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MOORS FOR THE FUTURE PARTNERSHIP

MANCHESTER 1824
The University of Manchester

Uncertainty in Delineation of Peatland Micro-catchments

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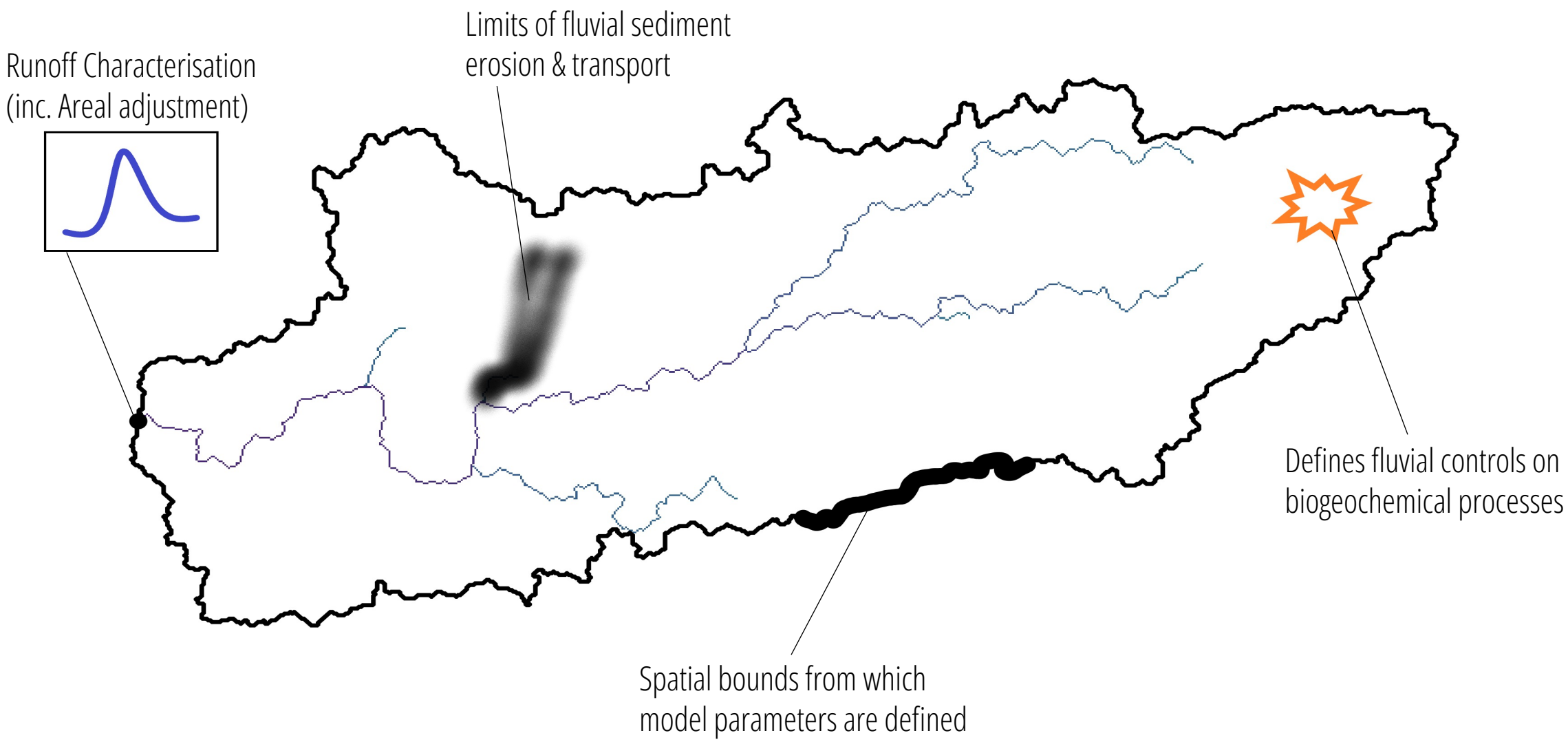
Micro-catchments



