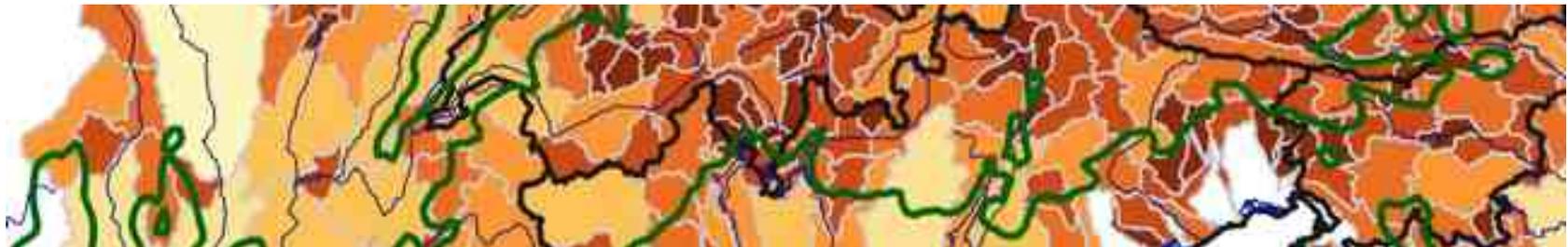


# Uncertainties in precipitation analyses for Alpine catchments and their use for evaluation

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# Scale

- Point / Area – areal support?
- Skill of a model (a reanalysis) depends on scale
- Scale-dependent evaluation informs about interpretation
- Scales of interpolation datasets are poorly known
- Risk that scale inconsistencies affect evaluation  
Osborn & Hulme 1997, Tustison et al. 2001, Göber et al. 2008, ...

