

ACCURACY OF BUILT-UP AREA MAPPING IN EUROPE
FROM THE PERSPECTIVE OF POPULATION SURFACE
MODELLING

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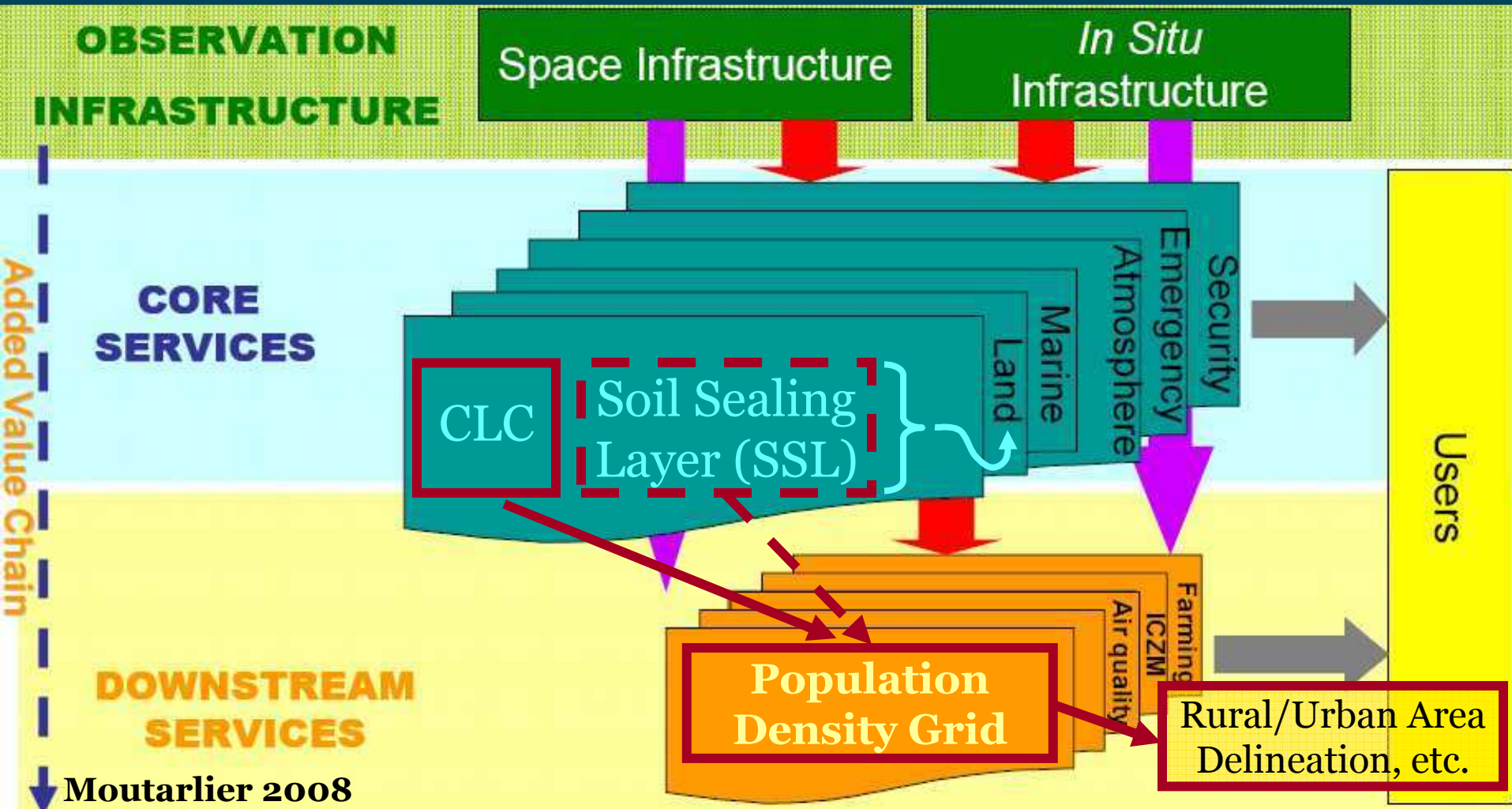
EUROPEAN FORUM FOR GEOSTATISTICS
5-7 OCTOBER 2010 TALLINN, ESTONIA



