Development of Vs30 and associated uncertainty maps for New Zealand based on geologic and topographic proxy parameters

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Brendon Bradley
Liam Wotherspoon
Chris McGann

Introduction

- Vs30 is the time-averaged shear wave velocity in upper 30 metres
- Used as a “sensibly crude” proxy for local geology
- Correlated with “proxies” including local geologic, topographic properties

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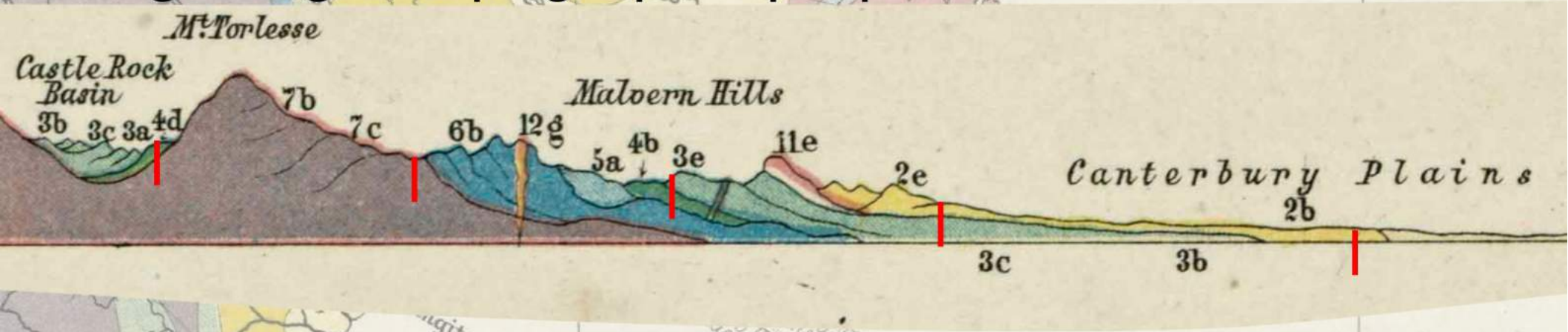
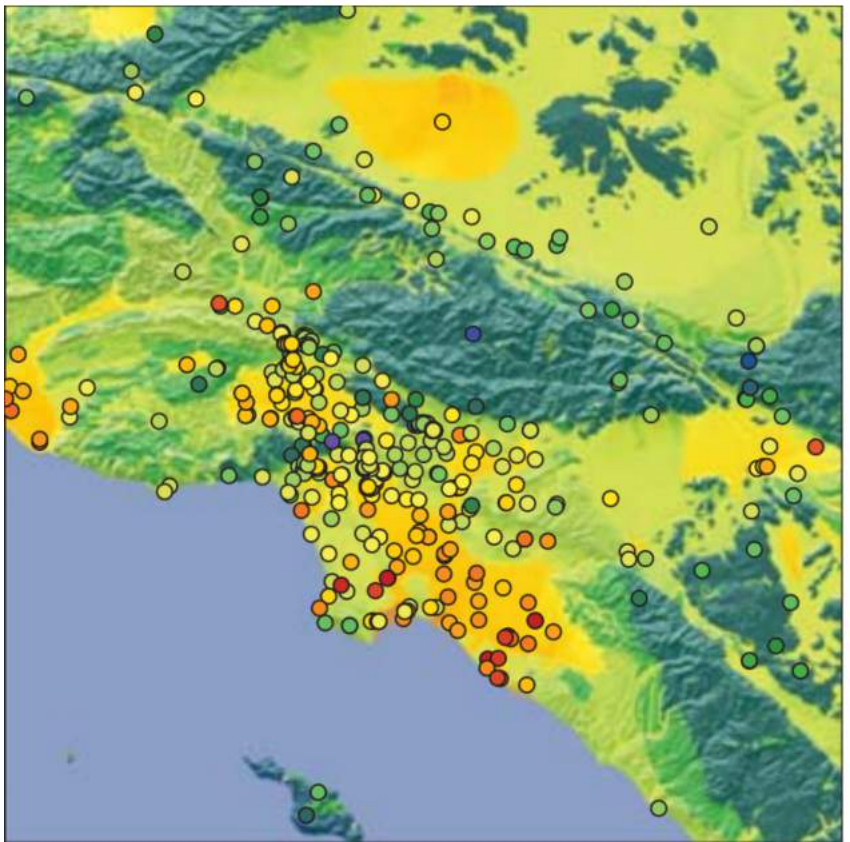
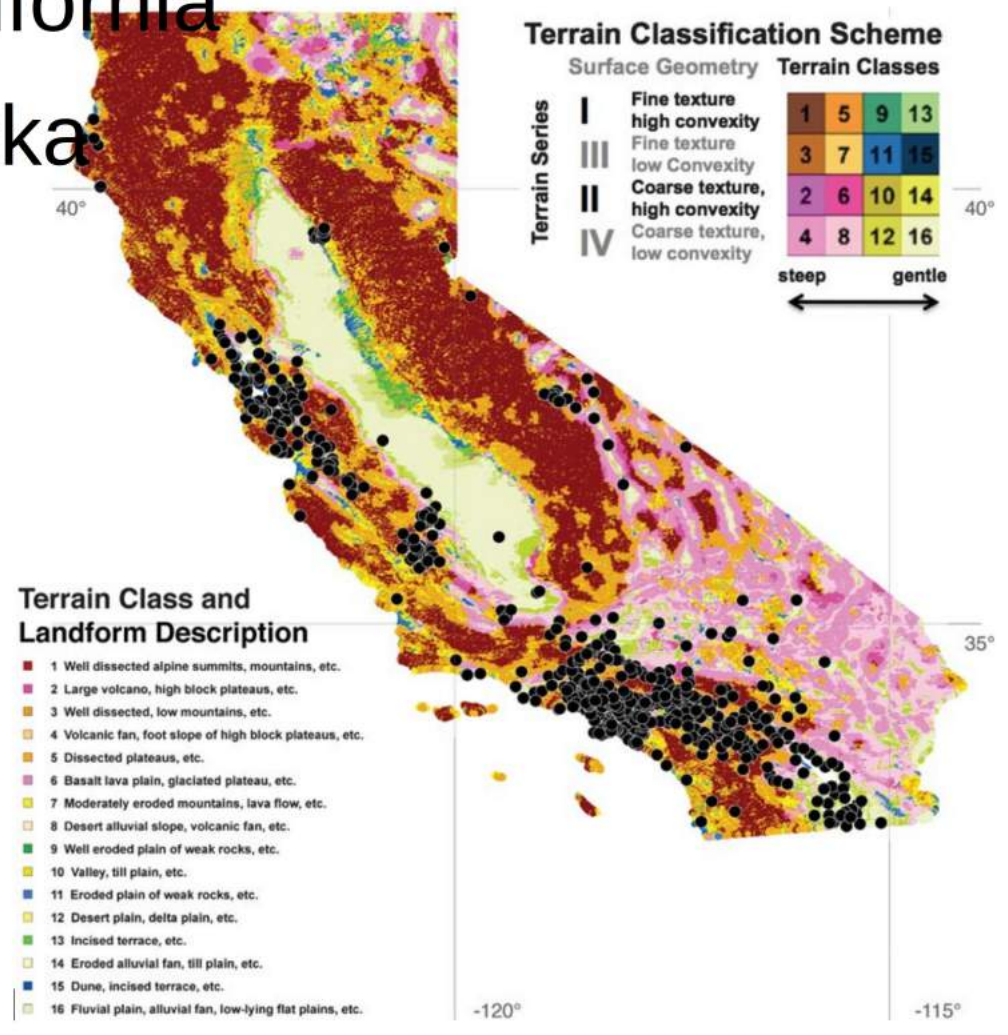


Other Vs30 proxy studies

- Thompson et al. (2014) – California
- Yong et al. (2012) – California
- Ahdi et al. (2017) – Alaska