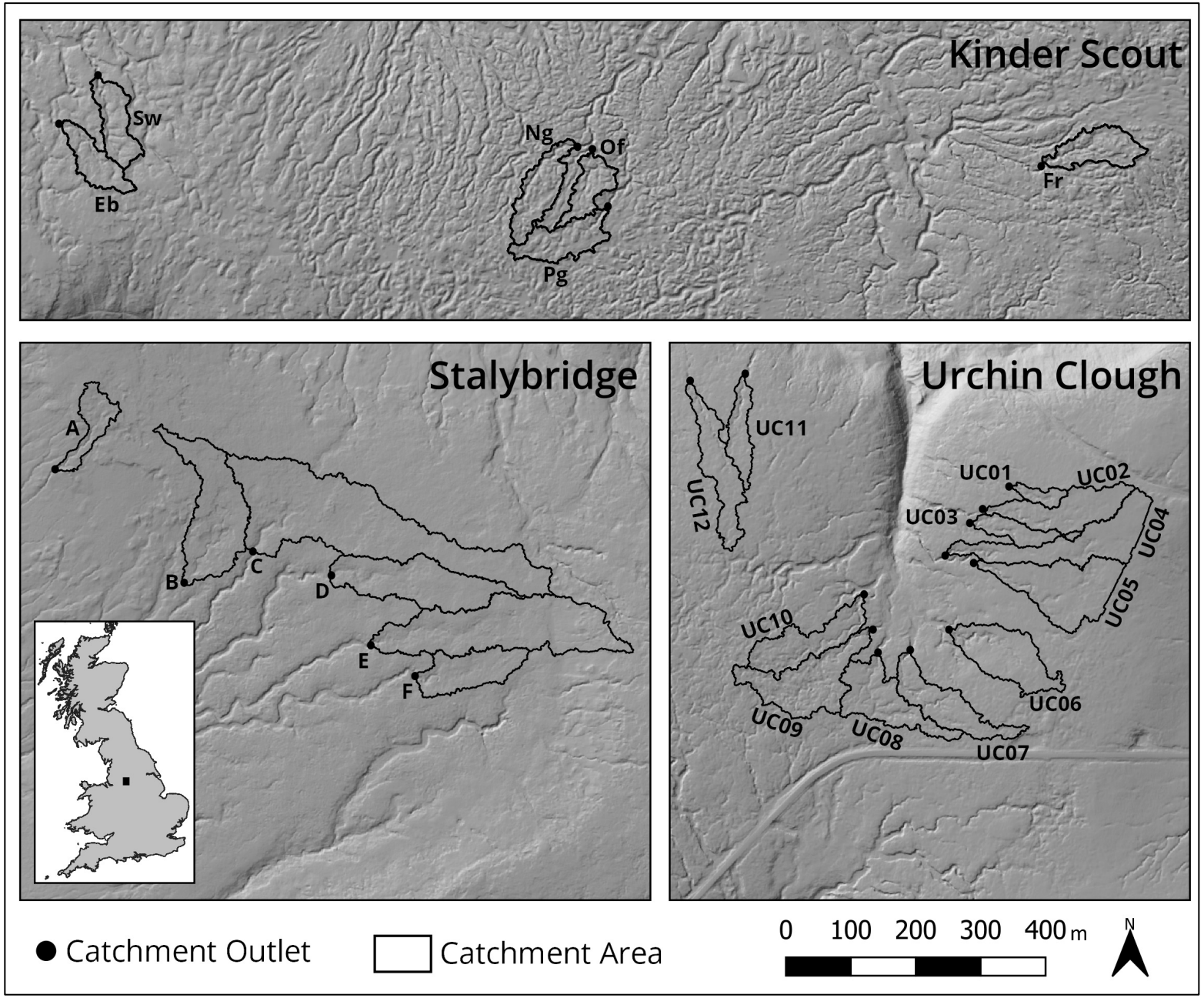
1m DTM (LiDAR)

