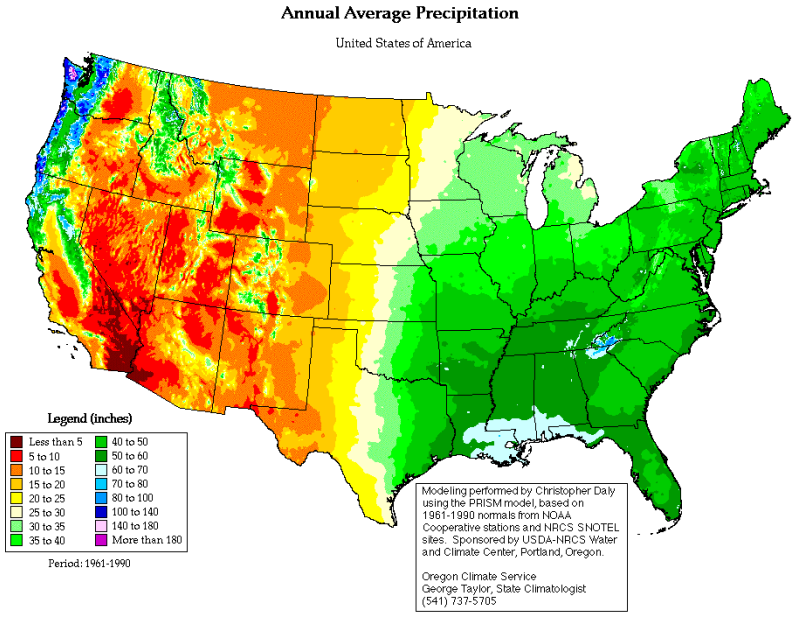
Exercise 6: Simple Linear Regression



Due date: October 10, 2013

E-mail a single Word document with your results to both Instructors. All analytical work needs to be done in R (except question 4). Scripts and output from R should be included in the Word document in an organized manner for full credit. For question 4 attach an Excel spreadsheet where all your calculations are visible and easy to follow.

1. Find the coordinates for the latitudinal and longitudinal limits of the continental U.S. How do they compare to the limits of the data in this study? (1 point).

2. Using R and the data in the file **paruelo.xls,** create linear regression models for C3 vs MAP, C3 vs MAT, C3 vs LAT, and C3 vs LONG. Report their R^2, slope and intercept estimates and their 95% confidence intervals. For each of your regressions include both a plot with the fitted values and their confidence and prediction intervals, and a plot of the residuals against the fitted values. Run the same regression analyses in OpenBUGS using uninformed prior distributions and report the slope and intercept estimates with their 95% credibility intervals. Discuss your results so far (3 points).

3. Repeat question 2 for the models after a log-transformation of the response variable: LOG10_C3 vs MAP, LOG10_C3 vs MAT, LOG10_C3 vs LAT, and LOG10_C3 vs LONG. Discuss whether and where you notice any improvements in these new regressions, as well as the biological relevance of these models (3 points).

4. Choose **one** of the eight models you created, and calculate the following frequentist regression parameters using Excel: R^2, slope and intercept estimates, 95% confidence intervals for the intercept and slope (3 points). *Hint: your numerical results should be the same as when you used R.*