Forest Height Estimates for Boreal Forest using L- and X-band POLinSAR and HUTSCAT Scatterometer

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FinSAR campaign: joint experiment of DLR & TKK

Goal
Evaluate the performance of POLinSAR tree height estimation algorithm, based on RVoG model inversion, in mixed boreal forest.

Test Site
Finland: Kirkkonummi-Oitbacka

Data
- **E-SAR**, 29 September 2003
  - X-band VV-pol single pass interferometry
  - L-band quadpol interferometry
- **HUTSCAT** scatterometer, 1 October 2003
  - C- and X-band vertical scattering profiles
- Ground measurements
- Stand inventory
HUTSCAT, retrieval of tree height

- Scatterometer, measures the vertical scattering profile of the forest
- X-band multipol (HH HV VH VV)
- C-band multipol (HH HV VH VV)
- Measurement flight: 1 October 2003
E-SAR, retrieval of tree height

- L-band quadpol interferometry
- X-band VV-pol single pass interferometry

Tree height retrieval

L-band
- full Random Volume over Ground model inversion for treeheight

X-band
- restricted Random Volume over Ground model inversion for treeheight

\[ \gamma_{RVoG}(\vec{\omega}) \]
Data: E-SAR, HUTSCAT, Stand Map, Ground Data
Tree height, HUTSCAT transects
Tree height, E-SAR L-band inversion
Ortoimage
Tree height from HUTSCAT profiles

- HUTSCAT X-band, multipol average
- Track 1, E-SAR near range
- -- ground line
- *Tree height:HUTSCAT
Tree height from L-band PolinSAR compared to HUTSCAT treeheight profiles

- HUTSCAT X-band, multipol average
- Track 1, E-SAR near range
- — ground line
- * Tree height: L-band E-SAR
Tree height from X-band inSAR compared to HUTSCAT treeheight profiles

- HUTSCAT X-band, multipol average, range geometry
- Track 1, E-SAR near range
- -- ground line
- * Tree height: X-band E-SAR
Comparison with stand inventory mean tree height, stand averages

Correlation 0.65087

Correlation 0.54513