

R-bridge-install-and-setup

Install and set up

There are many ways in which you can install the R-ArcGIS bridge. The R-ArcGIS bridge is essentially an R package, called **arcgisbinding**. Once installed, this package enables the easy transfer of data between ArcGIS and R along with advanced manipulation capabilities to ease your analysis workflows.

See below for the various options to install the **arcgisbinding** package:

- Step 1: Get R
 - Installing R Tips
 - Optional: Get RStudio
- Step 2: Check ArcMap or ArcGIS Pro Software Version
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 - ArcMap and Background Geoprocessing
 - ArcGIS Pro Trial
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Step 1: Get R

R is a free and open-source, specialized programming language designed for statistical analysis. The latest version of R, as of this writing, is R 3.5.1 and its download for Windows is available here (<https://cran.r-project.org/bin/windows/base/>). Previously released versions of R for Windows can also be found at this location (<https://cran.r-project.org/bin/windows/base/old/>). The bridge supports all versions of R from version 3.2.2 on to the latest release.

Additionally, the R-ArcGIS bridge can be used with all three versions of Microsoft R, Microsoft R Open, Microsoft R Client, and Microsoft R Server. More information on these offerings can be found on Microsoft's website for the project (<https://mran.microsoft.com/documents/rro/multithread>). The process for installing and working with the bridge in Microsoft's R offerings is no different than the process for traditional R. To start this process, simply download the latest version of Microsoft R you wish to work with. Microsoft R Open is free and open-source and can be downloaded here (<https://mran.microsoft.com/open>).

Once R (and optionally RStudio) is installed, proceed to 'Step 2: Check ArcMap or ArcGIS Pro Software Version' section to ensure you have the appropriate ArcGIS desktop software to work with the bridge.

Installing R Tips

By default, R will install to your `C:\Program Files` directory and it will install both a 32-bit and a 64-bit version. Unless you have an advanced use-case or plan to work exclusively in ArcMap or ArcGIS Pro, these defaults should be accepted as is. If you select to modify the installation location of R, make note of your choice as this information will be needed when installing the R-ArcGIS bridge. Additionally, should you select to only install one version of R (either 32-bit or 64-bit), be aware this will limit your options for working with the bridge. For more information, see the section on additional version details.

Get RStudio

RStudio is a popular interactive development environment (IDE) for R that can simplify working with the language and has several nice features. It has multiple versions available for download, including a free version, which can be found here (<https://www.rstudio.com/products/rstudio/download/>). While most commonly used with RStudio, R can also be used in other popular IDEs like Visual Studio, IntelliJ (via plug-in), and Jupyter Notebook.

Once R (and optionally RStudio) is installed, proceed to the section ‘Step 2: Check ArcMap or ArcGIS Pro Software Version’ to ensure you have the appropriate ArcGIS desktop software to work with the bridge.

Step 2: Check ArcMap or ArcGIS Pro Software Version

The R-ArcGIS bridge provides support for ArcMap, version 10.3.1 and beyond, and for ArcGIS Pro, version 1.1 and beyond. If you meet these requirements, you have everything you need to work with the bridge and can proceed to ‘Step 3: Install the R-ArcGIS bridge’ section.

Additional Version Details

ArcGIS Pro is a 64-bit application and therefore, will work with the 64-bit version of R. ArcMap on the other hand, is a 32-bit application and will work with the 32-bit version of R, unless you install Background Geoprocessing and enable it to run scripts in the background. In which case, you can work with the 64-bit version of R however, in this set-up, you can only use the bridge from ArcGIS and not from within R itself. For more details on working in 64-bit in ArcMap, proceed to the section ‘ArcMap and Background Geoprocessing’. Additional details on switching R between its 32-bit and 64-bit version will be covered in the ‘Select Your R Version’ section.

ArcMap and Background Geoprocessing

Background Geoprocessing is a separate install for ArcMap that enables you to work with 64-bit processing instead of the standard 32-bit processing. Full documentation on Background Geoprocessing can be found here (<http://desktop.arcgis.com/en/arcmap/10.3/analyze/executing-tools/64bit-background.htm>). Once you have installed Background Geoprocessing, you will need to enable it in ArcMap by navigating to your Geoprocessing Options under the Geoprocessing tab, see Figure 1. This allows scripts to run in the background and full details on this setting can be found here (<http://desktop.arcgis.com/en/arcmap/10.3/analyze/executing-tools/foreground-and-background-processing.htm>).

