The Process of Changing from Local Systems into SWEREF 99

– A Challenge for Lantmäteriet and a Great Step for the Municipalities

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Outline

- Introduction of SWEREF 99 for Swedish geodata
- The background with local control networks in Sweden
- Lantmäteriet has developed tools to…
  - perform so-called *direct projection*
  - analyse distortions of local control networks
  - create a correction model to handle the distortions
- Concluding remarks

Initial Work on National and Local Level

- Implementation of SWEREF 99 as national reference frame for GNSS was done in 2001 and is used for production of maps and data bases since 2007
- Lantmäteriet recommends local authorities to use the national reference frame
- Project ’RIX 95’
  - Calculate transformation parameters: local systems ↔ SWEREF 99
  - Establish new, easily accessible control points

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Swedish National Geodata Strategy

One of eight Strategic Goals:

- "*All bodies that produce, manage, provide and use geodata should utilise the national geodetic reference systems, SWEREF 99 and RH 2000.*"

In line with the INSPIRE directive, where it is prescribed that data exchange should be done using ETRS89 and EVRS.

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Background – Local Reference Frames

- Old local reference frames
  - Not strongly linked to national reference frame
  - Frames are often distorted, due to the way the networks are established
  - More or less every local authority has had its own reference frame
- Each municipality is responsible for its own control networks
  - Lantmäteriet can only give advise

Transformation Method for Local Systems

- Transformation parameters from RIX 95 project are mainly based on *direct projection*; in some cases combined with similarity transformation in two or three dimensions
  - LMV-rapport 2010:1 – Reit: *On geodetic transformations*
- Different rectification methods have been tested → the most suitable method – interpolation of residuals in Delaunay triangles – was chosen
  - LMV-rapport 2002:5 – Alfredsson: *Studies of Distortions When Changing Co-ordinate System* (in Swedish)
  - Kempe et al.: *Correction Model to Rectify Distorted Co-ordinate Systems*, FIG XXIII International Congress, Munich 2006

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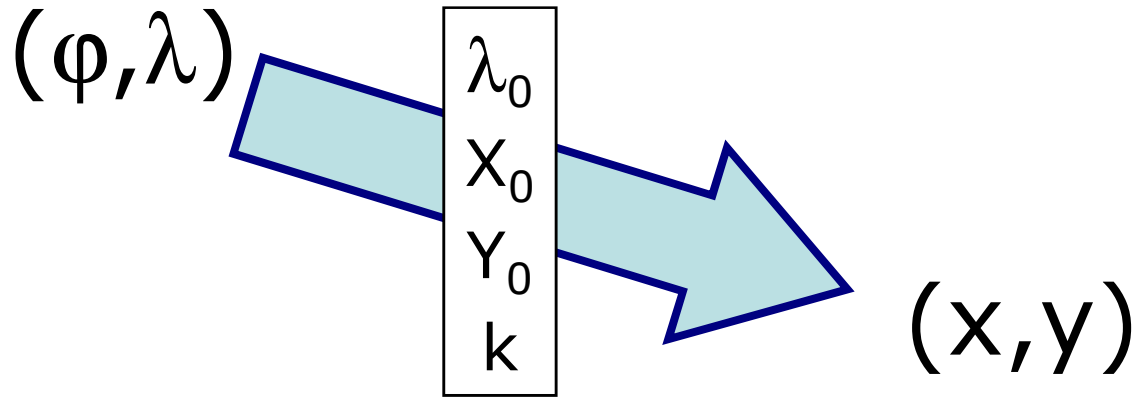
Direct projection

…makes it possible to shorten the transformation sequence.

A set of Transverse Mercator parameters are estimated to fit geodetic coordinates with grid coordinates.



