



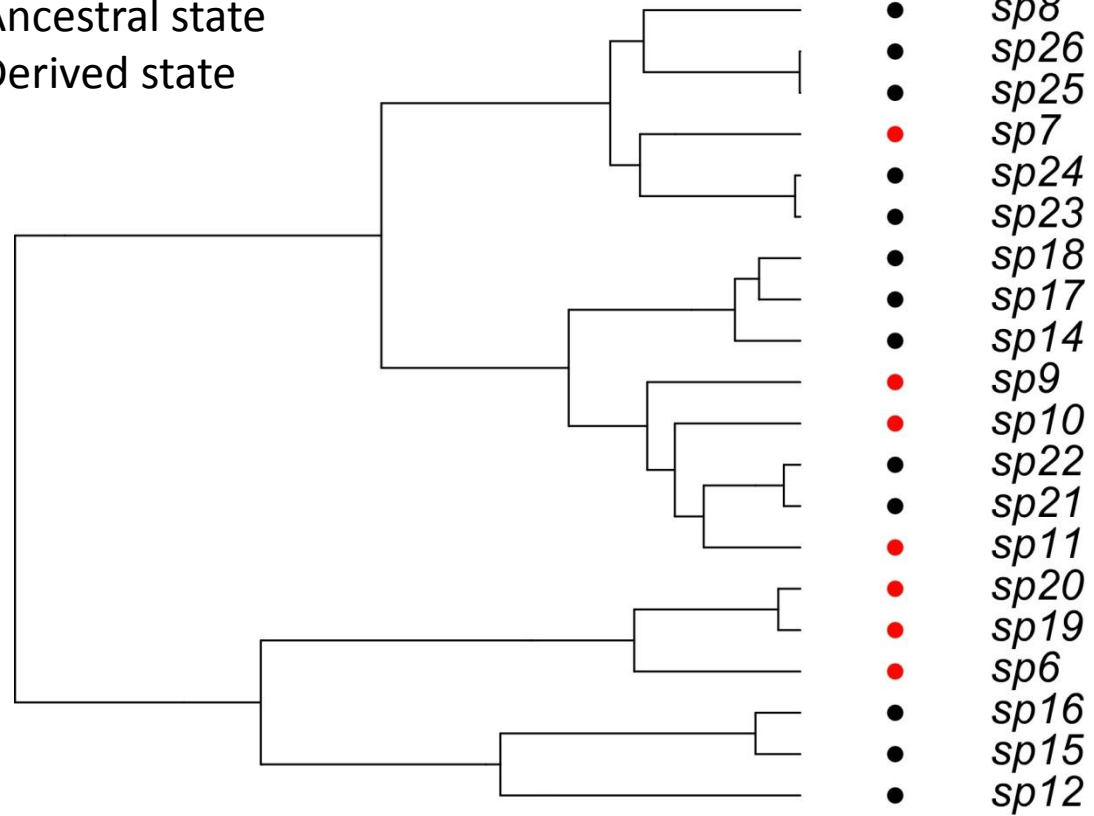
Accuracy of Ancestral State Reconstruction on simulated phylogenies

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Supervised by Greg Jordan and Barbara Holland

