Dutch Fog

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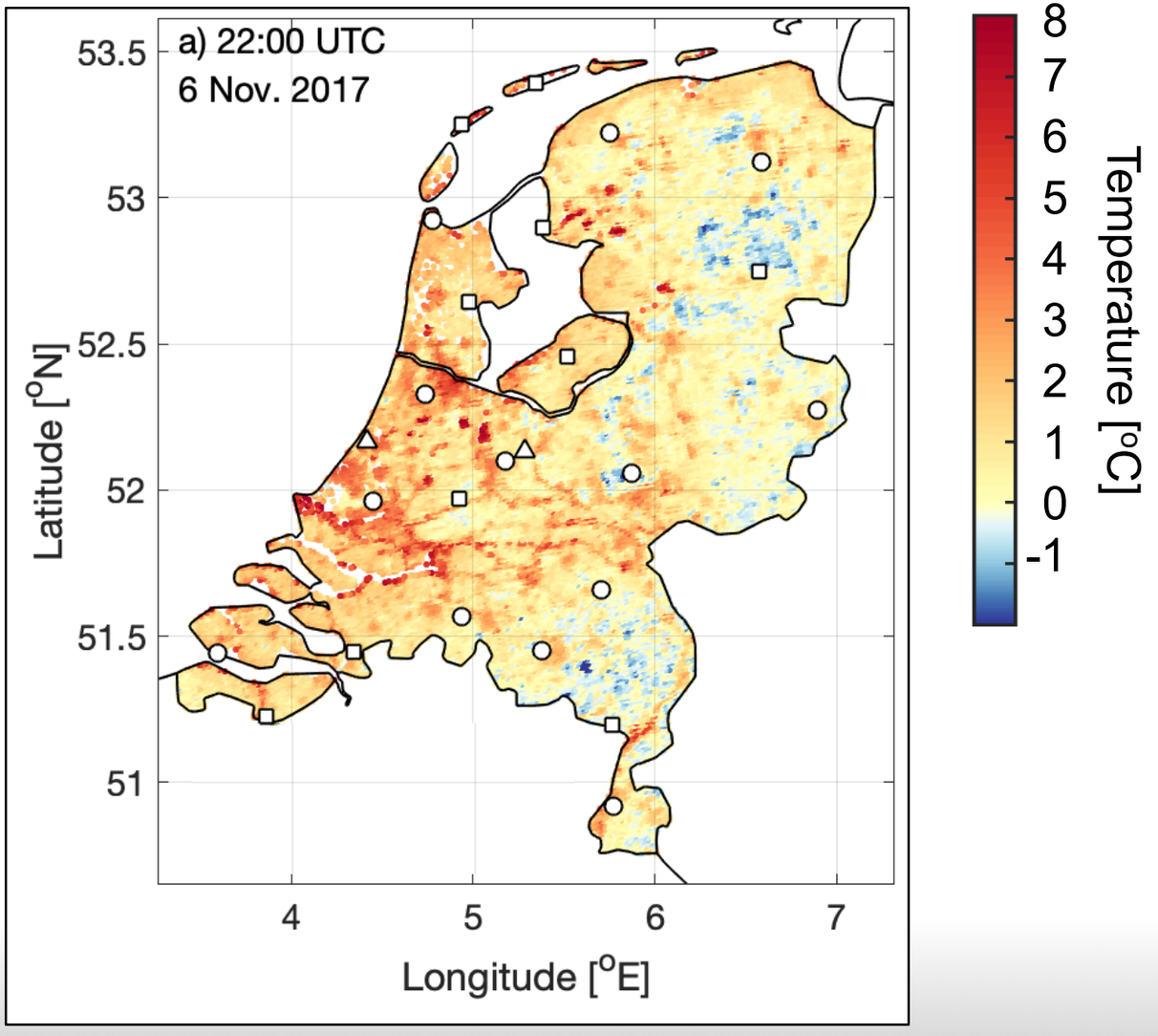
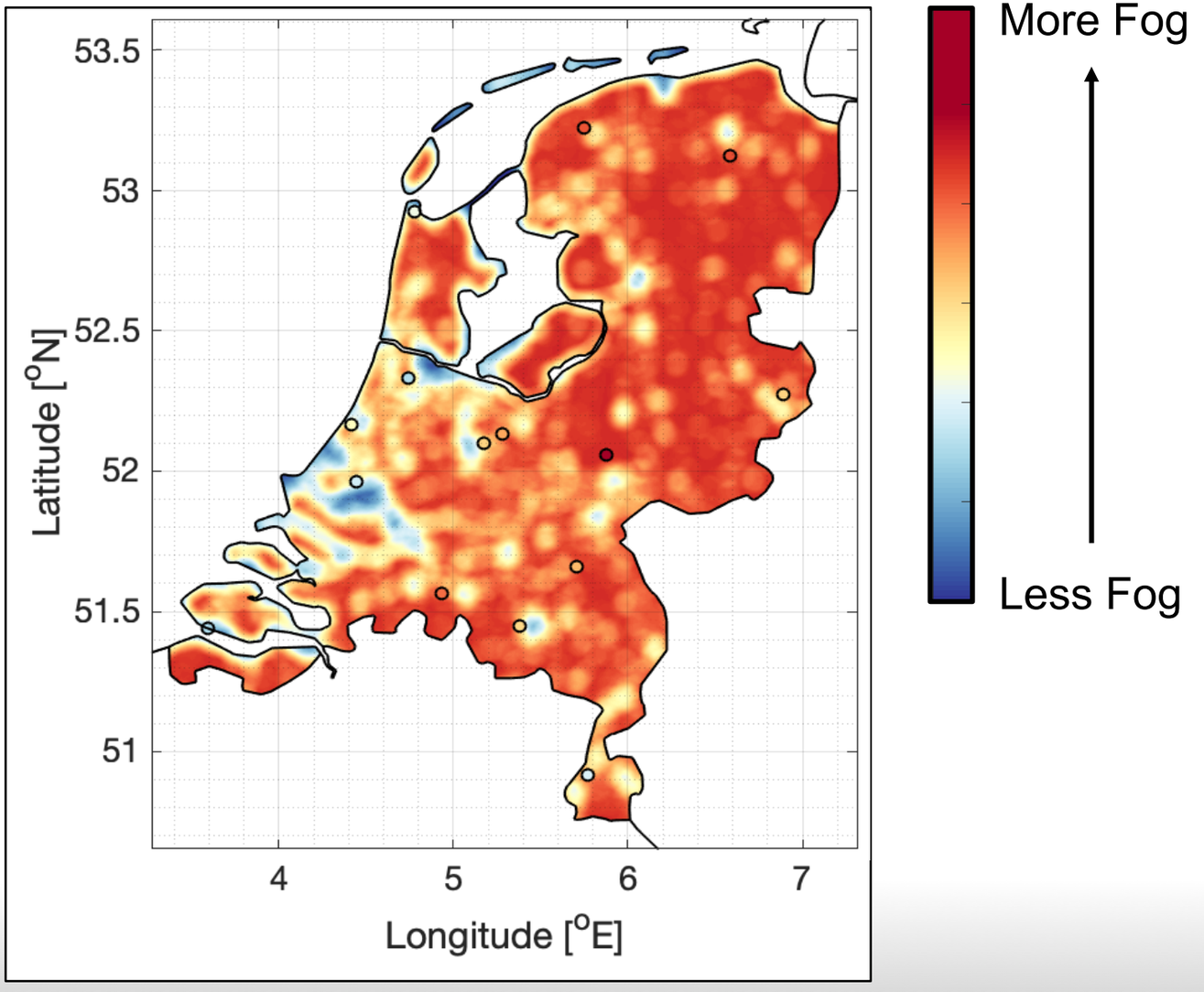
Dutch Nocturnal Temperature.