ArcGIS Pro Trial

Currently, if you have a license for ArcMap, you also have free access to ArcGIS Pro. While functionality of the R-ArcGIS bridge is consistent between ArcMap and ArcGIS Pro, in versions of Pro 2.0 and beyond, an installer for the bridge has been included. This simplifies the process of setting up the R-ArcGIS bridge

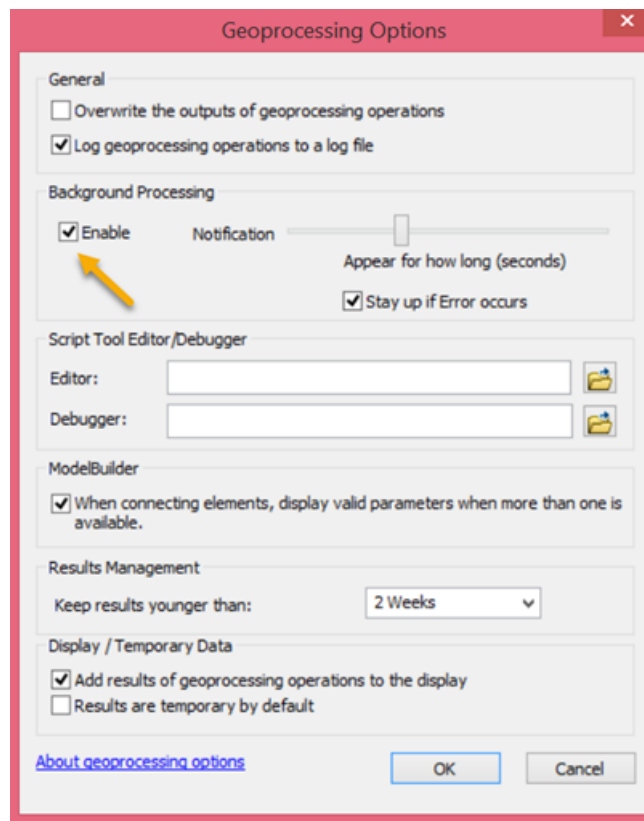


Figure 1: Background Geoprocessing

and makes checking for new versions of the bridge easy. If you wish to try working in ArcGIS Pro, this is a good place to start. If you are uncertain of how to access your version of ArcGIS Pro, a free 21-day trial version can be found here (<https://www.esri.com/en-us/arcgis/products/arcgis-pro/trial>).

Step 3: Install the R-ArcGIS Bridge

There are many ways to install the bridge. Your preferred method will depend on whether you are using ArcGIS Pro or ArcMap and your version of the software. Additionally, the bridge can directly be installed from R, which might be of interest if you are comfortable with working in R/RStudio. Select the section that matches your set-up and preferences to install the bridge.

- ArcGIS Pro 2.0 and beyond
- ArcGIS Pro 1.1-1.4
- ArcMap 10.3.1 and beyond
- Offline Installation Guide
- Install From R Guide

Pro 2.0+

If you are working in Pro 2.0 or beyond, you have access to the built-in R-ArcGIS bridge installer which streamlines the process of installing the bridge, allows you to select your desired version of R, and makes checking the bridge for updates easy. To install the bridge in this scenario, you will do the following:

- Open ArcGIS Pro and click on the ‘**Project**’ tab in your project, see Figure 2.

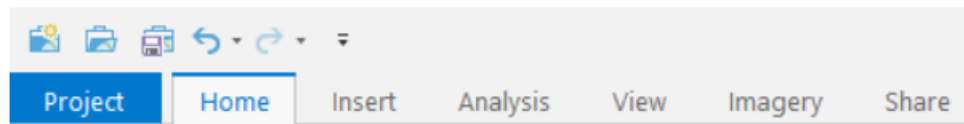


Figure 2: ArcGIS Pro Project Tab

- Select ‘**Options**’ on the blue, left-hand side panel and in the pop-up window, under Application, select ‘**Geoprocessing**’.
- Under the R-ArcGIS Support options, select your desired R home directory.

Note: All versions of R installed on your computer will appear in the drop-down menu. Make sure the version you select is R 3.2.2 or later. However, if you have installed R to a location other than the default, you might need to navigate to that location using the browse button.

