

Introduction to Hierarchical Bayesian Analysis for Ecological Data using WinBUGS



June 29-30th 2014, Montpellier

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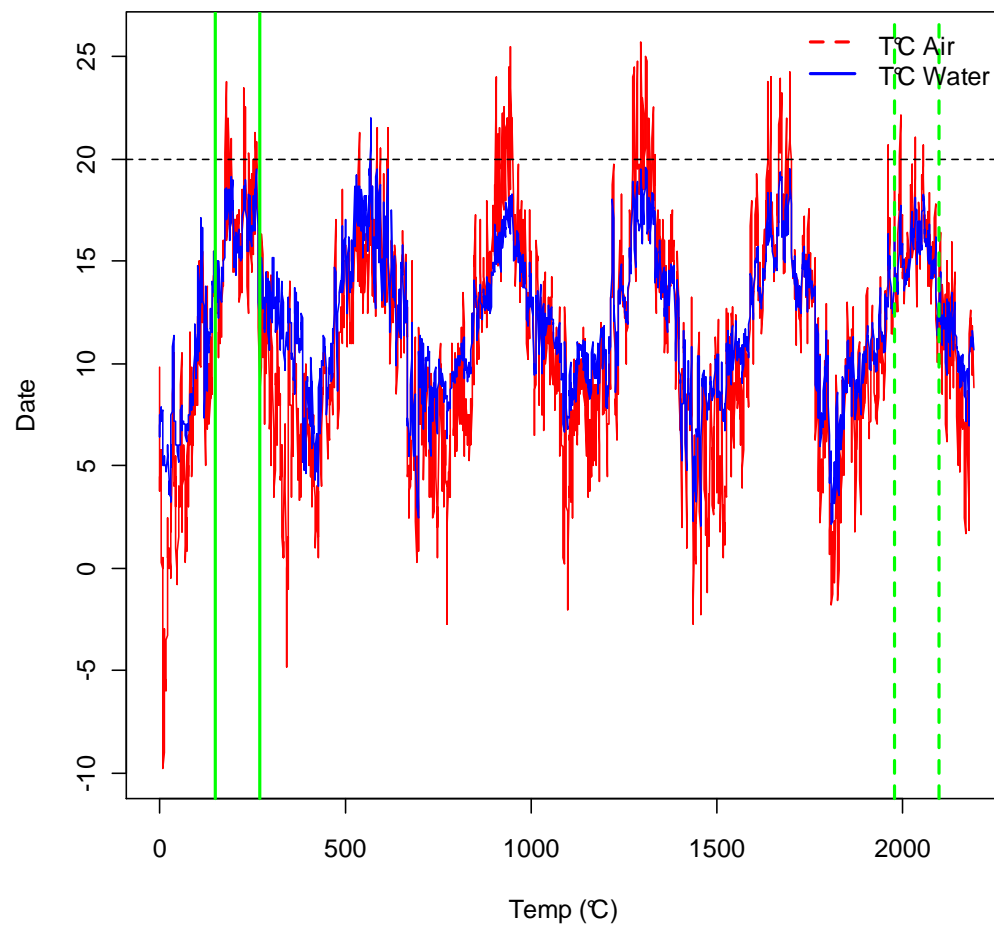
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Example 1