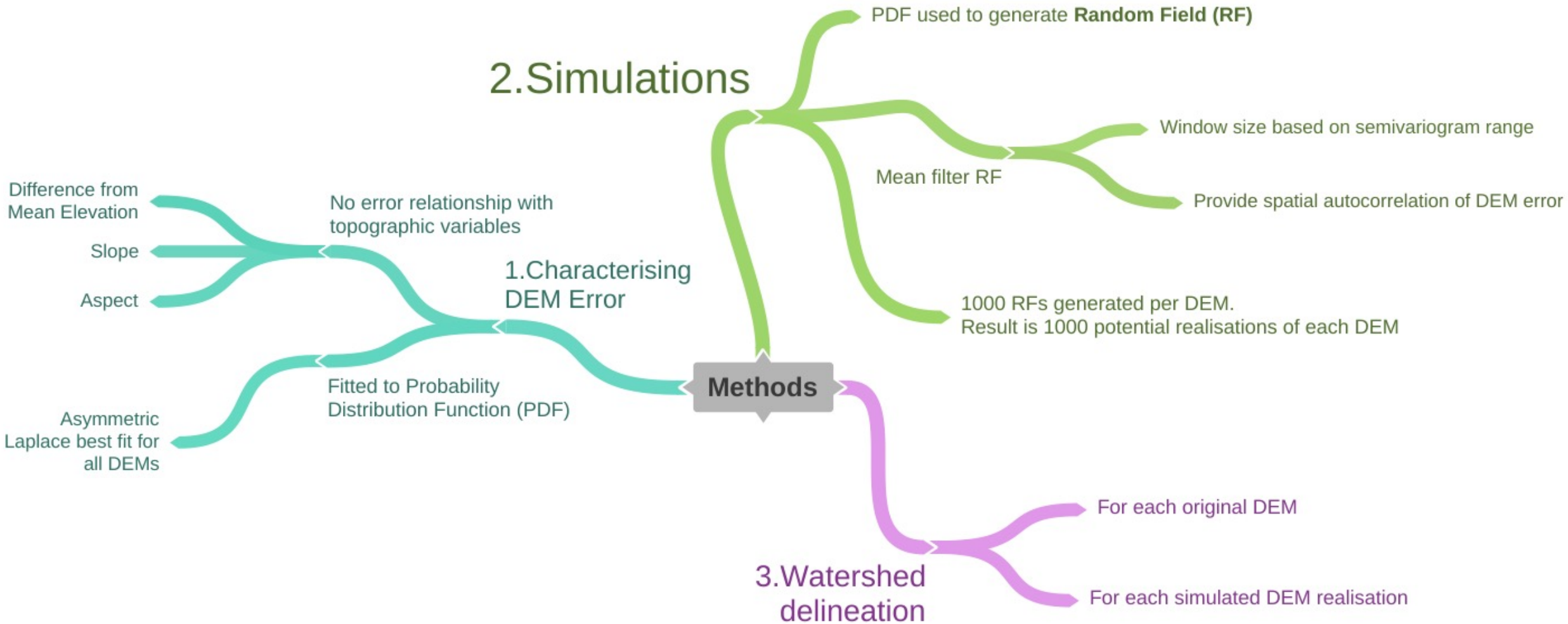
0.25m DSM (Photogrammetry)

0.5m DSM 1m DSM

Elevation Accuracy (900 GCPs)

