LDSF Data Analysis in the Knuckles project

What will you learn in the workshop?

We will cover a number of topics, including:

- Introduction to the **LDSF** and its applications

- Introduction to R and Quarto

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        – Quarto notebooks
        – Loading LDSF data into R
        – Data exploration and visualization
        – Summary statistics
        – Data visualization using ggplot2
        – Mapping data using leaflet
        – Statistical analysis using mixed–effects models
```

All of the above exercises will be hands-on working with LDSF data from the Knuckles project. We will work in Quarto, which is a great tool for reproducible research. Quarto can be used for report writing, data analysis, and to create presentations, among other things.

See also some slides about the LDSF here and the LDSF website for more information.

Before we get started...

We will be working in *R Statistics* for the analysis of LDSF data. The R programming language is a dynamic language built for statistical computing and graphics. R is often used in statistical analysis, scientific computing, machine learning, and data visualization. For a comprehensive introduction to R for data science, this book is highly recommended. It takes you through the basics of R programming as well as more advanced topics for those already familiar with R. We will not be following the book in the workshop, but it is a great resource for learning R.

Software needed for this workshop

Please install the following software ahead of the workshop:
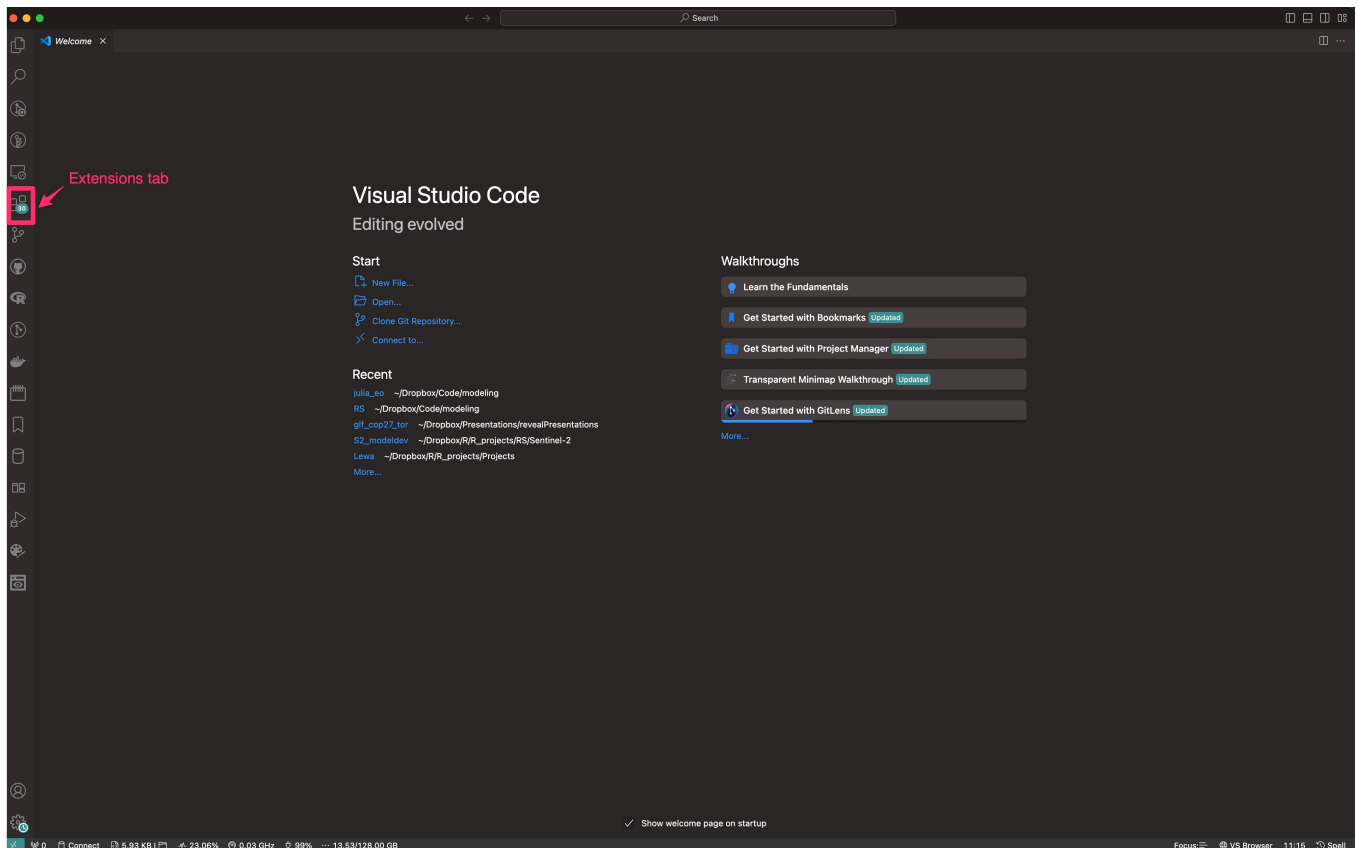
1. **R Statistics**: You will need to install it on your computer. Navigate to the R Project website and download the latest version of R for your operating system. Follow the installation instructions for

your operating system.

2. **VS Code**: This is a versatile code editor that can be used for any programming language. It is lightweight and has a lot of features that make it a great choice for coding. You can download it from the VS Code website.

3. Install **Quarto** from the Quarto website. Quarto is a document processing tool that allows you to write documents in markdown and R code. We will be using Quarto withon VS Code to write our reports and analyses.
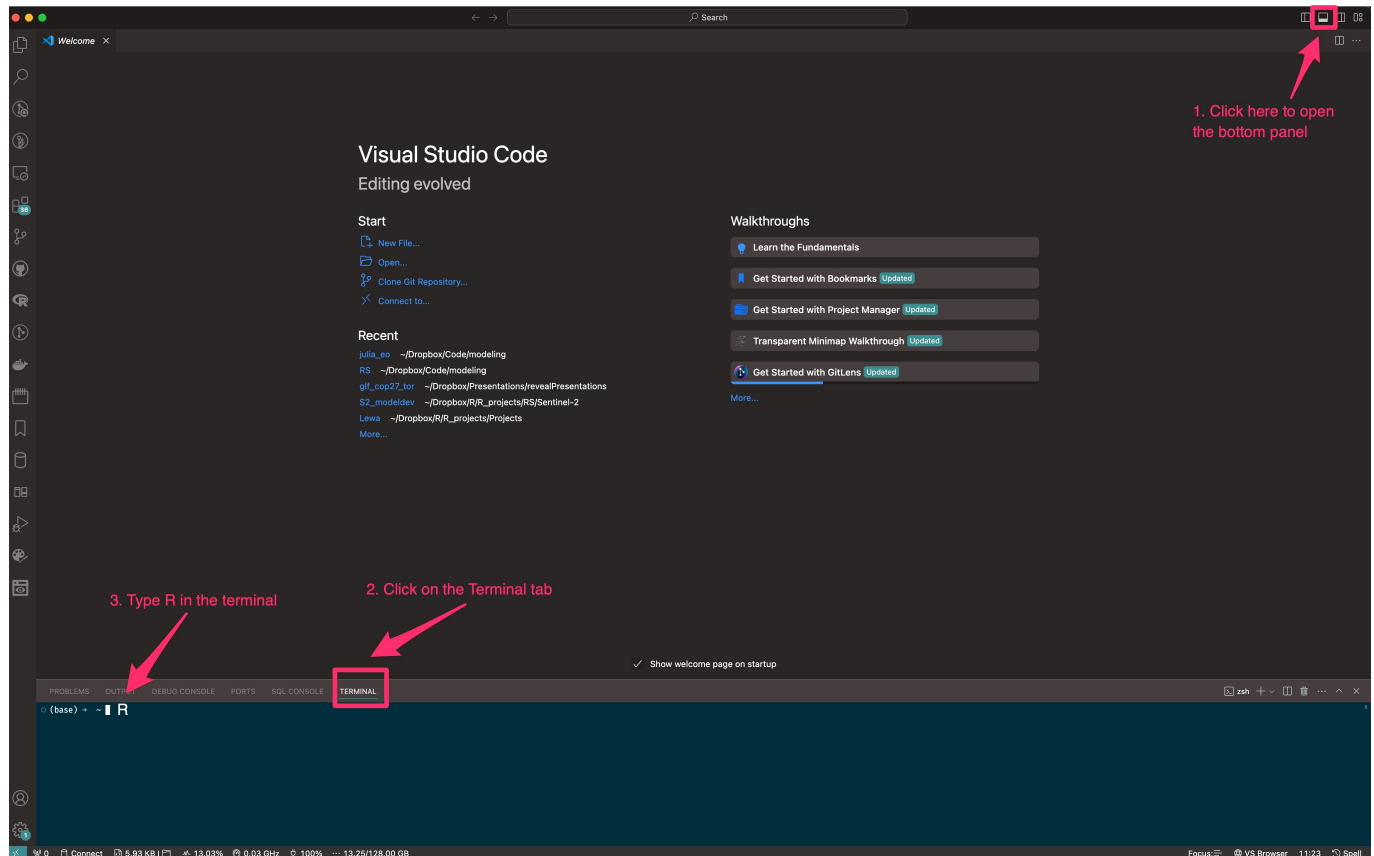
Once R, VS Code and Quarto are installed, please install the following extensions in VS Code:

a) Open VS Code and navigate to the *Extensions* tab on the left sidebar.

- Search for and install the R extension for Visual Studio Code.
- Search for and install the Quarto extension for Visual Studio Code.

b) Open R in the terminal

Once R is started in the terminal, run the following command to install the languageserver package:

```r
install.packages("languageserver")
```

We will work with some additional libraries/packages in the workshop. Please install these beforehand if you can:

```r
install.packages("dplyr") ## For data wrangling
install.packages("ggplot2") ## For plotting
install.packages("leaflet") ## For mapping
install.packages("lme4") ## For statistical modeling
```

(We will install additional libraries during the workshop as needed.)