>> *Spatial interpolations at several and well-defined space scales*



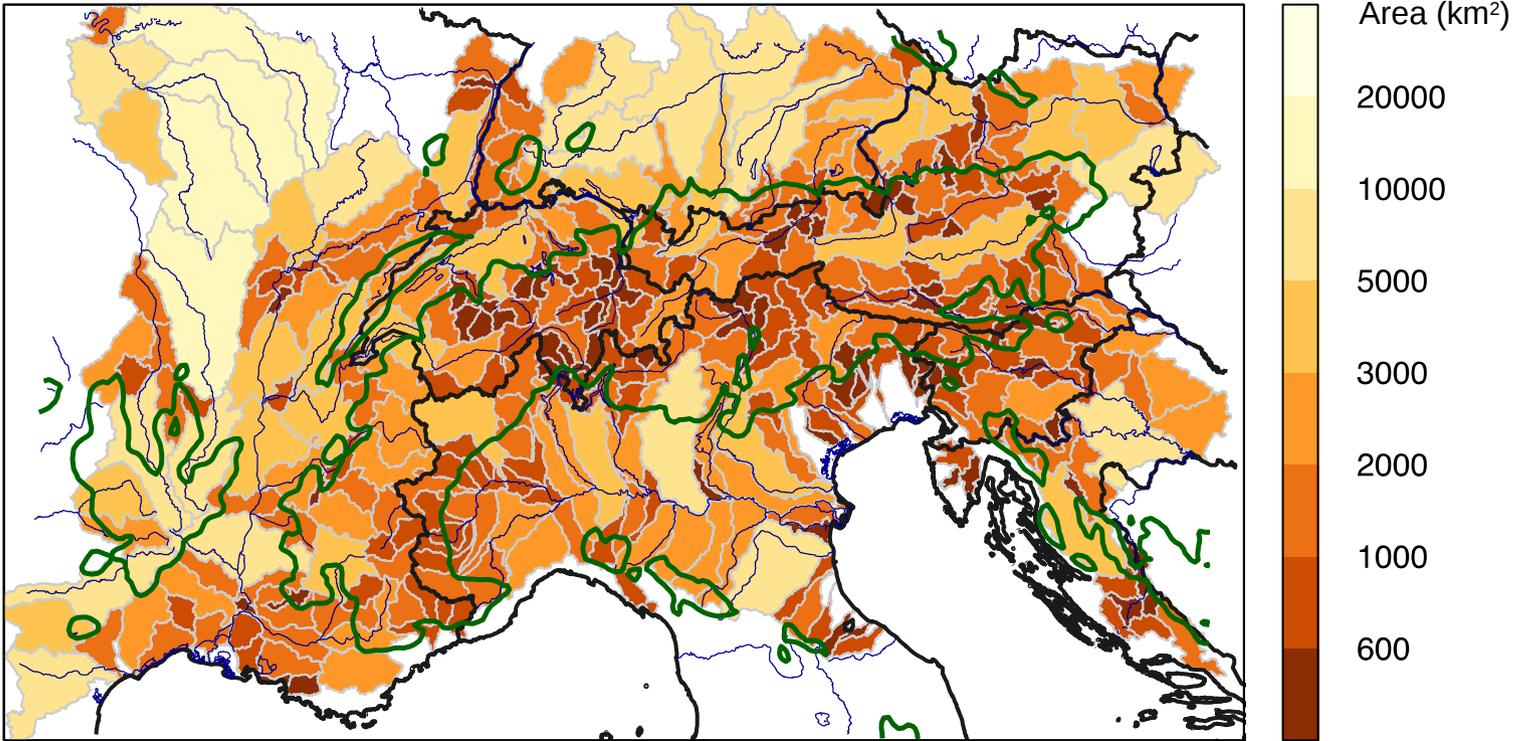
# Uncertainty

- Spatial interpolation is uncertain (systematic & random)
- Uncertainties depend on scale
- Can only talk about uncertainty if scale is specified
- Cross-validation measures uncertainty at *points* only
- Evaluation requires uncertainties at scales larger than points (one/several grid pixels).

>> Procedures to estimate uncertainties at several scales  
(statistical modelling)