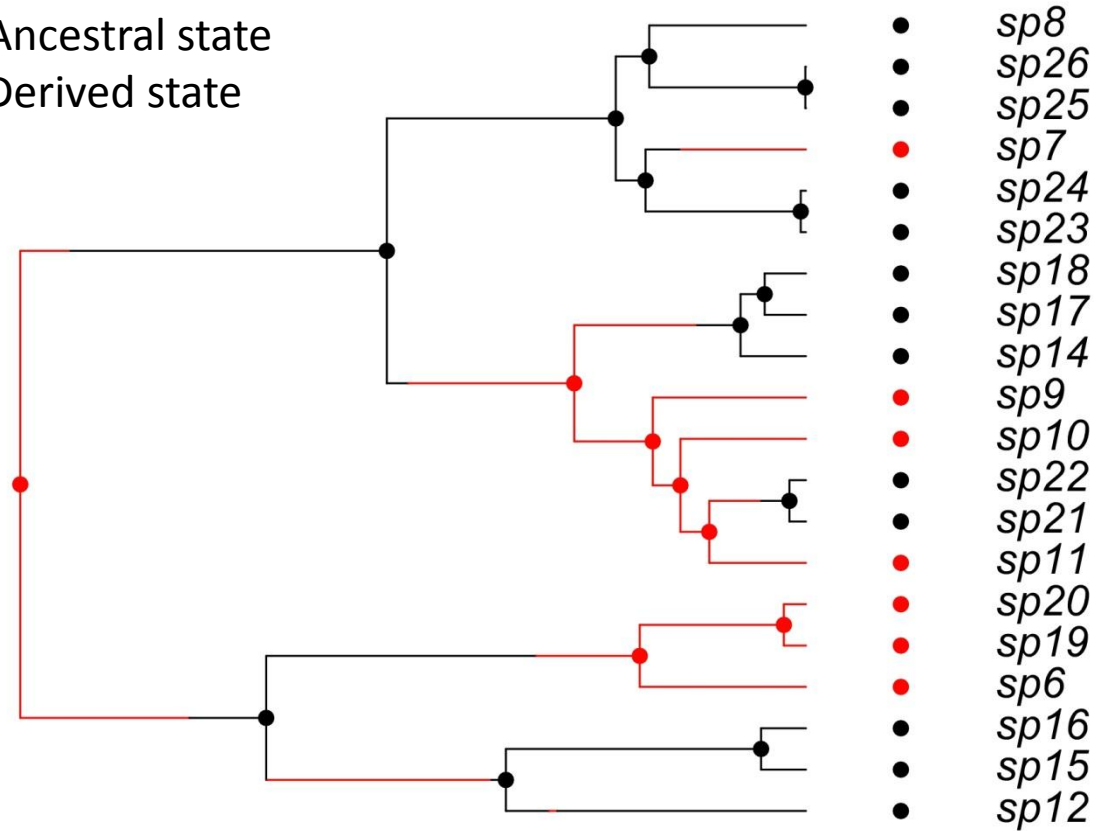
What is Ancestral State Reconstruction?

State 0 =  = Ancestral state
State 1 =  = Derived state



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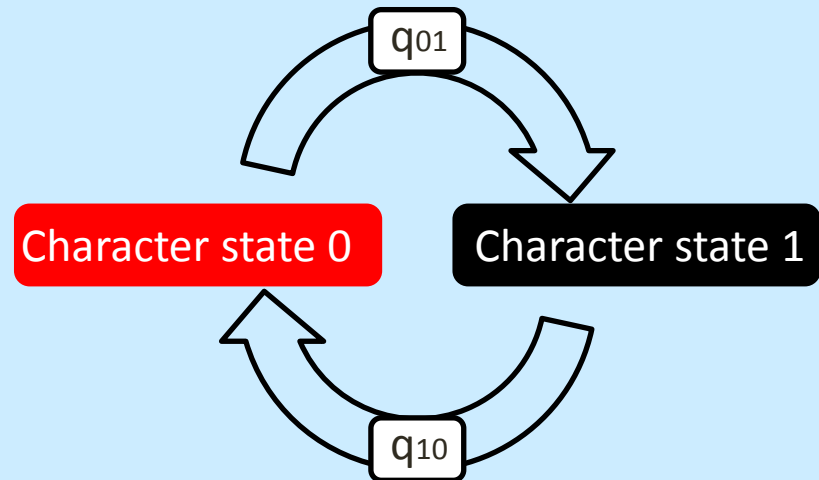
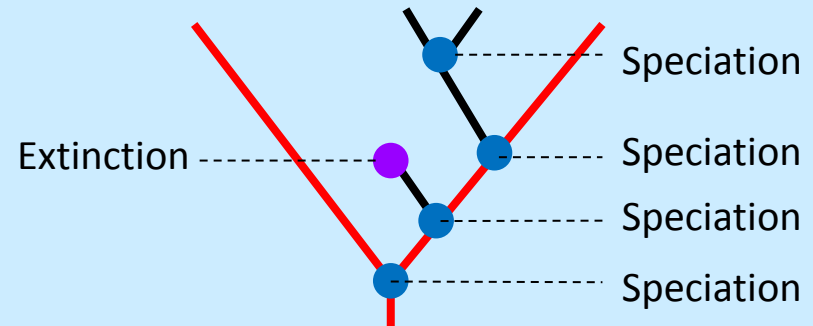