Other Vs30 proxy studies

- Thompson et al. (2014) – California
- Yong et al. (2012) – California
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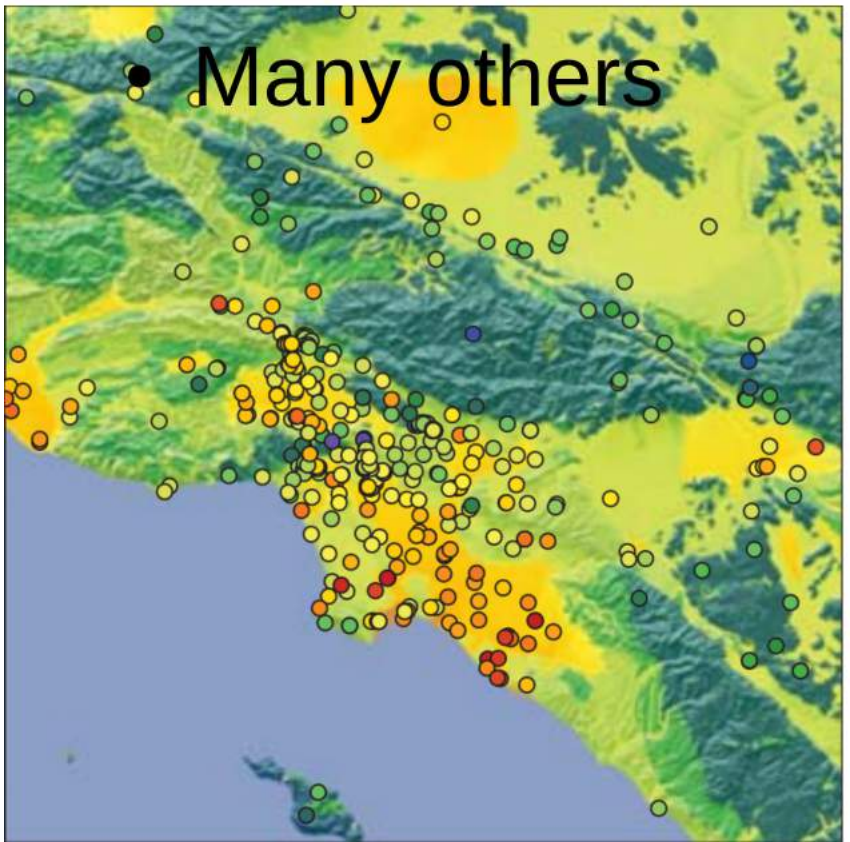
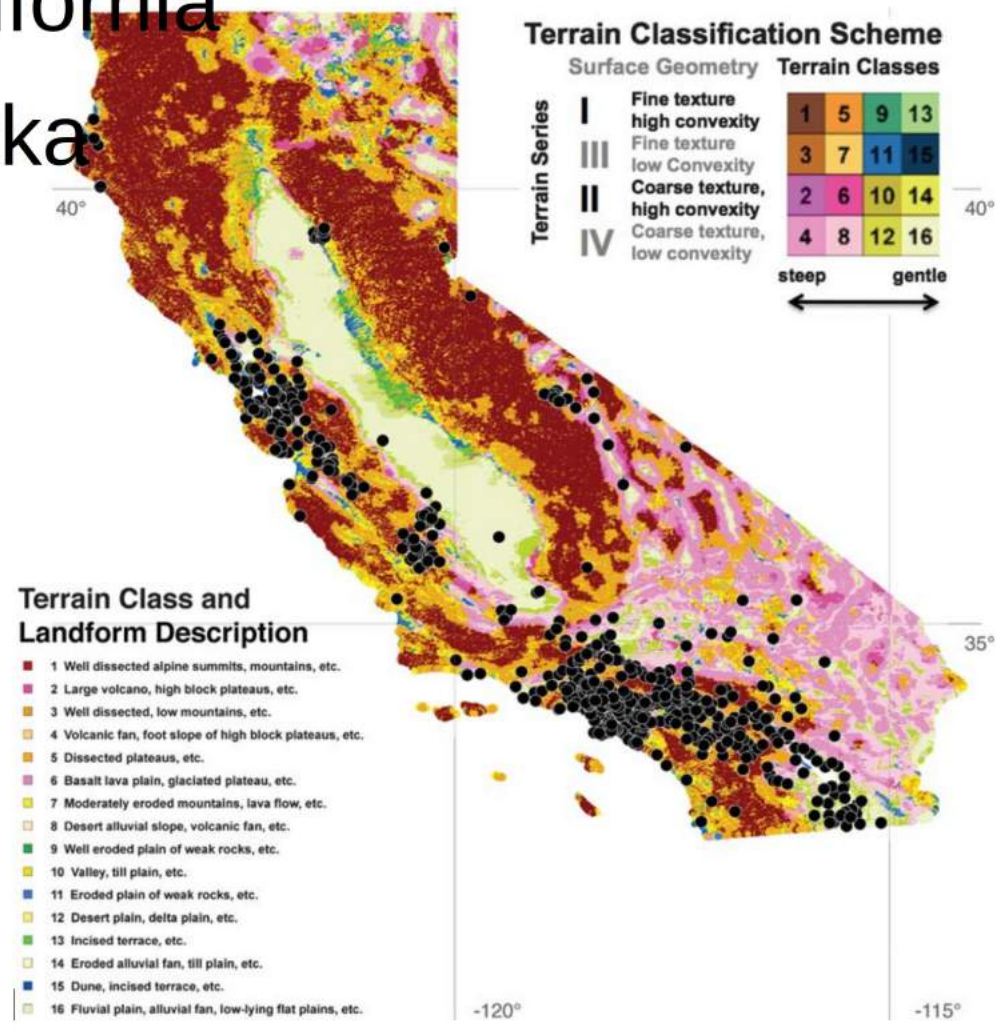
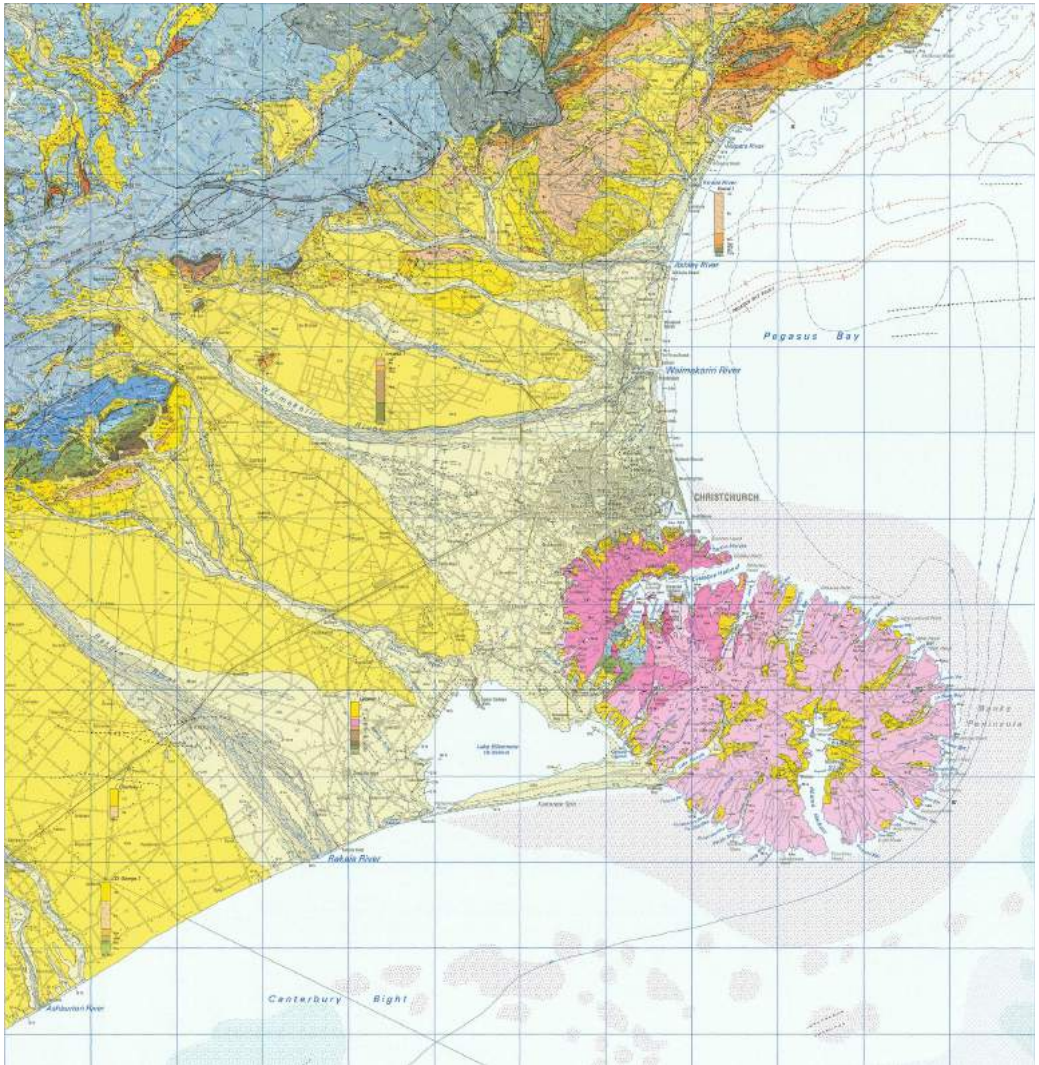
- Many others