The linear regression

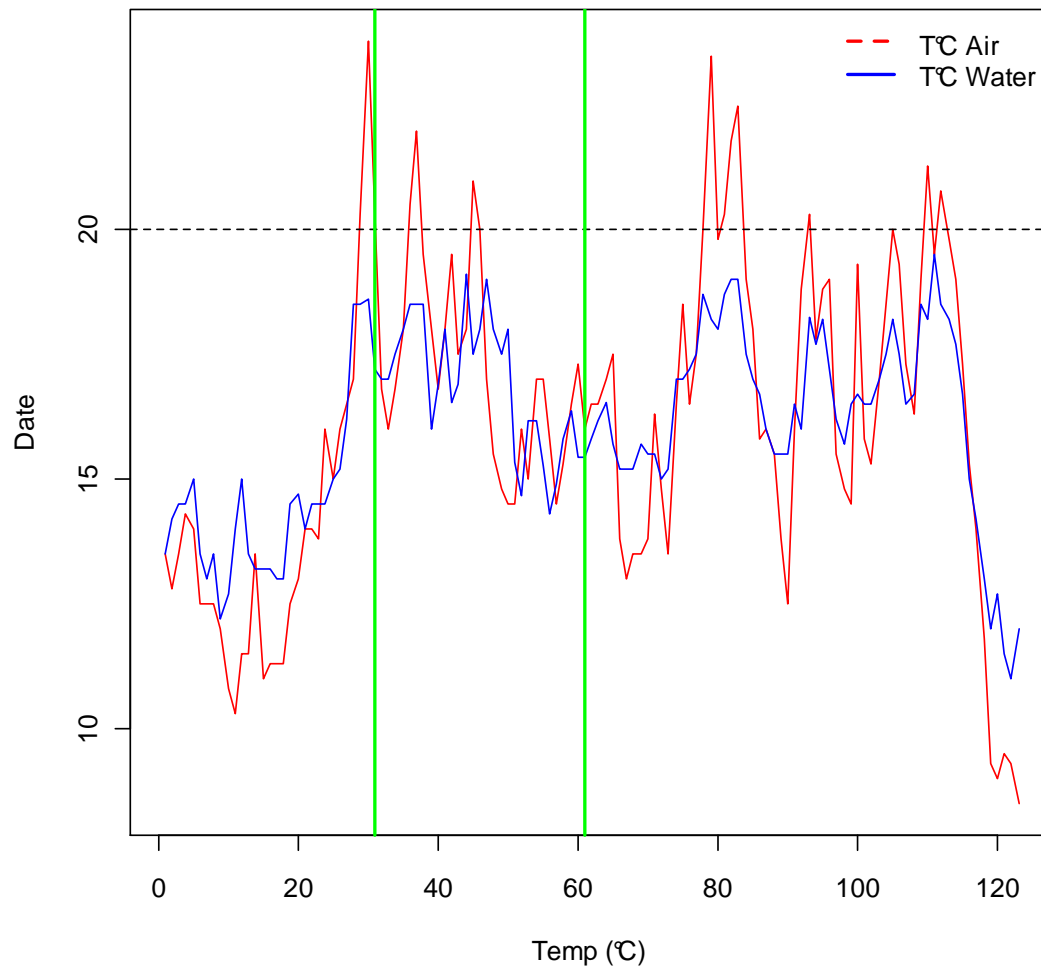
Time series

Oir River ; 87-88, 94-95, 2001-2002

