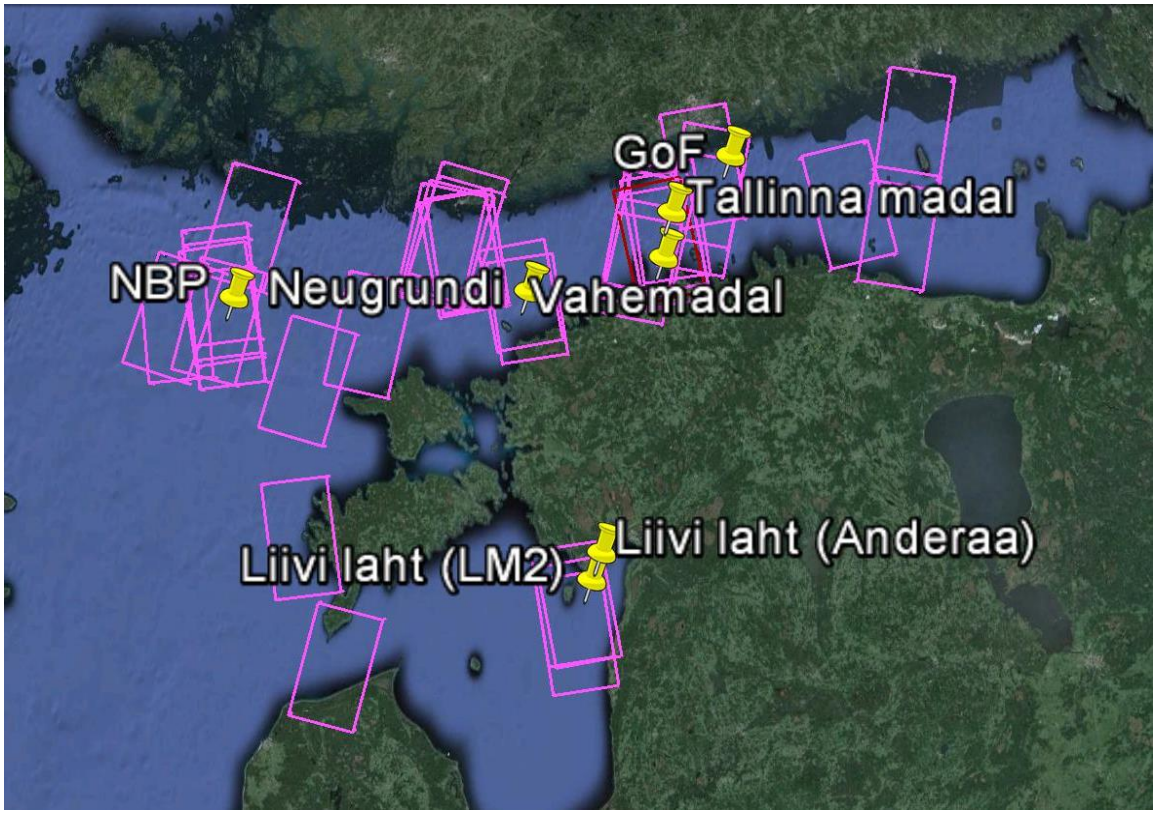
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# Sissejuhatus

