



# Bayes class : BC Phenology

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September 21, 2012

# **Identifying drivers of budburst in deciduous forests in North America**

**Aim:** To test the importance of chilling, forcing, and photoperiod as drivers of budburst for woody species species in British Columbia and relative to the eastern species

## **Questions:**

1. How do species differ in their sensitivity to cues?
2. Do we find interactions between cues?
3. Are there differences in cue use across longitude?

# Methods:

- Growth chamber study
  - 2 chilling levels: 21 or 49 days
  - 2 forcing levels: 20°:10°C or 15°C:5°C
  - 2 photoperiod levels: 8 or 12 h
- 21 dominant woody species
- Branches collected after dormancy
- 8 branches per species per treatment
- Have a comparable dataset from eastern North America

# The Model:

- Combined data from eastern and western species
- Forcing and photoperiod transformed to 0/1
- Using Chill Portions
- Site transformed to 0-3
- Standardized forcing, photoperiod, chill portions and site:

$$\text{force\_2z} = (\text{force} - \text{mean}(\text{force})) / (\text{sd}(\text{force}) * 2)$$

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force\_2z = (force - mean(force))/(sd(force)\*2)

$$\begin{aligned}\hat{y}_i &= \alpha_{sp_i} + \beta_{site_{sp_i}} \times site_i + \beta F_{sp_i} \times F_i \\ &\quad + \beta C_{sp_i} \times C_i + \beta P_{sp_i} \times P_i + \beta FP_{sp_i} \times FP_i \\ &\quad + \beta FC_{sp_i} \times FC_i + \beta CP_{sp_i} \times CP_i\end{aligned}$$

$$\begin{aligned}\beta P_{sp} &= \alpha P + \beta Praw_{sp} \times \sigma P \\ \beta FP_{sp} &= \alpha FP + \beta FPraw_{sp} \times \sigma FP \\ \beta FC_{sp} &= \alpha FC + \beta FCraw_{sp} \times \sigma FC \\ \beta CP_{sp} &= \alpha CP + \beta CPraw_{sp} \times \sigma CP\end{aligned}$$

$$\beta_{site} \sim N(\mu_{site}, \sigma_{site})$$

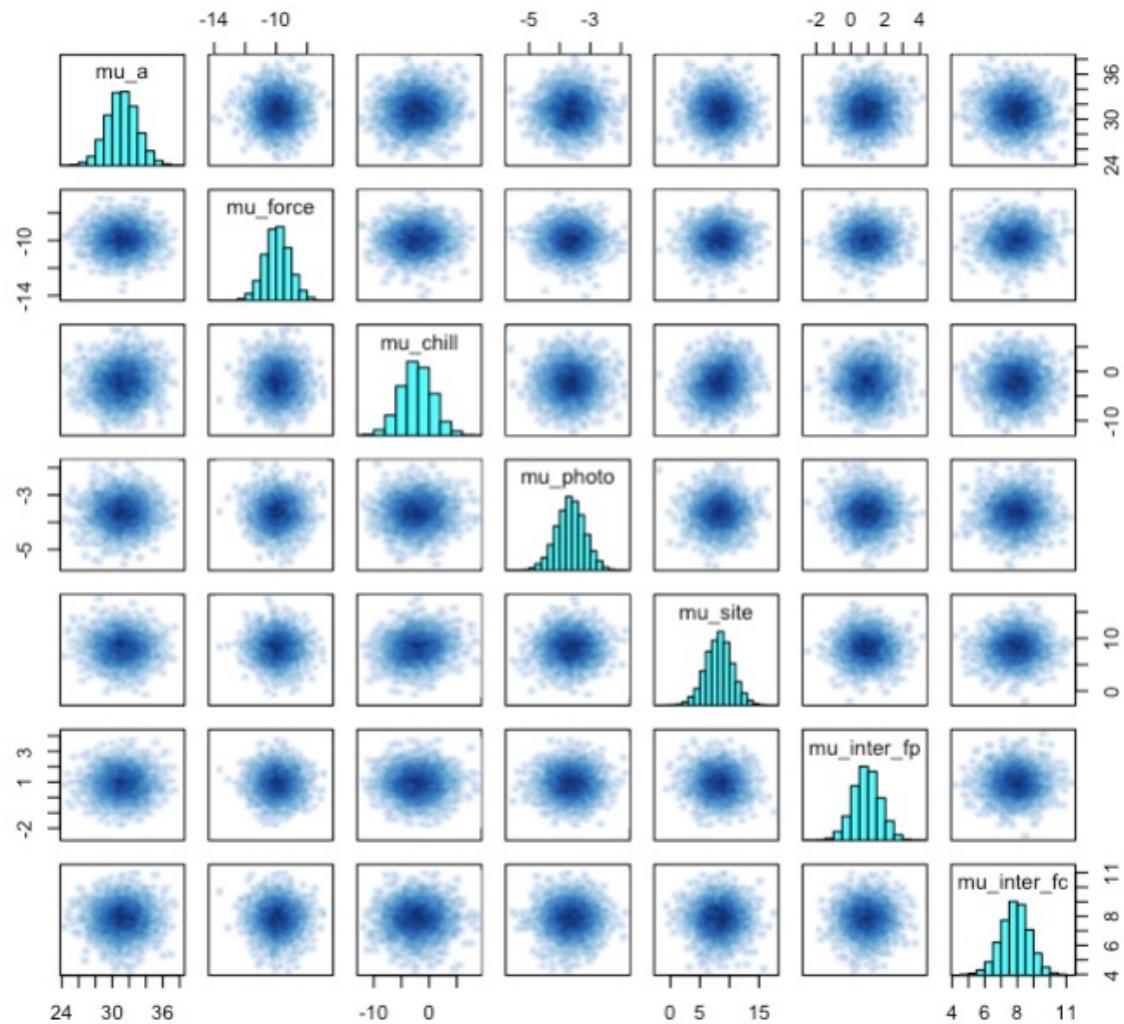
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$$y \sim N(\hat{y}, \sigma_y)$$