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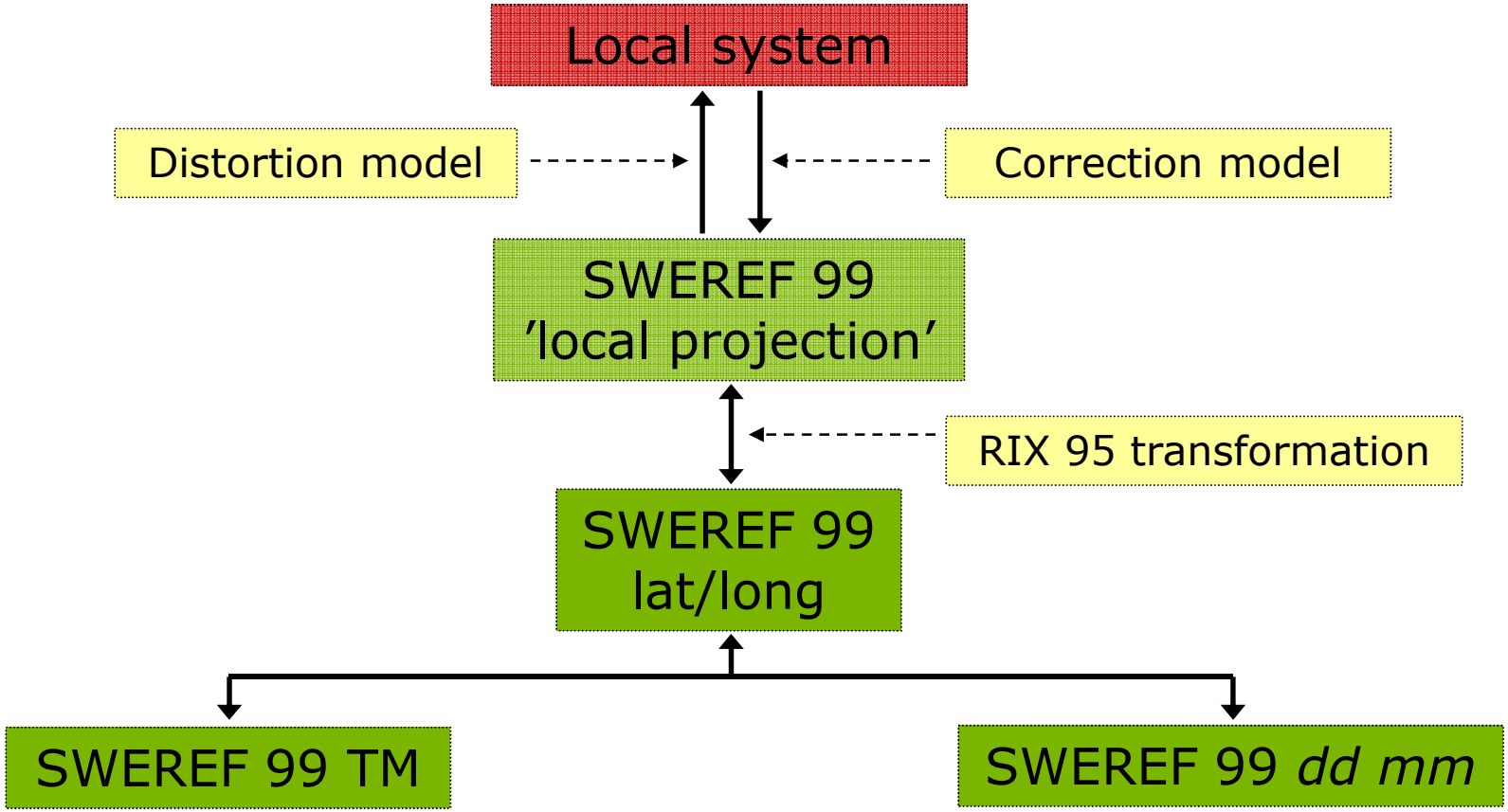
Transformation of Local Systems



