

# R You Ready for EDDIE?

Before coming to class, make sure your computer is ready to run the *Climate Change Effects on Lake Temperatures* module by completing the following tasks:

## A) Download and install R and RStudio

If you have not used R before, you will need to download and install a copy of the software to your computer. In addition, RStudio provides a user-friendly interface for running R and viewing plots.

- 1) Go to the **R website** (<https://www.r-project.org>). Then, under the Getting Started section, click on the link that says **download R**.
  - a. R software is downloaded from a CRAN (Comprehensive R Archive Network) mirror. For the fastest download, scroll to your country, then select the CRAN link that is closest to you, geographically. For example, in Blacksburg, Virginia, USA the closest CRAN would be <http://archive.linux.duke.edu/cran>, hosted by Duke University in Durham, North Carolina, USA.
  - b. From your local CRAN, select the download link (“Download R for”) that matches your computer operating system (Windows, Mac).
    - i. **Windows:** Click the link that says **install R for the first time**. Then, within the gray box, click the link that says **Download R x.y.z for Windows**, where x, y, and z are different numbers that designate the current version of R. This should start the file download. Proceed normally as with any new PC program, following the automated download instructions.
    - ii. **Mac:** Under the section labeled “Files”, click on the first blue link that ends in .pkg. This is the most recent R binary file. This should start the file download. Proceed normally as with any new Mac application, following the automated download instructions.
- 2) Go to the **RStudio website** (<https://www.rstudio.com/products/rstudio/download>). Scroll to the bottom of the page.
  - a. Under **Installers for Supported Platforms**, select the link that matches your computer operating system (Windows, Mac) to download and install RStudio.
    - i. **Windows:** Double-click the .exe file and proceed normally as with any new PC program, following the automated install instructions.

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This module was initially developed by: Carey, C.C., S. Aditya, K. Subratie, R. Figueiredo, and K.J. Farrell. 30 June 2017.  
Macrosystems EDDIE: Climate Change Effects on Lake Temperatures. Macrosystems EDDIE Module 1, Version 1.  
<http://module1.macrosystemseddie.org>. Module development was supported by NSF NSF DEB 1245707, ACI 1234983, & EF 1702506.

This document last modified: 19 December 2018 by K.J. Farrell.

- ii. **Mac:** Double-click the .dmg file; this will open a new window in your desktop. Drag the RStudio icon to the Applications folder to install it in your computer.

## B) Install packages used in this Macrosystems EDDIE module

Within R, researchers have developed “packages” that group together code and functions to allow you to easily perform different types of computing tasks. You’ll need to use multiple packages during the module activities, and it will be easiest to go ahead and install all of them ahead of time.

- 1) Now that R and RStudio are installed, open RStudio. The default window on the left of the screen is called the Console, and you can write commands in this window. The two windows on the right include tabs that you can view to see the history of code you’ve already run and your workspace, plots of figures you’ve made with your code, packages you’ve installed, and the files you have open in your working directory.
- 2) To install the packages, copy and paste the following lines of code to the right of the > in the Console, then press Enter. **Note:** You need to be connected to the internet to complete the package installation.

```
install.packages("sp")
install.packages("devtools")
library(devtools)
devtools::install_github("CareyLabVT/GLMr", force=TRUE)
devtools::install_github("CareyLabVT/glmtools", force = TRUE)
install.packages("httr")
install.packages("RCurl")
install.packages("jsonlite")
devtools::install_github("GRAPLE/GRAPLEr")
```

As you’re installing the packages, you might see a lot of red output messages. However, you can check that they downloaded successfully by then running the following scripts to load the packages:

```
library(glmtools)
library(GLMr)
```

To check if the packages have installed correctly, navigate over to the “Packages” tab in the bottom right window of RStudio and see if there is a check box next to GLMr and glmtools.

## C) Download and unzip the Climate Change Effects on Lake Temperatures module files

All the files you’ll need for the module are available for download online as a zip file (<https://serc.carleton.edu/eddie/macrosystems/module1.html>). We’ve organized the files

within the folder to make it easy to load and run through RStudio. Follow the directions below to extract and organize your files:

- 1) Click on the .zip file link, and save to your computer (e.g., your Downloads folder or Desktop)
- 2) Navigate to where the .zip file was downloaded, then right click and select extract (**PC**) or double click on the file to automatically unzip it into a new folder (**Mac**). Make sure the unzipped folder is moved to the **Desktop**.
- 3) Check that everything was extracted correctly by navigating to your Desktop, and double-clicking the folder “lake\_climate\_change”. The following separate files and folders appear inside the folder. **Do not open** any files yet; just make sure they’re in the folder.

*Files:*

field\_data.csv  
glm2.nml  
met\_hourly.csv  
R\_ForMacs\_Jun17  
R\_ForPCs\_Jun17  
Variable\_Name\_Metadata.csv

*Folders:*

MyExpRoot

## D) Attention Mac users!

*Update, Oct. 2017: We have made a change to the GLM package and the module scripts that should enable Mac users to run GLM with SIP enabled; however, if you continue to experience problems running GLM on a Mac, please follow the steps below.*

If you are running Mac OS X “El Capitan” or a newer operating system (e.g., Mac OS Sierra or Mac OS High Sierra), you will likely need to complete the following steps to disable System Integrity Protection (SIP) so that the GLM model runs correctly.

First, to check which operating system your computer is running, click on the apple symbol in the top left of your computer, and select “About This Mac”, the first option in the drop-down menu. This will open a window that says the operating system name and the version number (e.g., 10.11.6). If your operating system version number starts with 10.11.x or higher (e.g., 10.12.x, 10.13.x), then you’ll need to follow the directions below to successfully run the module. If your operating system version is 10.10.x or lower, you can skip the steps below.

For Mac OS El Capitan, Sierra, or High Sierra users:

- 1) Restart your Mac in Recovery mode by, holding down Command + R while your computer boots (this will take a few seconds). Release the keys after you see the Apple logo.
- 2) From the Utilities menu, select Terminal.
- 3) Type exactly: **csrutil disable** in the Terminal window, then press Return. Terminal should display a message that SIP was disabled.

- 4) Restart your computer by selecting Restart from the Apple menu.
- 5) If you want to re-enable SIP after class, follow the steps above, but type `csrutil enable` into the Terminal during Step 3.

These steps are necessary because the newer versions of Mac operating systems have installed SIP, which prevents the GLMr package from running the code needed for the model. You will know that you have run into this problem if you run the line of code in the module: “run\_glm(…)” and get the error message: “dyld: Library not loaded: libifcore.dylib”

SIP is a Mac program that prevents any user from creating new files in certain operating system directories. While it is meant to protect users, many software programmers and developers have to disable SIP on their computers to successfully write certain types of code (such as GLM). **Disabling SIP for a short period of time should not pose any dangers to your computer as long as you follow normal precautions** (e.g., don’t download any email attachments from people you don’t know, etc.). We encourage you to re-enable SIP using the instructions above after you complete the module in class.

To learn more about this issue, see: <http://www.macworld.com/article/2986118/security/how-to-modify-system-integrity-protection-in-el-capitan.html>