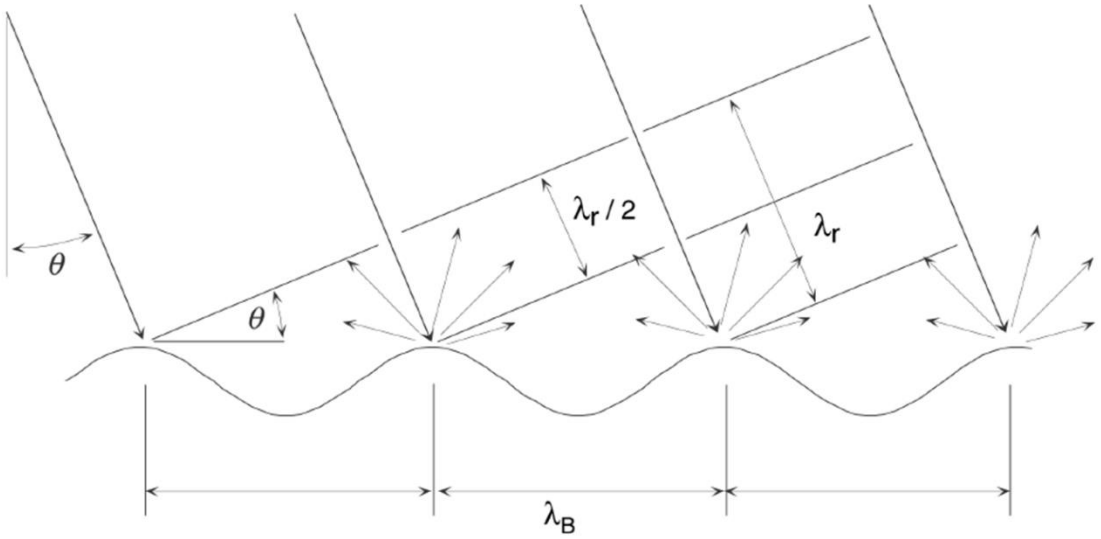
- Tuvastada kõrglahutusliku x-laineala SAR sensori võimekus Läänemere kohal;
- Arendada meetod laineparameetrite määramiseks;
- Andmete analüüs ja valideerimine mõõtmiste ning mudeliga;
- SAR sensori eeliste väljatoomine.

# Andmed




- 43 pilti, Stripmap režiimis, 30x50 km katvusega
  - HH ja VV polarisatsioonid
  - 2012 – 2013
  - Avaookean
- ADCP, Waverider, rõhuandur
- SWAN lainemudel

# Meetod




- 512 x 512 piksli suurune pilt
- $L_{min}$ = 15 m, $L_{max}$ = 200 m

- Korrelatsioonianalüüs:
  - Pearsoni koefitsient - *r*
  - Olulisuse tõenäosus - P
  - Ruutkeskmine hälve - RMSD
  - Bias

$$\lambda_B = \frac{\lambda_r}{2sin\Theta_i}$$

$$\lambda_{min} = \frac{R_0}{V_{SAR}}\sqrt{H_{sig}}$$

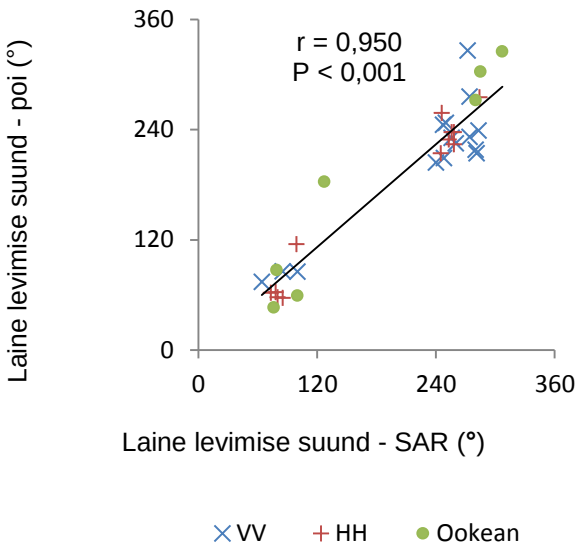
$$L = \frac{2\pi}{\sqrt{k_x^2 + k_y^2}}$$