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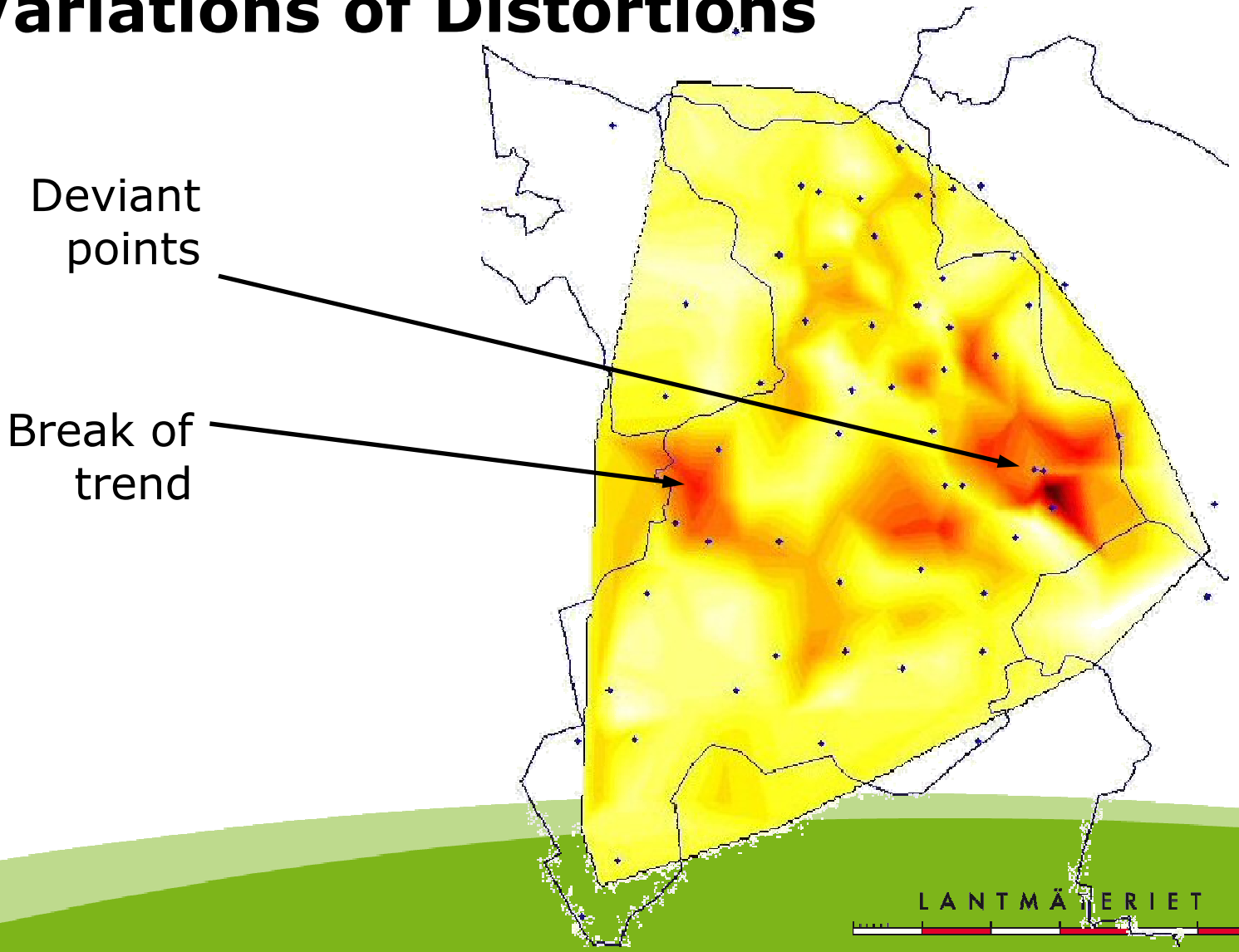