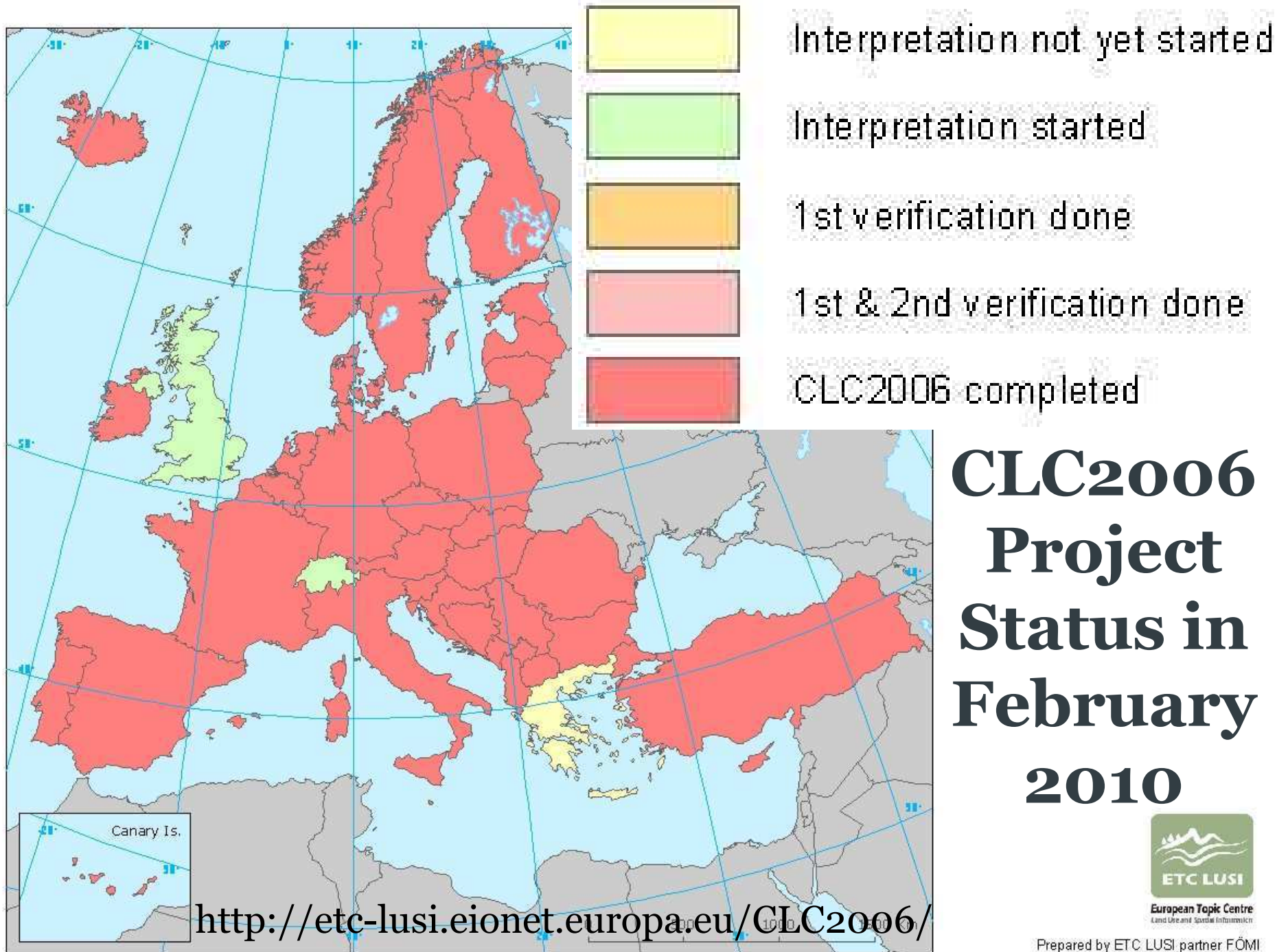
Content

1. European Land Cover Datasets:
 - Corine Land Cover - CLC
 - Soil Sealing Layer - SSL
2. SSL accuracy assessment in Austria and Slovakia
3. Comparison with the SSL accuracy assessment in other countries
4. Conclusions about SSL for population surface modelling

SSL and CLC in the GMES Architecture

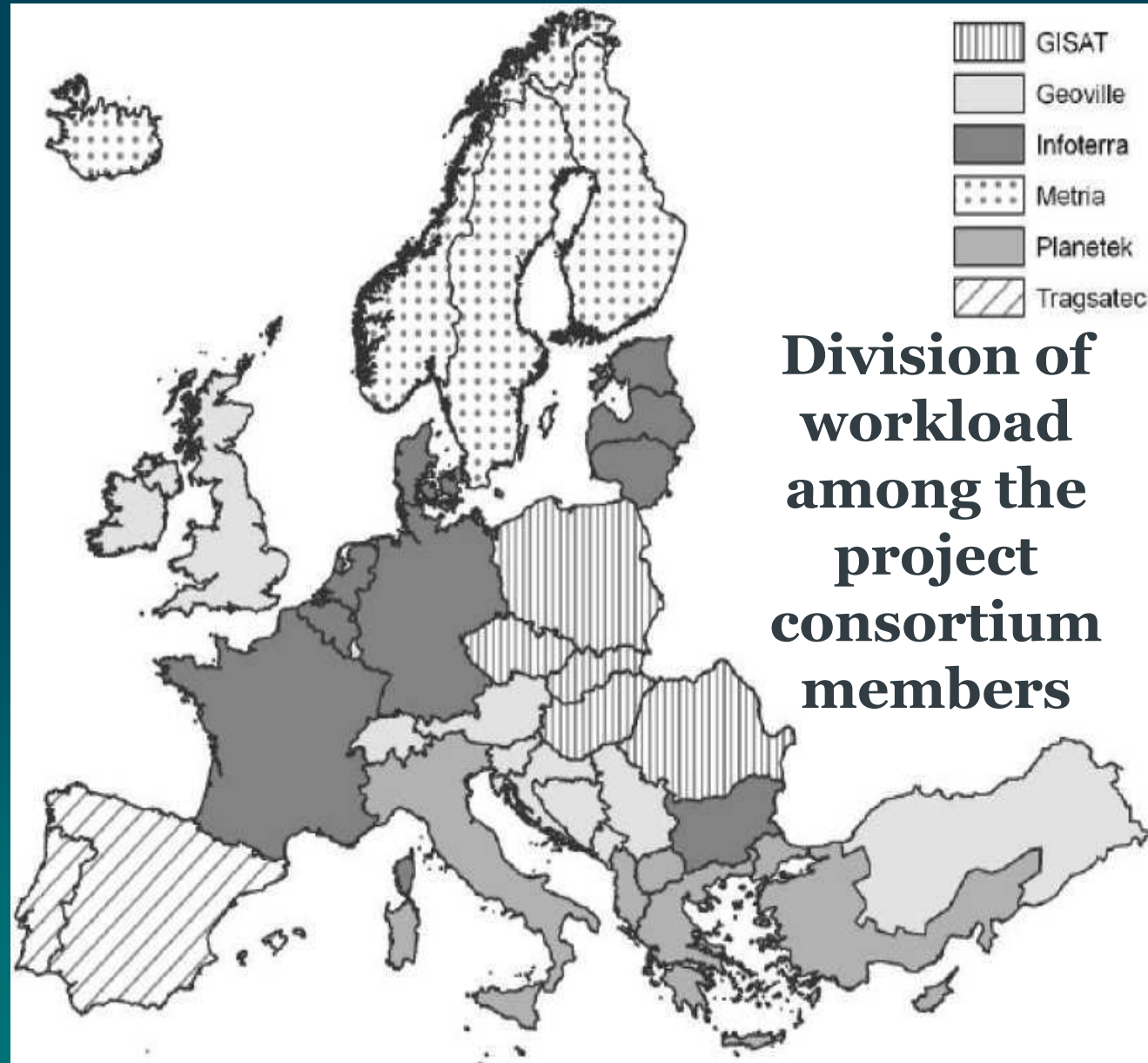


Soil Sealing Layer (SSL) - A dataset complementing the role of **Corine Land Cover (CLC)** in population surface modelling, rural/urban area delineation and other environmental and socioeconomic applications



