Introduction

Coherence Training of empirical exponential model

Random backscatter: Saturation at 75-100 m³/ha, R² backscatter vs. GSV 0.82 (HH) - 0.48 (HV)

Combination of backscatter and coherence led to improvement of GSV estimation, in particular exclusion of areas with contradictory GSV (coherence vs. backscatter) helpful

Potential of ALOS PALSAR to map the GSV of the Siberian forest with a precision close to the accuracy of the conventional forest inventory data (relative RMSE approx. 25%)

Data availability Siberia: In average 4 coherence images (8K 46 days) acquired at frozen conditions and 6 FBD backscatter images acquired at unfrozen conditions

SUMMARY OF RESULTS
- Coherence at frozen conditions offers the largest potential for GSV estimation: Saturation at 230 m³/ha, R² between coherence and GSV is 0.58 (Comparable to ERS-1/2 Tandem)

Data & Methods

Results

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### STUDY AREA

Central Siberia: Middle Siberian Plateau in the southern part of the territory is characterised by hills up to 1,700 m. Northern part is flat with elevations up to 500 m. Boreal forests.

### FOREST INVENTORY DATA

Ministerial forest inventory data: Many parameters, including the average GSV per forest stand.

### METEOROLOGICAL DATA

Typical weather conditions observed: Temperatures far below freezing point during winter and above 0°C during summer. Only light precipitation.

### EXPERIMENTAL DATA – SUMMARY

#### a) Signatures of clear cuts

Number of available samples: 31 sample sites, each containing 1 clear cut

#### b) Signatures of dense forest

Saturation level of coherence vs. backscatter

#### c) Correlation of GSV and SAR data

#### d) GSV saturation level

GSV values in Siberia are particularly flat during summer.

### ACCURACY OF GSV MAPS DEPENDING ON USED DATA

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<tbody>
<tr>
<td>R² coh + int</td>
<td>0.79</td>
<td>0.79</td>
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<tr>
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<td>50.3</td>
<td>56.2</td>
<td>59.1</td>
<td>56.1</td>
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</table>

Corrected relative RMSE approximately 25% for all sites.

### FOREST STAND LEVEL BASED COMPARISON OF GSV (HREBTOVSKY)

Backscatter based vs. coherence based GSV map

SAR based vs. inventory GSV

### DELINEATION OF GSV MAPS

1. Random training data selection (20% of inventory data)
2. Training of empirical exponential model
3. Pixel based model inversion
4. Averaging intermediate GSV maps resulting in one backscatter based and one coherence based GSV map
5. Merging coherence and backscatter based GSV map
6. Elimination of pixels with a GSV difference > 100 m³/ha
7. Setting all negative GSV values to zero
8. Assessing accuracy using remaining 80% of inventory data

### PALSAR BASED GSV MAP EXAMPLE (HREBTOVSKY)

- SN (short)
- LN (long)
- W (west)
- E (east)

PALSAR data: Arctic: unfrozen; Bold: FBD (Fine Beam Dual); Other: FBS (Fine Beam Single) & frozen