A method for estimating a character state through time.

Rates and parameters: making trees

Controlled by 6 parameters:

- λ_0 and λ_1 - state dependent speciation rate
- μ_0 and μ_1 - state dependent extinction rate
- q_{01} , and q_{10} - state dependent character change rate



Project aims:

Investigate ASR accuracy in the case of:

1. (a) State based character change and/or extreme character change

(b) State based extinction and/or extreme extinction
2. Node depth throughout trees under different regimes of character evolution.

Methods

Possible parameters:

$$\lambda_0 = \lambda_1 = 1$$

$$\mu_0, \mu_1 = (0.5, 0.38, \dots)$$

$$q_{01}, q_{10} = (0.1, \dots)$$

List of possible parameter settings grouped by parameter set identity:

$\lambda_{0.1}$	$\lambda_{1.1}$	$\mu_{0.1}$	$\mu_{1.1}$	$q_{01.1}$	$q_{10.1}$	$\lambda_{0.2}$	$\lambda_{1.2}$	$\mu_{0.2}$	$\mu_{1.2}$	$q_{01.2}$	$q_{10.2}$...
1	1	0.5	0.5	0.1	0.1	1	1	0.5	0.38	0.1	0.1	...

Make trees using
1 group of
parameter
settings



treeID
1



treeID
2

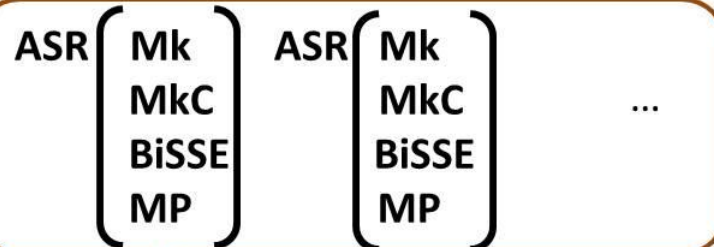


treeID
3

...