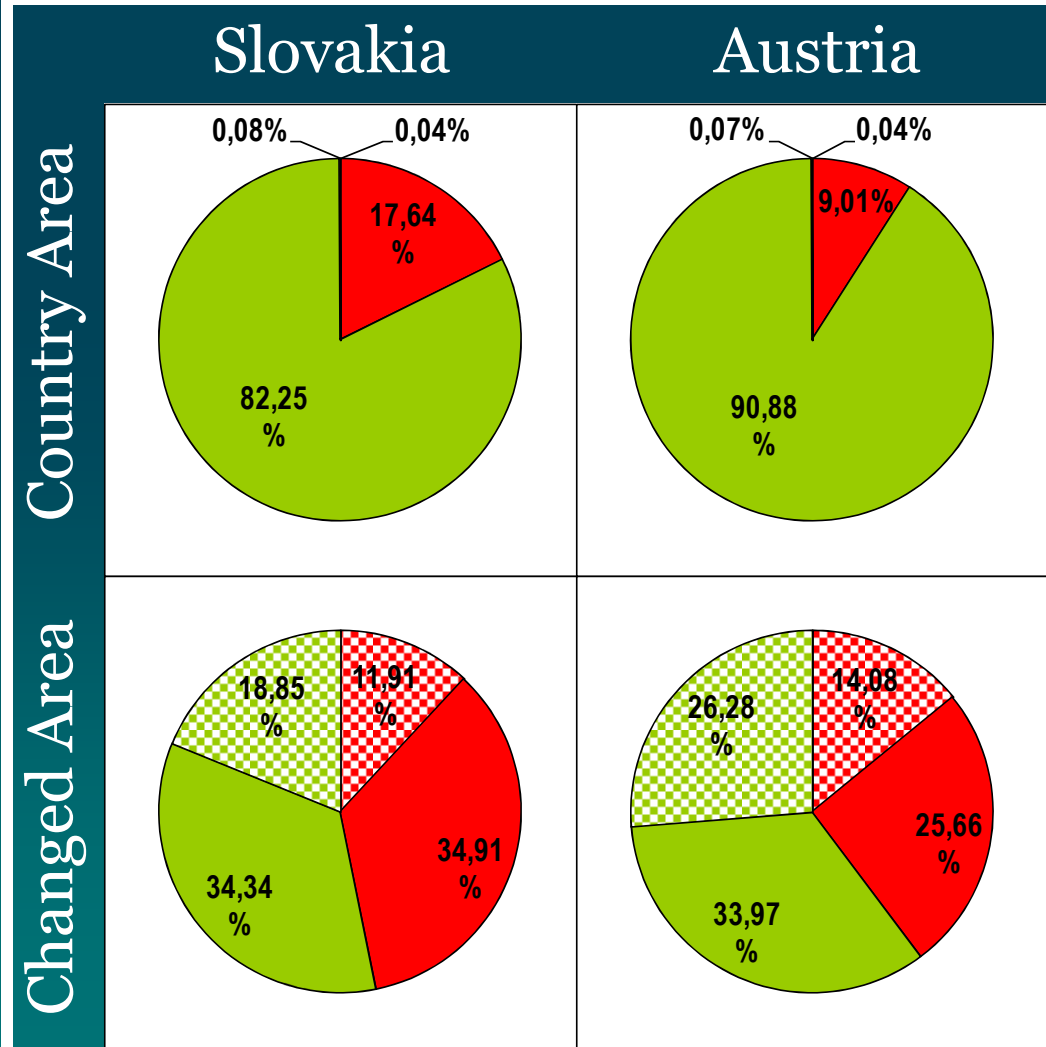
Soil Sealing Layer (SSL): Line of Production

- 21/02/2007 tender deadline
- 03/05/2007 contract award
- 02/12/2008 project ends
- cca 01/2009 qual. assess. ends
- 12/06/2009 version 1 release
- 26/01/2010 version 2 release



Main Changes between Versions 1 and 2

- Removal of mines, dumps, and construction sites (CLC class 13)
- 320 Urban Atlas cities (specifically their Larger Urban Zone and Urban Audit delineations) checked in more detail than the other areas, especially for omission errors



Accuracy Assessment in Austria and Slovakia

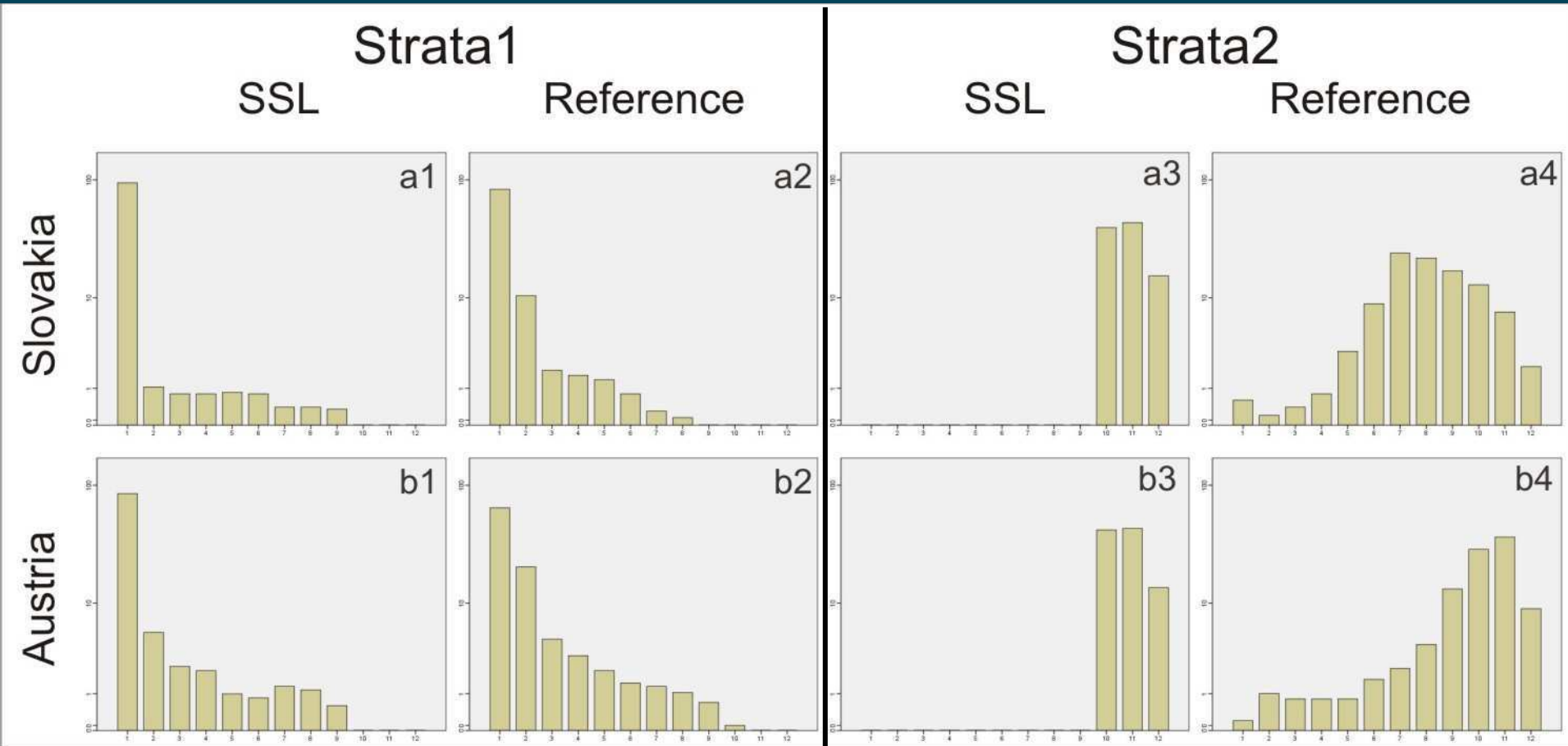


Recommendations:

- Random stratified sample
- Min. 500 samples from Strata1: $\geq 80\%$
- Min. 2000 samples from Strata2: $< 80\%$