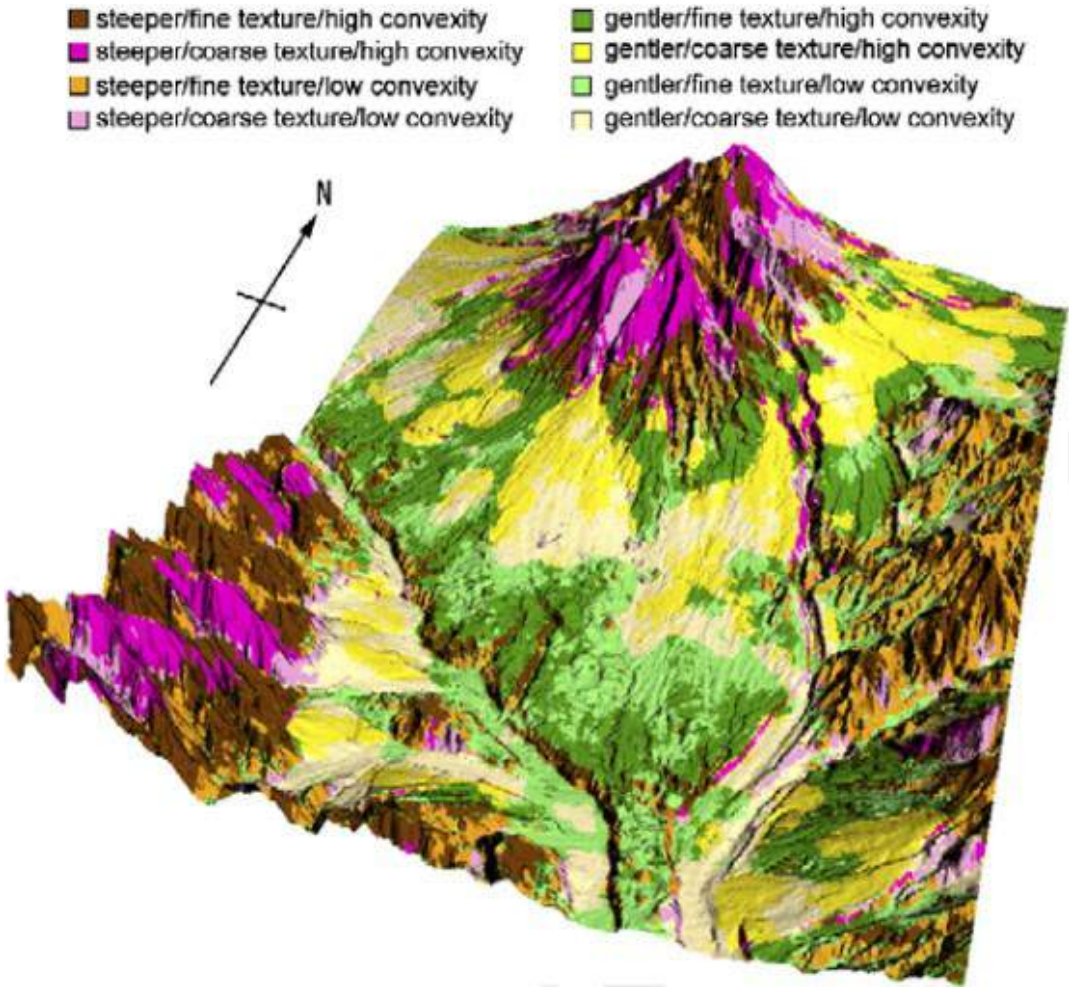


Categorisation

Geology



Topography



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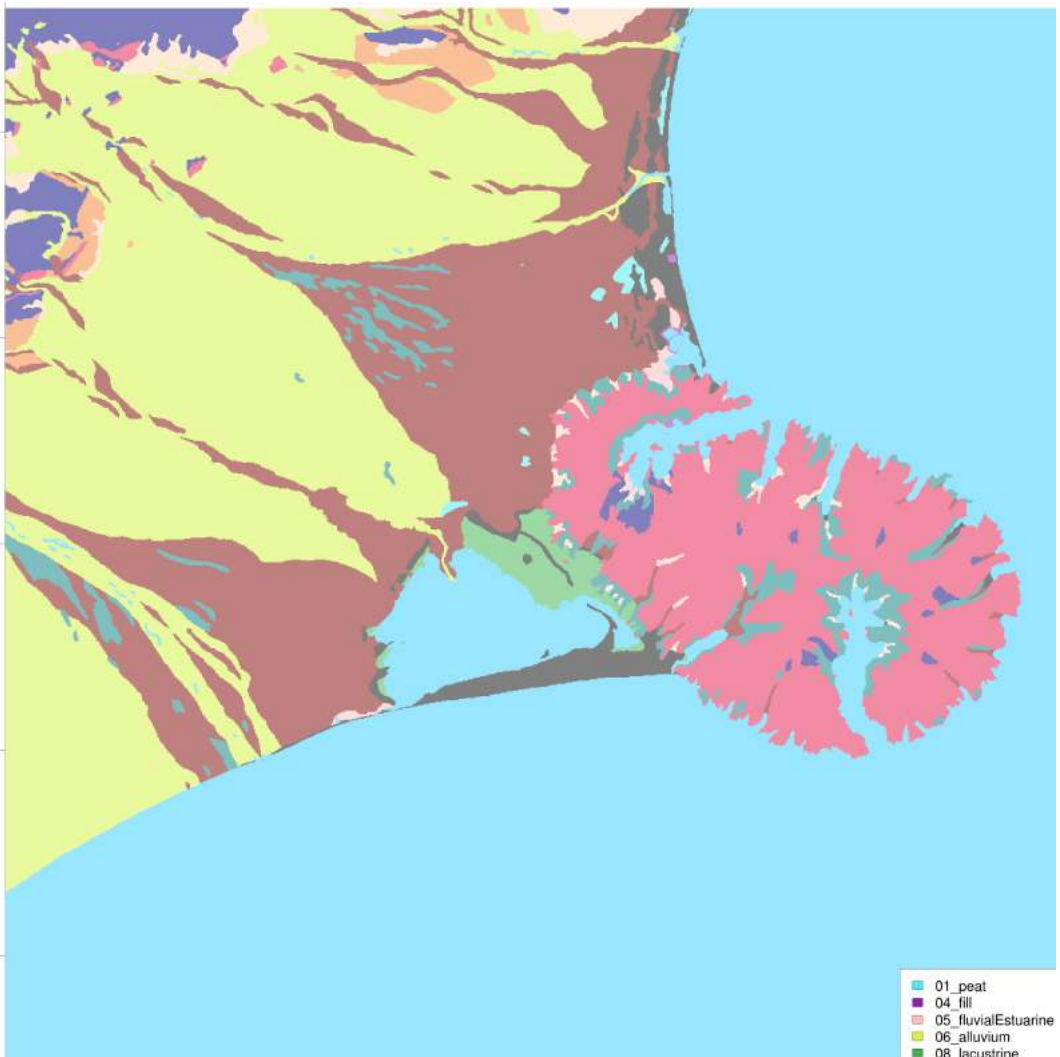

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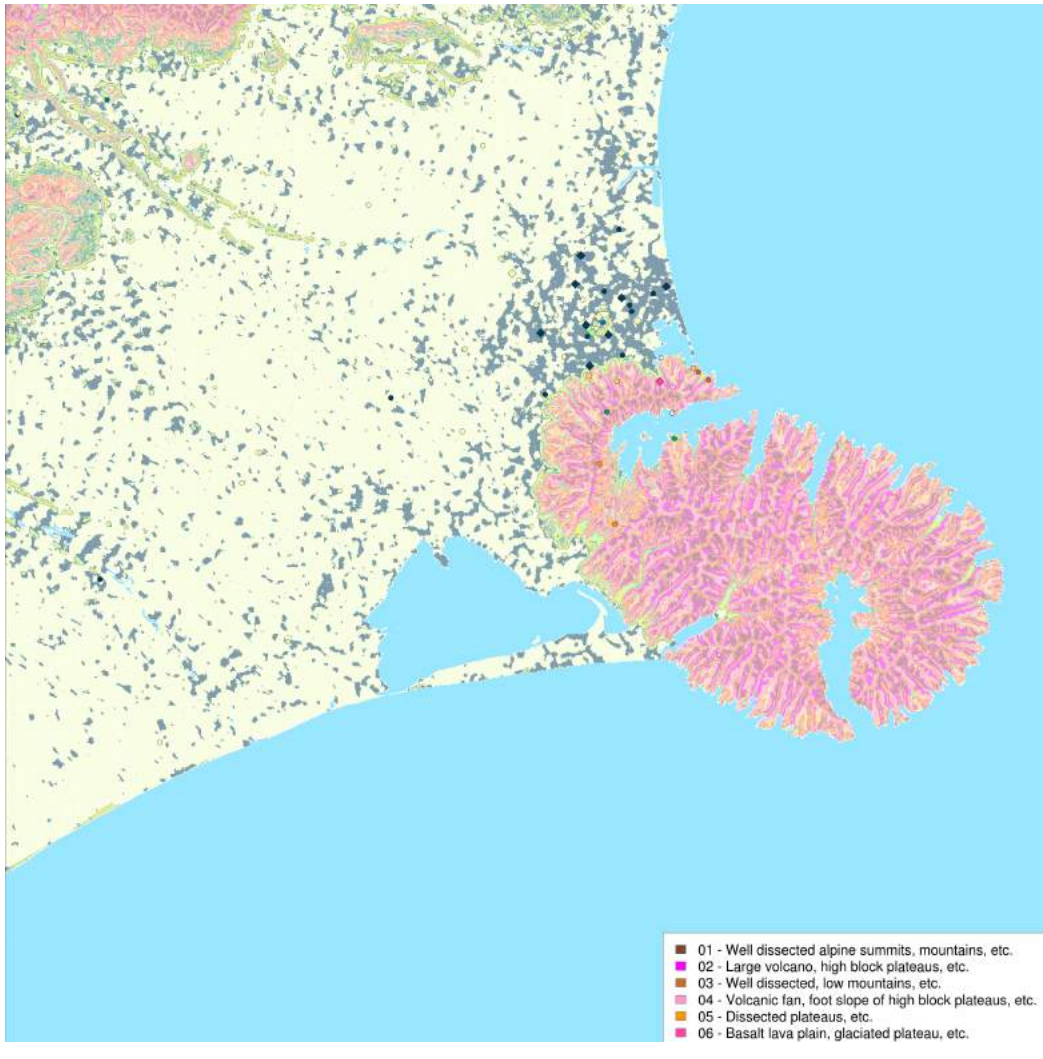
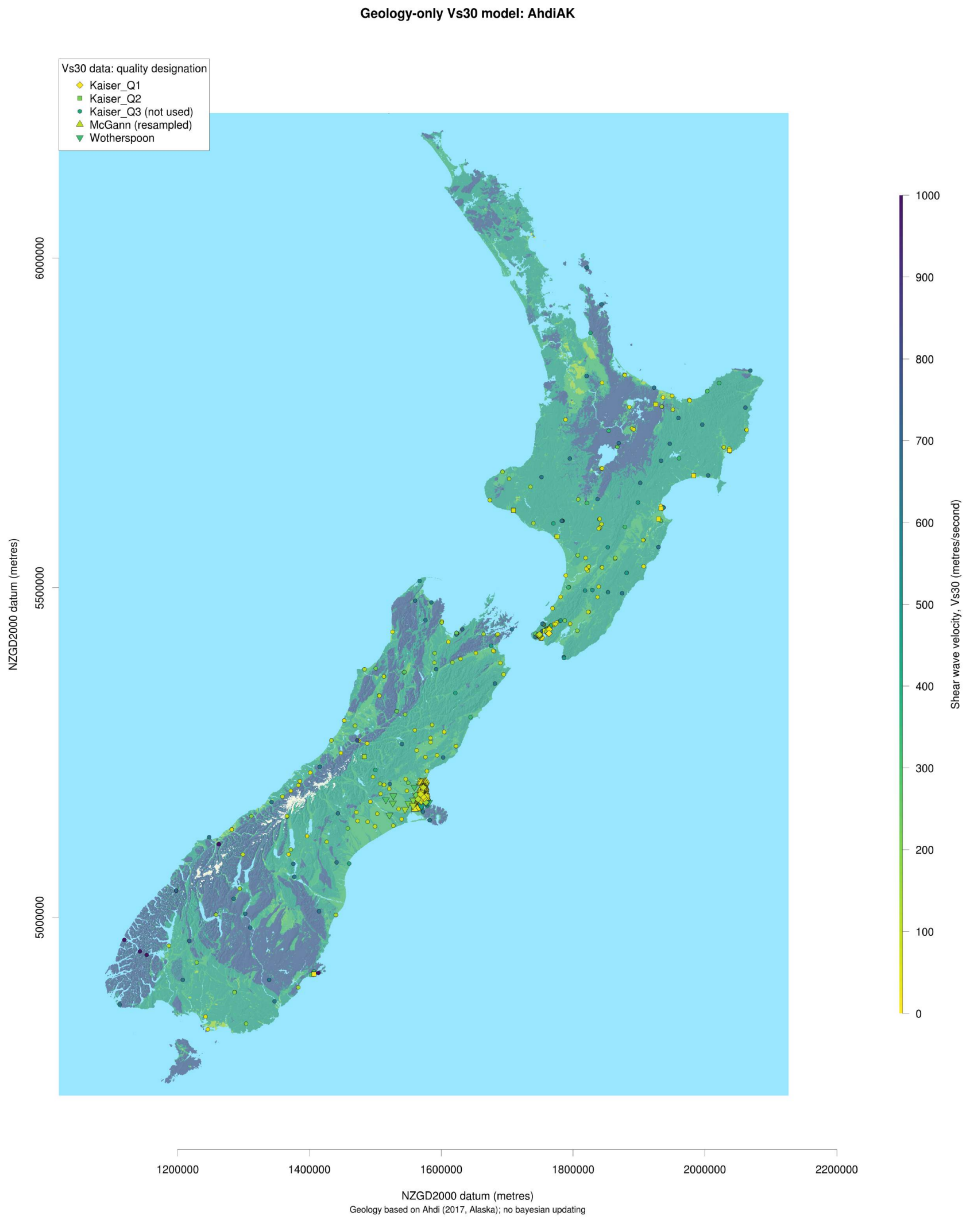
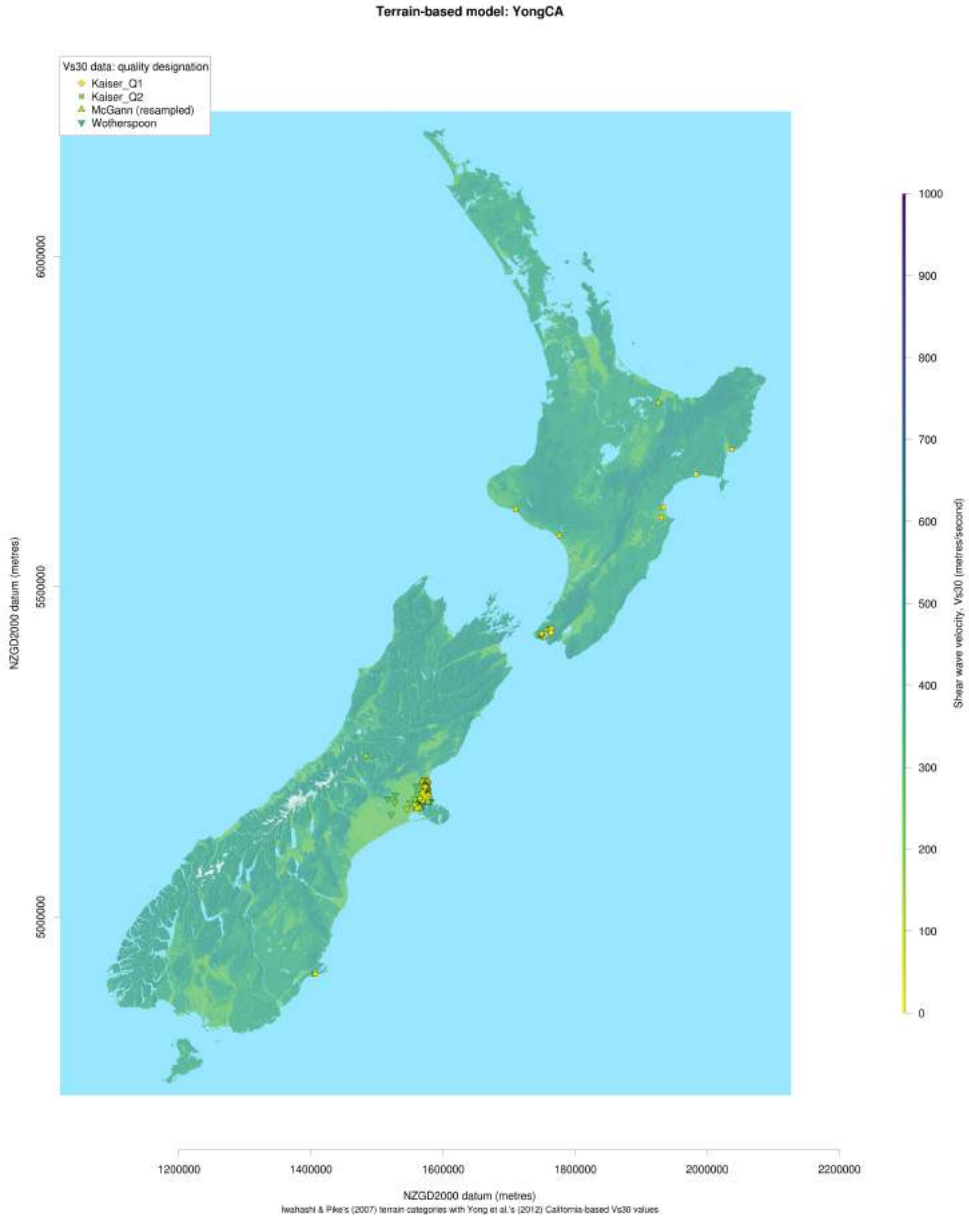
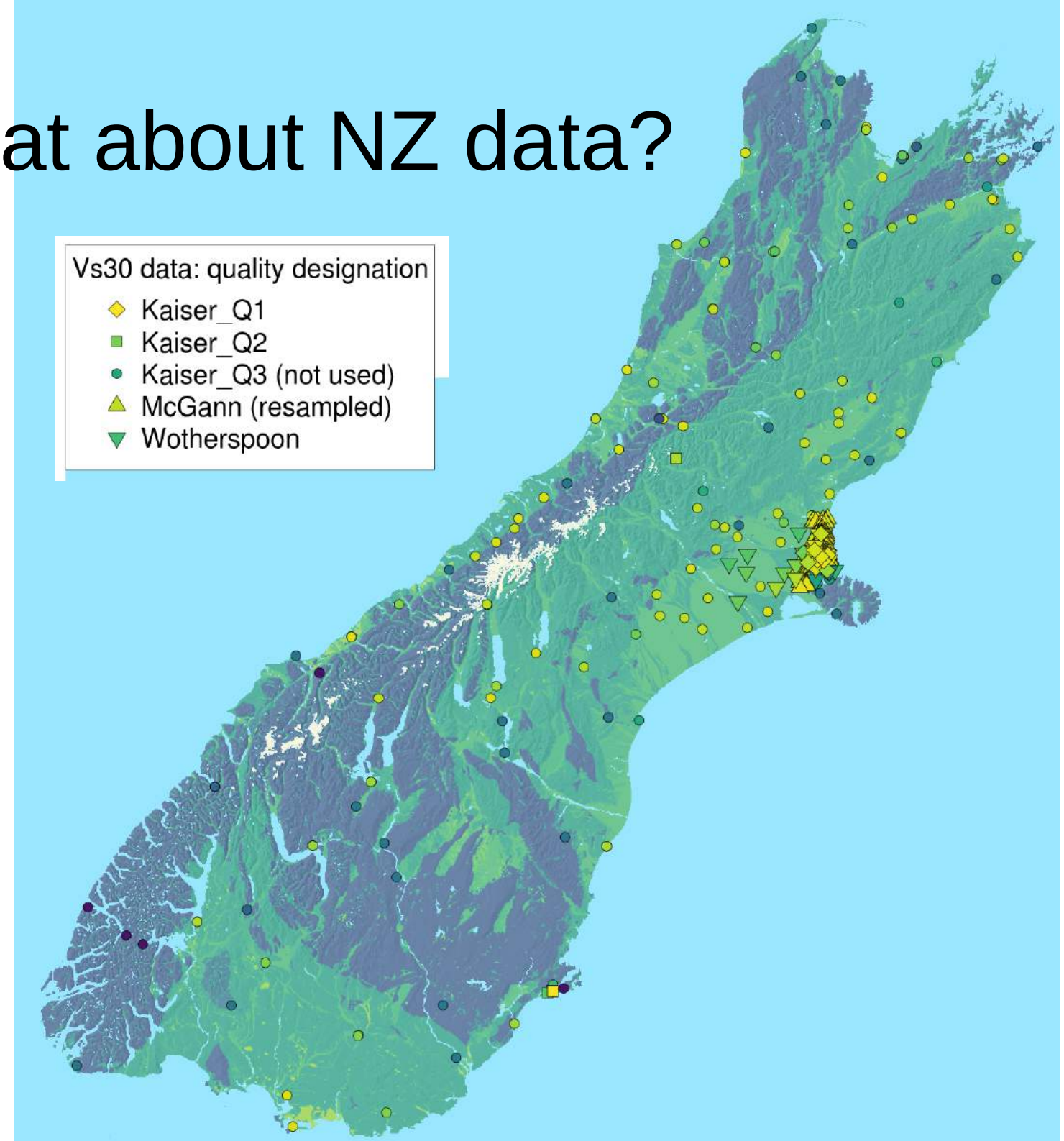