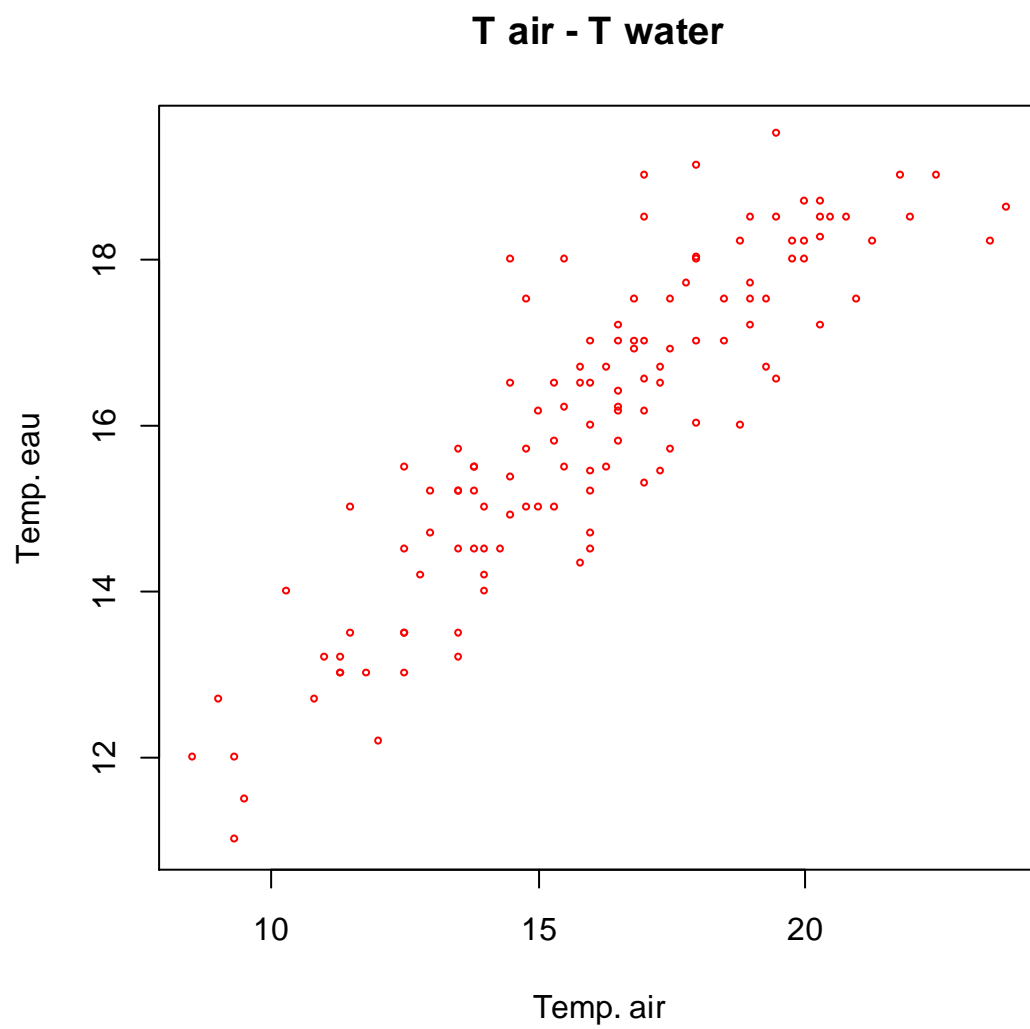


Time series

Oir River - June-Sept 1987



Pairwise correlation

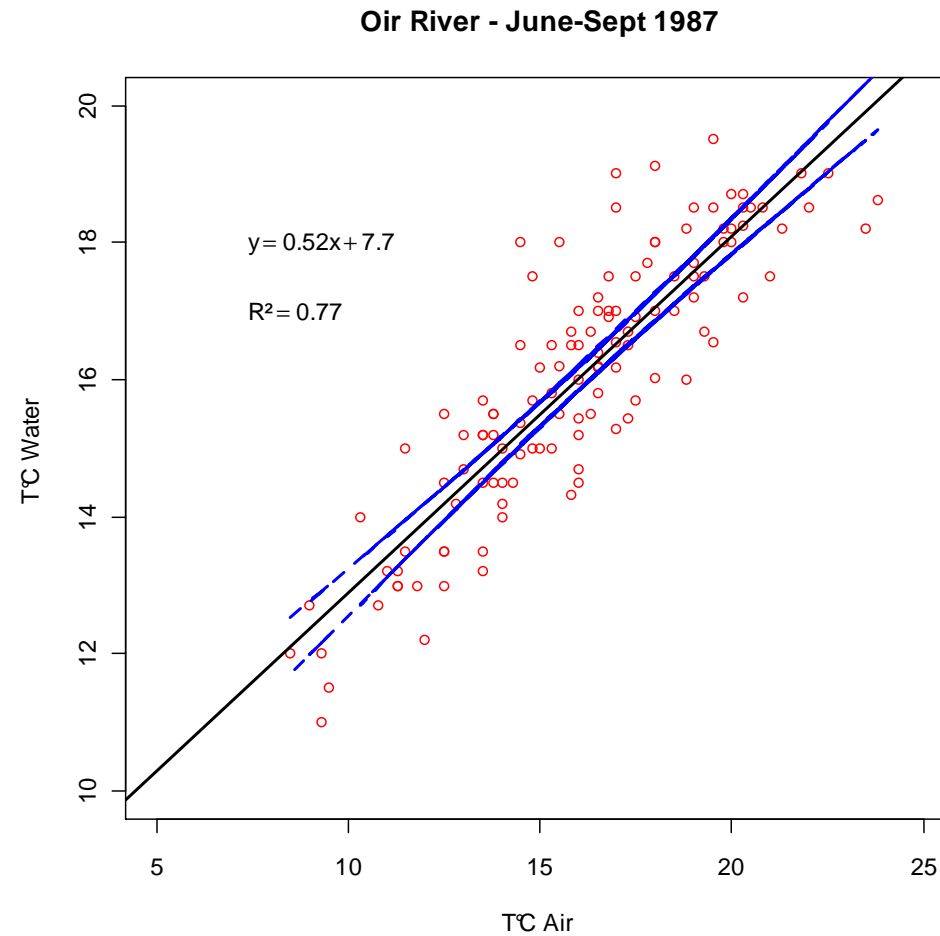