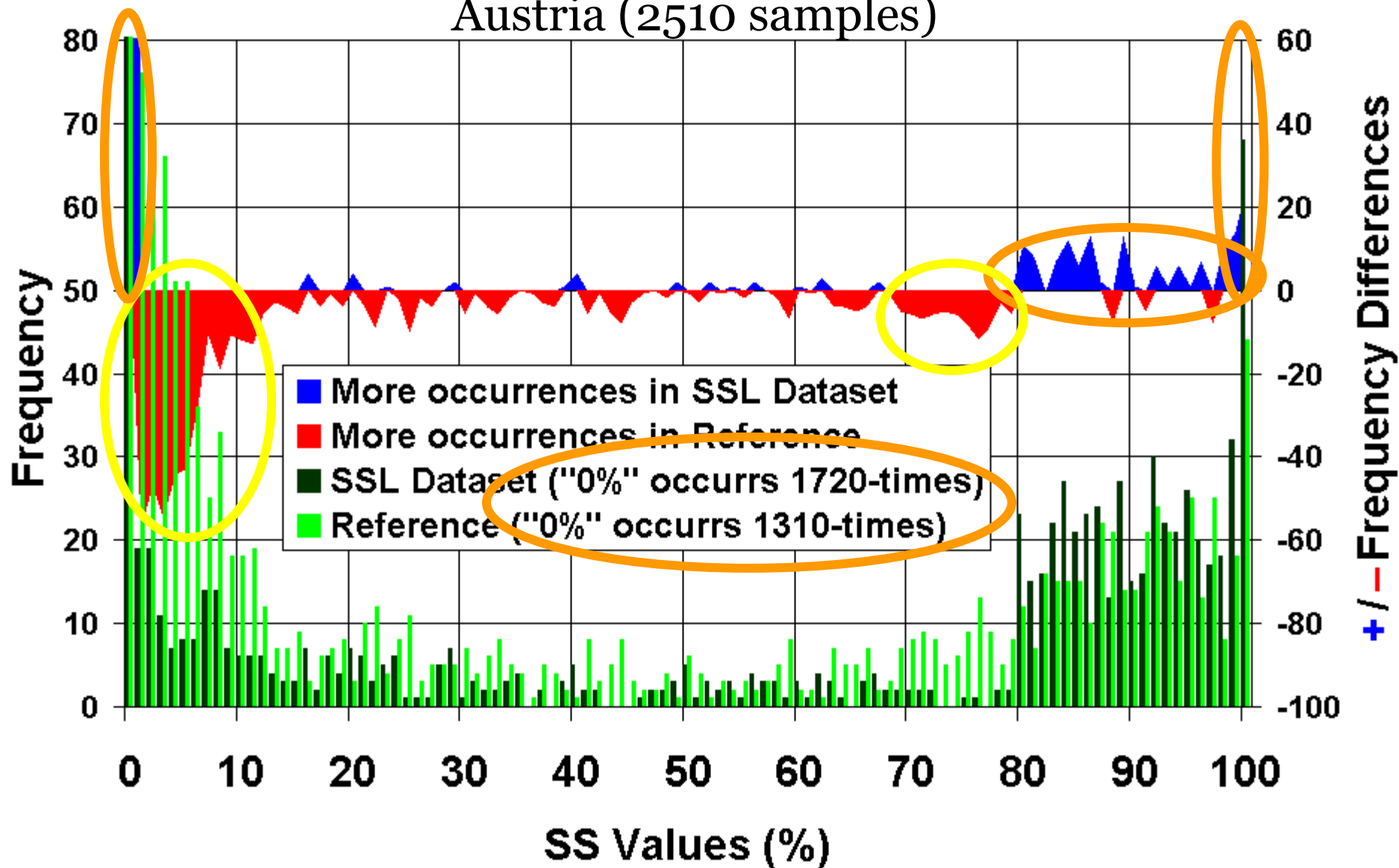
- For each sample plot (100x100m) a pair of values is compared:
 - SSL pixel value from the 100m final product (0-100%)
 - Reference value (SSR) – photo interpretation (10x10 points)
- Austria (SSL v.1): 2014 + 496 = 2510 samples (**Banko 2008**)
- Slovakia (SSL v.2): 2000 + 500 = 2500 samples

Frequency Histograms of Sample Values



- X axis - Subsets based on soils sealing values (left to right):
0%, 1-9%, 10-19%, 20-29%, 30 - 39%, 40-49%,
50-59%, 60-69%, 70-79%, 80-89%, 90-99%, 100%
- Y axis - Frequencies in logarithmic scale: 0, 1, 10, 100 %

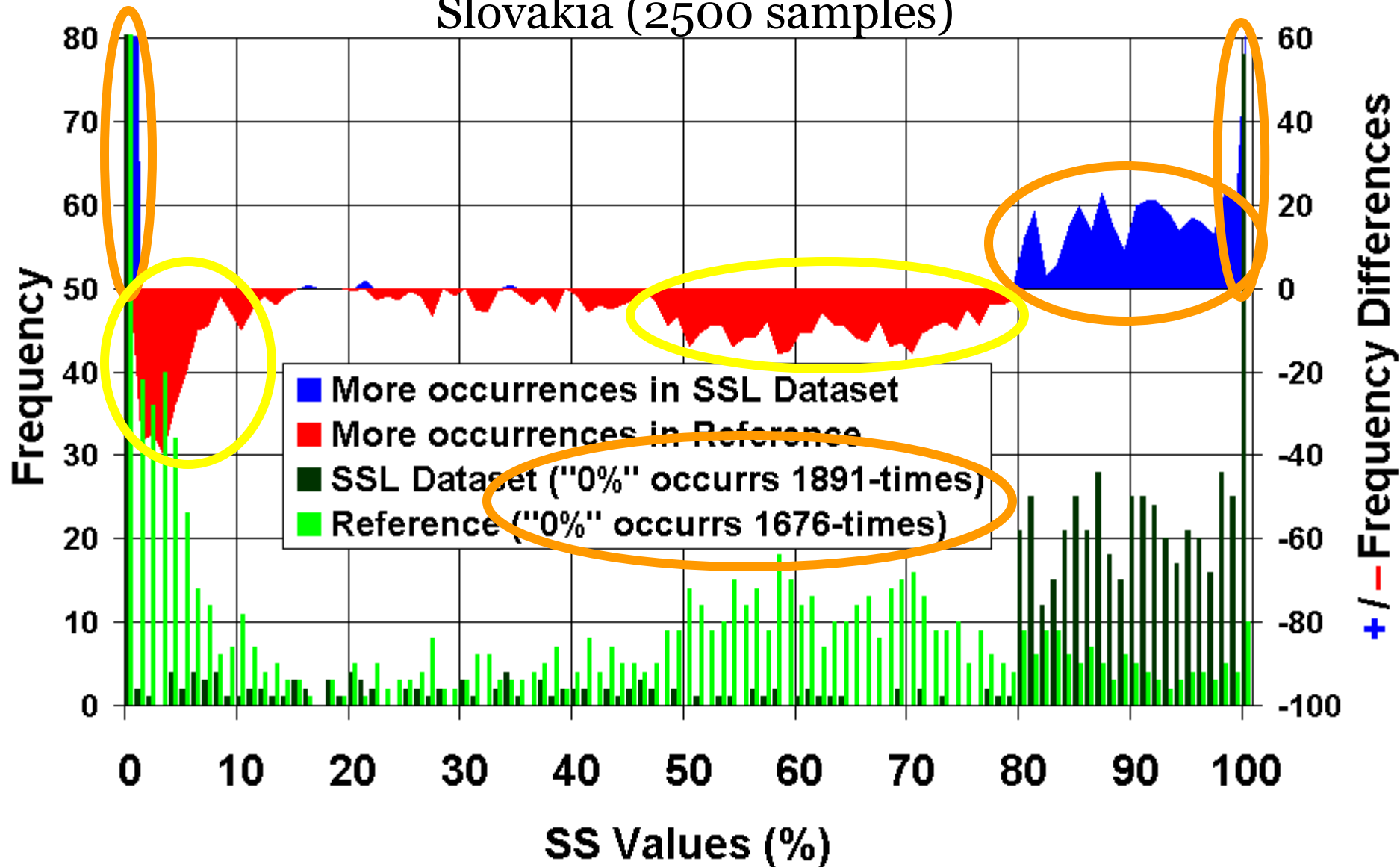
Austria (2510 samples)