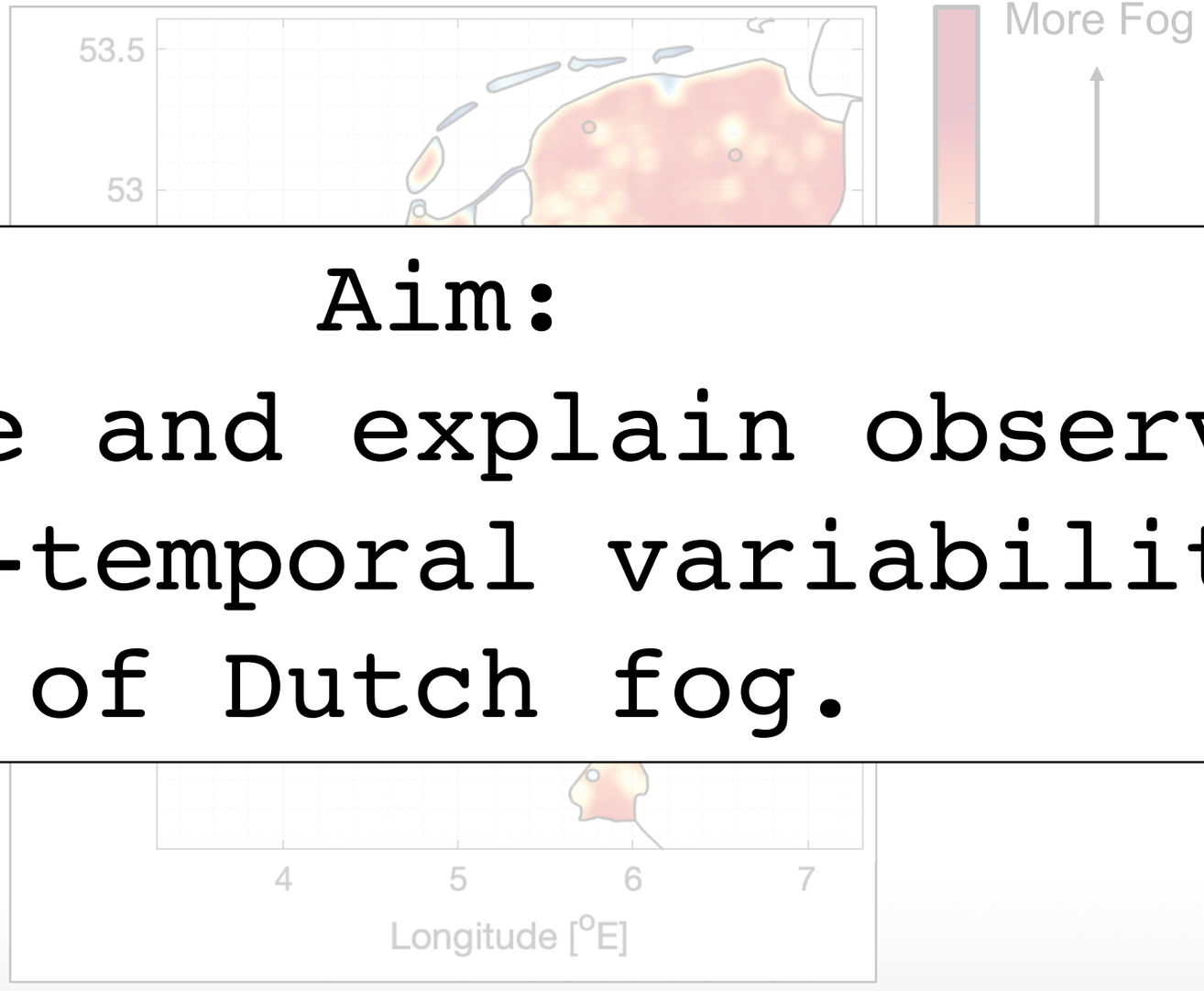
Near-surface temperature highly variable.

Dutch fog.



Fog climate variable throughout the country.

Dutch fog.



Aim:

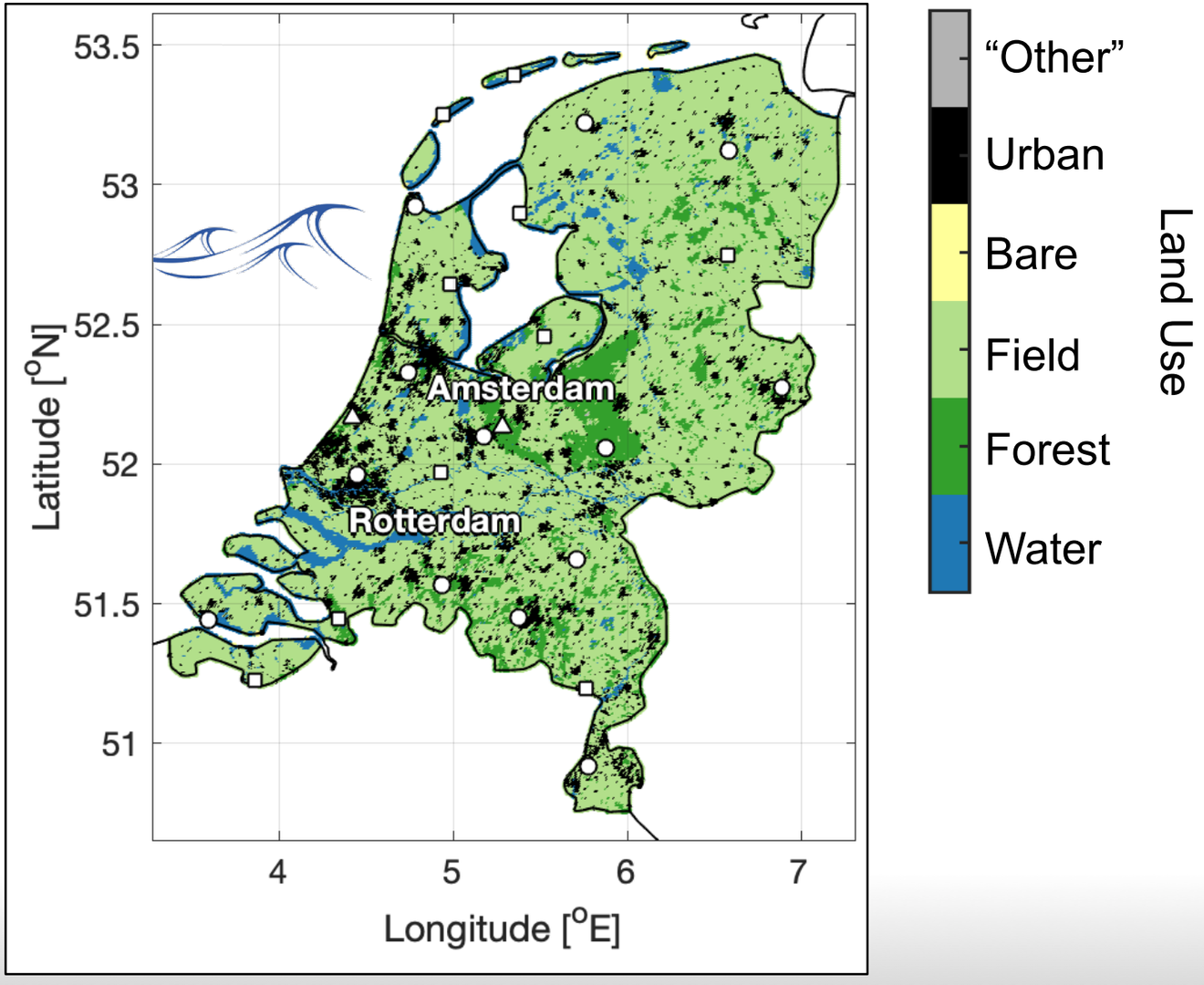
Describe and explain observed spatio-temporal variability of Dutch fog.

Fog climate variable throughout the country.

What leads to spatial variability?

Variability in the absence of topography.

What leads to spatial variability?