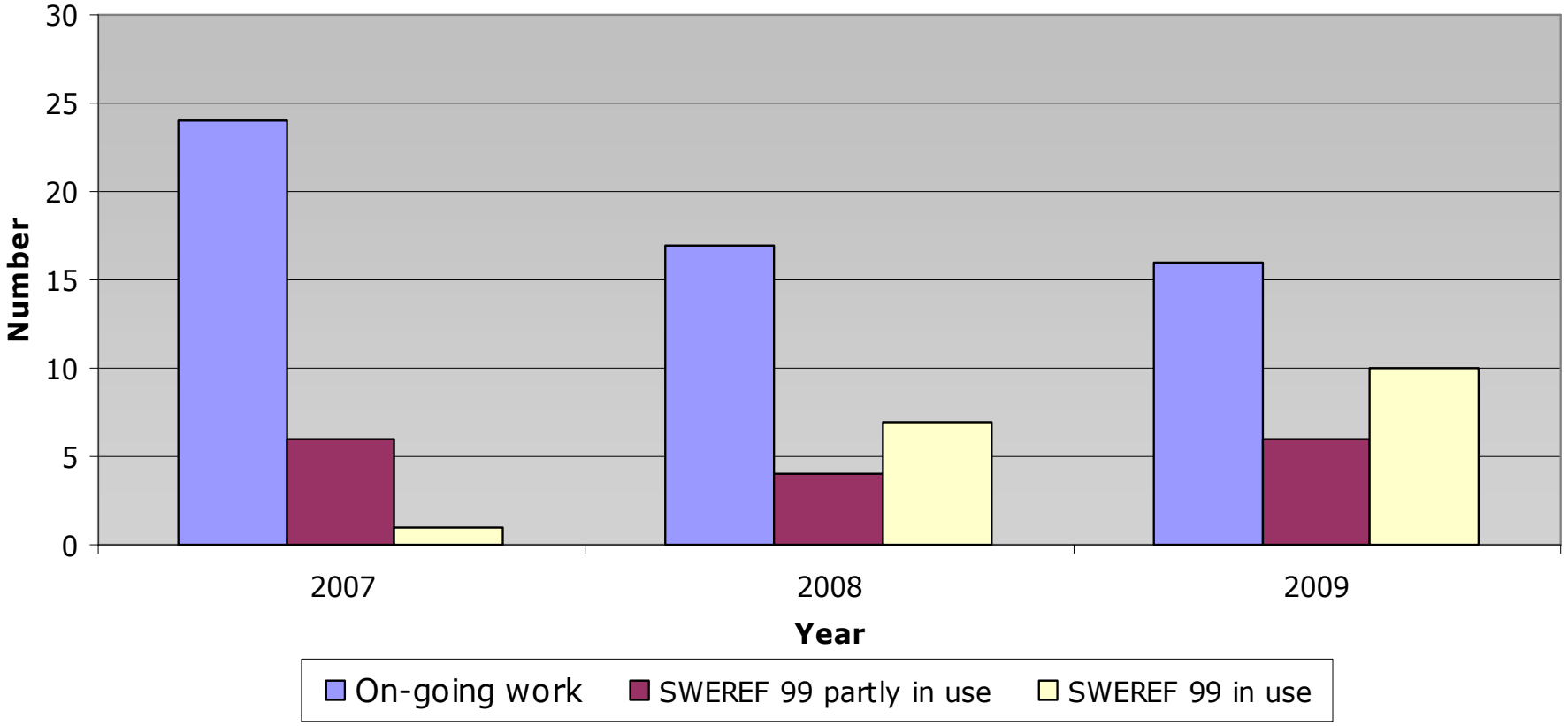
Variations of Distortions