Underestimation of the number of 1-15% cells, 70-80% cells

Overestimation of the number of 0% cells, 80-99% cells, 100% cells

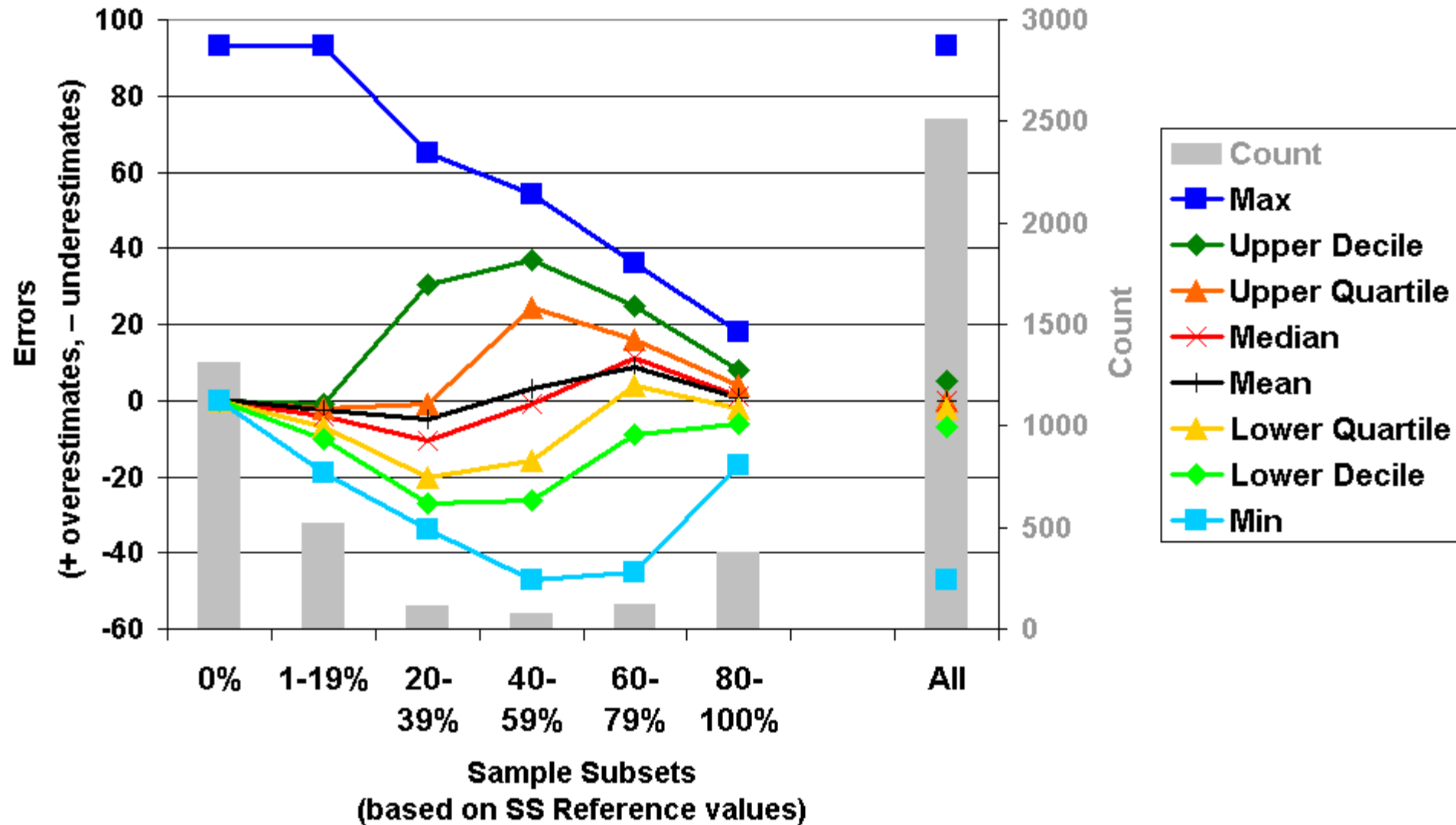
Slovakia (2500 samples)