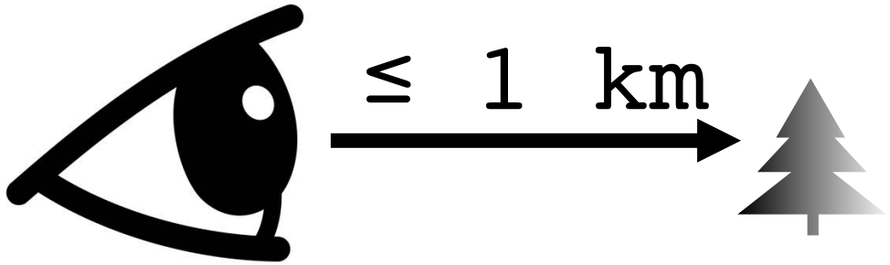
Variability in the absence of topography.

Observational Data.

Hourly observations from 1955-2000

Definitions

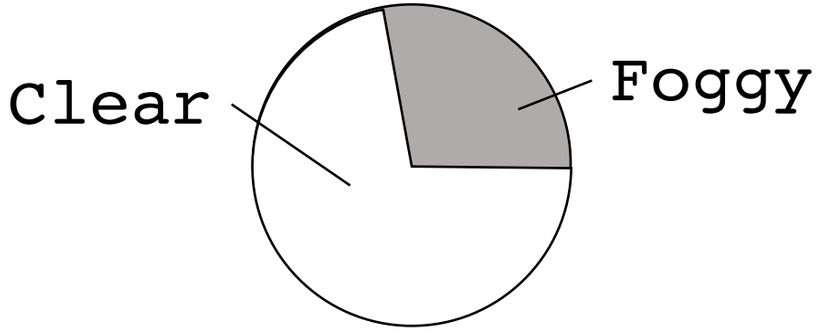
FOG:



≤ 1 km

(all types)

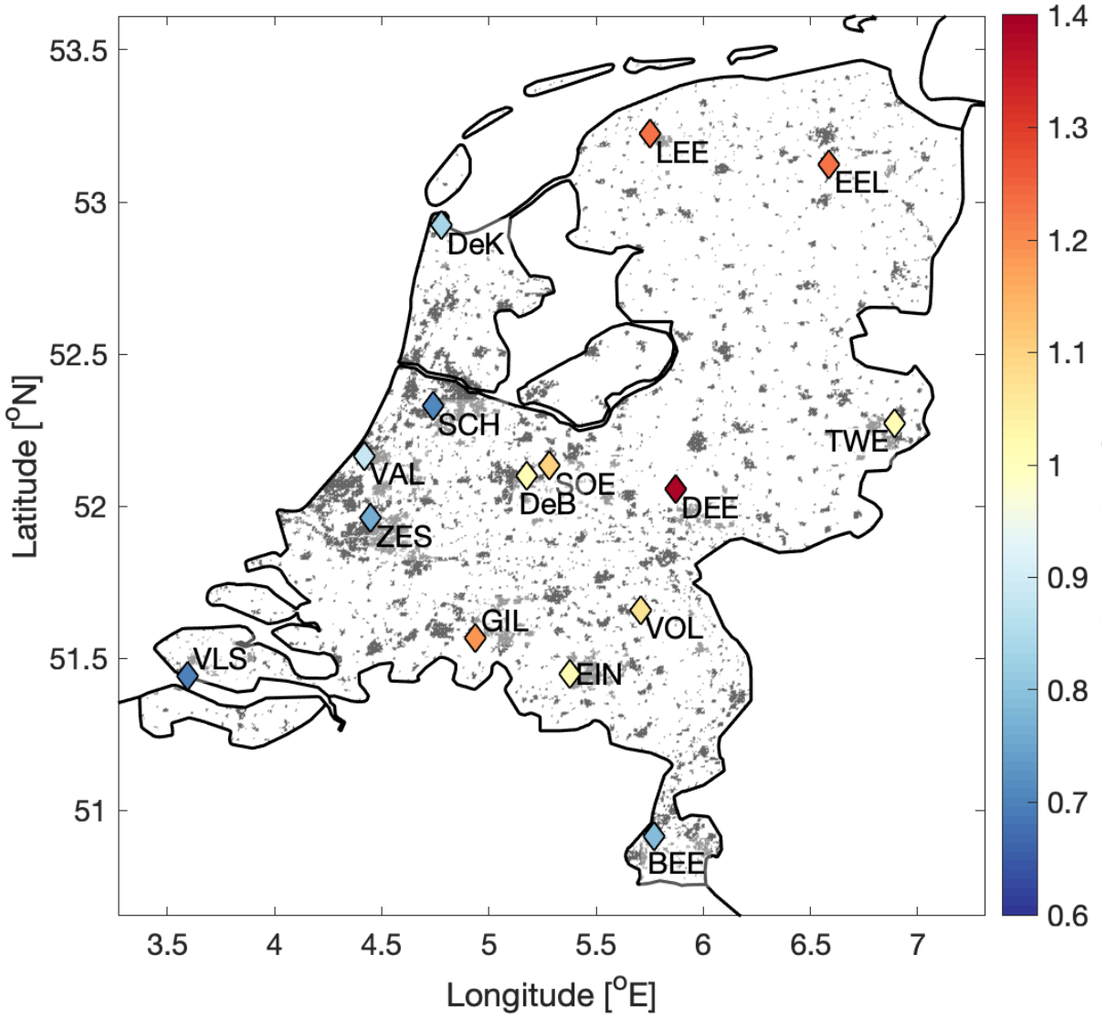
FOG FRACTION:

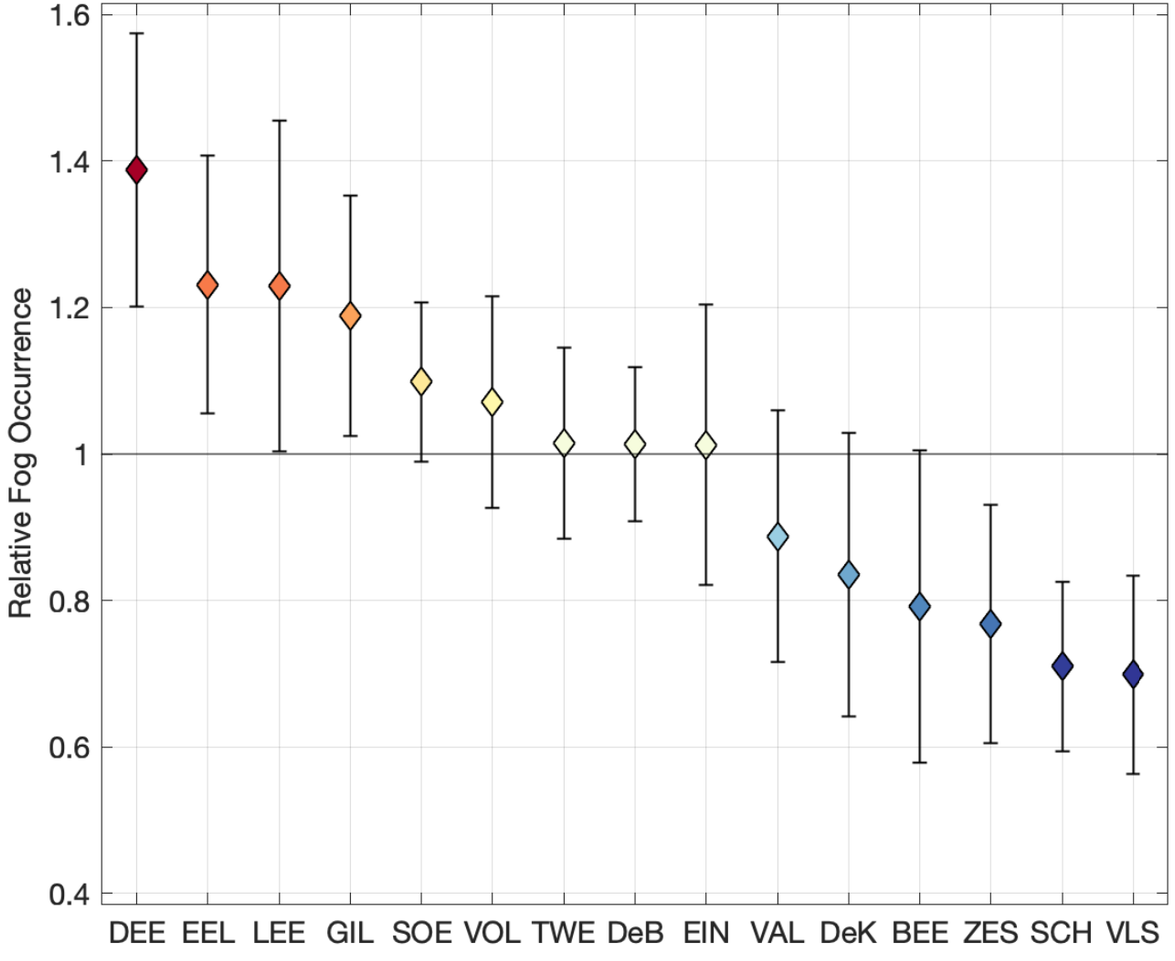


RELATIVE FOGGINESS:

Dutch mean

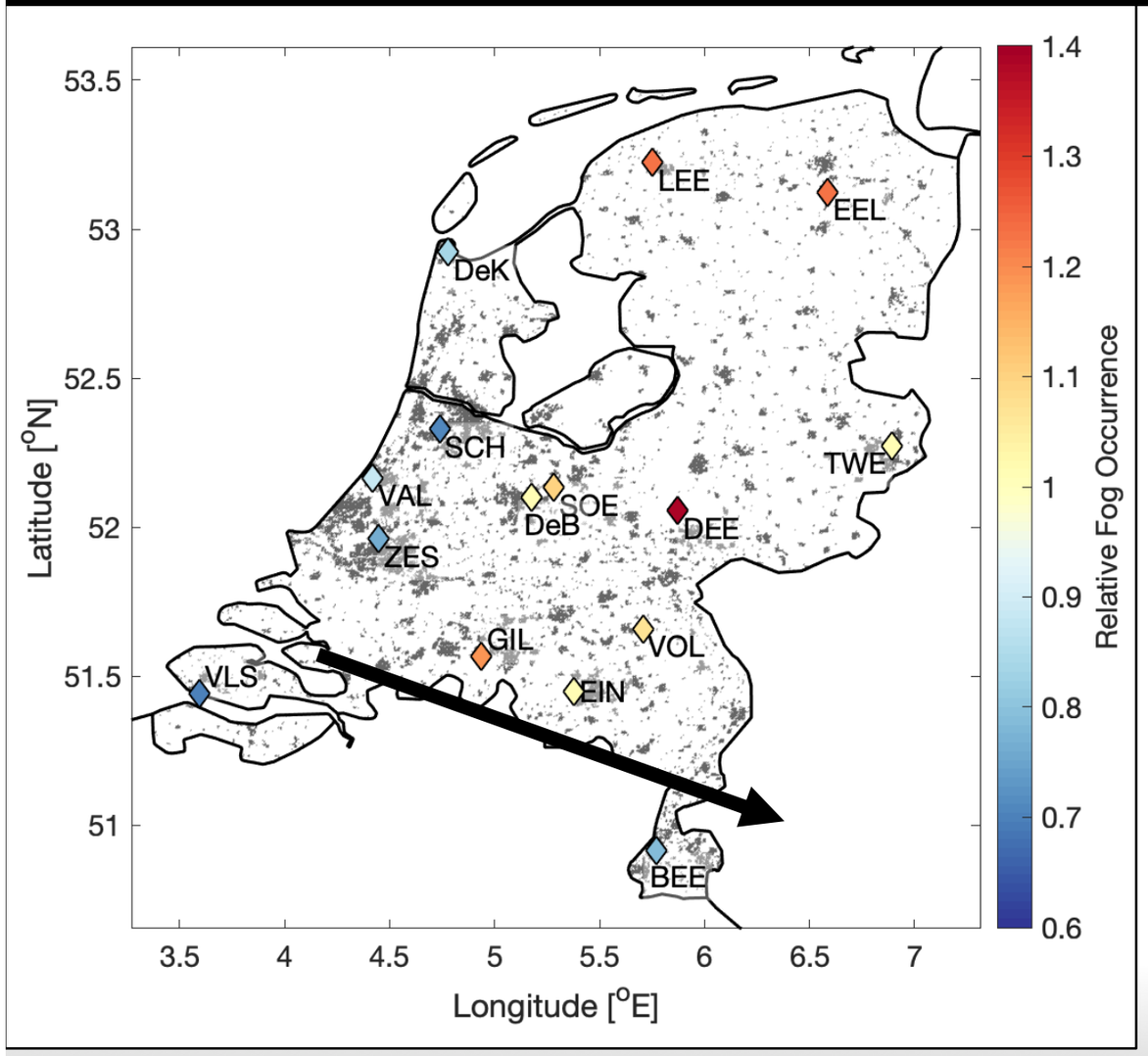
Factor of two difference in fog occurrence.





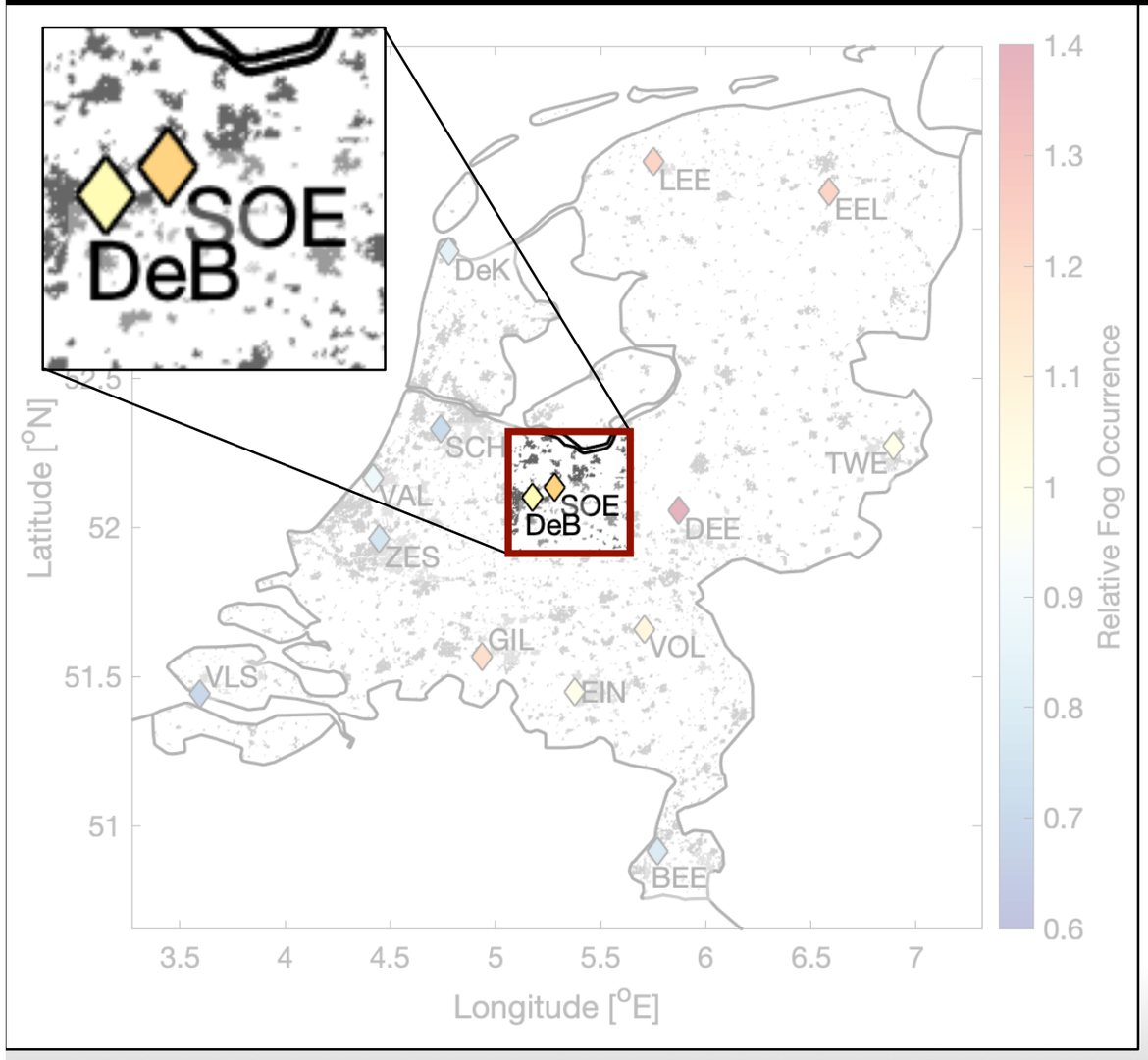
What explains this (mesoscale) variability?

