Introduction to putting models on the dispersion parameter in glmmTMB

Mollie Brooks

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This video covers

- dispersion parameters and dispersion models
- simulated example

Dispersion already estimated in many models

- by default
  - e.g. `gaussian`, `nbinom1`, `nbinom2`, `compois`
  - estimated dispersion parameter
- different from dispersion models
- extract single dispersion parameter using `sigma()`
- `?sigma.glmmTMB` for all definitions

Dispersion models

```
glmmTMB(y~x, disp=~d, zi=~z, family=compois, data)
```

- when to use dispersion model
  - dispersion differs with some covariate
  - doesn't follow the constrained mean-variance pattern
- log link to keep it positive

Ex: Simulated data

- repeated measures of individuals
- many time points
- treatment affects both μ and σ^2
- `gaussian` family

$$\sigma^2 = \phi = exp(X\beta)$$

$$log(\sigma^2) = log(\phi) = X\beta$$

see `code_disp.R`

Recap

- `?sigma.glmmtmb` for definition of dispersion parameter
- simulated example
- `fixef(m0)$disp`

Also, see the first part of the video on the beta distribution for an example using real data.