Disaggregating and harmonising soil maps using DSMART

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MAP DISAGGREGATION
- “Disaggregation and Harmonisation of Soil Map Units Through Resampled Classification Trees”
1. Prepare database of soil polygons, covariates
2. Take \( n \) random samples from each polygon
3. Assign a soil class to each sampling point
4. Build See5 decision tree with sampling points
5. Apply tree to map grid
6. Count number of times each cell is allocated to each soil type
7. Calculate probabilities from counts
8. Generate maps

(iterated \( i \) times)
STUDY AREA

› Dalrymple Shire (~68,000 km²)
  - Similar to Sri Lanka (~66,000 km²)
  - Twice as big as Belgium (~31,000 km²) and Moldova (34,000 km²)
  - Slightly bigger than West Virginia (62,756 km²)

(1:250,000)
SOIL PROPERTY MAPPING
TARGET SOIL PROPERTIES

› (At each depth increment) perform a weighted-mean calculation at each grid cell using soil class probabilities as weights

› Depth to parent material from soil profile descriptions
  - If absent, used lower boundary of deepest reported soil horizon

› Soil pH (1:5 H₂O) for each depth increment from reference soil profile descriptions

PROPR: “digital soil property mapping using soil class probability rasters” (Odgers et al. 2014)
GlobalSoilMap requires 90% confidence interval about reported value.

Need to have an idea of soil property variability:
- Usually not abundant point data
- Often have some idea of range, typical value

Use a triangular distribution (proxy of the Beta distribution, often used in data-limited scenarios)

**PROPR**: “digital soil property mapping using soil class probability rasters” (Odgers et al. 2014)
› DSMART - disaggregate all soil classes simultaneously

› Data mining is able to identify soil-landscape patterns over many realisations

› Create soil properties using available information for each soil series and the weights assigned by the probability rasters

› Use range of property values to provide uncertainty estimates.

› Next Steps: Use the PROPR algorithm to calculate the soil hydraulic properties with POLARIS
THANK YOU