Coastal effect.



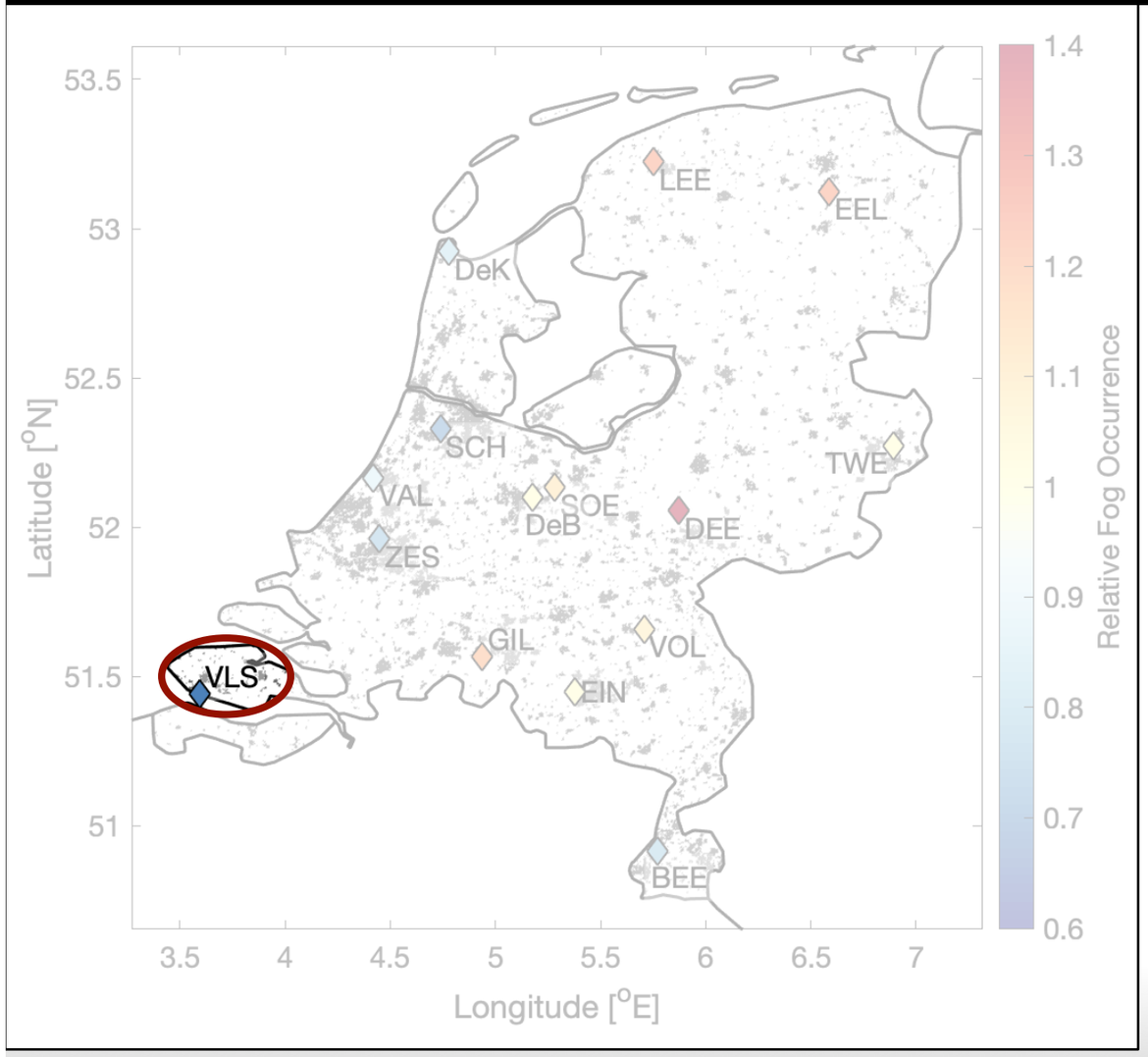
Fog Occurrence
Increases Inland

More Urban = Less Fog



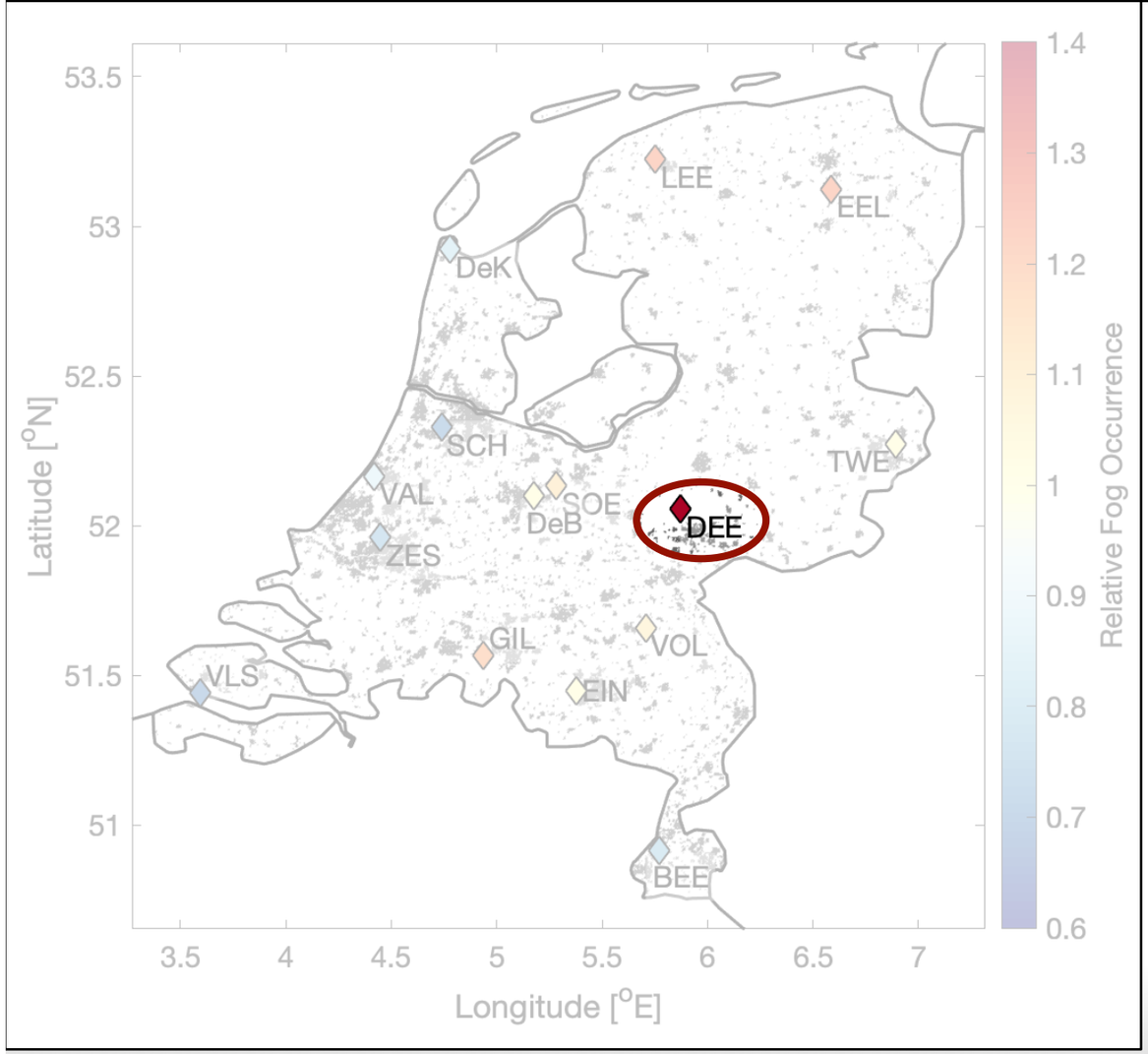
7 km apart, 10% difference in fog.