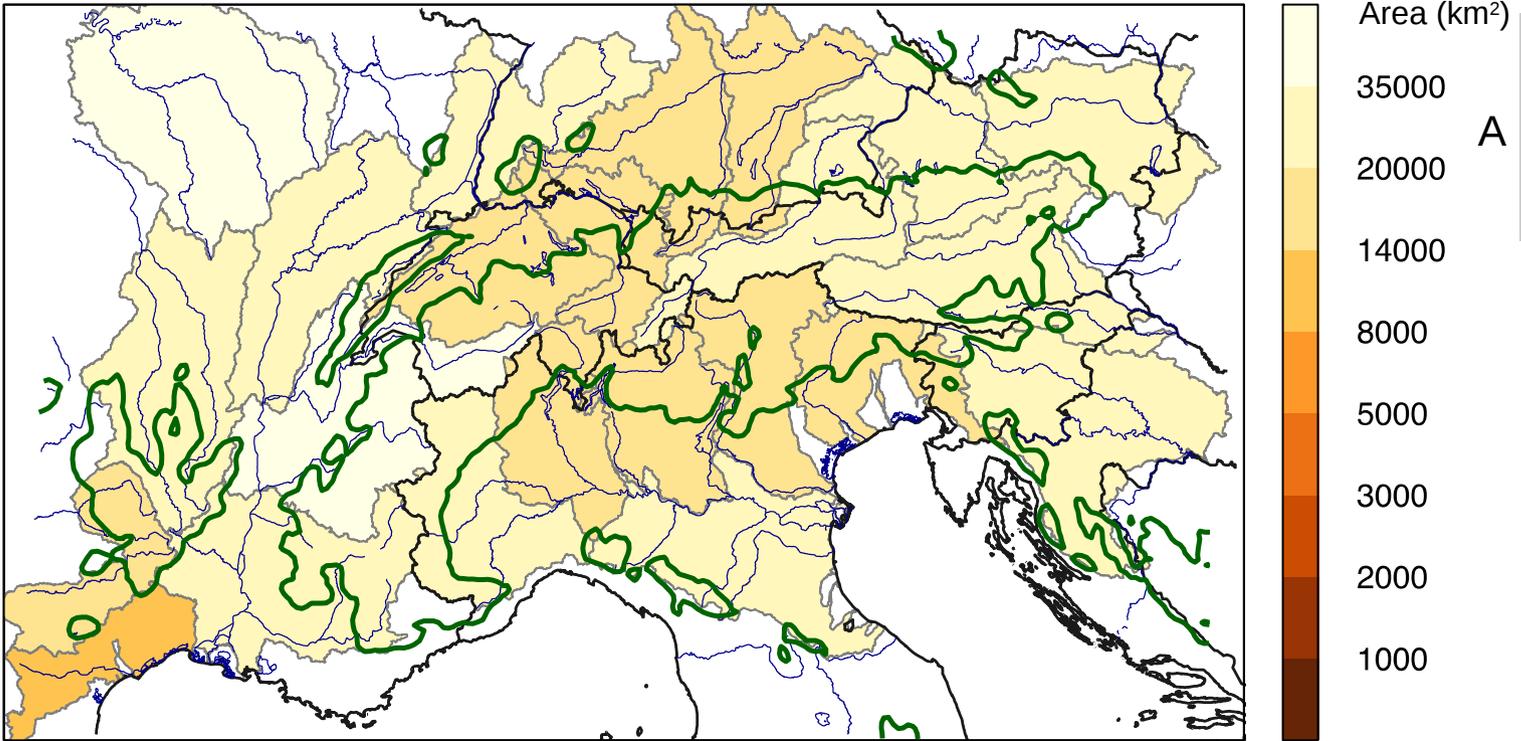
# Hydrological Units in the Alps



European River Catchments Dataset of EEA [\[link\]](#)  
336 elementary hydrological units in Alpine domain



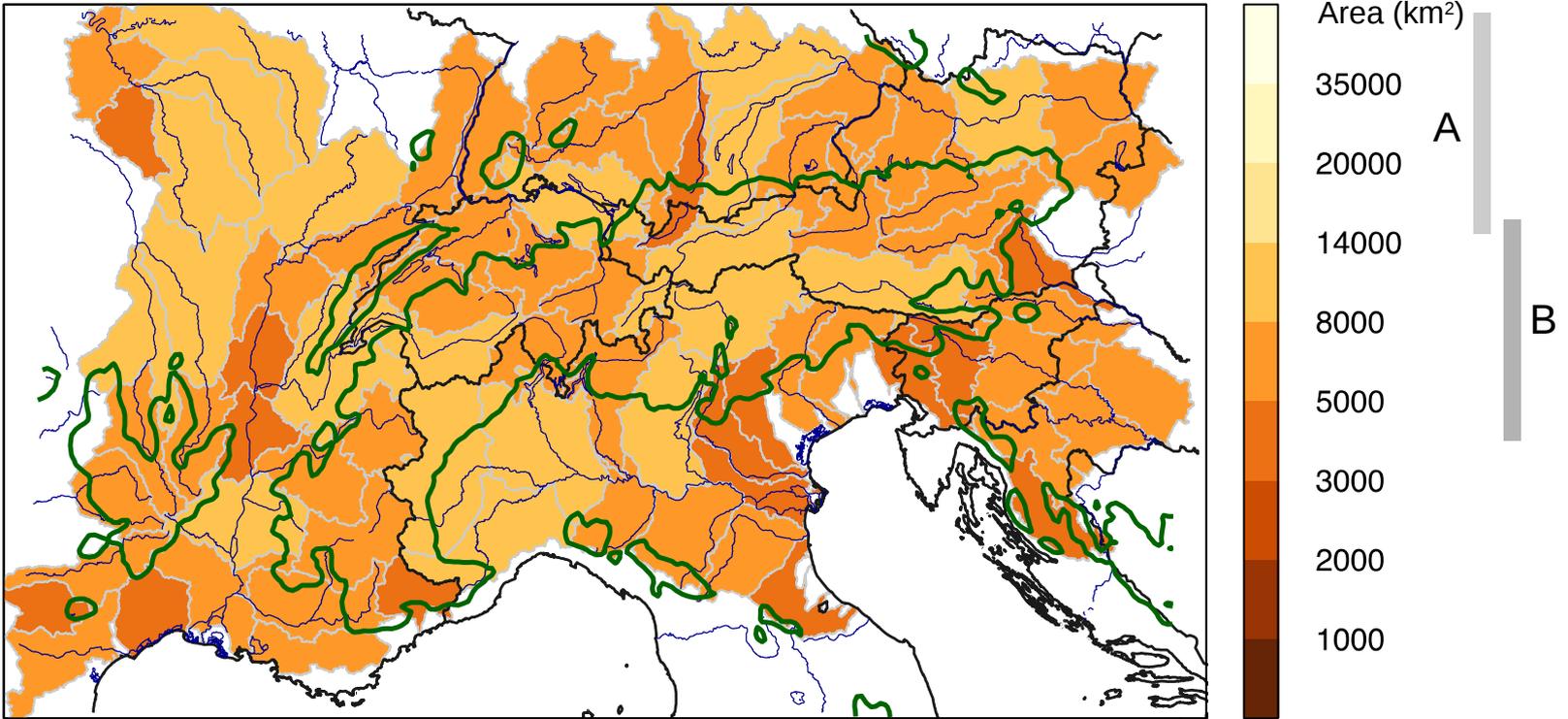
# Scale A



23 units, area: 14'000-44'000 km<sup>2</sup> (25-75 grid points)