First stab at Vs30 models: using values developed by others





What about NZ data?



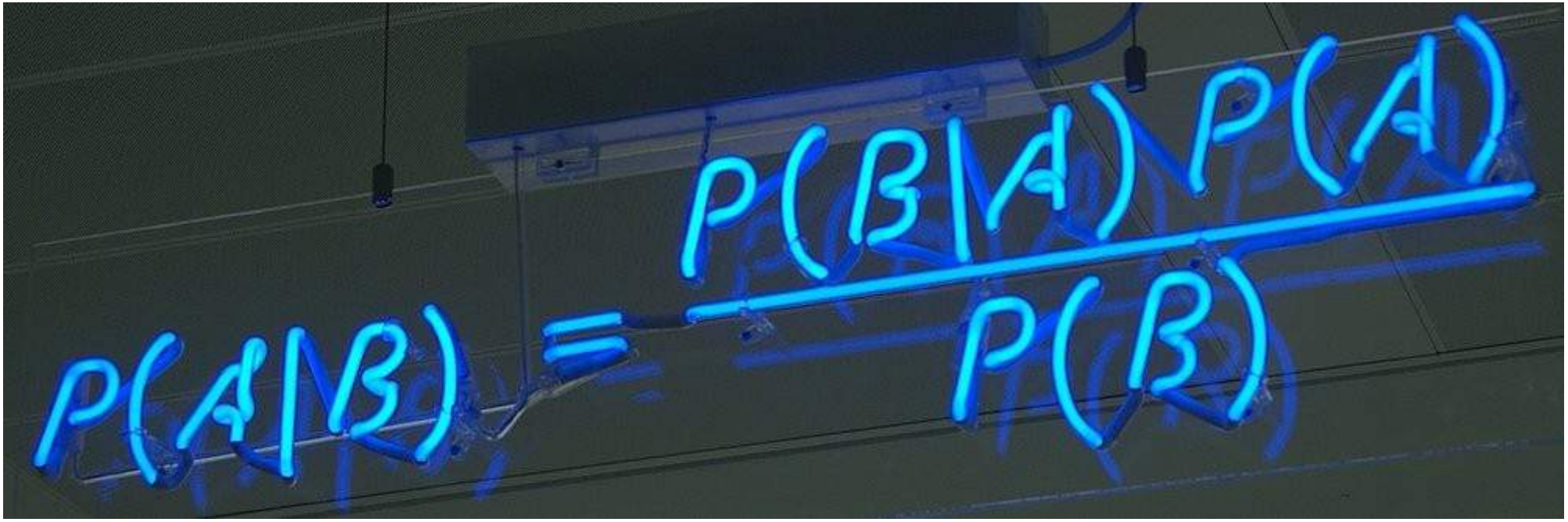
Kaiser_all
Kaiser_noQ3
Vs30, m/s
1500
1000
900
800
700
600
500
400
300
200
100
01_peat
04_fill
05_fluvialEstuarine
06_alluvium
09_beachBarDune
10_fan
11_loess
12_outwash
13_floodGravel
14_moraineTill
15_undifSed
16_terrace
18_crystalline
groupID

How to...?