Regional variability explained.



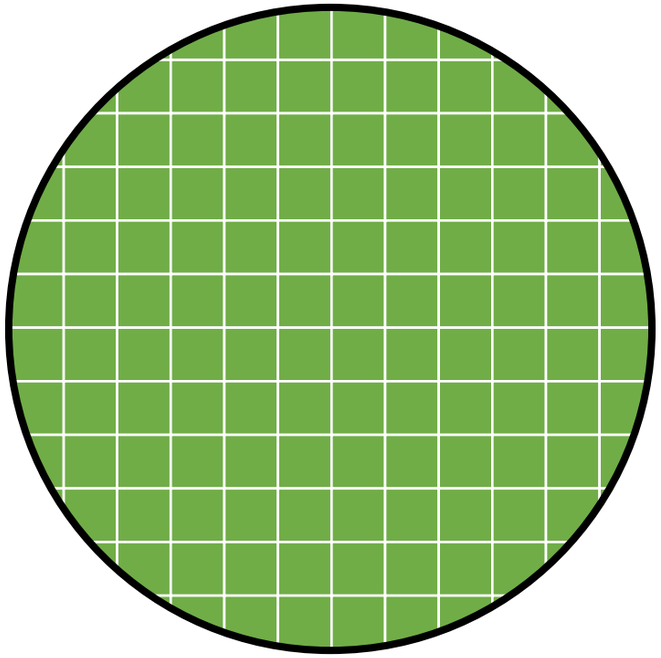
- Least fog at Vlissingen
- Coastal-urban setting

Regional variability explained.



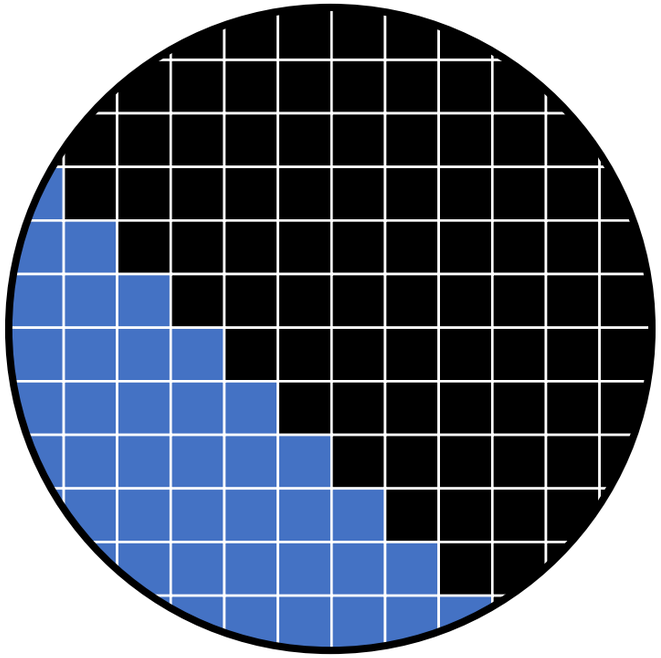
- Most fog at Deelen
- Located in forest clearing near largest national park

Regional Weighting Index (*RWI*)



- Want a way to describe regional land use

Regional Weighting Index (*RWI*)



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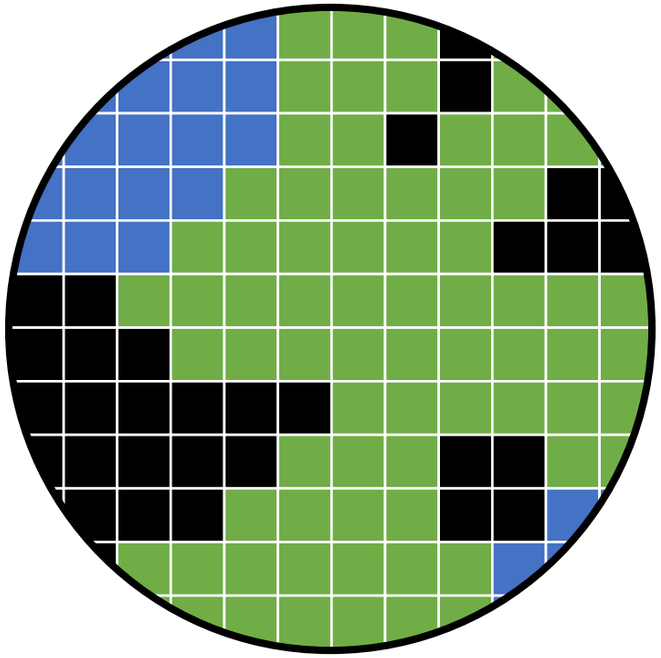
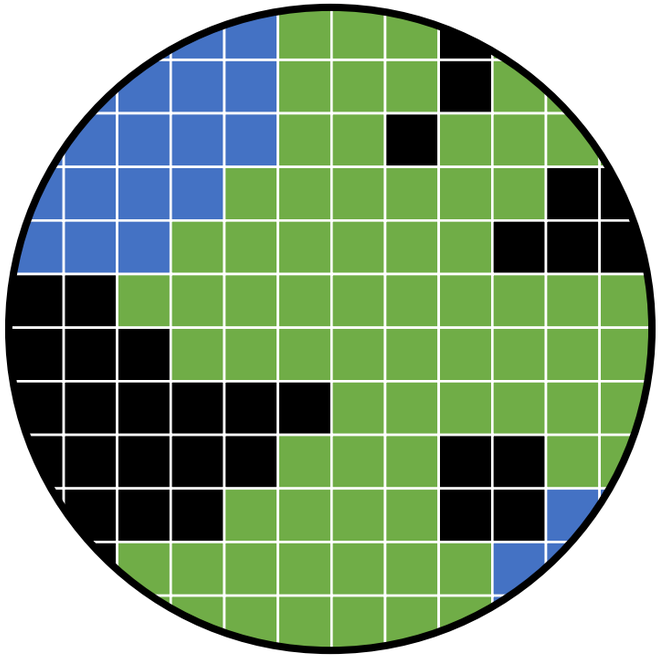
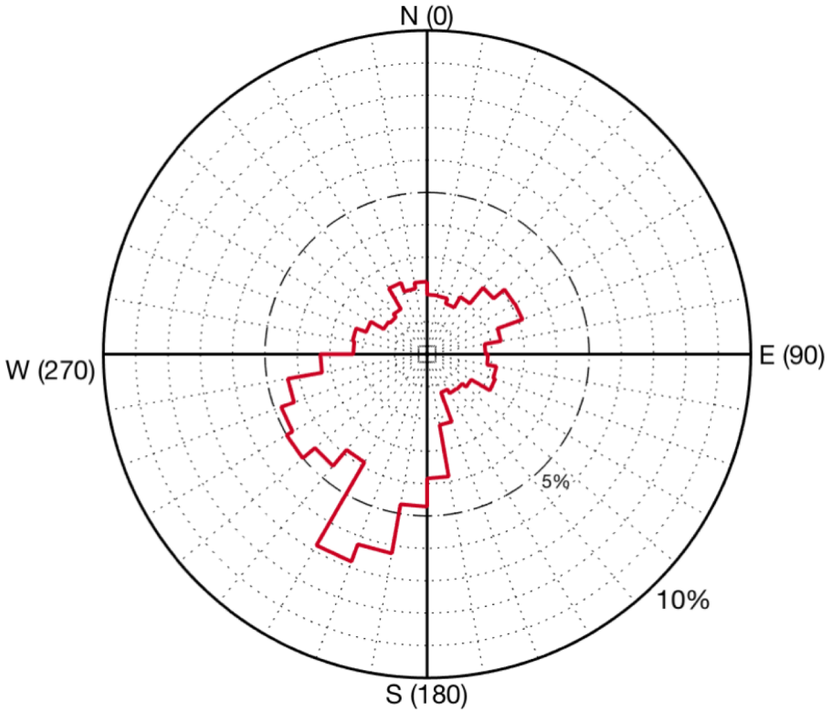
Regional Weighting Index (*RWI*)



