

Physics and Math for Renew

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July 2, 2023***

***We are going to learn about a curious particle called
the neutrino. But in the process of learning about it
we are also going to learn some tools and basics.***

Purpose

- ***How to solve problems on a computer using modern tools.***
- ***Introduce Mathematica***
- ***Demonstrate simple problem solving using mathematica.***
- ***Discuss how tools like this could be included to make problem solving more interesting for you.***

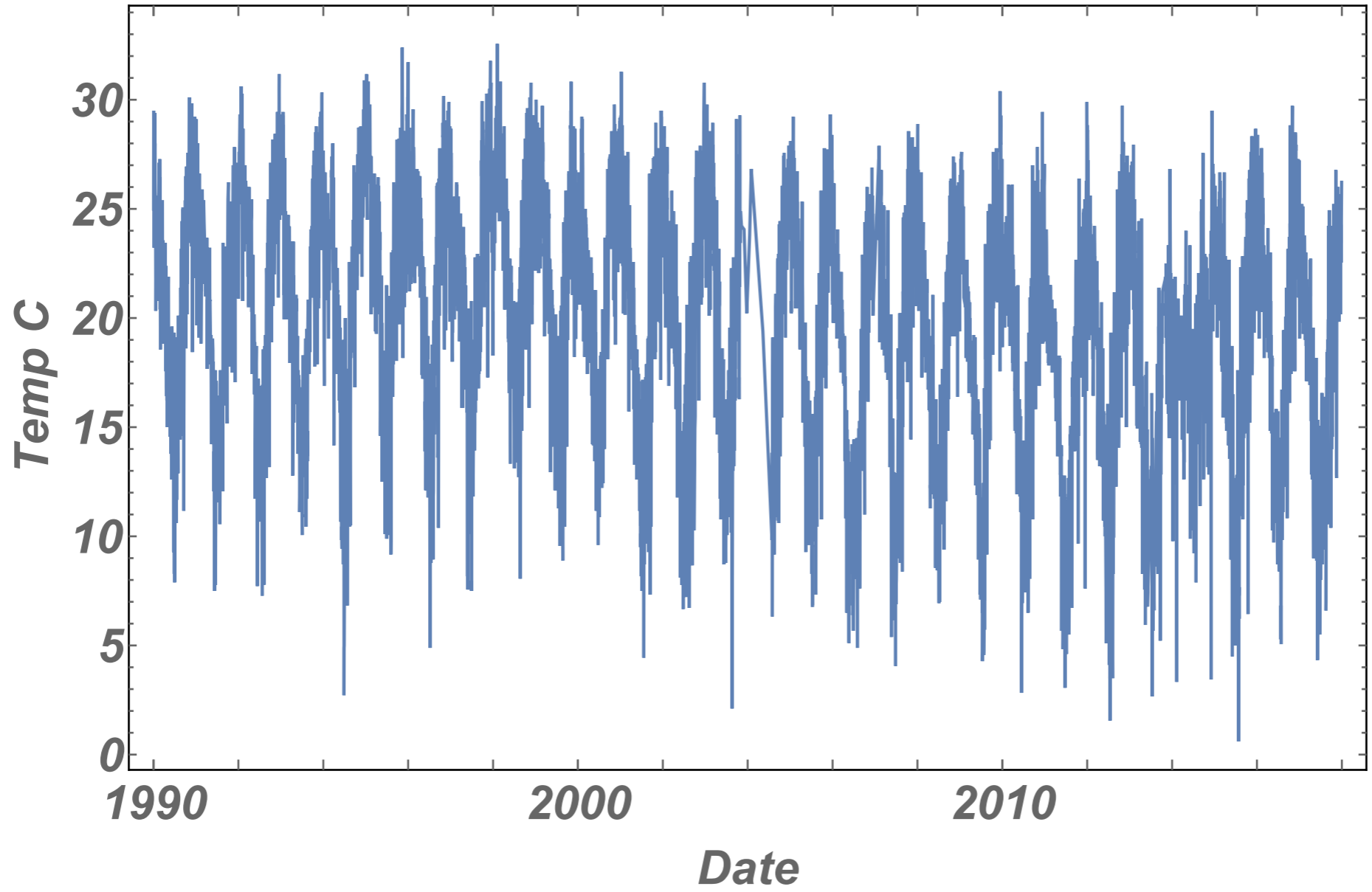
Discussion 1

- **What are the important elements of problem solving ?**
 - **Read the problem ! Understand what information you have and what conclusion is needed.**
 - **Figure out the units ! First make sure you understand the units of the answer. Is it in meters, seconds, or the number of long jumps?**
 - **Divide the problem into parts. Solve the ones you understand first. Make a decision approximately what the answer should be.**
 - **Find a similar problem with a solution.**
 - **Ask questions...**
- **Later we will do some fun problems.**

