PSI validation results
and open issues

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Introduction

- What is PSI validation about?
  - Not a simple comparison against ground truth, e.g. thermometer:
    - PSI products are “complex” and not easy-to-understand
  - It is a learning process, which involves:
    - Product characterization, sometimes “discovering” “new” pros and cons that are not well understood or documented
    - Highlighting pros & cons ➔ Communicate to end users (a lot to be done)
    - Increasing product acceptability (a lot to be done)

- Remark: often multi-purpose PSI products are assumed: some validation outcomes can be irrelevant for some specific application (I do not care about mm!). But usually are relevant for many applications.

- Remark: we do (mainly) “technical validation”; the “user validation” will follow (especially at the beginning of the learning process the user can be “still to be found”)
A learning process: examples

- PSIC4:
  - blind test
  - “big deformation” (C-band viewpoint!) ➔ aliasing
Is this still valid?
What are the performances of new unwrapping techniques?
A learning process: examples

- **PSIC4:**
  - blind test (detection not working)
  - “big defo” (C-band viewpoint!) ➔ aliasing

- **Jubilee Line:**
  - Very focused target, both spatially and temporally
  - “Non linear” deformation
JLE: deformation of Treasury building

- Out of standard PSI capabilities in 2004 (a posteriori statement!)
- Result relevant to key civil engineering applications (e.g. tunnels)
- Is this still valid?

http://www.terrafirma.eu.com/JLE_intercomparison.htm
Another example from tunnel monitoring
TF Validation Project: inter-comparison

- Comparison of the outputs from the different PSI processing chains
  - comparison in the radar space (not affected by geocoding errors)
  - considering all combinations (4 results, 6 possible pairs)

- Three test sites, four teams:
  - number of datasets: 12
  - number of PS: ~ 700,000
    - For each PS: > 39 samples (ASAR)
    - > 83 samples (ERS)
  - number of PS pairs: ~ 370,000

“Average PS” vs. “the PS champion”

www.terrafirma.eu.com/Terrafirma_validation.htm
Inter-comparison of velocities

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<th></th>
<th>Max.</th>
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<th>Mean</th>
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These values are representative of the PSI studies that concern areas with similar characteristics to those of the three test sites.

Key: avoid extrapolation to different application contexts, e.g. mining

Statistics for the velocity differences computed over all the common PS for ERS Alkmaar dataset.
Inter-comp. of time series (key product)

Correlation = 0.301
VHR PSI
VHR: Cosmo Skymed
VHR PSI: time series

- X-band: remarkable quality improvement wrt C-band
VHR PSI: thermal dilation

1) Worth to properly validate

2) Important to document the (remaining) limitations