- Fraction of surrounding area that is either urban or ocean

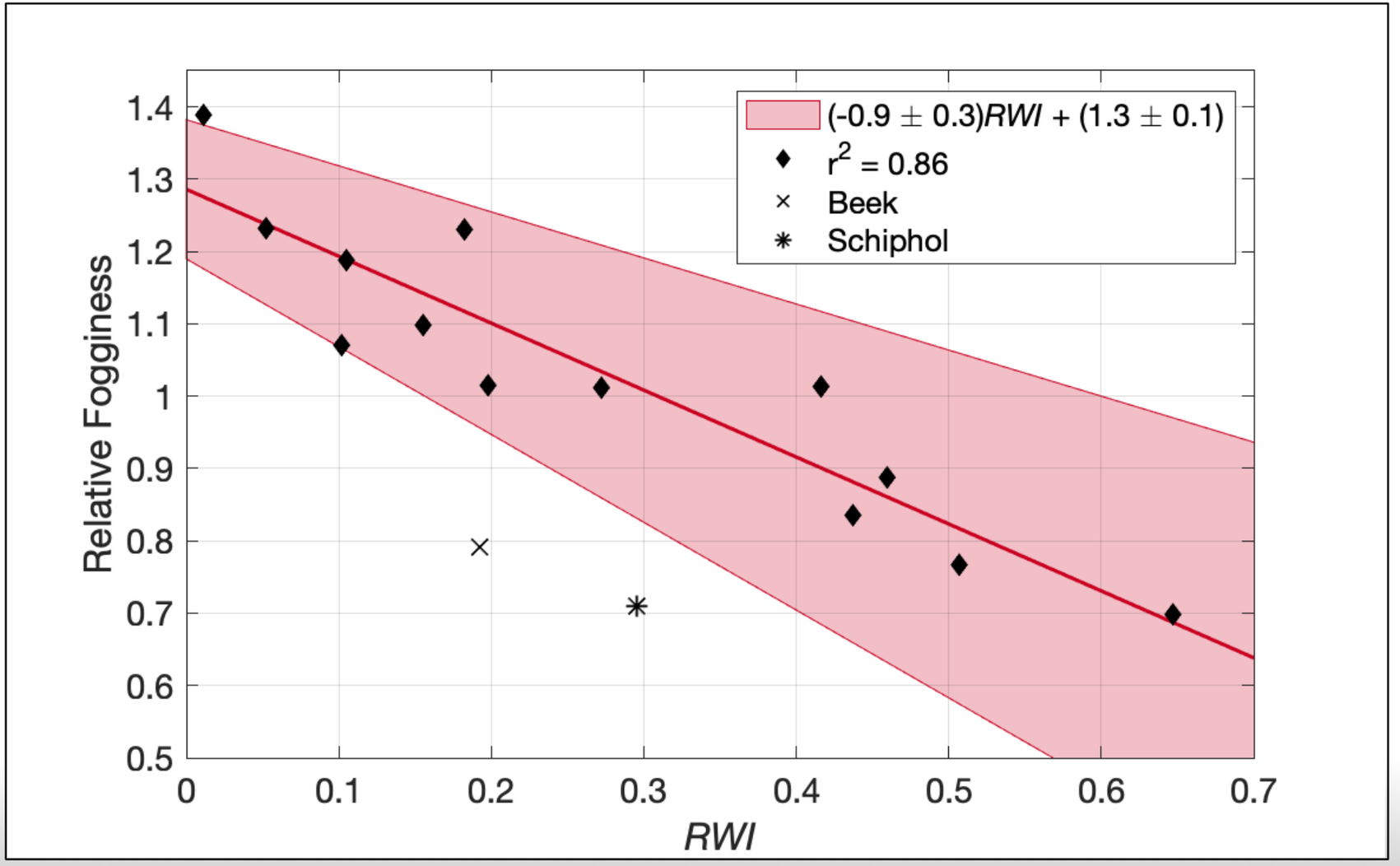
Regional Weighting Index (*RWI*)





- Fraction of surrounding area that is either urban or ocean, weighted by weak-wind distribution

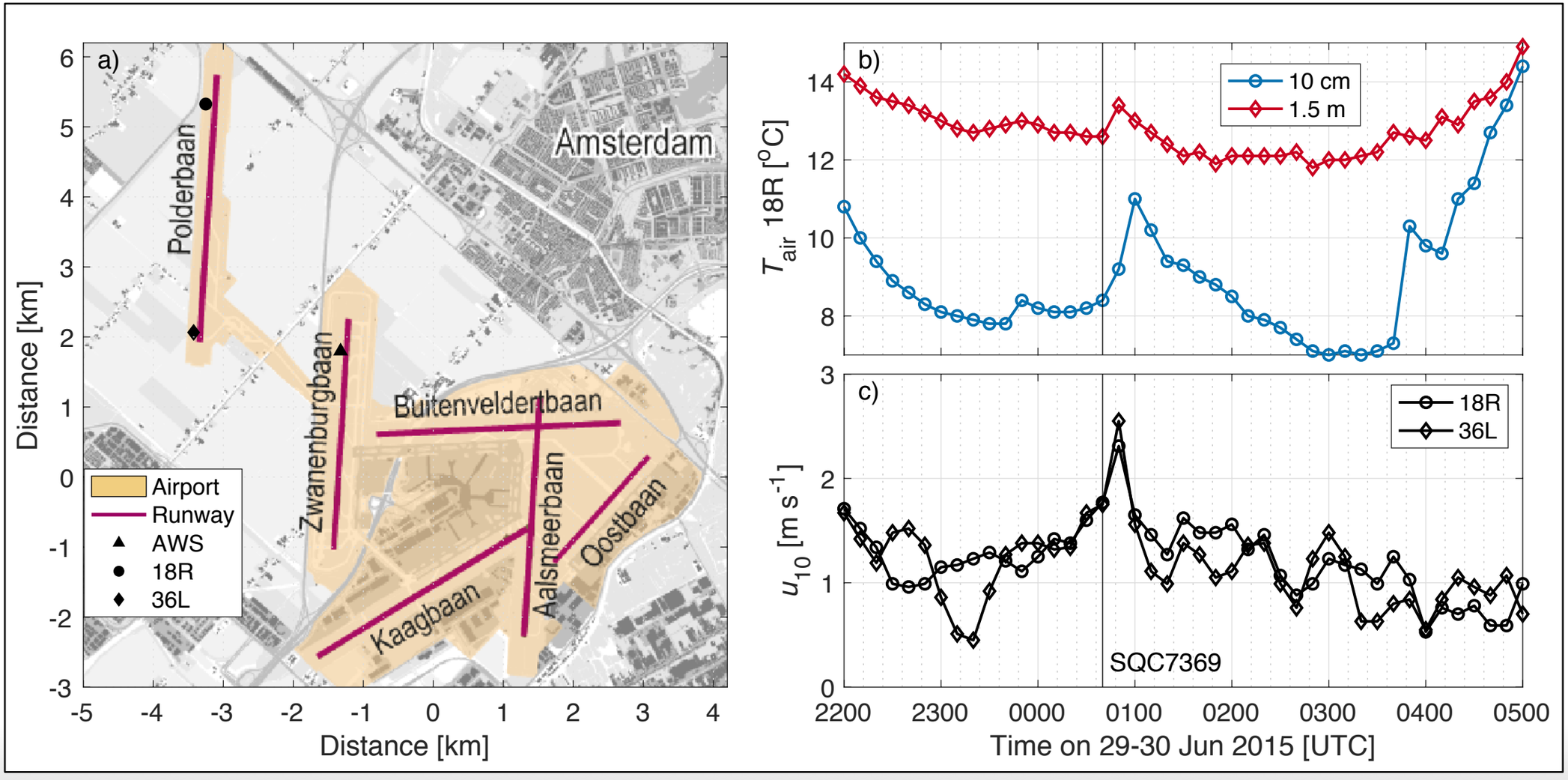
Relative fog occurrence sorted by *RWI*.