$$\gamma = \arctan\left(\frac{k_y}{k_x}\right)$$

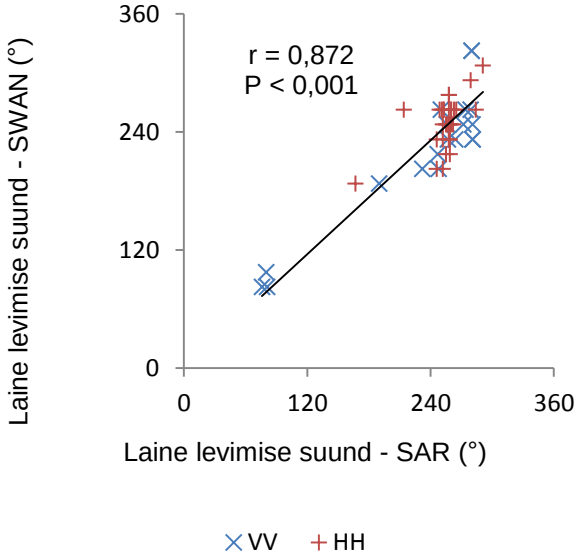
$$\omega = \sqrt{gk\tanh(kh)}$$

$$E = \int_{k_{min}}^{k_{max}} \int_0^{2\pi} S(k,\varphi)dkd\varphi$$

# Tulemused – laine levimise suund

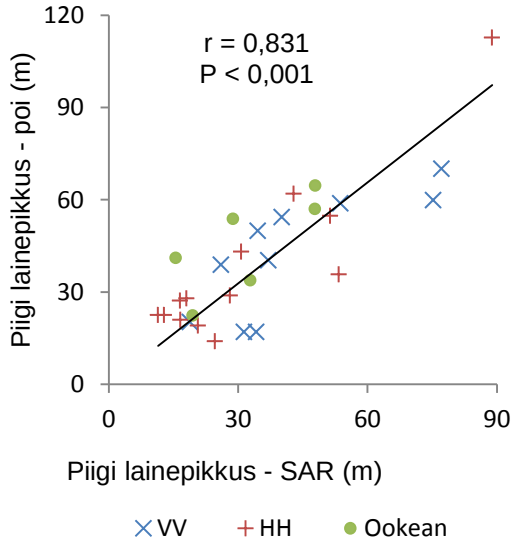