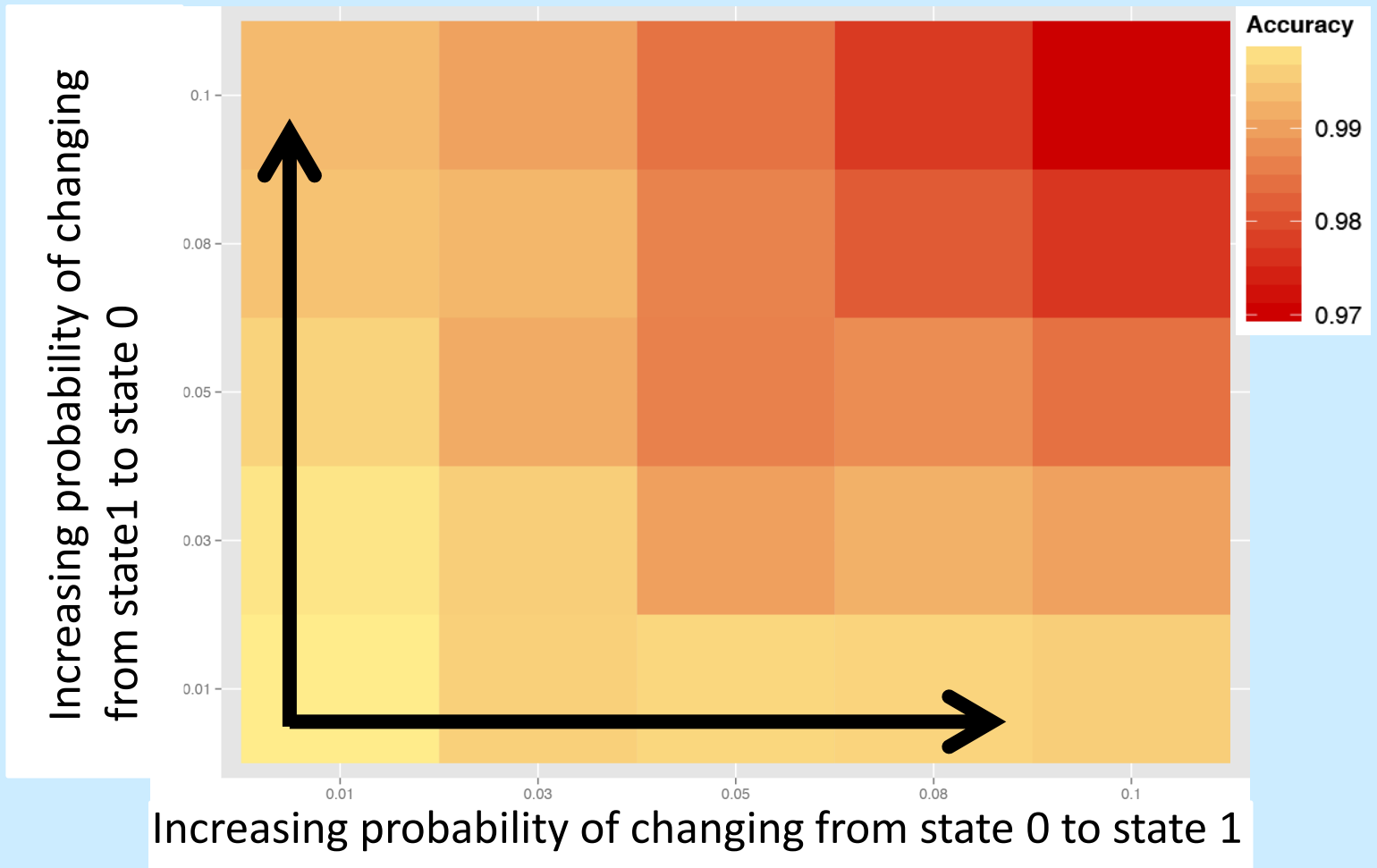


treeID
200

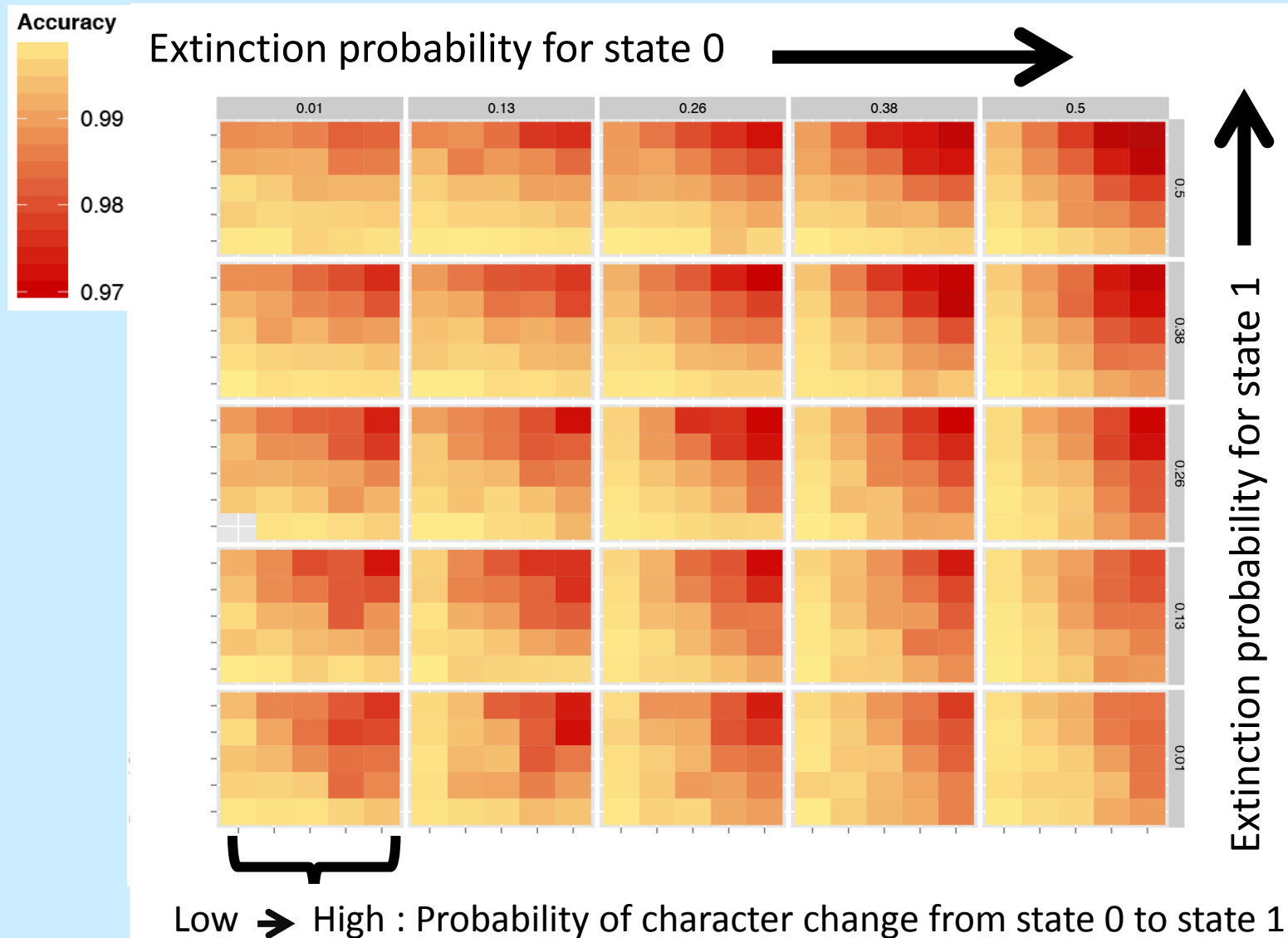


Get accuracy

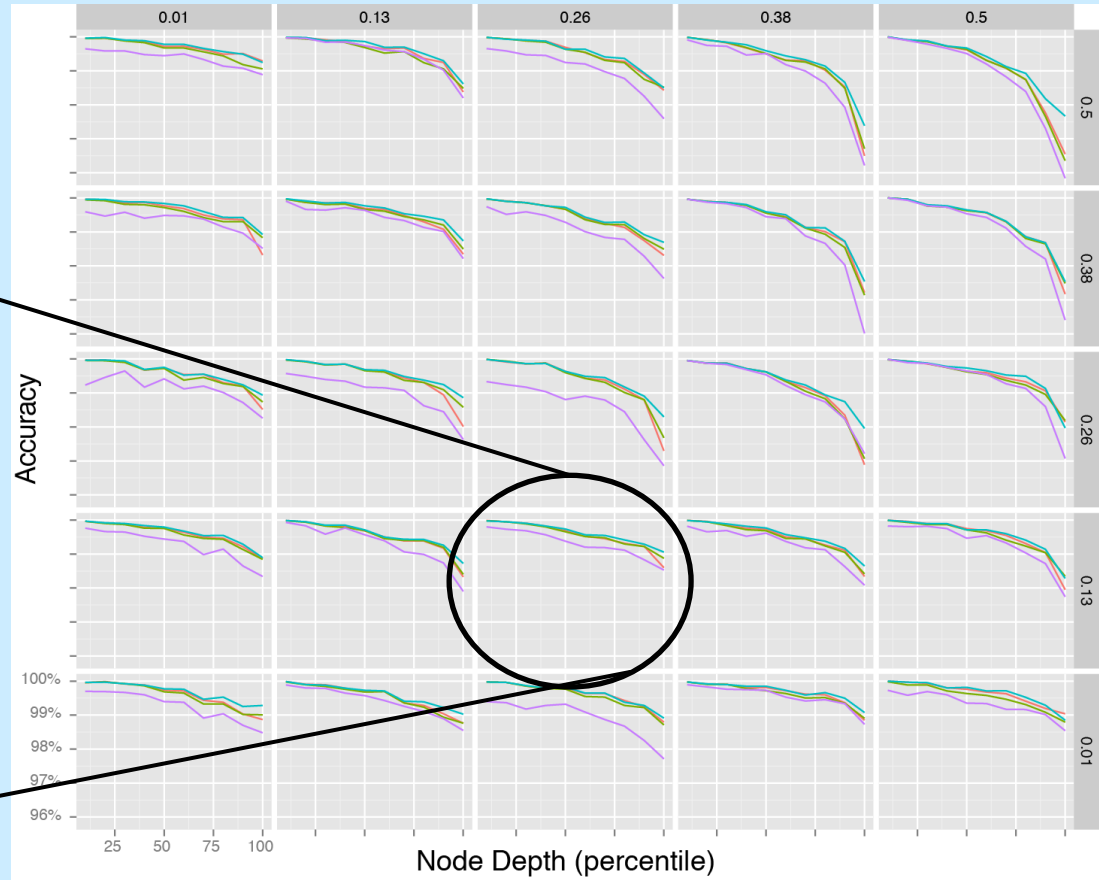
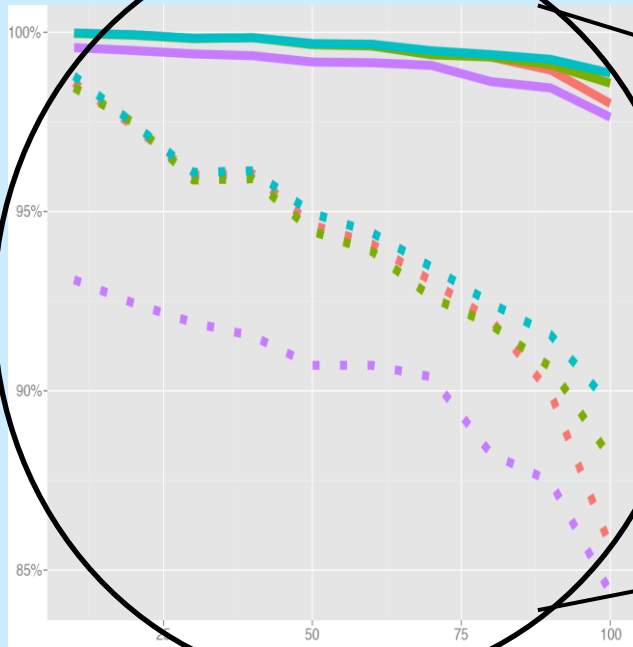
Results from parsimony



Results: μs and $q s$ varied, λ fixed



Results: selective extinction and node depth



Conclusions

Extreme and state based evolution is (still) difficult to model accurately

Deep-time evolution is difficult

BiSSE is not as good as we had hoped- but now we get to make it better!

Future work

What's up with BiSSE?

Are the trees we simulate similar enough to “real” trees?

Model the apocalypse

Ta!

Many thanks to Greg & Barbara, the honours people, and my very patient friends

Questions?