Underestimation of the number of 1-15% cells, 50-80% cells

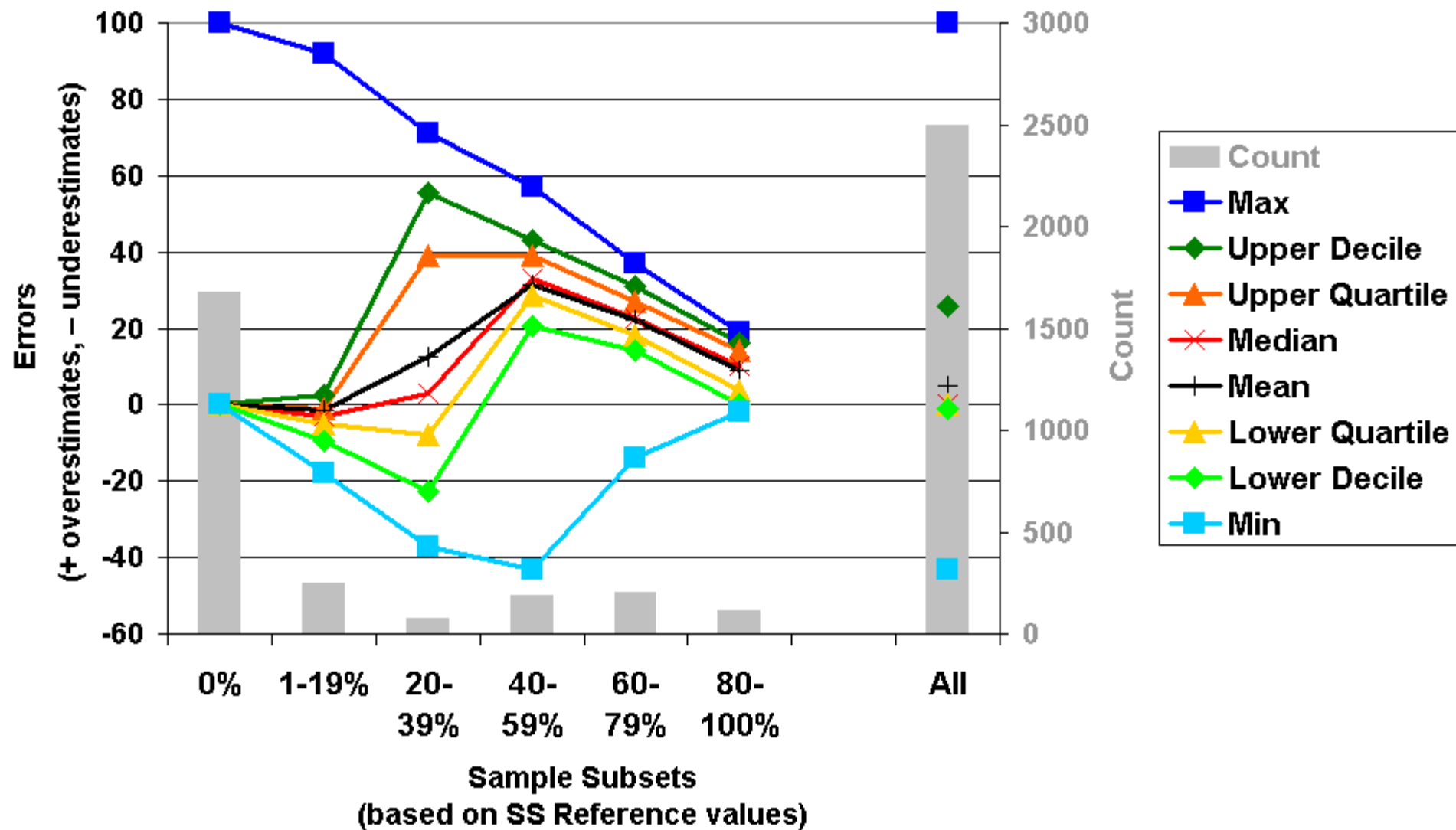
Overestimation of the number of 0% cells, 80-99% cells, 100% cells

Errors in Different Sample Subsets



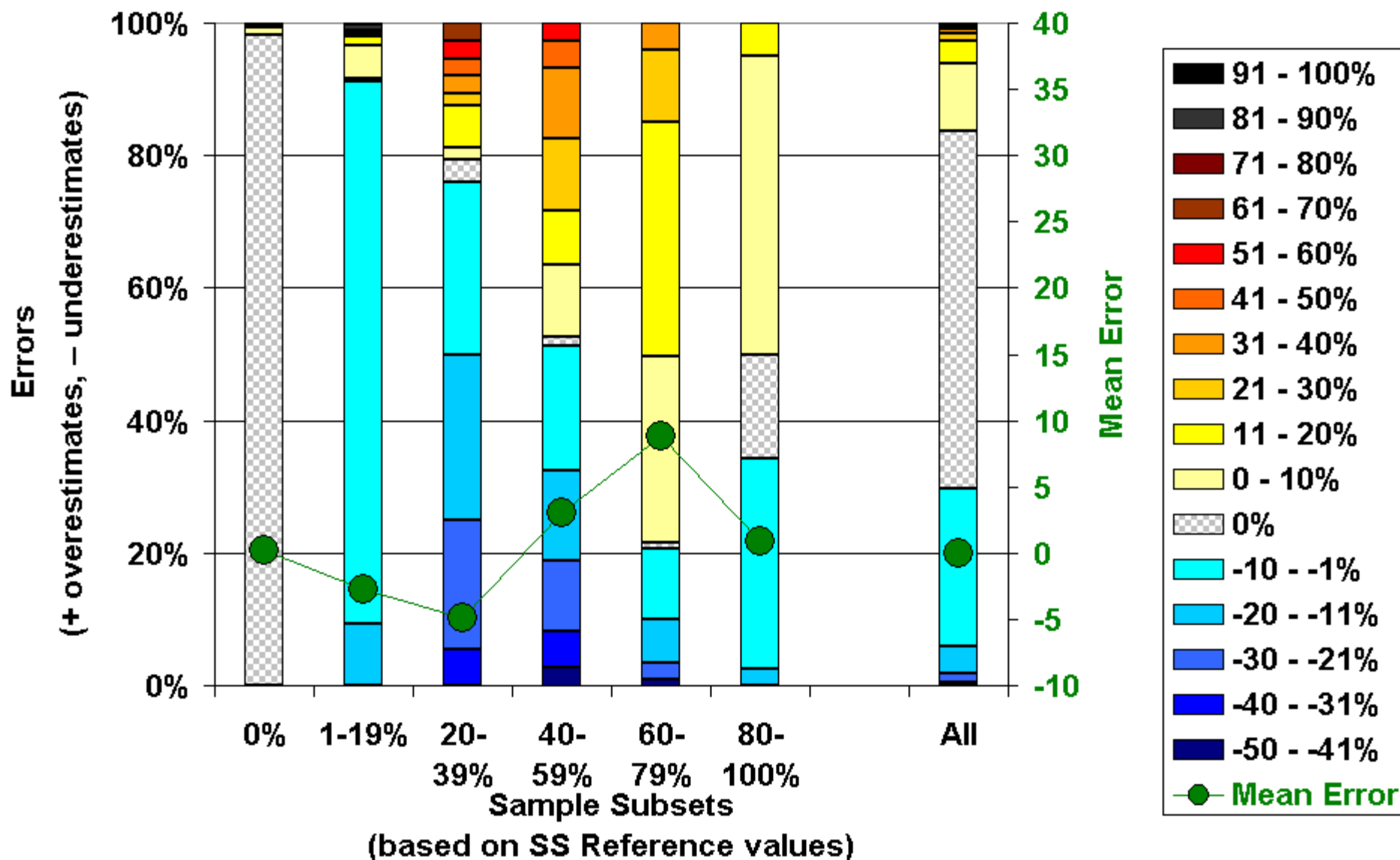
Austria (2510 samples)