RMSD = 30°
Bias = 0,4°

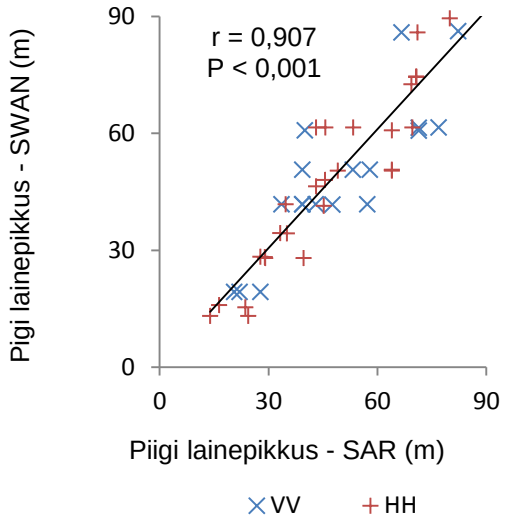



RMSD = 25°
Bias = 0,16°

# Tulemused – lainepikkus

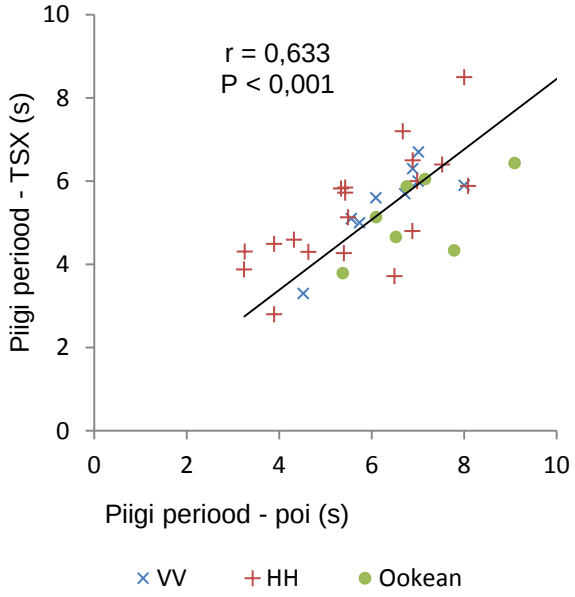



RMSD = 13,2 m
Bias = -0,18 m

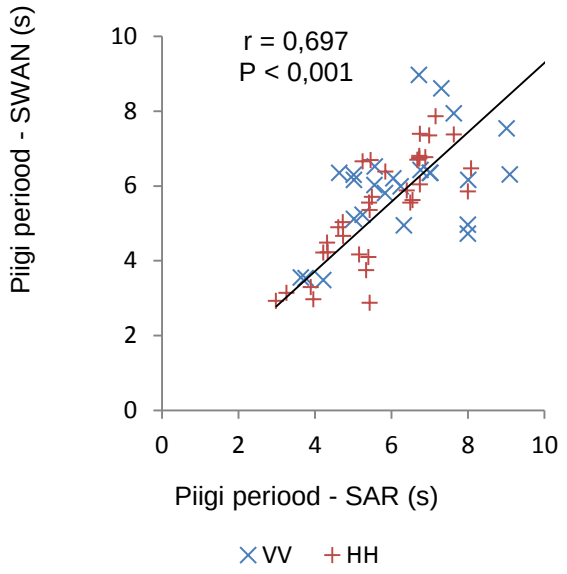



RMSD = 9,4 m