Linear regression

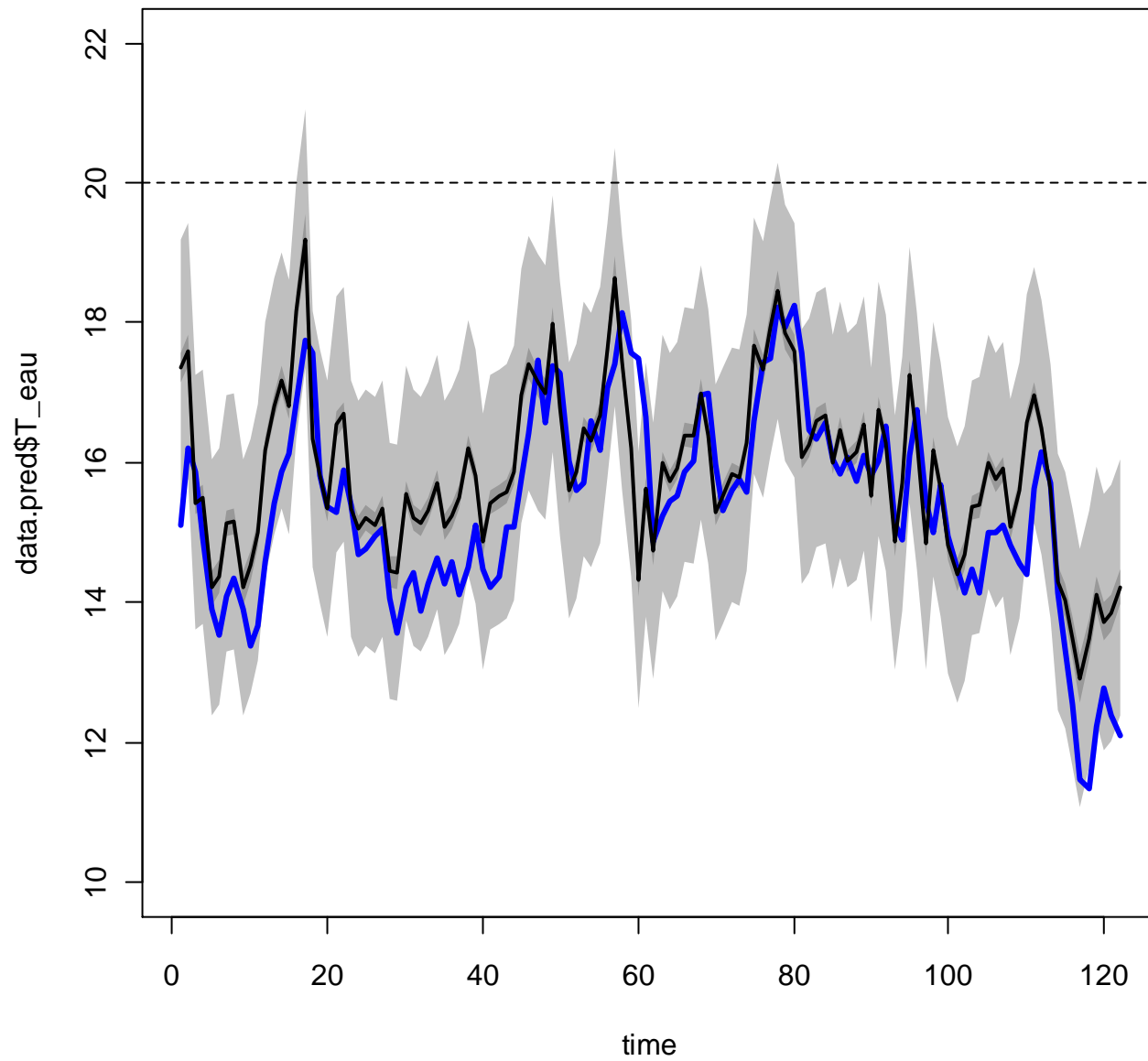
$$Y_t = \alpha \times X_t + \beta + \varepsilon_t$$

