

# Extended GeoHiSSE

**Question: Do island clades have a higher diversification rate than continental clades?**

This framework allows the three types of cladogenetic speciation to vary (all were the same in GeoHiSSE). This will allow us to explore which types of speciation (allopatric, widespread symp, and subset sympatry) are at play

$q$  = Transition between states ( $A \rightarrow B$ )

## Extinction

$X$  = range contraction, extirpation

## Anagenetic Range Evolution

$d$  = dispersal but no cladogenesis

## Cladogenetic Range Evolution

$S$  = Speciation

Represents a separate speciation rate

**0** = Continents only

**01** = Continents + Islands (widespread)

**1** = Islands only

**A** = Empirical Data

**B** = hidden state with randomized data