Schiphol Airport

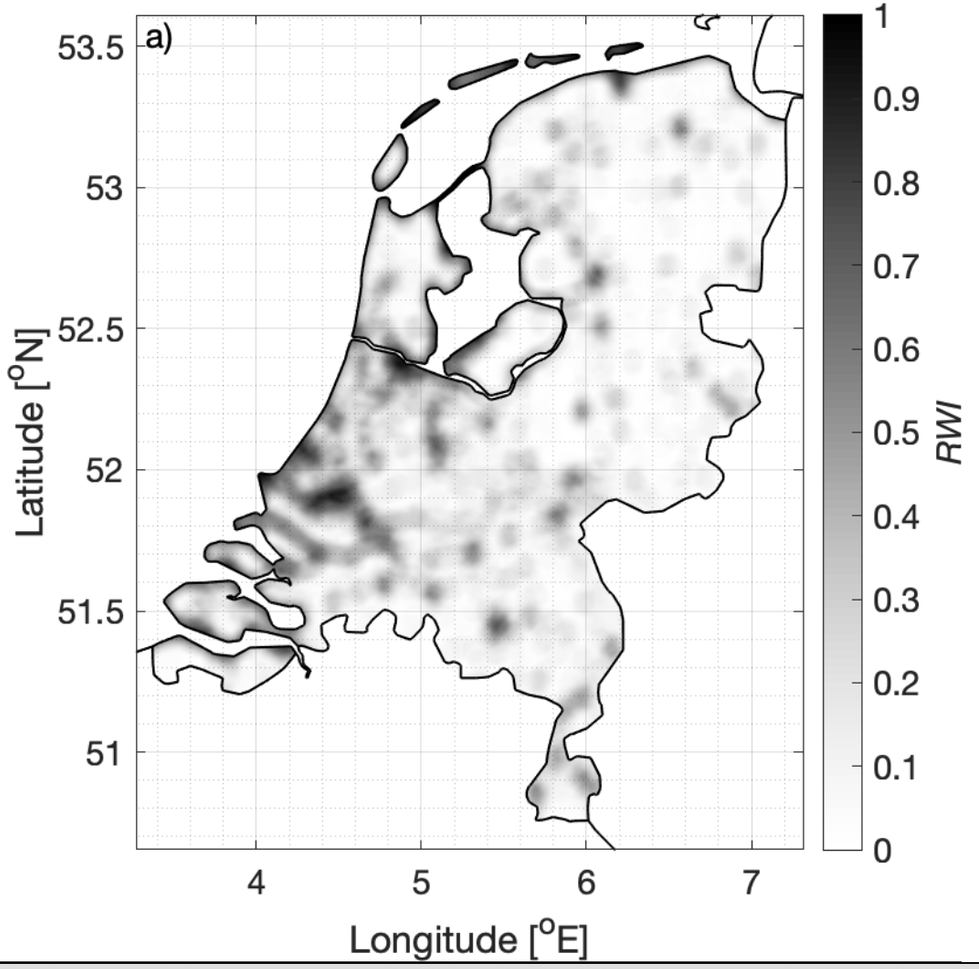
Locally highly urbanized.

Schiphol Airport



With a further influence from *airplanes*?!

Outlook and Further Application



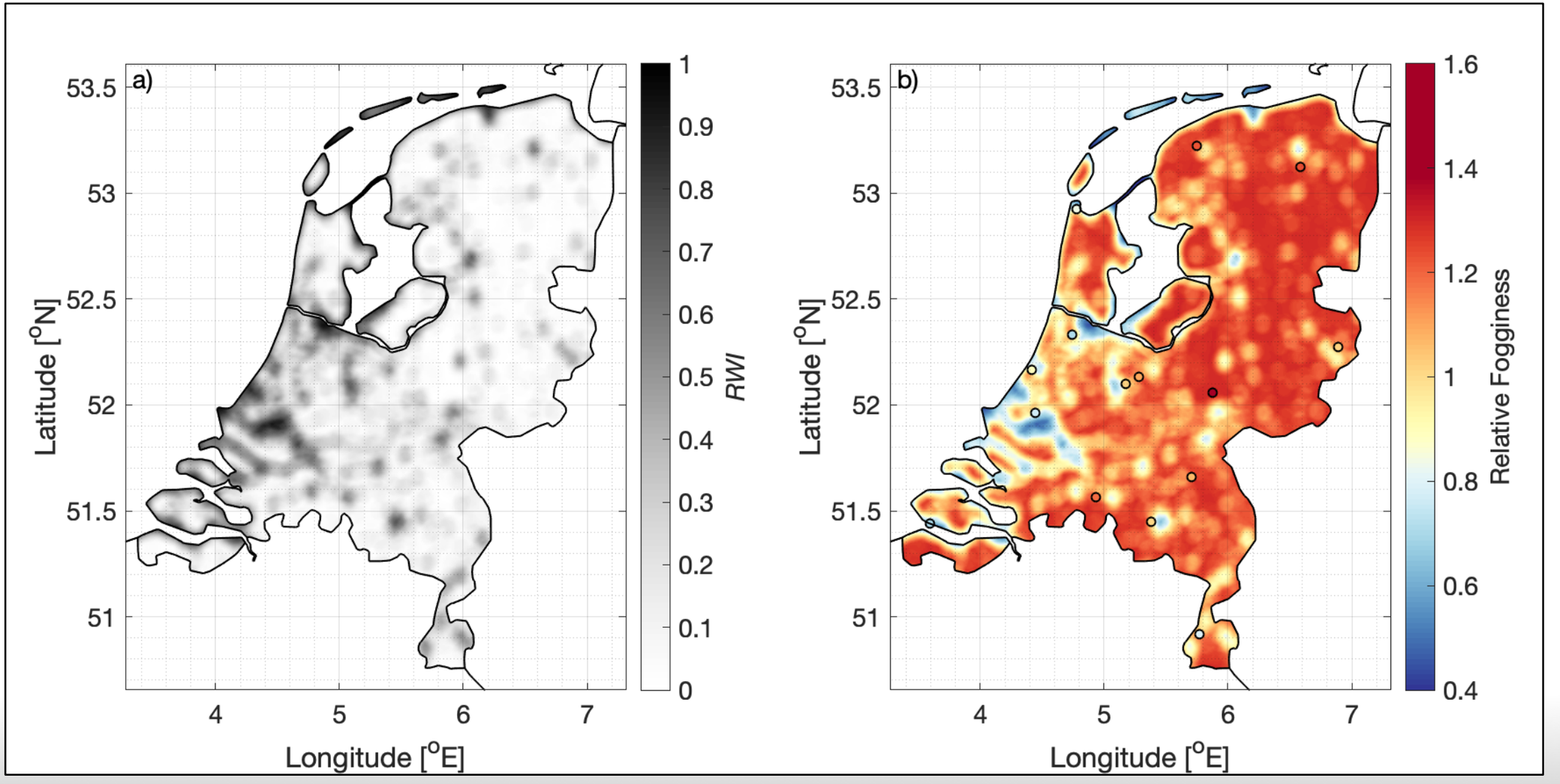
assuming synoptic similarity…

Calculate *RWI at any location*

↓

Estimate Relative Fogginess*

Outlook and Further Application



Summary

- The Netherlands is a relatively small, flat country
  - Yet, spatio-temporal variability in fog is large

- Analysis of 45 years weather station data shows:
  1. Mesocscale variability linked to urbanization and ocean influences
  2. Interannual variability linked to wintertime pressure-gradient forcing

- With synoptic similarity, can compare relative fogginess using *RWI*
  - Validation needed!


THANK YOU.
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Under Review at QJRMS
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