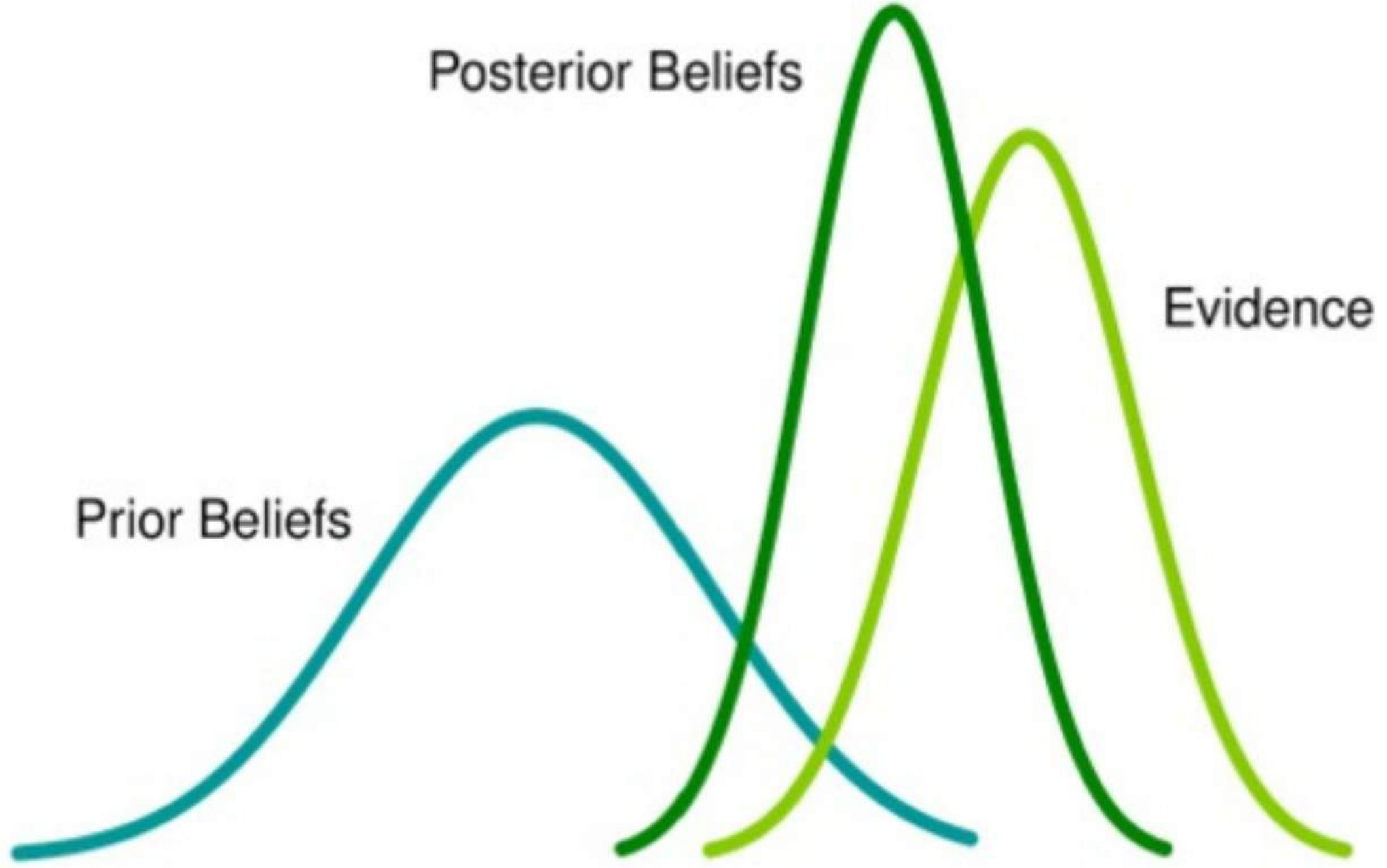
- Make use of others' estimates where data is sparse?
- Let NZ data govern when data is plentiful?
- Use probabilistic reasoning consistently?

How to...?