Bias = -0,006 m

# Tulemused - periood

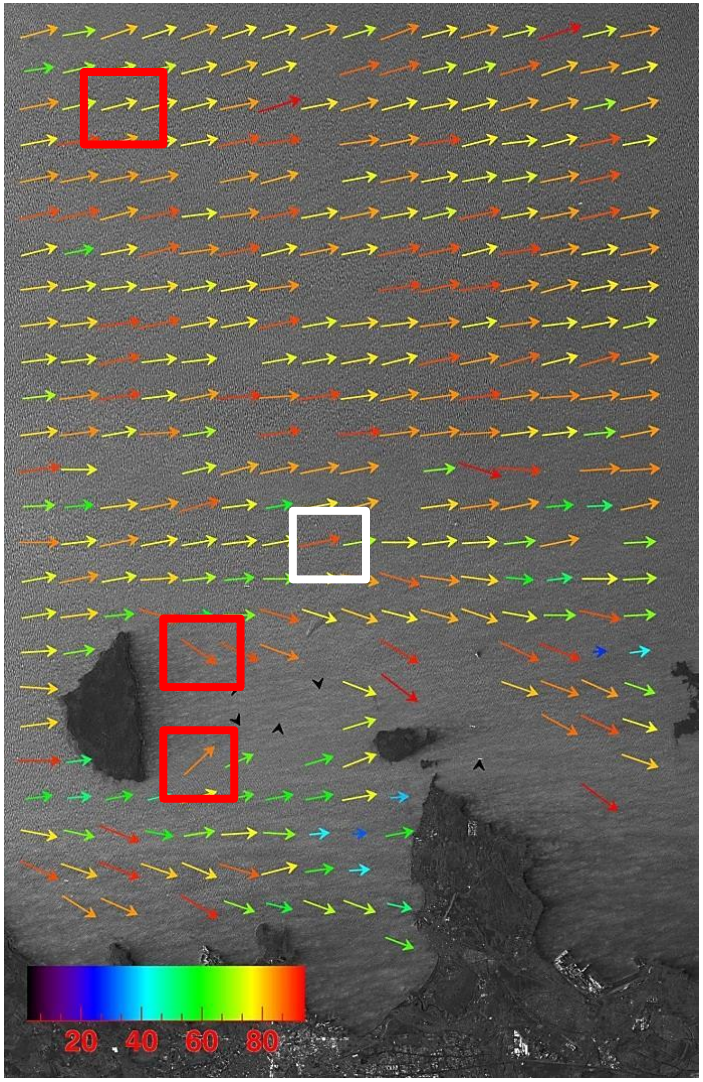


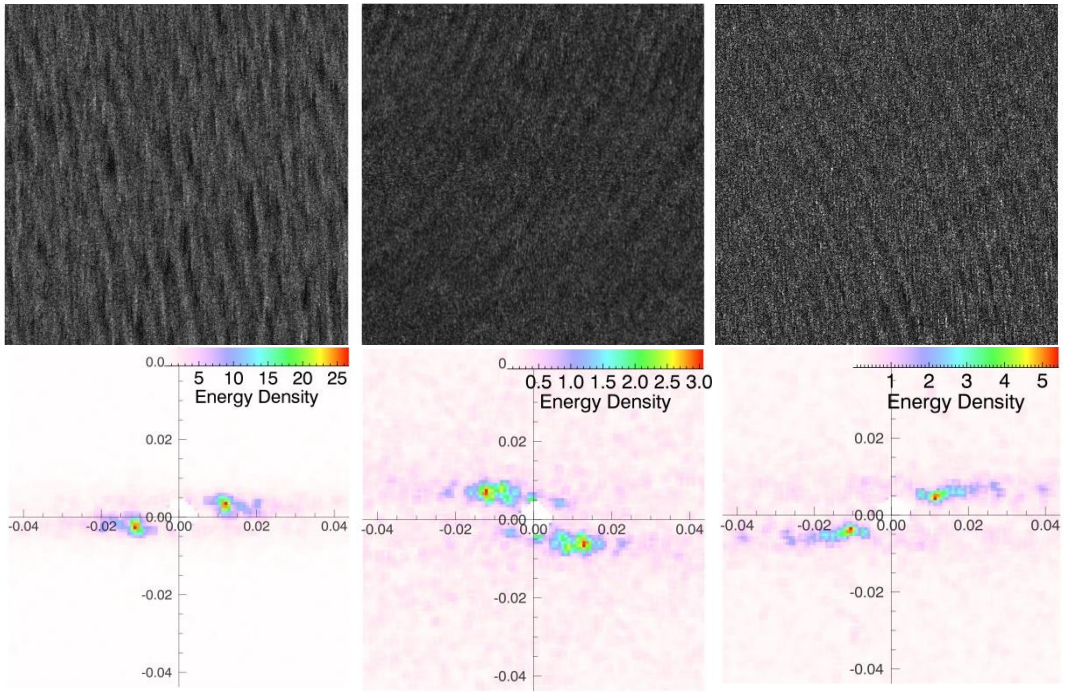

RMSD = 1,38 s
Bias = 0,02 s



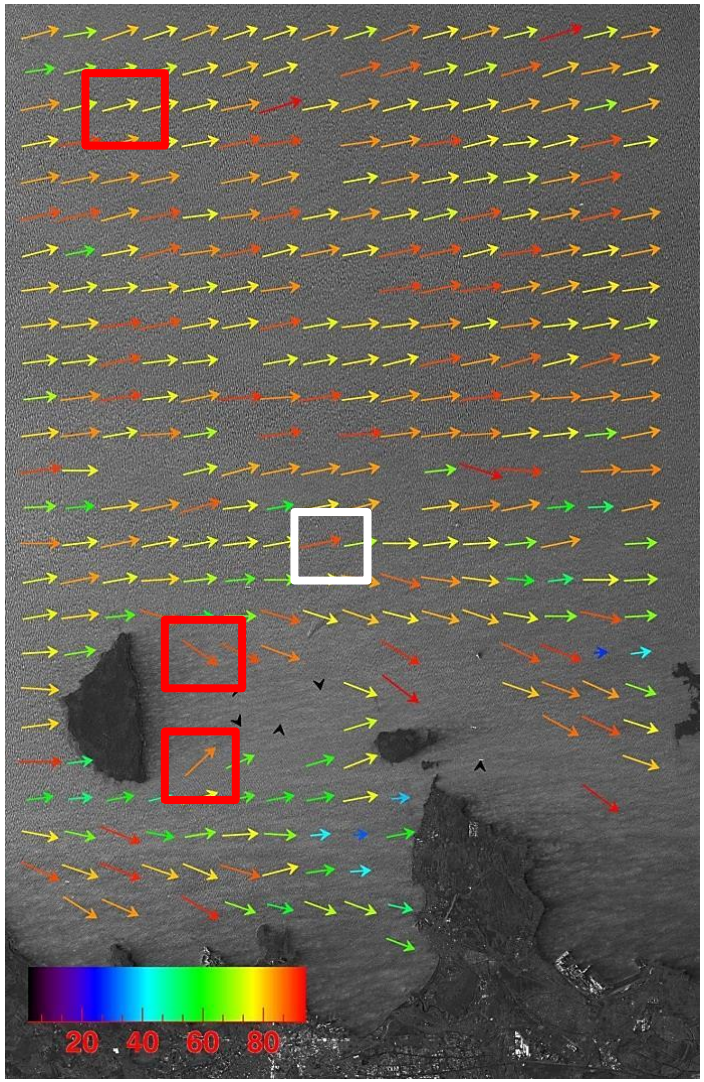

RMSD = 1,19 s
Bias = 0,005 s

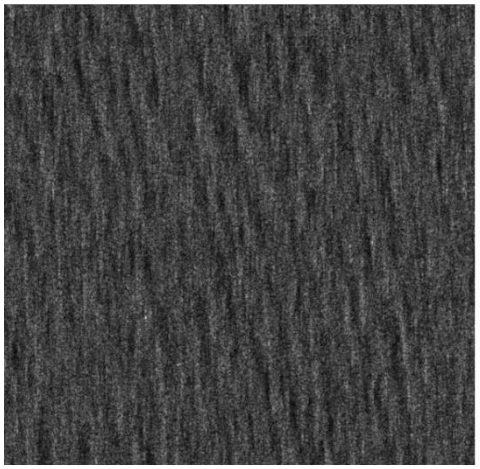