Study Area & Data



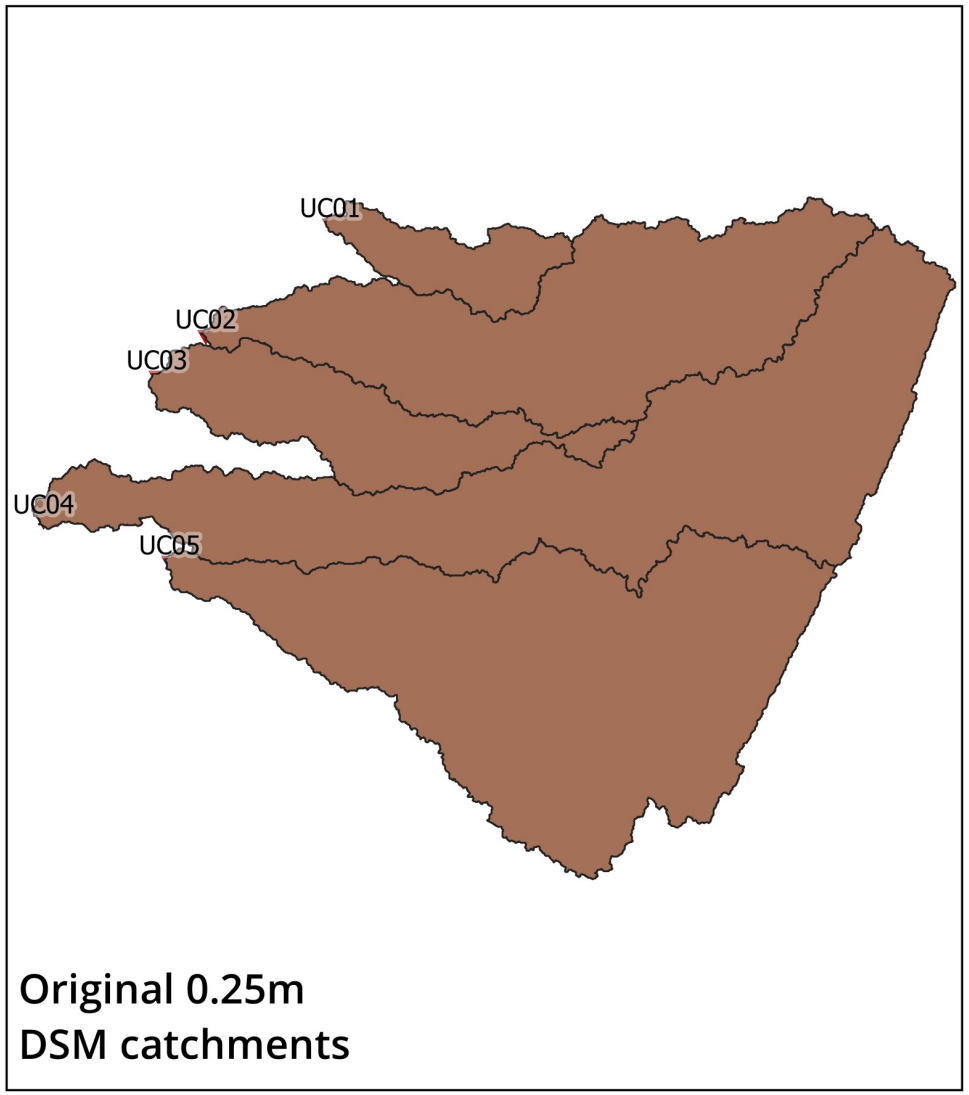

Methods
1.Characterising DEM Error
No error relationship with topographic variables
Difference from Mean Elevation
Slope
Aspect
Fitted to Probability Distribution Function (PDF)
Asymmetric Laplace best fit for all DEMs
2.Simulations
PDF used to generate Random Field (RF)
Mean filter RF
Window size based on semivariogram range
Provide spatial autocorrelation of DEM error
1000 RFs generated per DEM.
Result is 1000 potential realisations of each DEM
3.Watershed delineation
For each original DEM
For each simulated DEM realisation