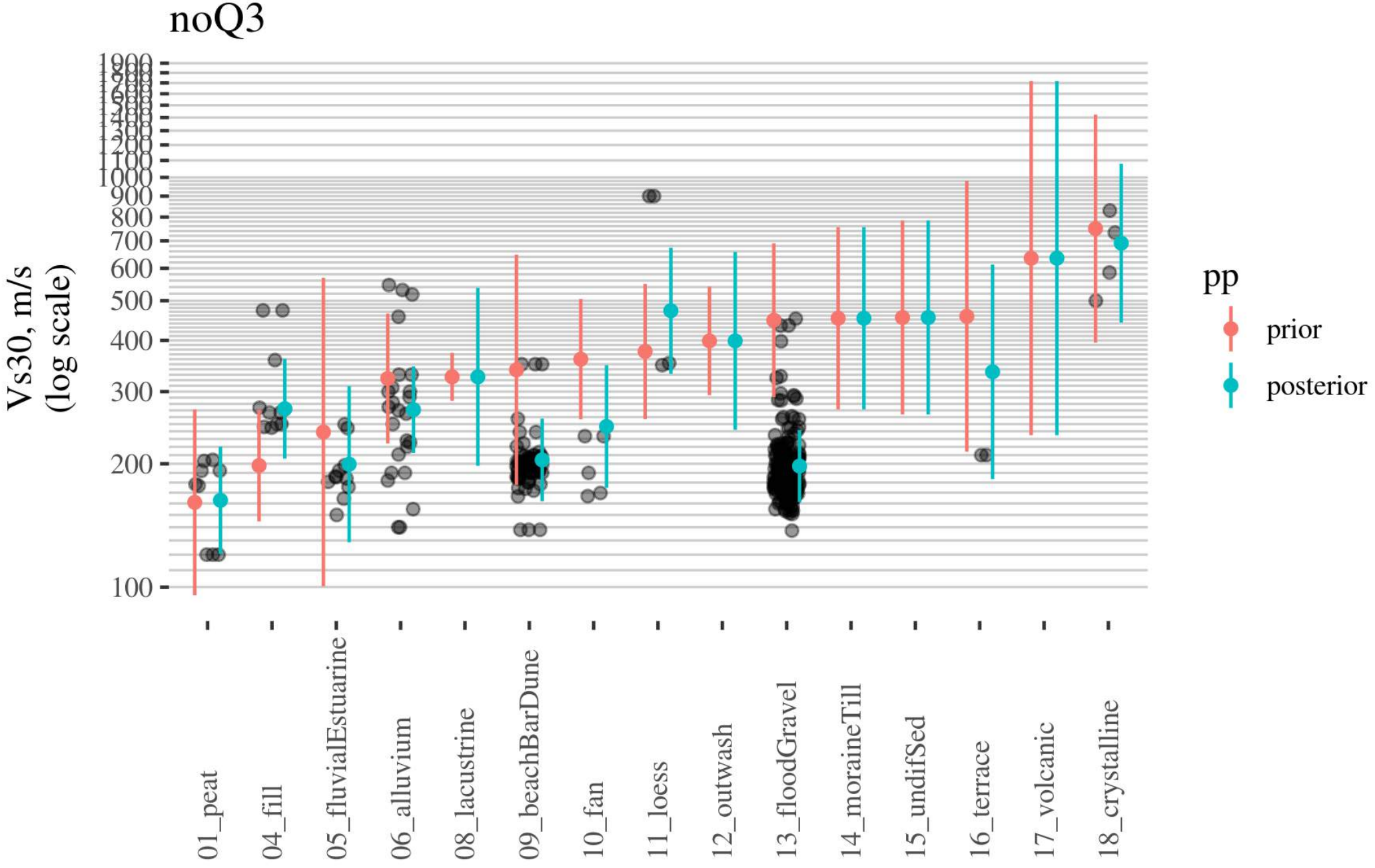
BAYESIAN ANALYSIS



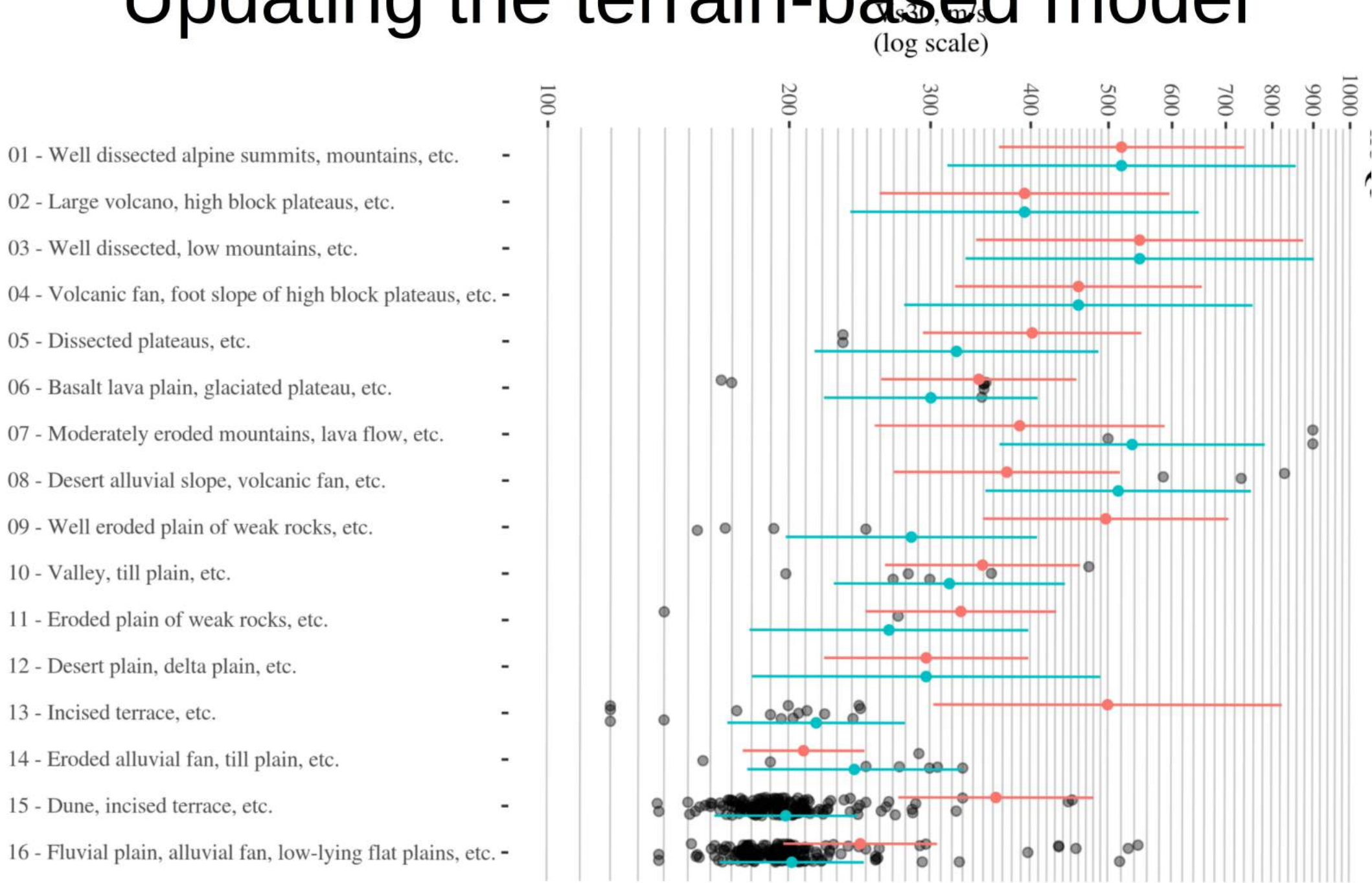
Bayesian analysis



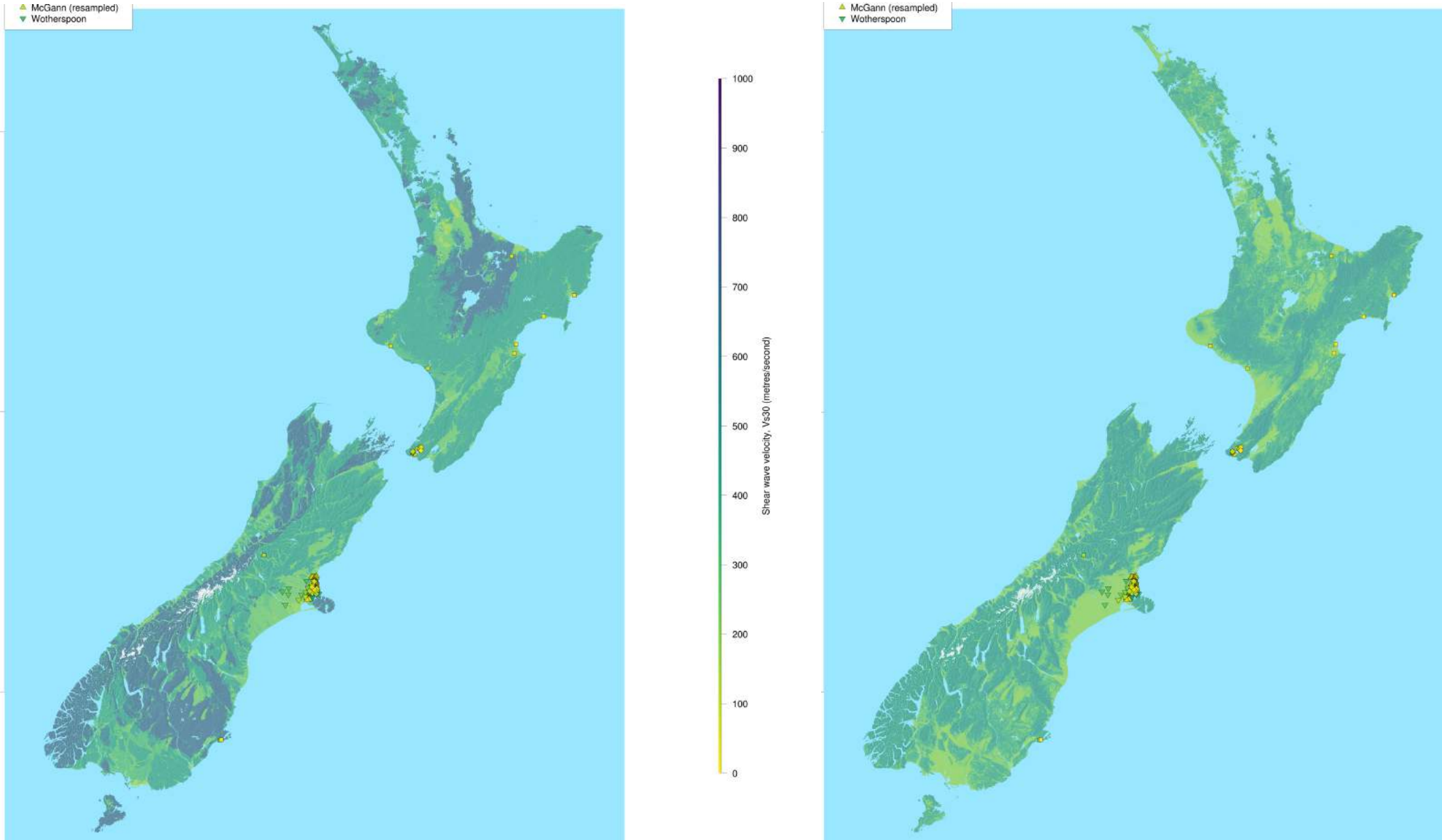
Updating the geology model



Updating the terrain-based model



Examining updated models



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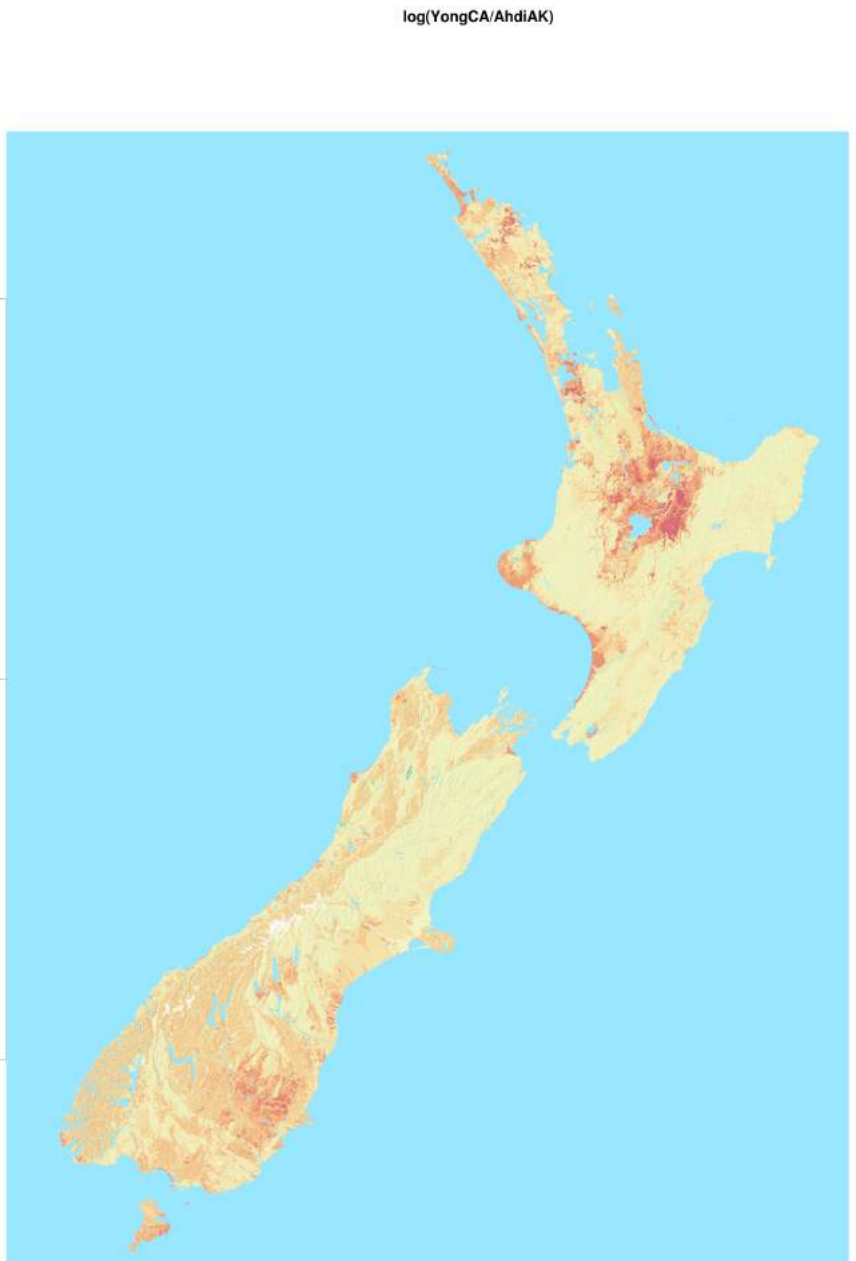
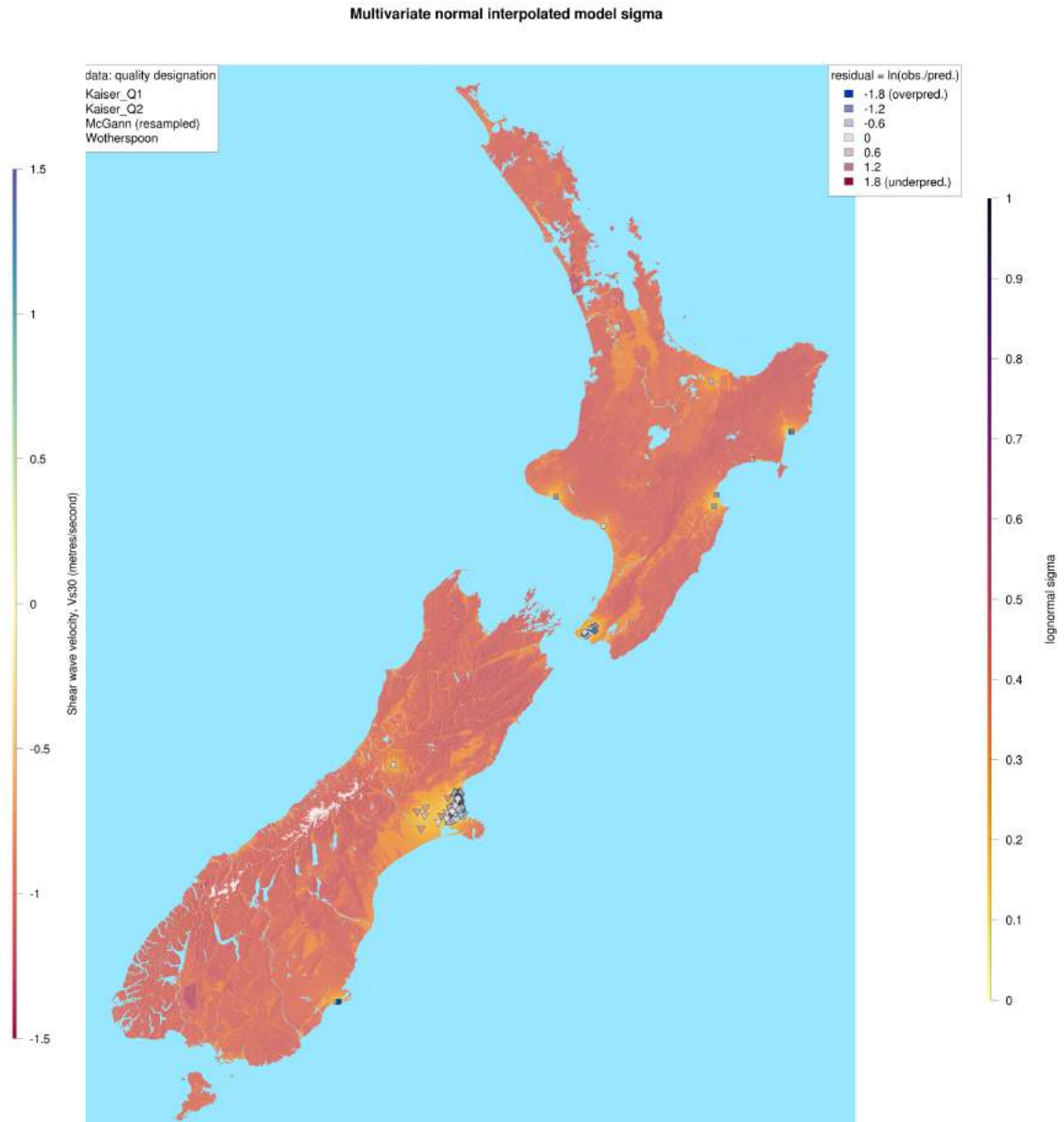
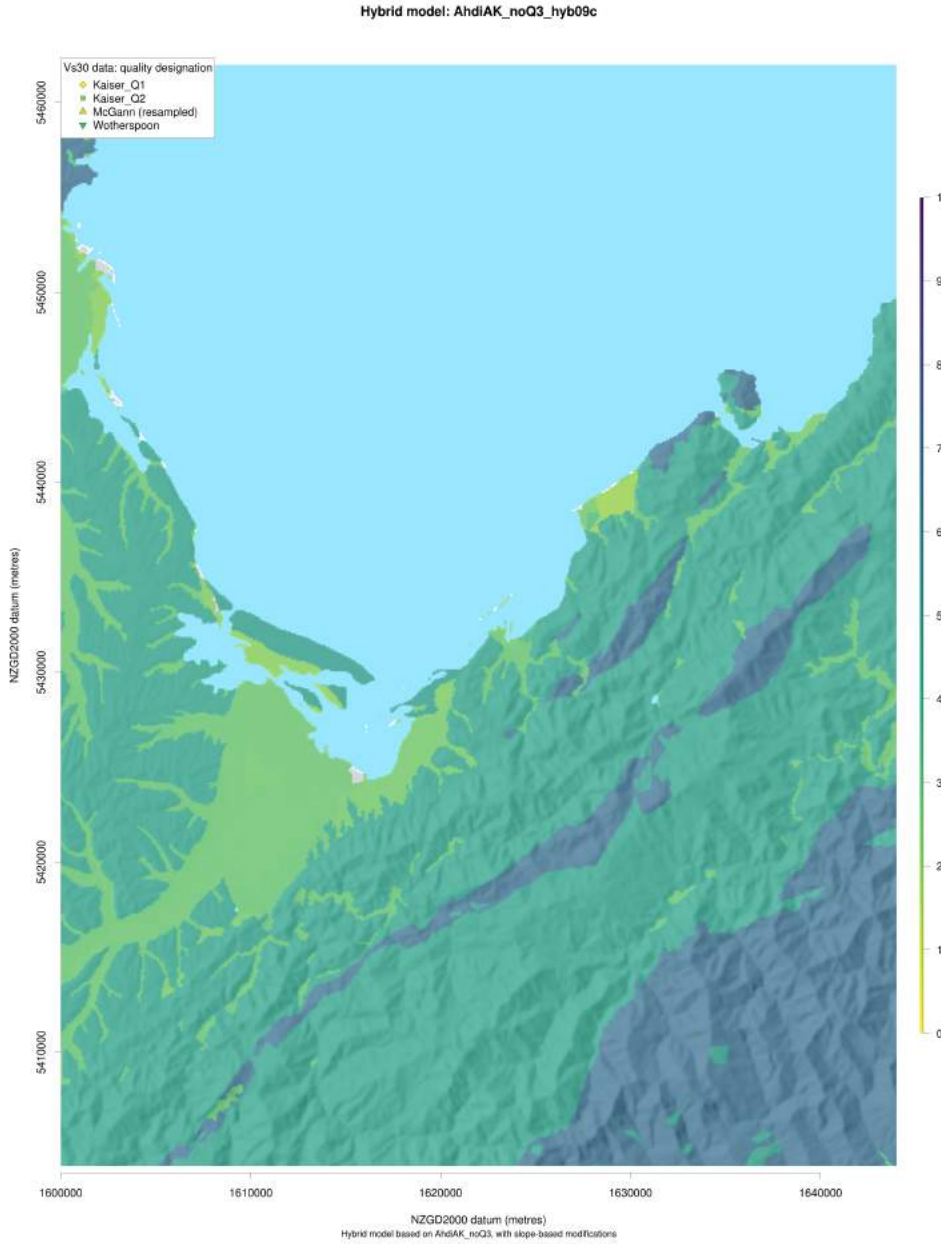
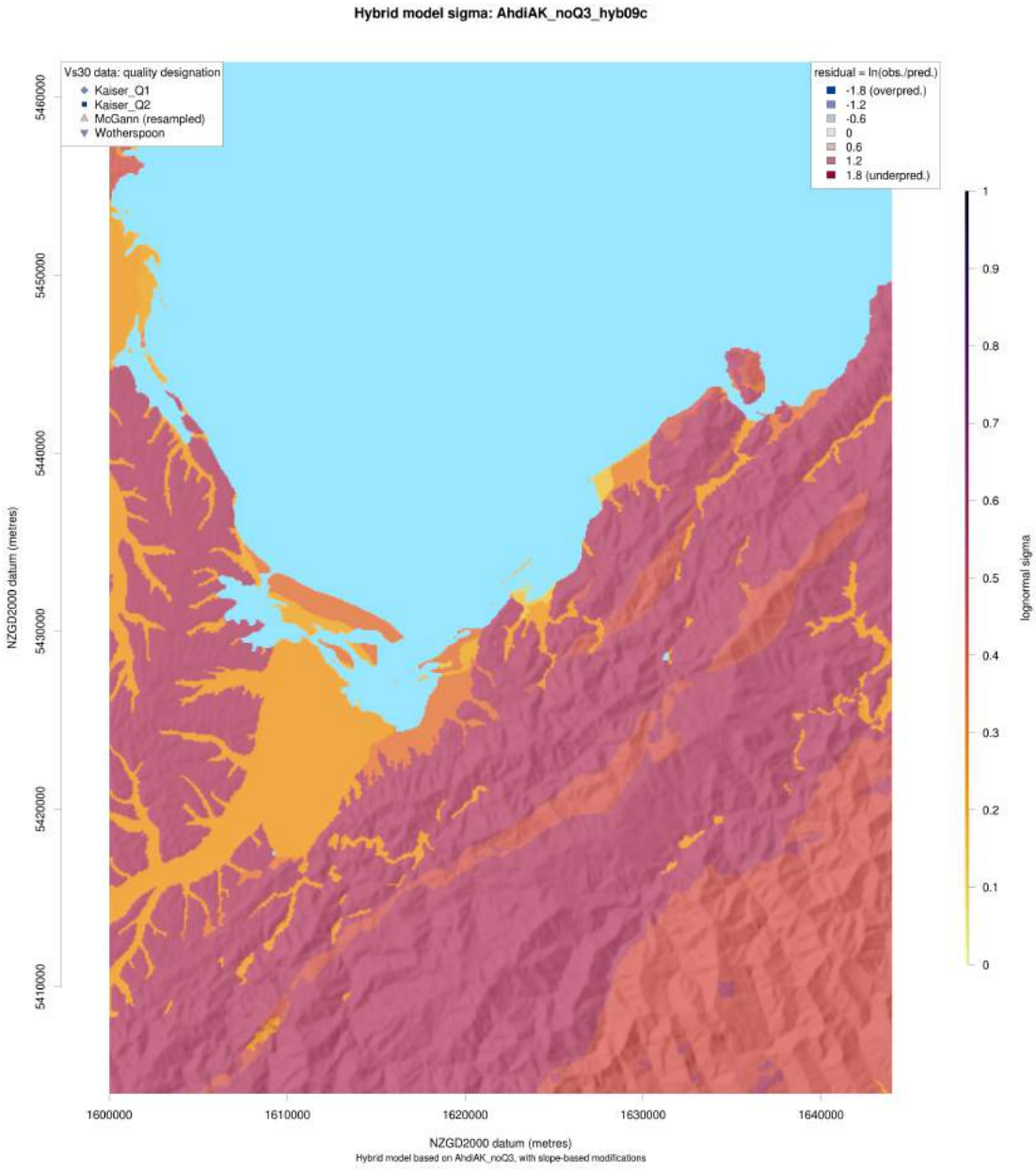