- If you have never installed the R-ArcGIS bridge, you will see a warning indicating that you need to install the **arcgisbinding** R package, to enable R to connect with ArcGIS. As such, when you click on the icon next to the warning you will be presented with options to automatically download and install the **arcgisbinding** package, or to separately download the package, or to install the package from file. Select the first option to ‘**automatically download and install**’ the **arcgisbinding** package.
- A pop-up window will appear to inform you there is a new ‘arcgisbinding’ version and will ask you if you wish to install it. Select ‘**Yes**’.
- A progress bar will appear to inform you of the status of the installation before showing an Output Message to report the final status. If you scroll down, you should see that the package ‘arcgisbinding’ was successfully installed, see Figure 3 for details.

After you have installed the bridge, you can skip to the section ‘Check Your Installation’.

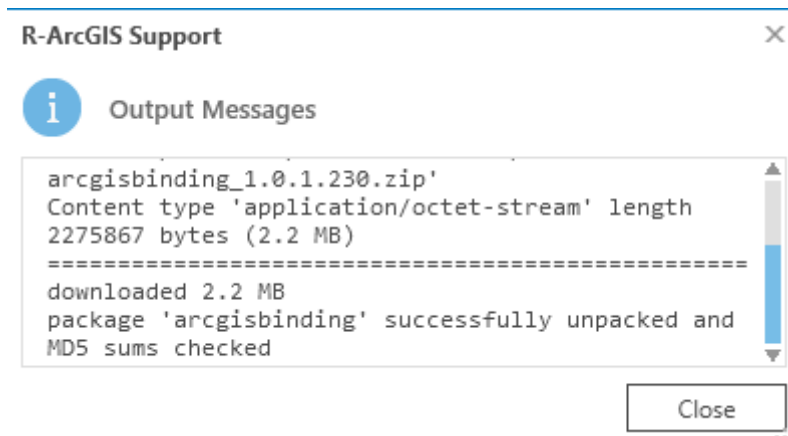


Figure 3: R Installer Output Message

Pro 1.1-1.4

If you are working in an earlier version of Pro, you can install the bridge by downloading and adding a Bridge Installation toolbox to your project that contains tools to assist in the process of installing and maintaining the **arcgisbinding** R package. To install the bridge in this scenario, you will do the following:

- Go to the R-ArcGIS bridge installation page (<https://github.com/R-ArcGIS/r-bridge-install>) and click the ‘Clone or download’ button and select to ‘Download ZIP’.
- Locate the downloaded file on your computer. Right-click the ‘**r-bridge-install-master**’ zipped folder and extract to a location you can easily find, such as your Documents folder.
- Open ArcGIS Pro and if necessary, click on the ‘View’ tab to open the Catalog pane for your project.
- In the Catalog pane, navigate to and add a folder connection to the folder location you extracted to which contains the Python Toolbox, **R Integration.pyt**.
- Open the toolbox, which should look as seen in Figure 4, to view the four script tools it contains:

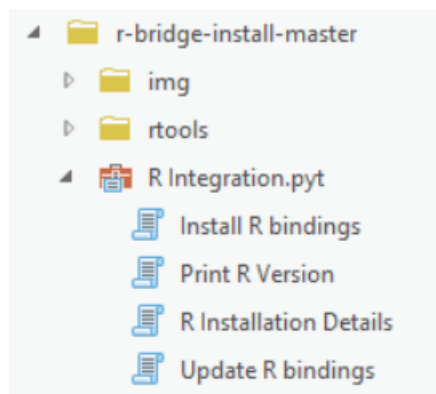


Figure 4: R Integration Python Toolbox in ArcGIS Pro

- Run the **Install R bindings** script. You can then test that the bridge is able to see your R installation by running the **Print R Version** and **R Installation Details** tools.

After you have installed the bridge, you can skip to the section ‘Check Your Installation’.