Errors in Different Sample Subsets



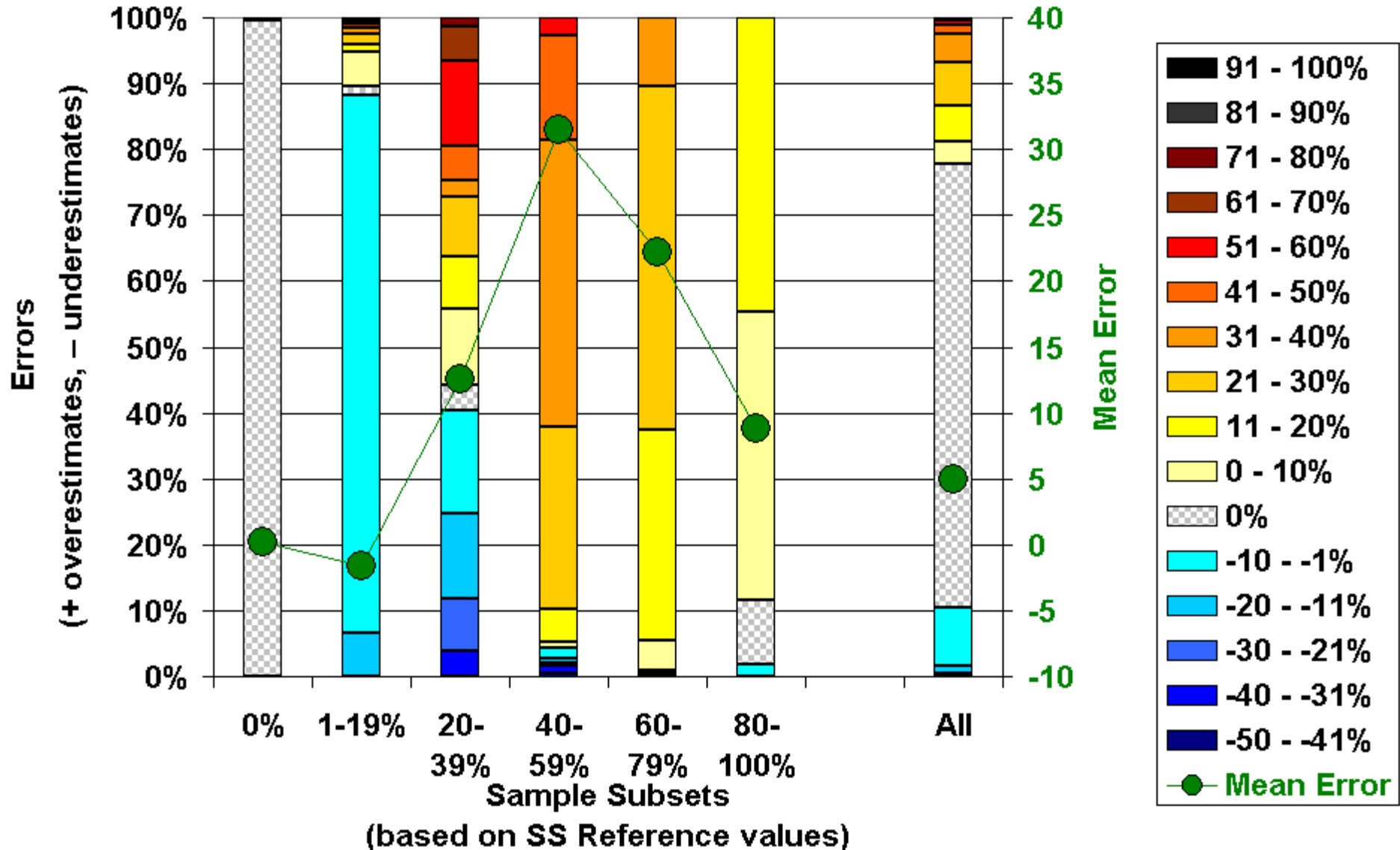
Slovakia (2500 samples)

Structure of Errors According to Their Magnitudes



Austria (2510 samples)

Structure of Errors According to Their Magnitudes

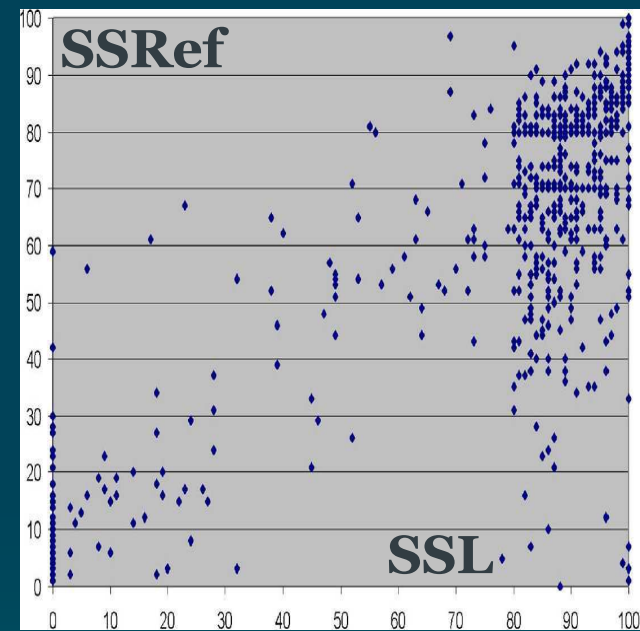
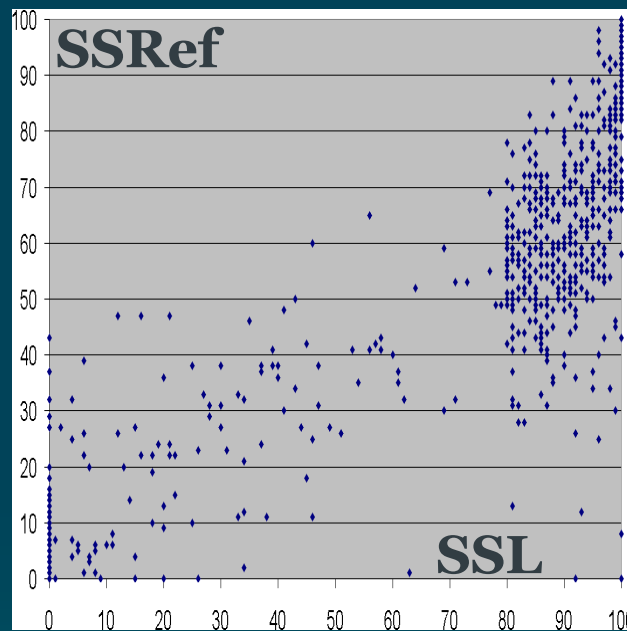
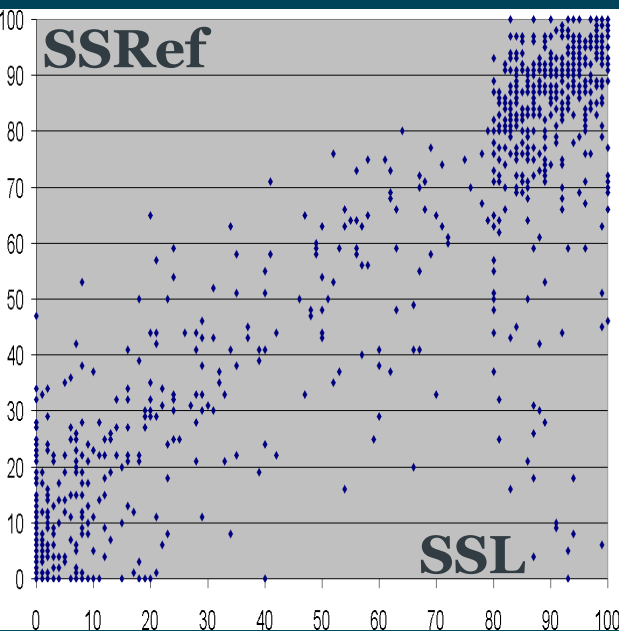


Slovakia (2500 samples)

Austria (2510 s.) Slovakia (2500 s.) Hungary (600 s.)