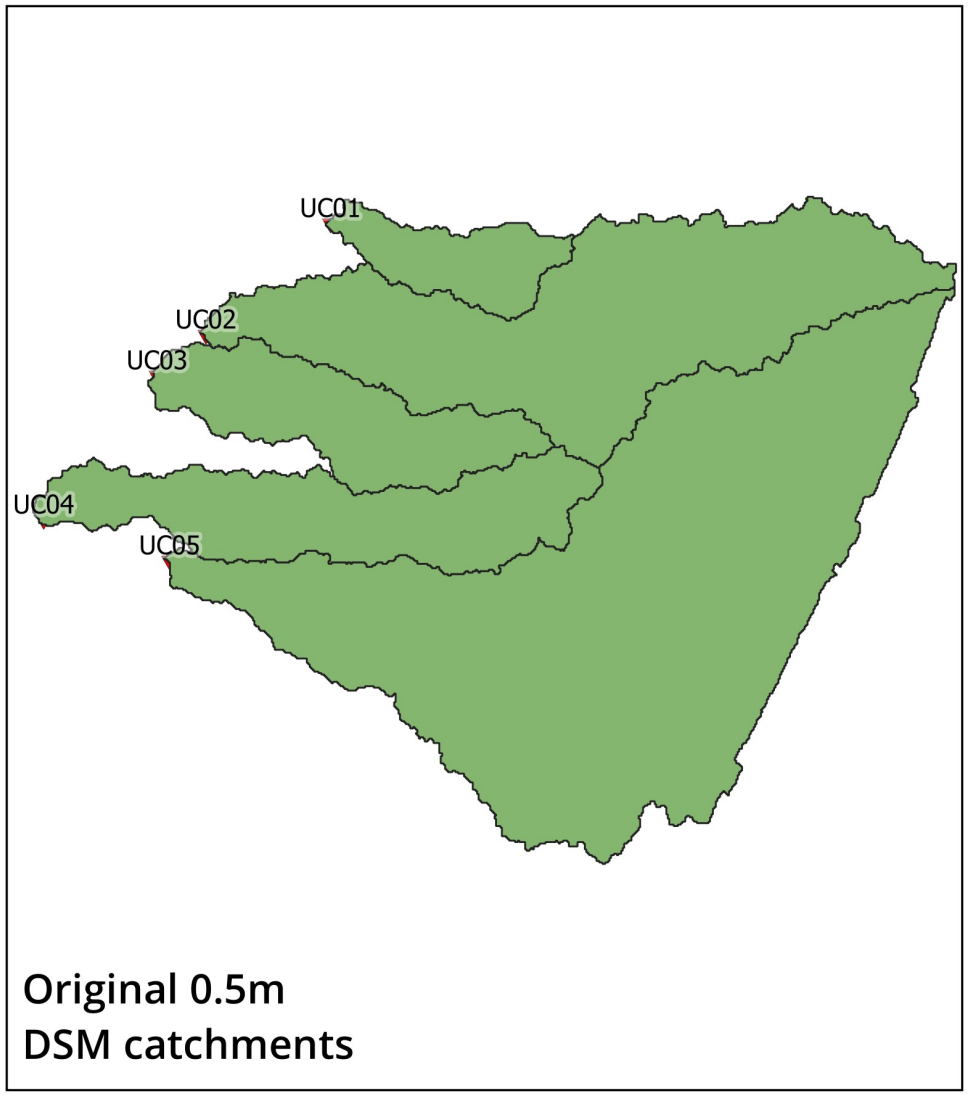
		0.25m DSM	0.5m DSM	1m DSM	1m DTM	range
Kinder Scout	Eb	0.52	0.52	0.52	0.53	0.01
	Sd	0.59	0.59	0.59	0.60	0.01
	Ng	0.70	0.70	0.70	0.69	0.01
	Of	0.46	0.46	0.46	0.47	0.01
	Pg	0.68	0.68	0.68	0.67	0.01
	Fr	0.64	0.64	0.64	0.64	0.01
Urchin Clough	UC01	0.17	0.17	0.28	0.40	0.23
	UC02	0.91	1.04	0.93	0.79	0.25
	UC03	0.37	0.36	0.35	0.57	0.22
	UC04	1.28	0.50	1.43	0.31	1.13
	UC05	1.39	2.07	1.22	2.12	0.90
	UC06	1.02	0.99	1.69	2.00	1.01
	UC07	0.86	0.87	0.83	1.42	0.59
	UC08	0.95	0.91	0.98	0.66	0.32
	UC09	1.22	1.28	1.27	1.32	0.10
	UC10	0.86	0.97	0.96	0.71	0.26
	UC11	0.43	0.43	0.62	0.41	0.20
	UC12	0.85	0.53	0.65	0.94	0.42
Stalybridge	A	0.46	0.49	0.45	0.98	0.52
	B	1.63	1.60	1.21	1.20	0.43
	C	4.00	4.00	4.45	3.72	0.73
	D	1.49	1.66	1.73	2.71	1.22
	E	2.52	2.32	2.39	1.51	1.00
	F	0.82	0.81	0.82	0.79	0.03

Consistent in extensively gullied peat (well defined morphology)