Weighted model





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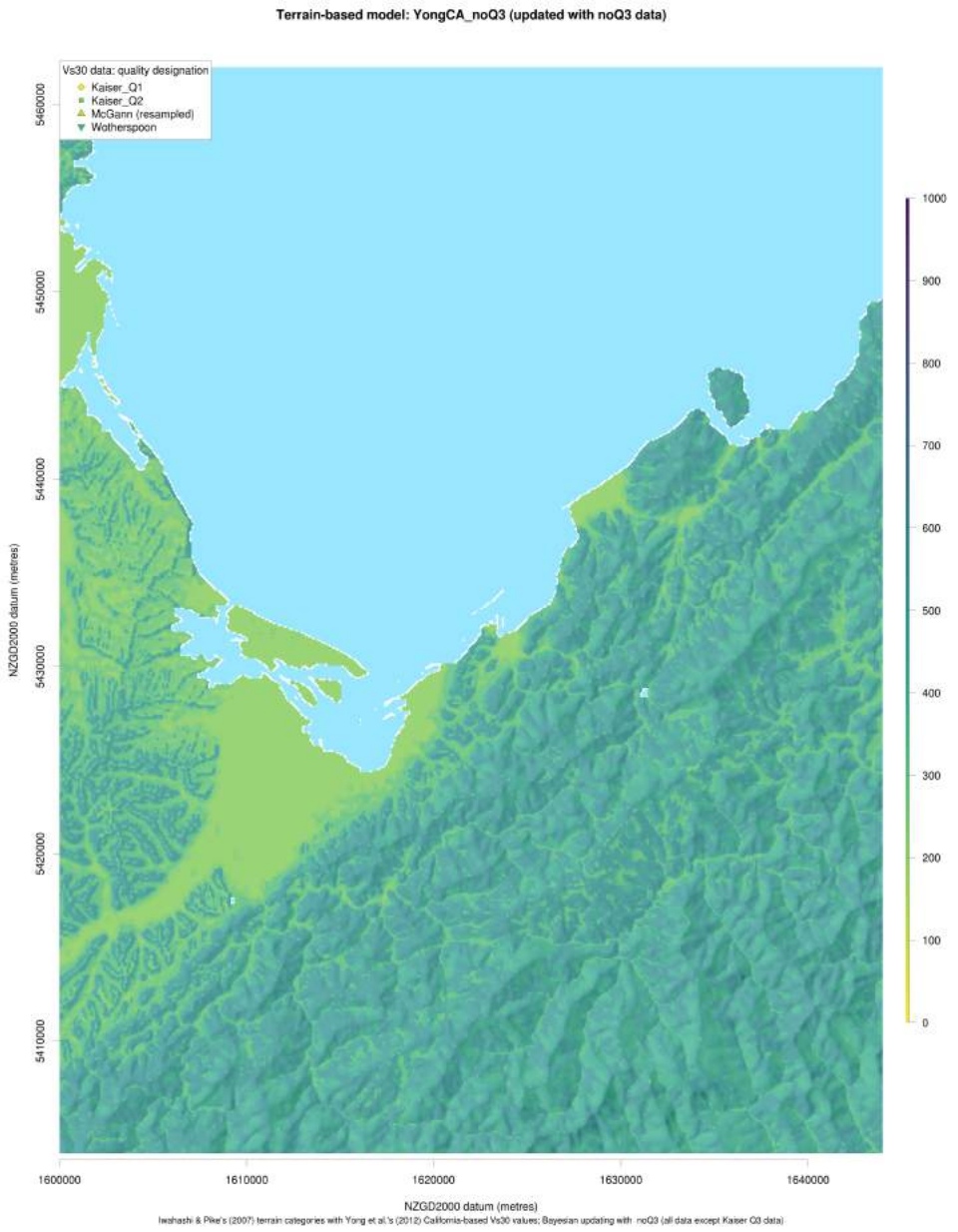