$$\varepsilon_t \stackrel{iid}{\sim} N(0, \sigma^2)$$

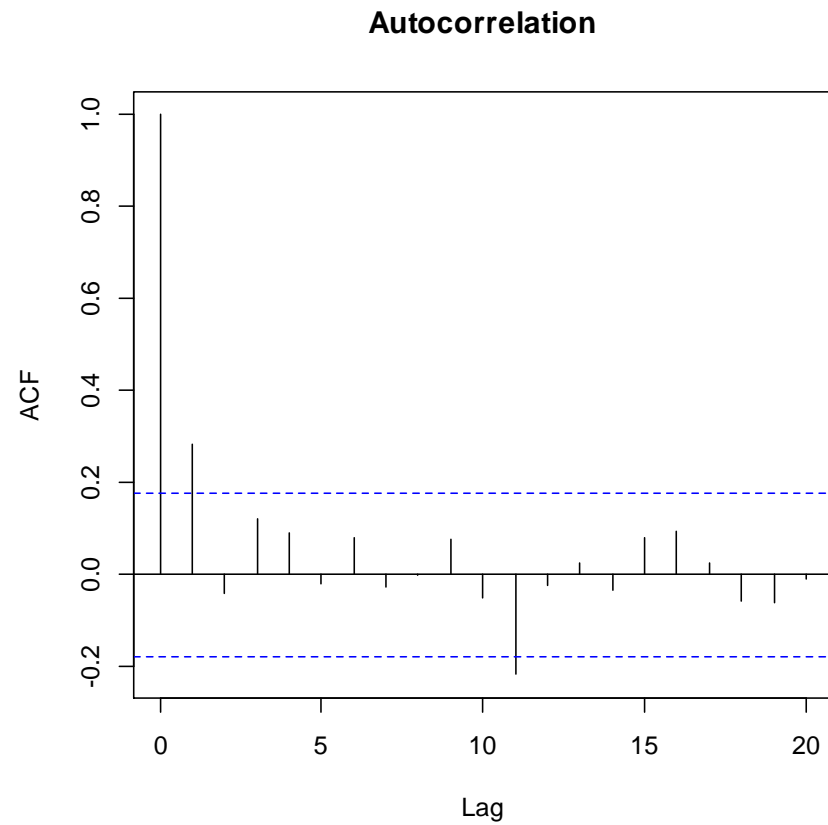
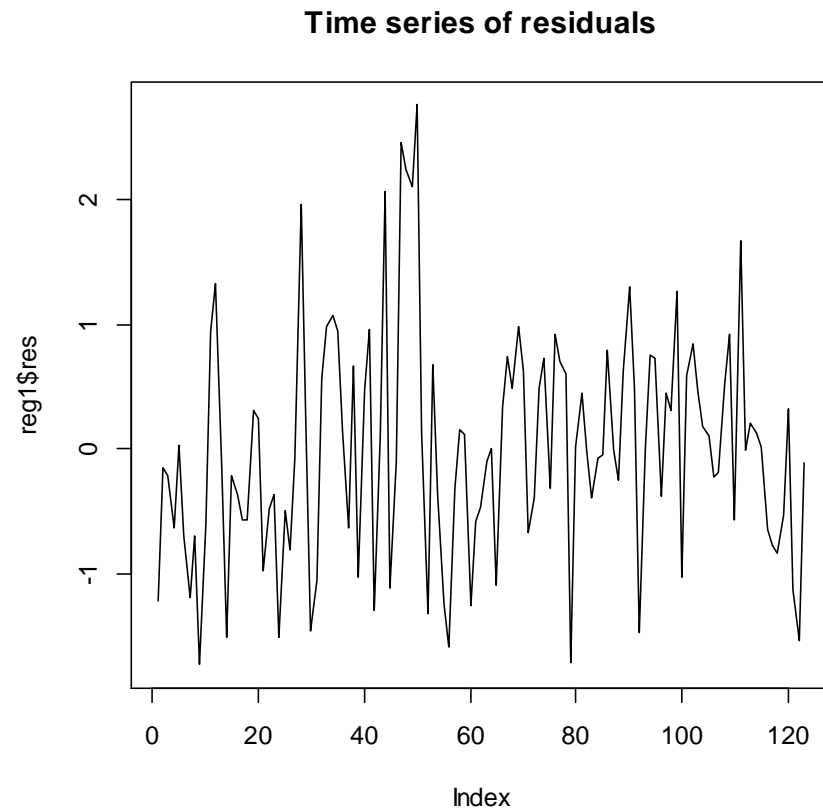
Maximum likelihood estimate



Prediction T°C Air - Summer 2002



Time series of residuals



A model with autoregressive process on the residuals

$$Y_t = \alpha \times X_t + \beta + \varepsilon_t$$

$$\varepsilon_t = \rho \times \varepsilon_{t-1} + \omega_t$$

$$\text{innovation} : \overset{iid}{\omega_t} \sim N(0, \sigma^2)$$