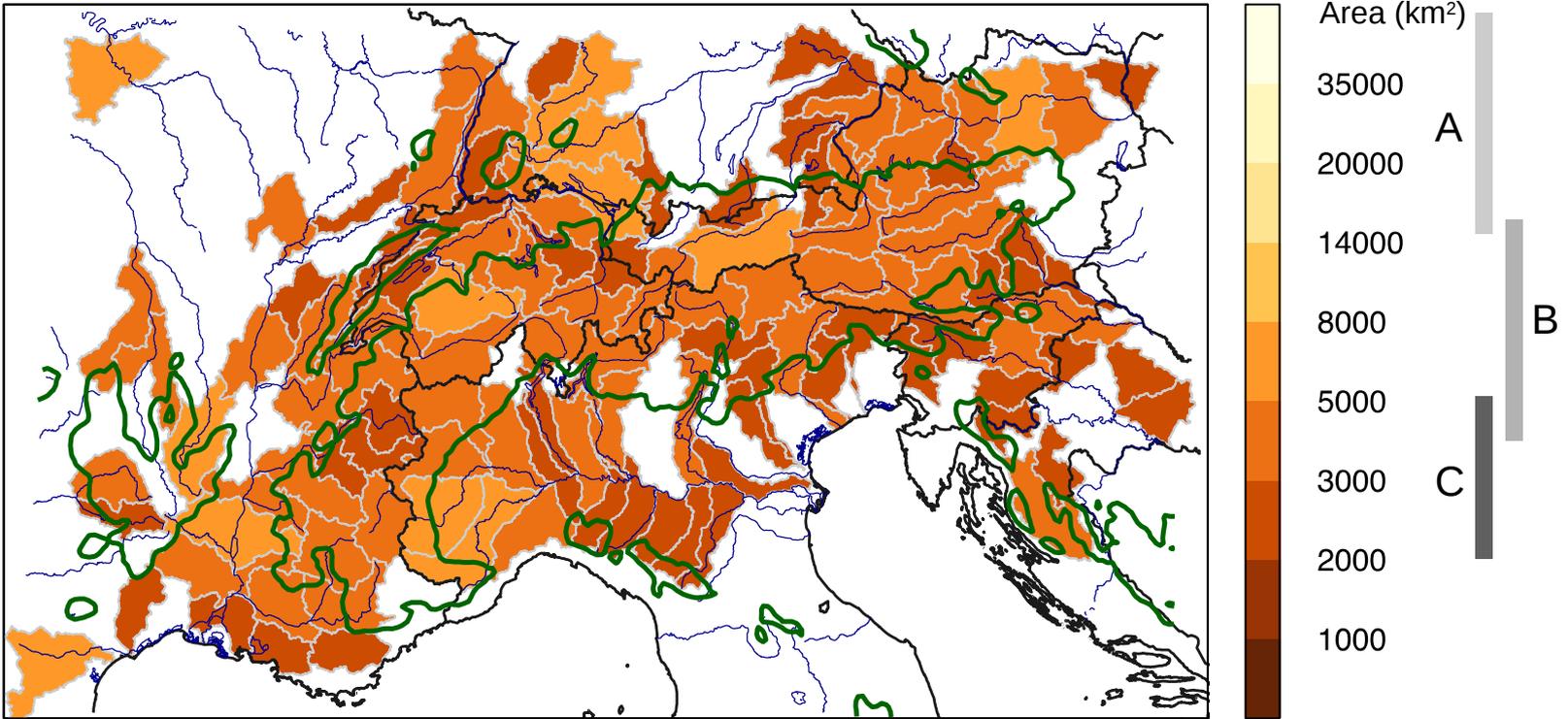
# Scale B



78 units, area: 3'500-14'000 km<sup>2</sup> (6-20 grid points)