ArcMap 10.3.1+

If you are working in ArcMap, you can install the bridge by downloading and adding a Bridge Installation toolbox to your project that contains tools to assist in the process of installing and maintaining the **arcgisbinding** R package. To install the bridge in this scenario, you will do the following:

- Go to the R-ArcGIS bridge installation page (<https://github.com/R-ArcGIS/r-bridge-install>) and click the ‘**Clone or download**’ button and select to ‘**Download ZIP**’.
- Locate the downloaded file on your computer. Right-click the ‘**r-bridge-install-master**’ zipped folder and extract to a location you can easily find, such as your Documents folder.
- Open ArcMap and if necessary, click on the ‘**Windows**’ tab to open the Catalog pane for your project.
- In the Catalog window (<http://desktop.arcgis.com/en/arcmap/10.3/map/working-with-arcmap/what-is-the-catalog-window-.htm>), navigate to and add a folder connection to the folder location you extracted to which contains the Python Toolbox, **R Integration.pyt**.
- Open the toolbox, which should look as seen below in Figure 5, to view the four script tools it contains:

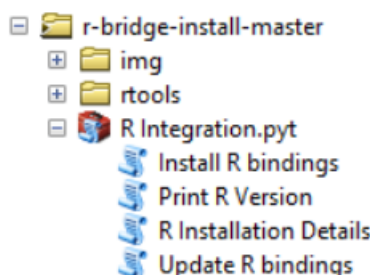


Figure 5: R Integration Python Toolbox in ArcMap

- Run the **Install R bindings** script. You can then test that the bridge is able to see your R installation by running the **Print R Version** and **R Installation Details** tools.

After you have installed the bridge, you can skip to the section ‘Check Your Installation’.

Install Offline

All the above methods depend on a working internet connection. If you typically work in an offline setting, you can still install the R-ArcGIS bridge by doing the following:

- From a machine that does have internet access: download this repository (<https://github.com/R-ArcGIS/r-bridge-install/archive/master.zip>) and also download the latest version of the **arcgisbinding** R package (<https://github.com/R-ArcGIS/r-bridge/releases/tag/v1.0.1.232>). As of writing, this is **arcgisbinding_1.0.0.232.zip**.
- Copy both zip files onto the machine that you’re performing the offline installation on. Extract the **r-bridge-install-master** zip into a folder you can easily locate and place the **arcgisbinding_1.0.0.232.zip** into the same folder location as the “R Integration” Python toolbox.
- Run the installation procedure as listed above under either ArcGIS 10.3.1 or later, if you are using ArcMap, or under ArcGIS 1.1 - 1.4.1, if you are using Pro.

After you have installed the bridge, you can skip to the section ‘Check Your Installation’.

Install From R

If you plan to mostly work in R or RStudio, installing the bridge directly in R might be desirable. The process is quite simple and can also be a good alternative for those who wish to not use the installer. You can install the **arcgisbinding** R package from R or RStudio by doing the following:

R

- Download the latest version of the **arcgisbinding** R package (<https://github.com/R-ArcGIS/r-bridge/releases/tag/v1.0.1.232>). As of writing, this is **arcgisbinding_1.0.0.232.zip**.
- Open the version of R you plan on working with. All R graphical user interfaces (gui) show the R version number and whether it is 64-bit or 32-bit. Select according to the bridge's requirements and your current ArcGIS desktop software. For more information, see the section 'Additional Version Details'.
- Once in R, select the '**Packages**' tab and choose the option to '**Install package(s) from local files...**'
- This will prompt you to select the file you wish to install. Navigate to the location where you have downloaded the **arcgisbinding.zip** file and select the zipped folder.
- R will automatically install the **arcgisbinding** package for you into your R version's library. This package is now accessible for both 64-bit and 32-bit R of this specific version.

After you have installed the bridge, you can skip to the section 'Check Your Installation'.

RStudio

- Download the latest version of the **arcgisbinding** R package (<https://github.com/R-ArcGIS/r-bridge/releases/tag/v1.0.1.232>). As of writing, this is **arcgisbinding_1.0.0.232.zip**.
- Open RStudio and check the current version by looking at the automatically printed messages in the console window. You will see both your R Version number and whether you are currently in 32-bit R or 64-bit R. If you wish to adjust the version of R being used, see the section on 'Select Your R Version'.
- Once in RStudio, select the '**Tools**' tab and choose the option to '**Install Packages...**'
- A pop-up window will appear with several options, see Figure 6. For the option, '**Install from:**', select '**Package Archive File (.zip; .tar.gz)**' from the dropdown list.