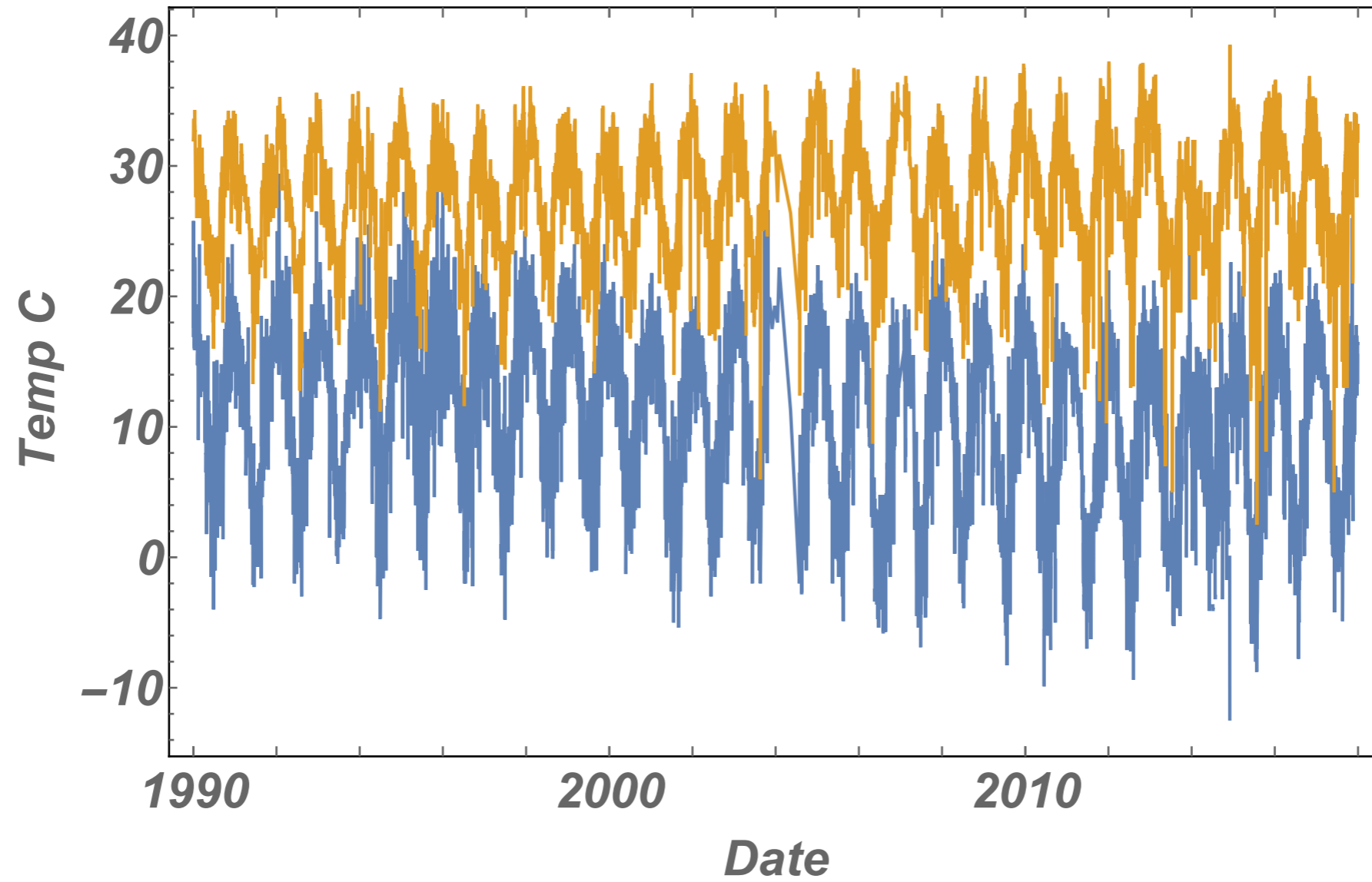
First quick exercise on Mathematica

- ***Mathematica is a computer program that allows you to do mathematics on the computer.***
- ***You have to learn to type in equations and set up problems using the special language. The program will solve the problems for you.***
- ***Most important: the solutions can be visualized in a variety of ways. This makes the tool very important for education.***
- ***We are going to learn elementary techniques for using this program.***
- ***But first I must convince you of its power ! And so we are going to***
 - ***Make a plot of the weather over last many decades !***
 - ***And then make a plot of phases of argon gas in temperature versus pressure.***
 - ***On your pc go to the folder labeled UNIT1 on the desktop and click on WINDHOEK-TEMP.***
 - ***aside: This program is distributed free on raspberry pi. With network access you have access to a huge library of information and data from the providers of this program (Wolfram).***