Variability between different DEM type and resolutions

Catchment areas from the original DEMs



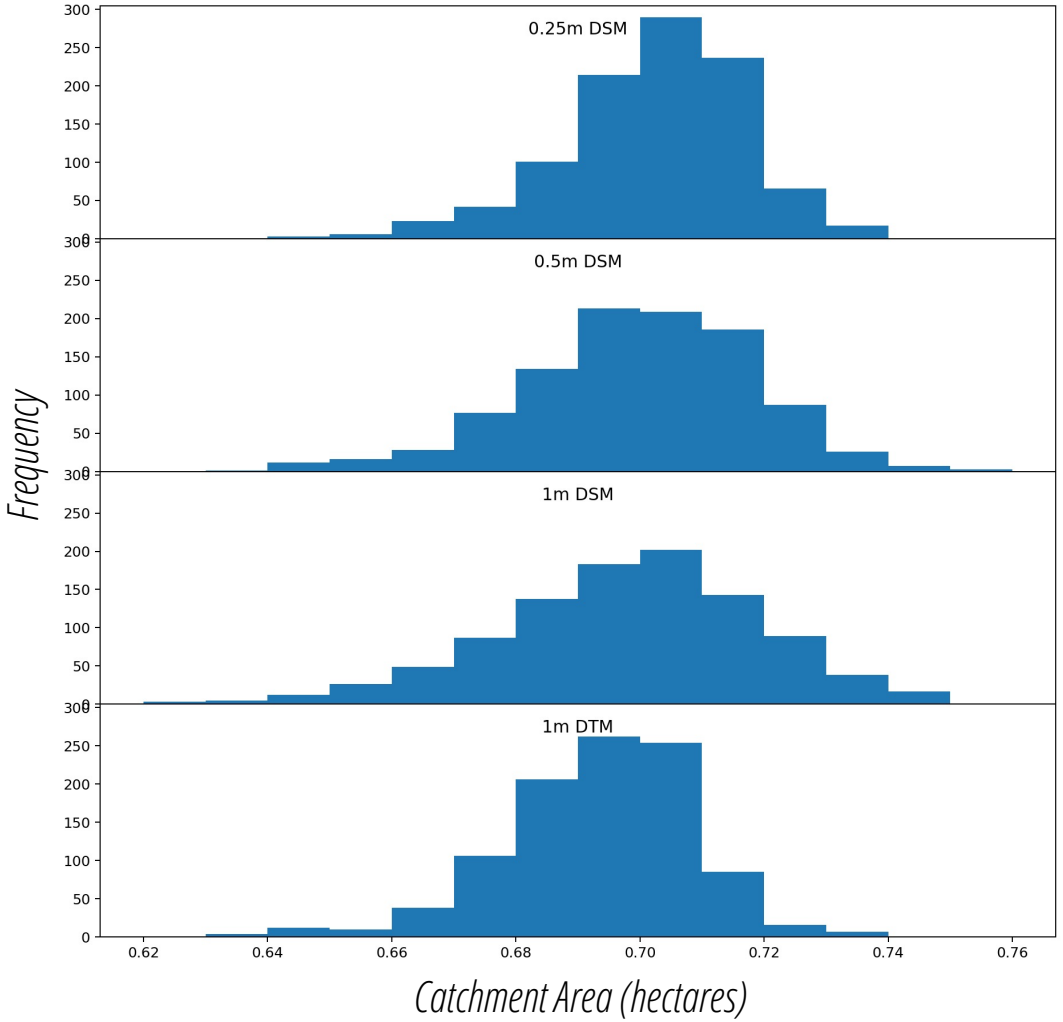


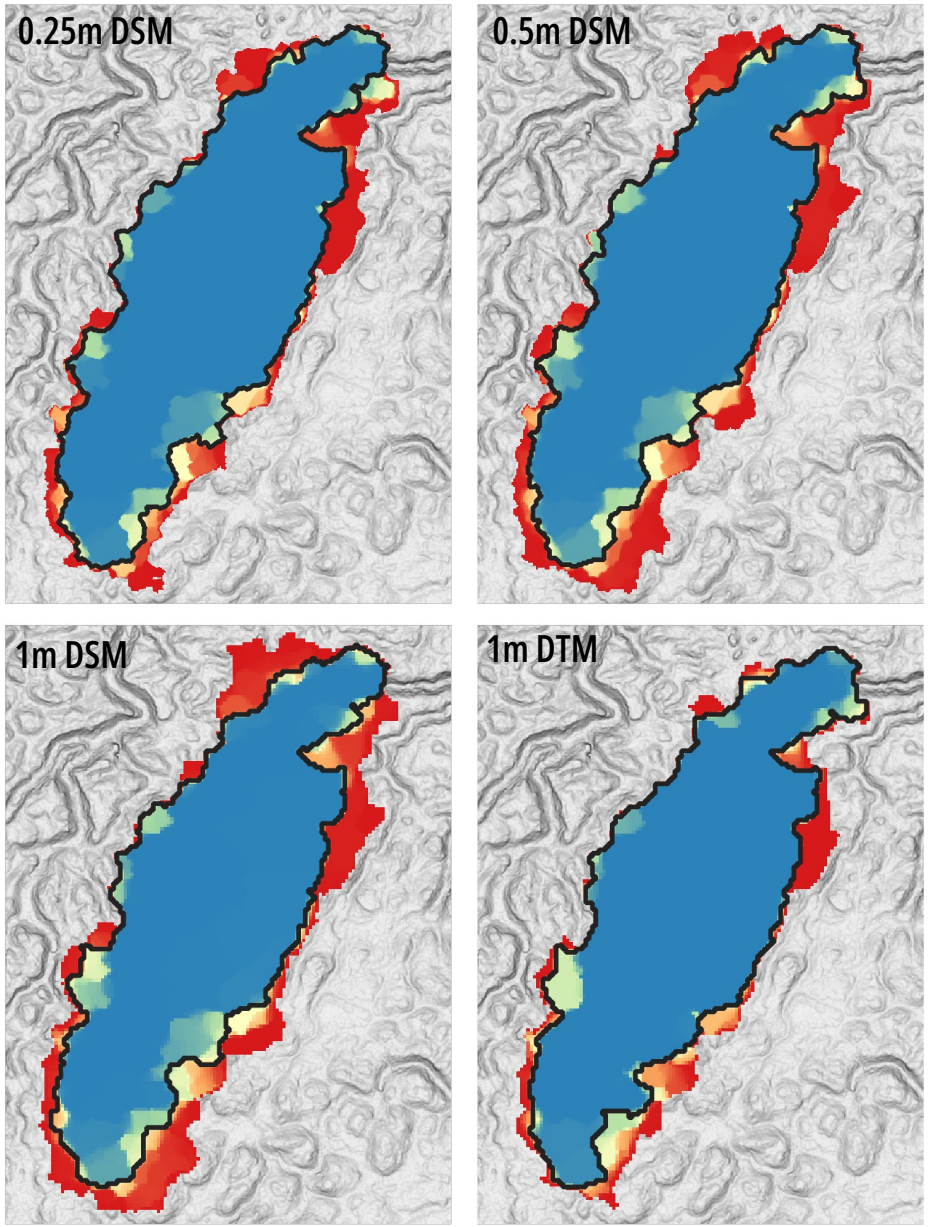