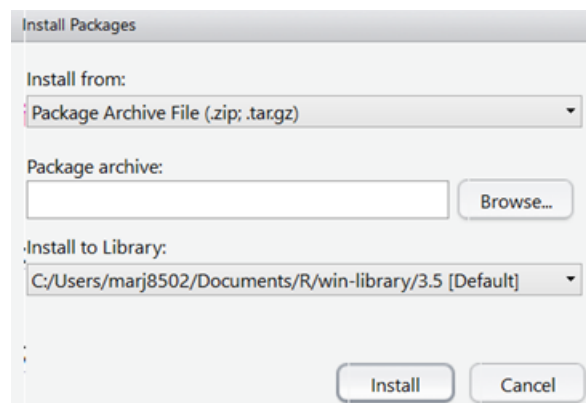


Figure 6: RStudio Install Packages Window

- This will prompt you to select the file you wish to install. Navigate to the location where you have downloaded the `arcgisbinding.zip` file and select the zipped folder.
- Unless you are an advanced user, leave all other options at their defaults and click **‘Install’**.
- R will automatically install the **arcgisbinding** package for you into your R version’s library. This package is now accessible for both 64-bit and 32-bit R of this specific version.

After you have installed the bridge, you can skip to the section ‘Check Your Installation’.

Troubleshooting Installation Problems

Occasionally, things do not work as we would hope. In these cases, check our list of common issues to see if any of them might pertain to your case.

- The original R-ArcGIS bridge installer for ArcMap and earlier versions of ArcGIS Pro first assumes you have accepted the default install location for R. If it cannot find R in that location, it will then check your computer’s environment variables for the `R_HOME` variable. If you have installed R in a location other than the default and have not set an `R_HOME` variable, the **Install R bindings** tool might fail to install the bridge because it cannot find your R installation. In this case, you can either follow the instructions under the section for installing the bridge from within R or by setting your `R_HOME` environment variable to equal the path you have installed R at.

Note: By setting `R_HOME` you are hard-coding the location R is installed at. This can cause problems in certain scenarios and it is best to avoid leaving this variable set.

- On Windows 7, KB2533623 (<https://support.microsoft.com/en-us/help/2533623/microsoft-security-advisory-insecure-library-loading-could-allow-remote-code-execution>) must be installed. Without this hotfix, the library will generate the error “The procedure entry point `AddDllDirectory` could be located”.
- Still stuck? Add an issue and we’ll take a look (<https://github.com/R-ArcGIS/r-bridge-install/issues>). To learn more about GitHub issues see the following link (<https://help.github.com/articles/about-issues/>).

Upgrade the arcgisbinding Package

Since the R-ArcGIS bridge is not an Esri Product, it can be updated outside of traditional development release cycles. As a result, updates can occur whenever needed to provide enhancements or to address issues. When starting a new project that uses the R-ArcGIS bridge, it is always wise to check for updates to guarantee you are working with the latest version of the **arcgisbinding** R package. There are several ways to check for updates and depending on your original installation method, you might prefer one over the other.

With the Installer

If you installed the bridge with either the built-in installer in versions of Pro 2.0 and beyond or with the installation toolbox for earlier versions of ArcGIS Pro or ArcMap, both include the ability to check for updates.

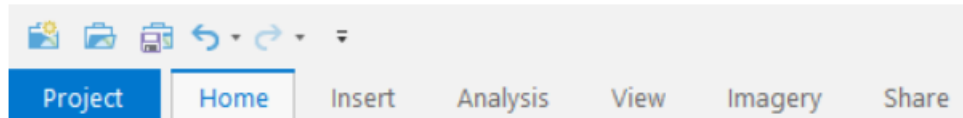


Figure 7: ArcGIS Pro Project Tab

Pro 2.0+

- Open ArcGIS Pro and click on the **‘Project’** tab in your project, see Figure 7.
- Select **‘Options’** on the blue, left-hand side panel and in the pop-up window, under Application, select **‘Geoprocessing’**.
- Under the R-ArcGIS Support options, select your desired R home directory.

Note: All versions of R installed on your computer will appear in the drop-down menu. Make sure the version you select is R 3.2.2 or later. However, if you have installed R to a location other than the default, you might need to navigate to that location using the browse button.

- If you have previously installed the R-ArcGIS bridge, you will see an installed message that lets you know the version of your **arcgisbinding** package and allows you to check for updates, download the latest version, or update from a file. Check for updates and ensure you have the latest version of the **arcgisbinding** package. If prompted to update, click ‘Yes’ and the latest version will automatically be installed.

Earlier Versions of Pro or ArcMap

- If necessary, return to the earlier sections on installing the bridge for Pro 1.1-1.4 or for ArcMap 10.3.1 to obtain the toolbox containing installation and maintenance tools for the bridge.
- Open the toolbox, and run the **Update R bindings** tool. This tool will check if any updates for the **arcgisbinding** package are available and if so, it will update your package.