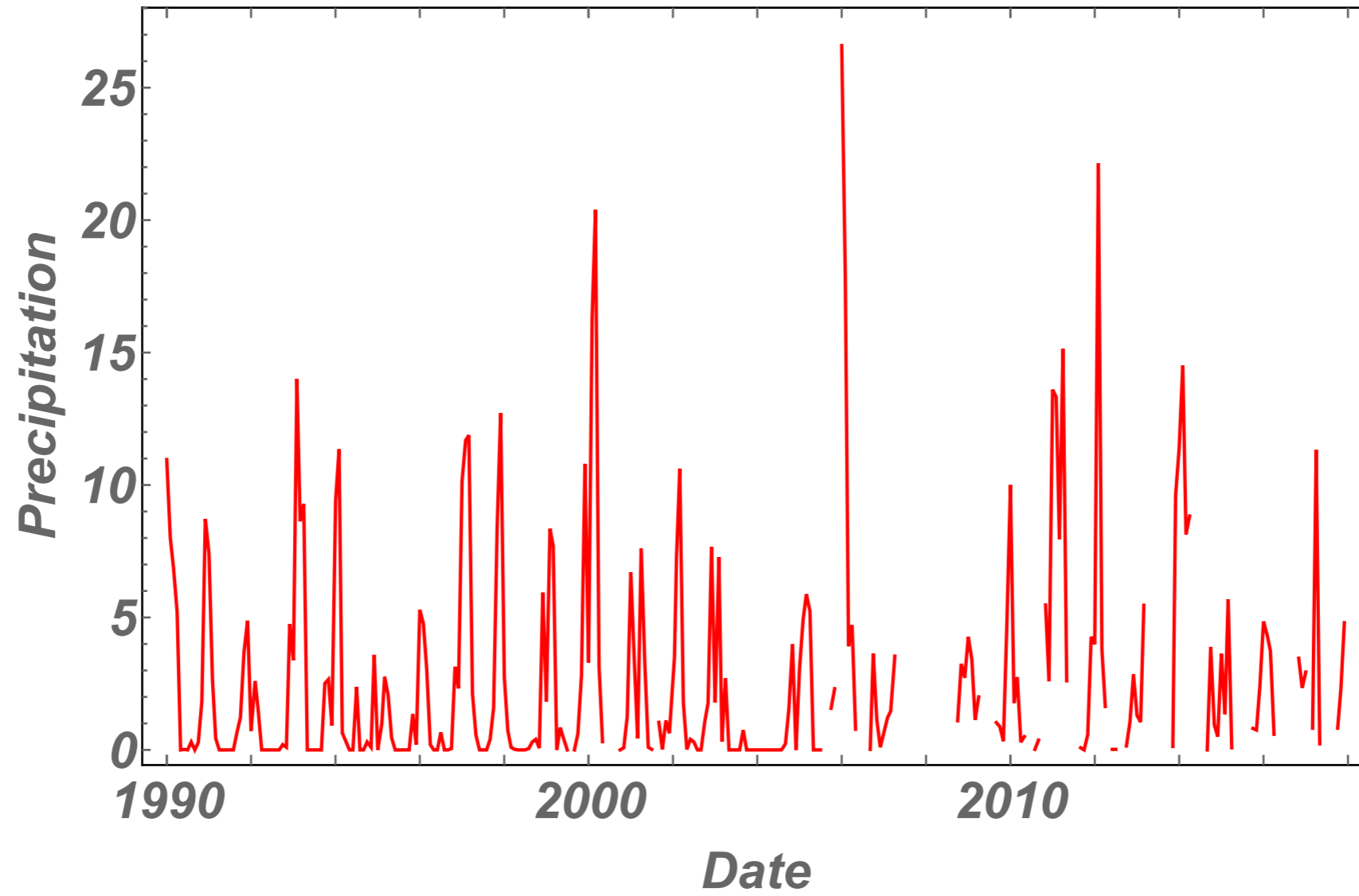
daily average temperature over 3 decades



minimum and maximum temp daily



weekly rainfall in cm



aside: we originally intended to use a Raspberry PI

- ***www.raspberrypi.org for more information.***
- ***The raspberry-pi is a compact ARM based computer with a lot of functionality.***
- ***It needs USB power through a micro-USB connector.***
- ***Has 4 USB ports, 1 HDMI output, 1 ethernet, 1 audio out, WIFI, GPIO capability. Can be used with many other low cost components.***
- ***System is built on a micro-SD card. Comes with delian-linux (rasbian) with many educational tools including games. Comes with Mathematica.***
- ***Supported by a large global community that is interested in making computing easy and fun.***



***Cost is US\$35/each
with cables and microSD cost
goes to ~US\$50-60***