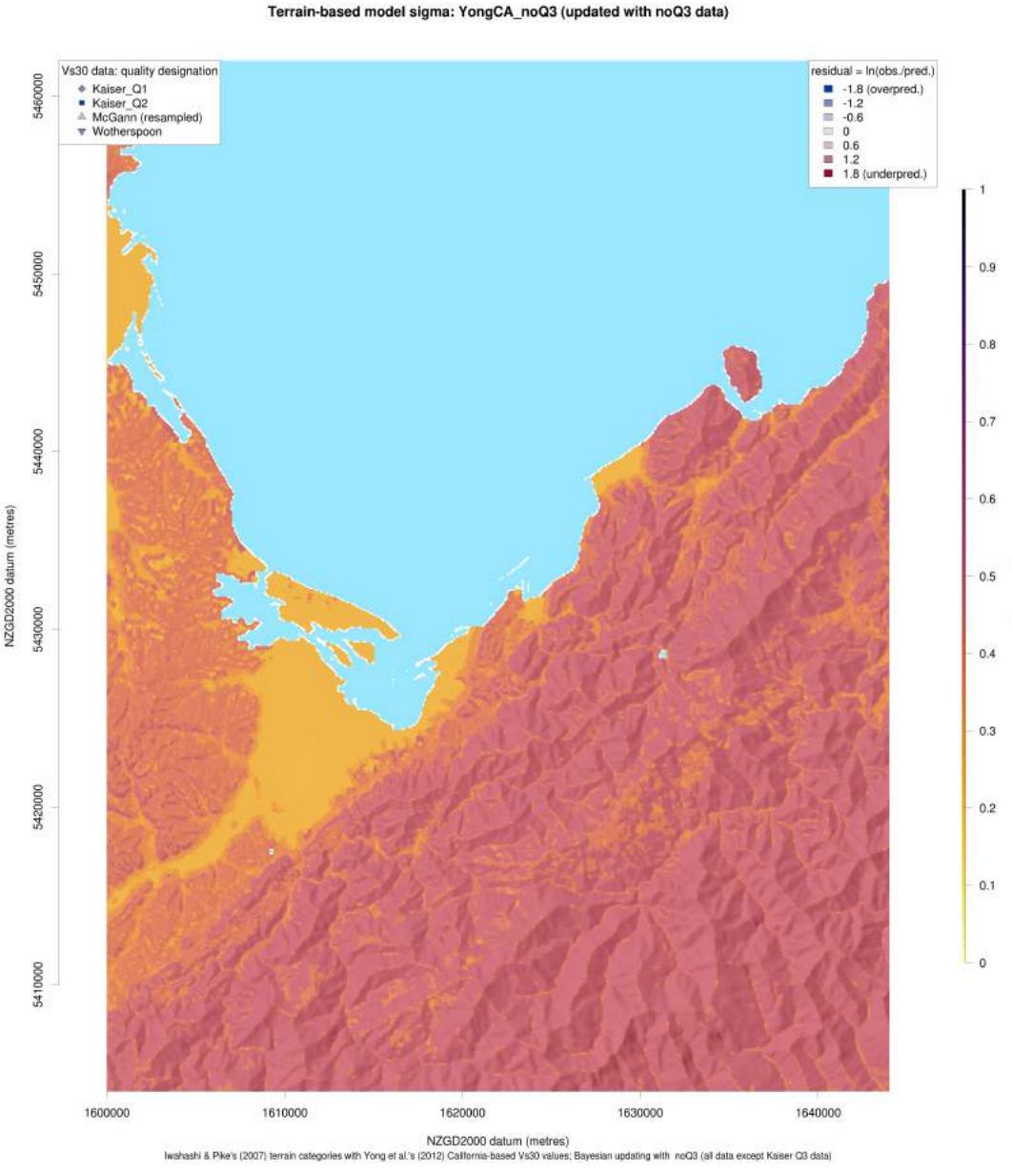
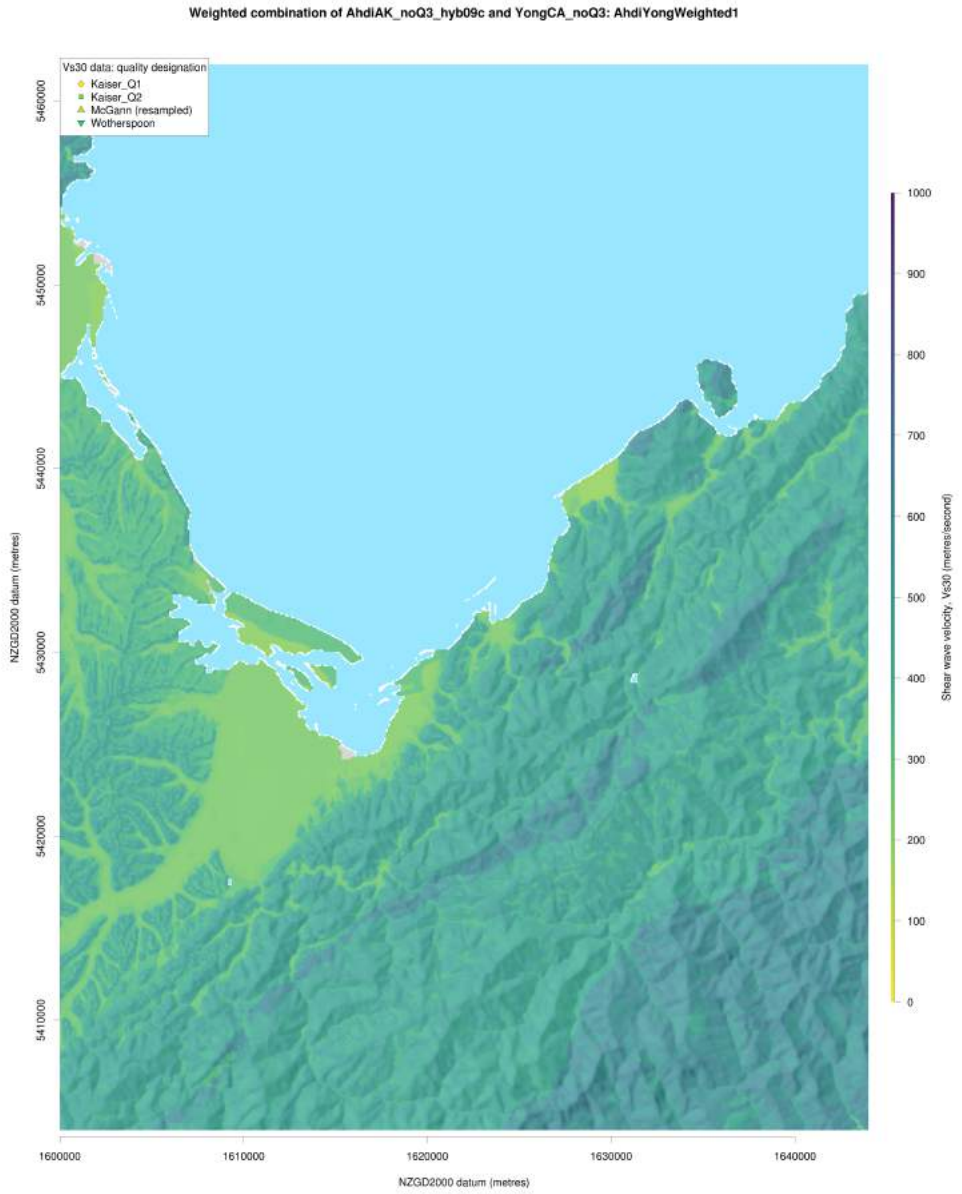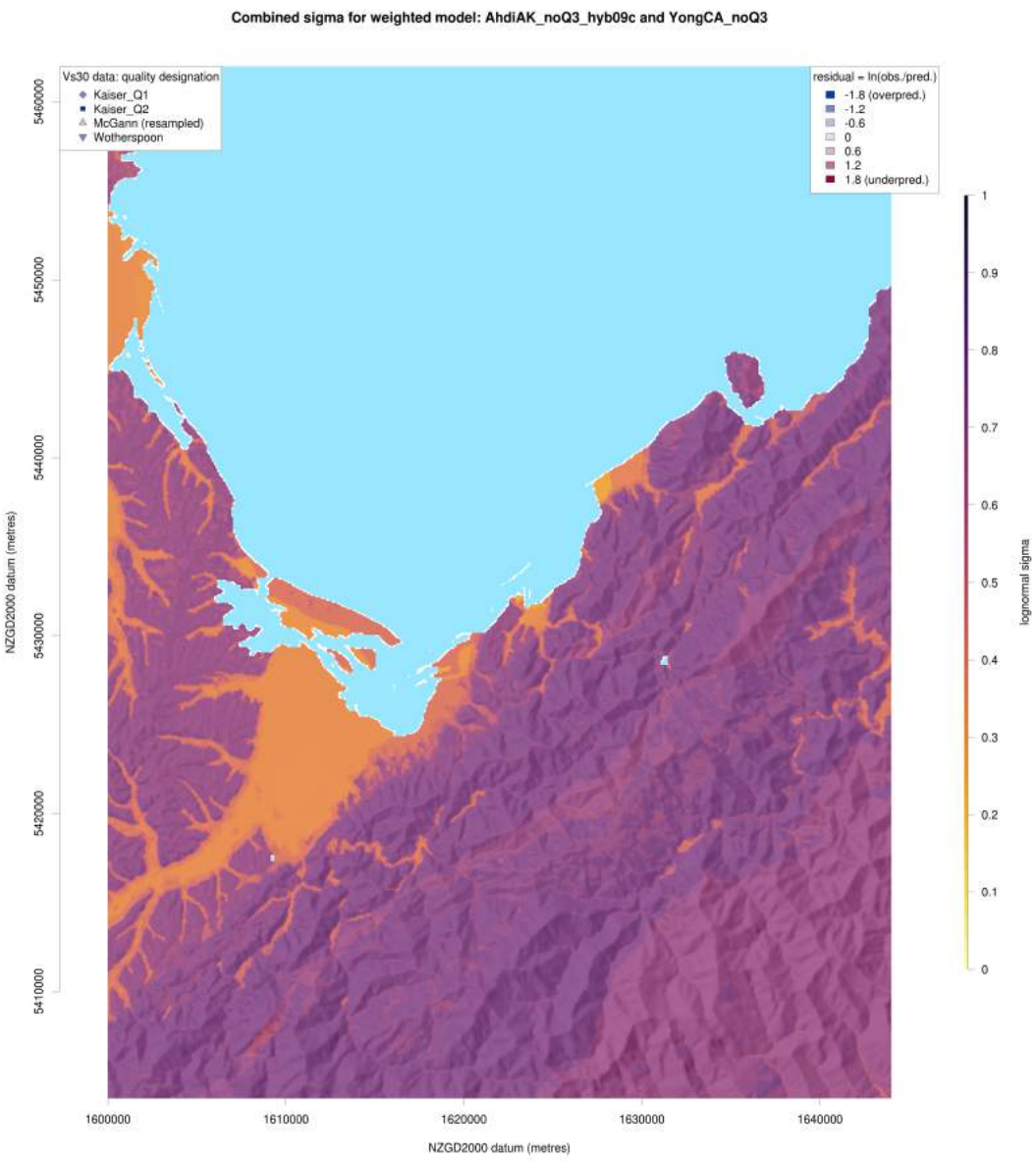
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