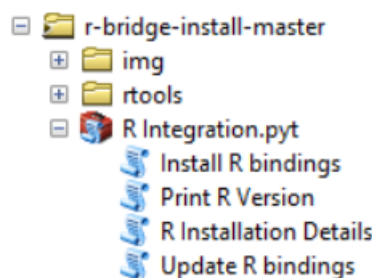


Figure 8: R Integration Python Toolbox in ArcMap

With R/RStudio

- To begin, you will need to check your current version number of the **arcgisbinding** R package. This can either be done by following the steps listed under check your installation as the version number is printed out once you run the function `arc.check_product()`. Additionally, in RStudio, the Packages window displays all the packages you have installed, along with their version numbers, see Figure 9.

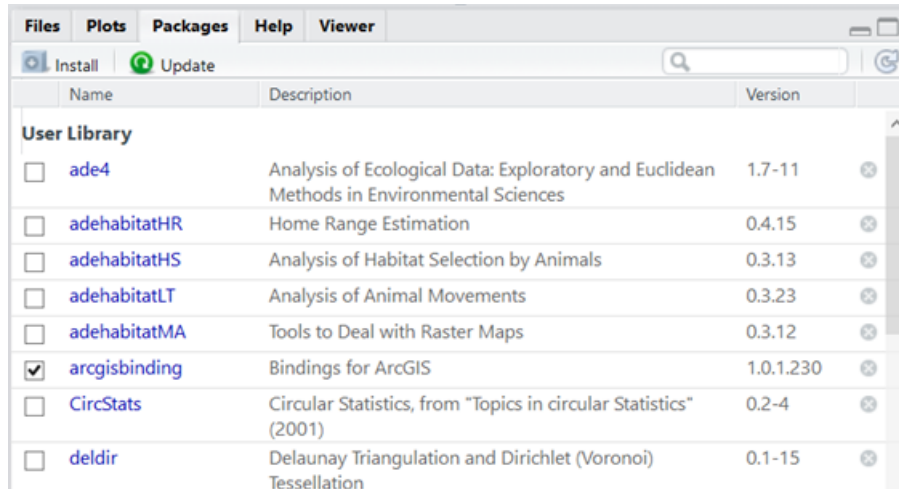


Figure 9: RStudio Package Window

- Check the version number associated with the latest version of the **arcgisbinding** R package. If the version number has increased, download the most recent arcgisbinding zip folder and update the **arcgisbinding** package using the same steps covered in the ‘Install From R Section’.

Step 4: Check Your Installation

Once you have the bridge installed, you can check your installation was successful with the following steps:

- Open R or RStudio and in the console type the following:

```
R    library(arcgisbinding)
```

- Once the **arcgisbinding** library has loaded, type:

```
R    arc.check_product()
```

- You should see a printout message informing you of the version of ArcGIS desktop software you are working with along with version information for the **arcgisbinding** package.

You are now up and running the bridge. This installation will maintain in place for all future projects or R sessions. In ArcGIS, you will not need to go through the process of installing the bridge again unless you wish to switch the version of R you are working with. In R, to gain access to bridge functionality for any future script, simply load the **arcgisbinding** package into your library.

Select Your R Version

Based on your configuration and project needs, you might wish to switch between the different versions or 64-bit/32-bit R offerings you have installed on your machine. When opening R, you can simply pick the version corresponding to what you want to work in. However, with RStudio, you have the option to configure which version of R it is using under the hood. You can use this option to switch between different versions as needed. To do so, start by doing the following:

- Open RStudio and check the current version by looking at the automatically printed messages in the console window. You will see both your R Version number and whether you are currently in 32-bit R or 64-bit R.
- To make an adjustment, click on the **‘Tools’** tab and select **‘Global Options...’**.
- A pop-up window will appear with general R settings and options you can customize. The first one shown is your **‘R version:’**. If you click on the **‘Change’** button, you are shown a dropdown list of all the different versions of R you currently have installed on your machine.
- Select the version you wish to work with and click **‘OK’**. RStudio will notify you that you will need to restart your session for this change to take effect. Click **‘Apply’** and then **‘OK’** on the Option pop-up before closing down RStudio and reopening for your change to be implemented.