# Juhtumiuuring – Tallinna laht

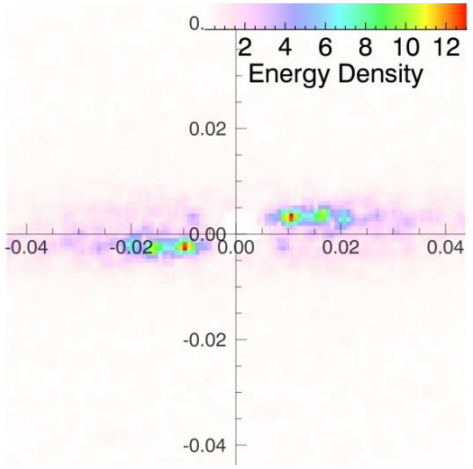


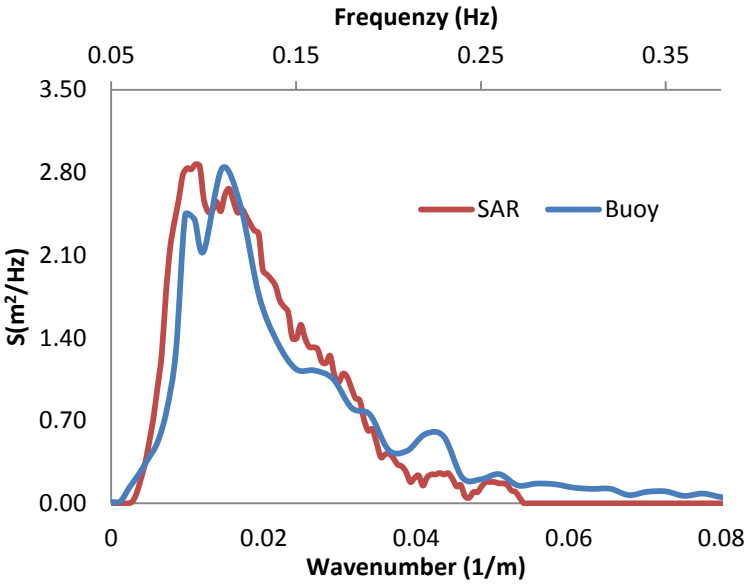



# Juhtumiuuring – Tallinna laht

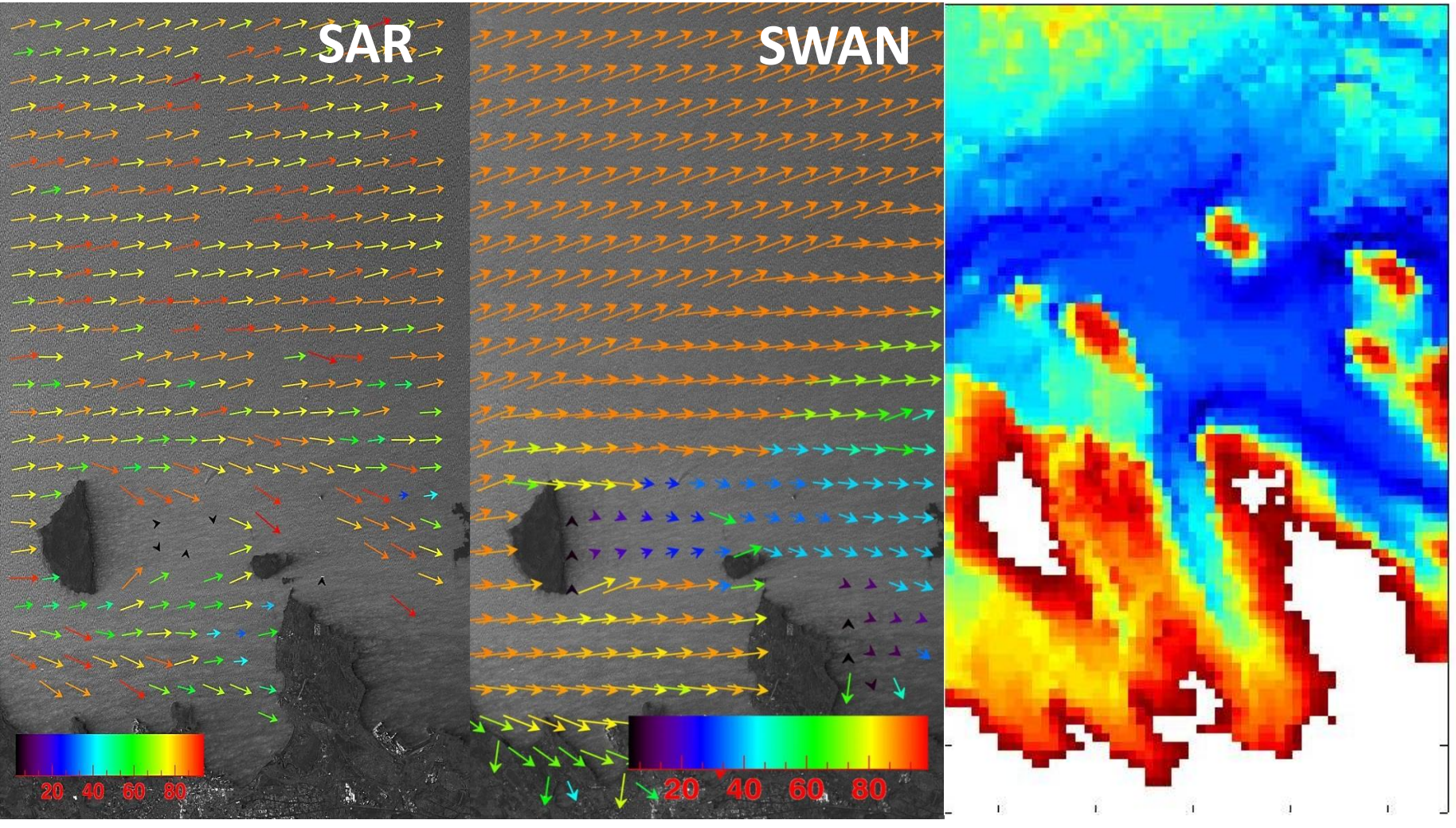




# Juhtumiuuring – Tallinna laht



# Kokkuvõte

- X-laineala SAR sensor tõestas enda kasulikkust;
- Laineparameetrite täpseks hindamiseks on vaja väljakujunenud lainevälja;
- Kõrged korrelatsioonikoefitsiendid;
- Kuni 20 m lained on radari pealt tuvastatavad;
- SAR tulemused suurema varieeruvusega.

# TÄNAN TÄHELEPANU EEST!