# The Model:

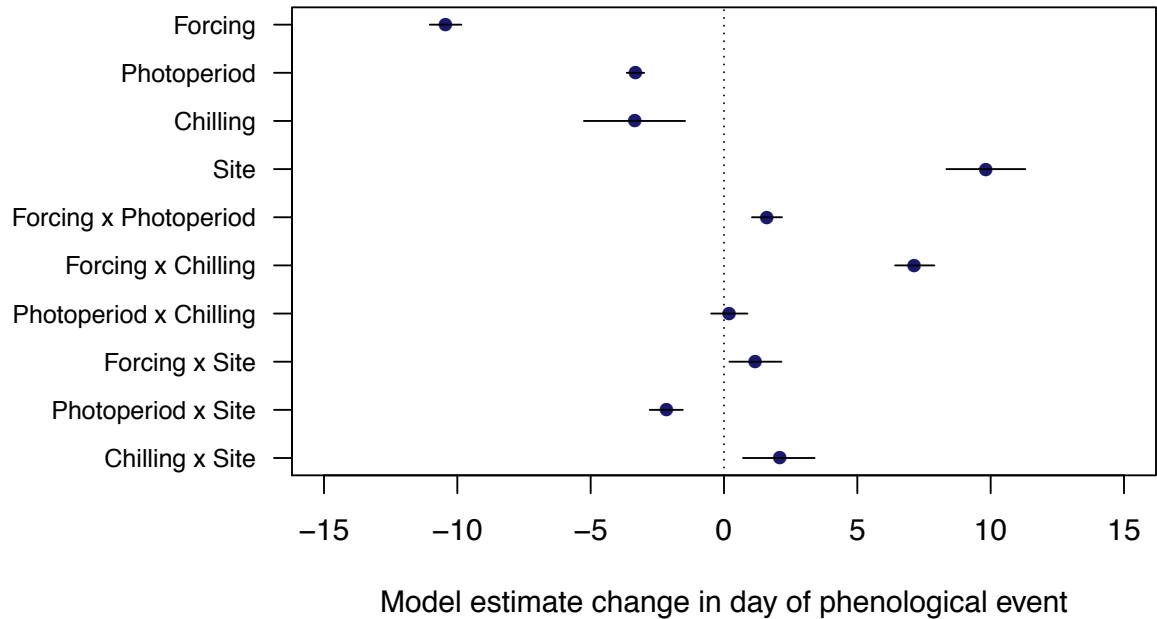
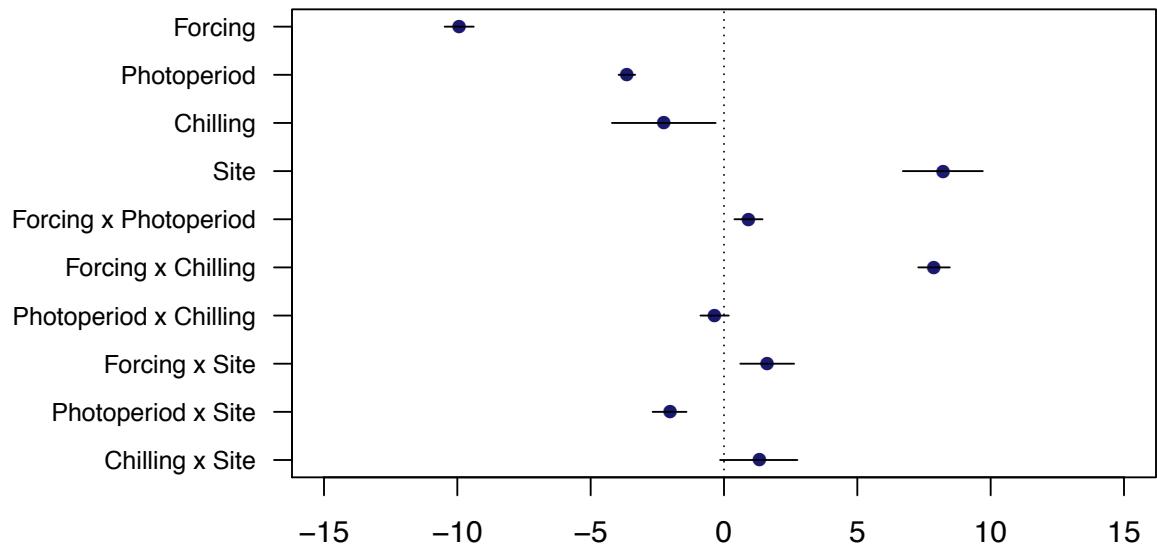
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# Preliminary Results:

- All three cues advance budburst
- Forcing has the strongest effect
- Terminal and lateral buds respond differently to chilling and photoperiod
- Do find cues to interact



# Next Steps:

- Finalize results
- Explore correlations between the cues
- Add phylogenetic effects