Introduction of SWEREF 99 in Other Governmental Agencies



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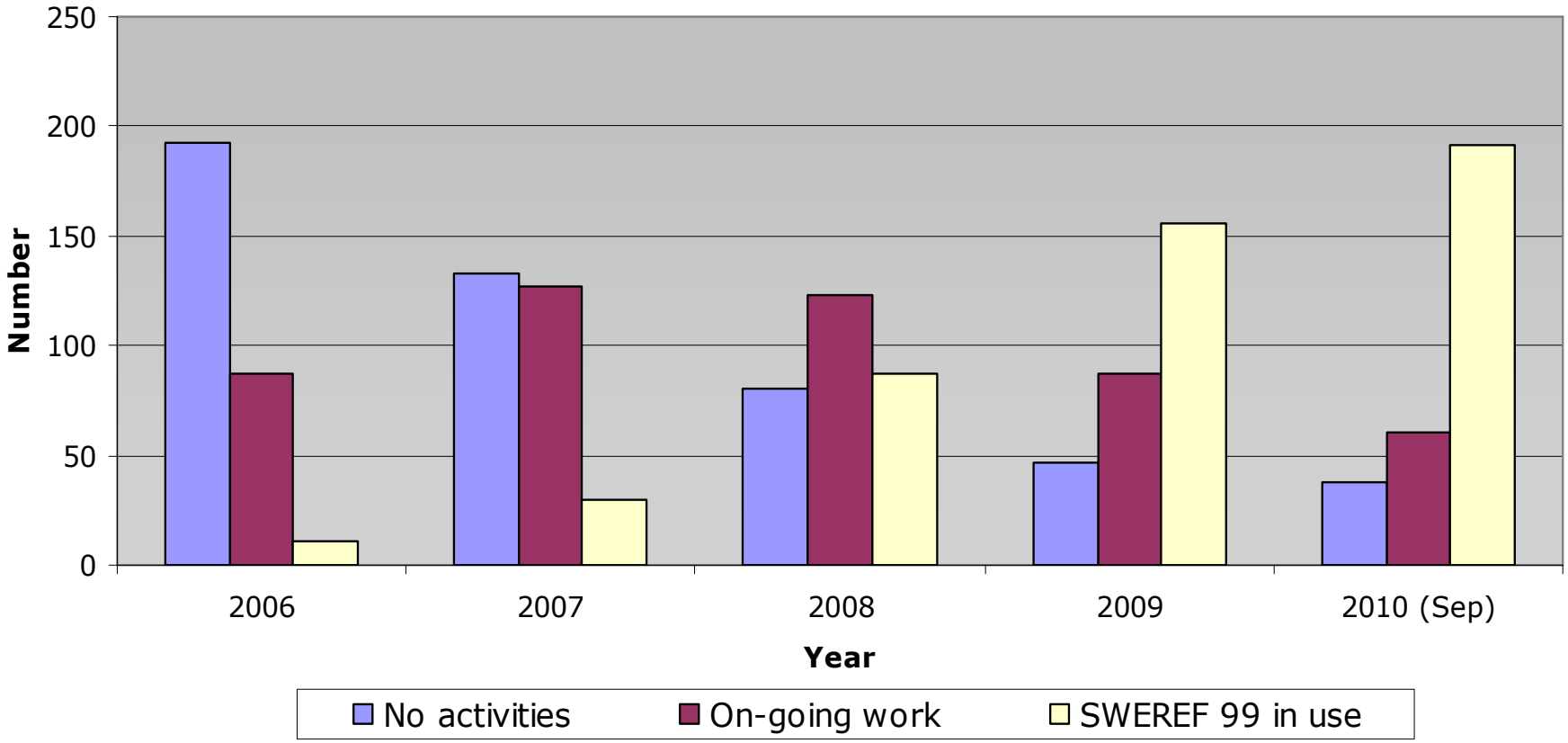
Introduction of SWEREF 99 in the Municipalities



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Concluding remarks

- SWEREF 99 seems to be accepted more quickly by the municipalities (local authorities) than by the governmental agencies
- The correction method chosen – simple interpolation in Delaunay triangles – has, so far, produced correction models good enough for their purposes
- Introduction of the new height system RH 2000 is ongoing, but at a slower pace

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Thanks for your attention!

More information can be obtained from our website

- www.lantmateriet.se/refsys
- www.lantmateriet.se/geodesi