0 25 50 75 100 m

N

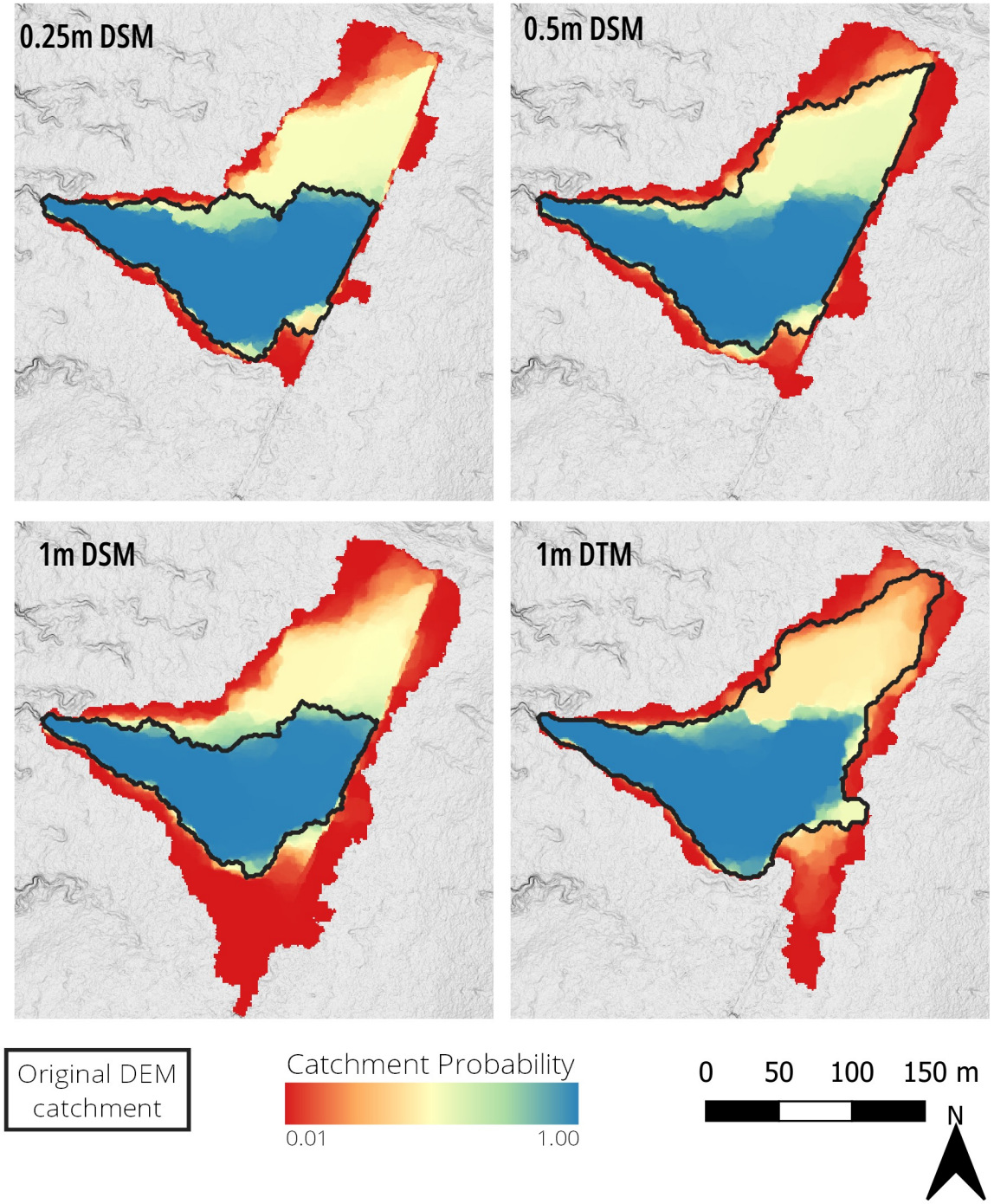
Catchment delineated from the original 0.25m DSM and resampled to 0.5m result in marked difference for UC04 and UC05