Banko 2008

Maucha & Petrik 2008



$$\text{SSRef} = 2.08 + 0.90 \text{ SSL}$$
$$R^2 = 0.93$$

$$\text{SSRef} = 0.73 + 0.71 \text{ SSL}$$
$$R^2 = 0.92$$

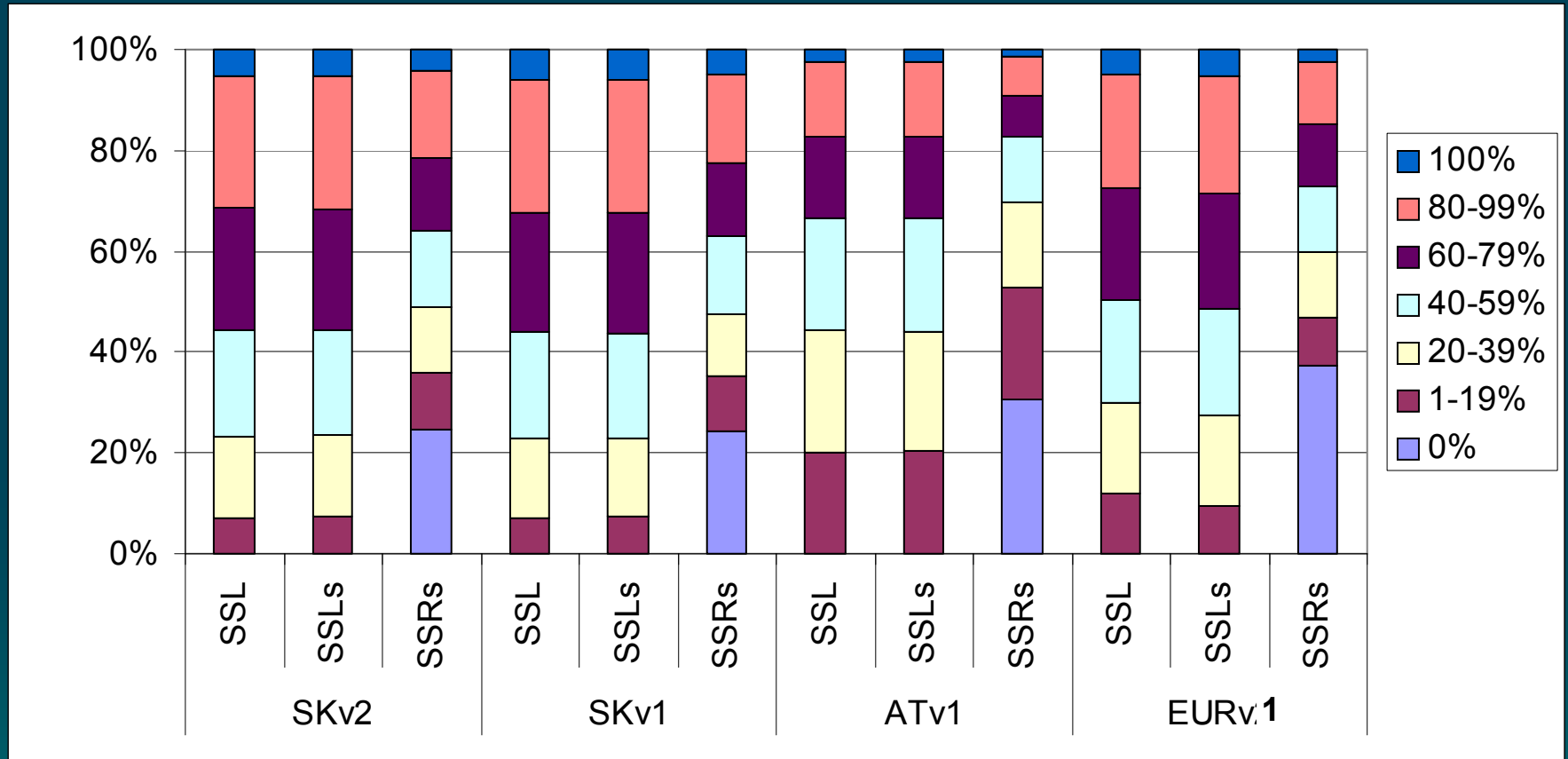
?

France (2500 s.)

Dorelon 2009

$$\text{SSRef} = 2.66 + 0.79 \text{ SSL}$$
$$R^2 = ?$$

The contribution of each of the (SSL defined) classes to the total sealed area of the country (11 countries)



SSL - as derived from the SSL dataset

SSLs - as estimated from the SSL values of the samples

SSRs - as estimated from the reference values of the samples

SKv2 - in Slovakia based on SSL version 2

SKv1 - in Slovakia based on SSL version 1

ATv1 - in Austria based on SSL version 1

EURv1 - in 11 European countries based on SSL v. 1 (Gallego 2010)

Conclusions

- Definition ambiguity – Are forest and agricultural dirt roads, parking and open storage lots without artificial cover (just bare in situ material, e. g. soil, rock) soil-sealed areas?
- **Overestimations** of *larger* SS values in *some* countries
- **Underestimations** of *smaller* SS values in *most* countries
- **Less** frequent errors of *larger* magnitude (mostly **overestimations**)
- **More** frequent errors of *smaller* magnitude (mostly **underestimations**)
- **Overestimation** of the share of impervious surface in areas with more compact settlement pattern (**urban** areas) in *some* countries
- **Underrepresentation** or complete omission of small/dispersed settlements (**rural** areas) in *most* countries, which, however, account for a substantial part of the total area of impervious surface in Europe

Conclusion

About the Soil Sealing Layer (SSL)

Q: Should this new land cover dataset be used in population surface modelling?

A: It should be used, but with caution.

Acknowledge its merits, be aware of its limits.



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Thank you.

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**This research was supported by a Marie Curie Intra
European Fellowship within the 7th European
Community Framework Programme**