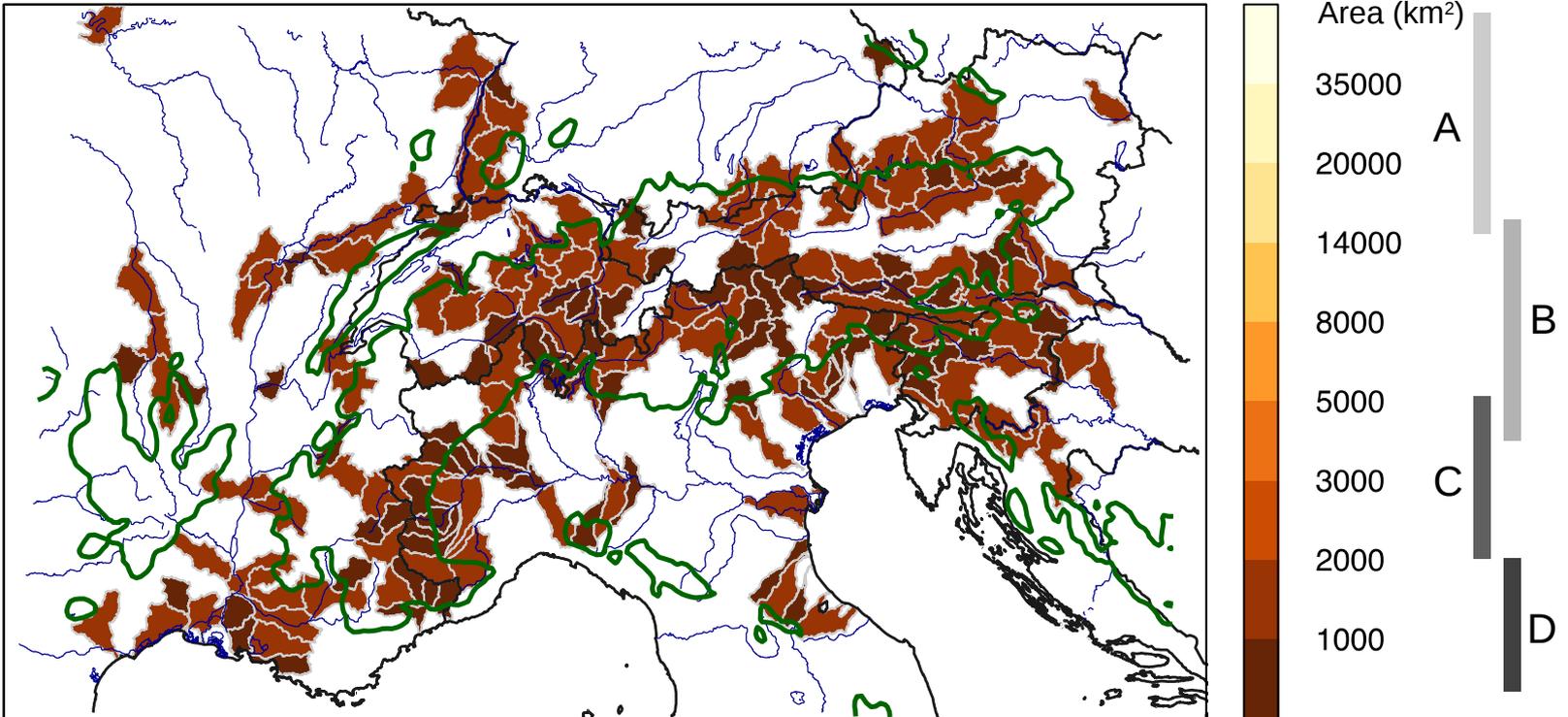
# Scale C



113 units, area: 2'000-5'000 km<sup>2</sup> (3-8 grid points)



# Scale D



185 units, area: 500-2'000 km<sup>2</sup> (1-3 grid points)



# Probabilistic “Polygoning”

- Estimate pdf of daily area-average precip over polygons, conditional on point observations in the neighbh.
- Capture dependencies of interpolation uncertainty on
  - spatial variance of precipitation (day-to-day)
  - station density
  - area of hydrological unit (scale)
- Sources of Uncertainty
  - Measurement Errors (to be considered later)
  - Interpolation Errors



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