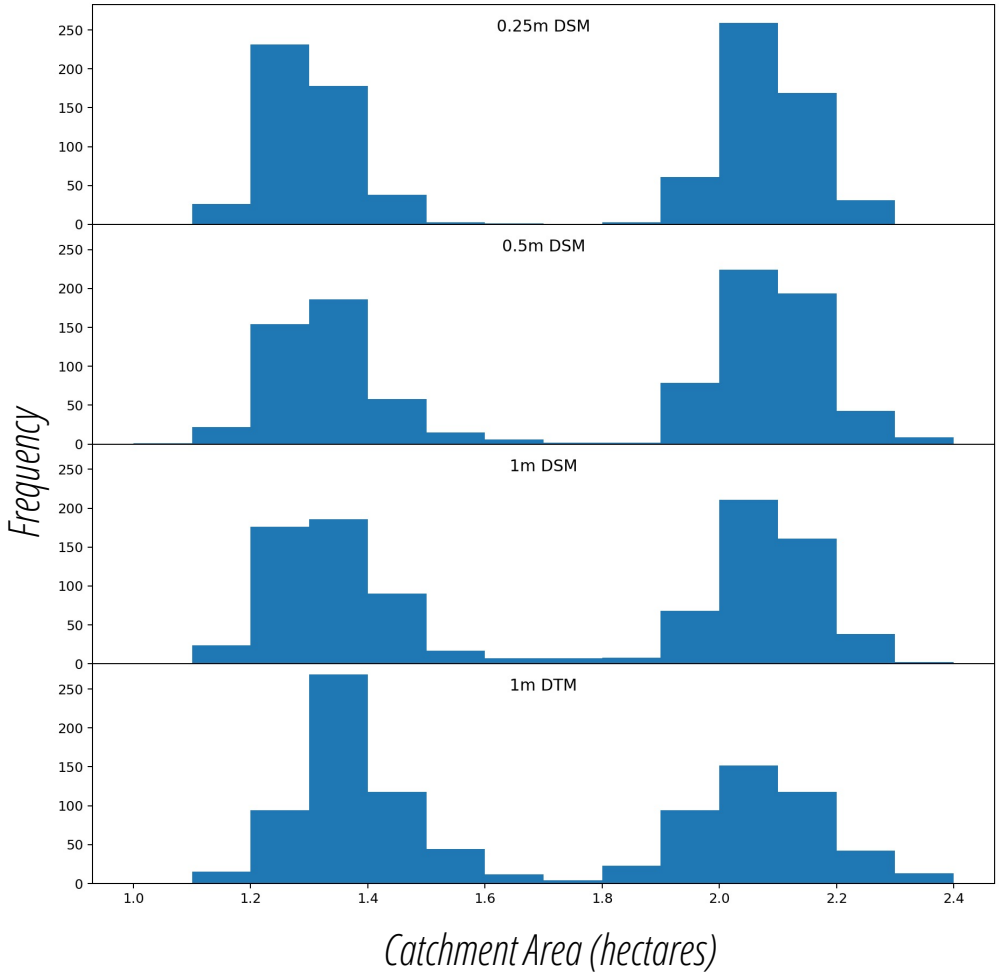
Simulation results from a degraded catchment (Ng):





Simulation results from a relatively intact catchment (UC05)





Implications

Micro-catchment delineations **are more sensitive to DEM error** in more intact peatlands

DSM suited for catchment delineation in low-canopy environments

Uncertainty in micro-catchment area may **propagate error** to hydrological analyses (e.g. water balance calculations)

Field assessment of watershed should be carried out where possible

Uncertainty in catchment areas..

Certainly time for an Ottakringer!

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