

01 Seminar - ENSO

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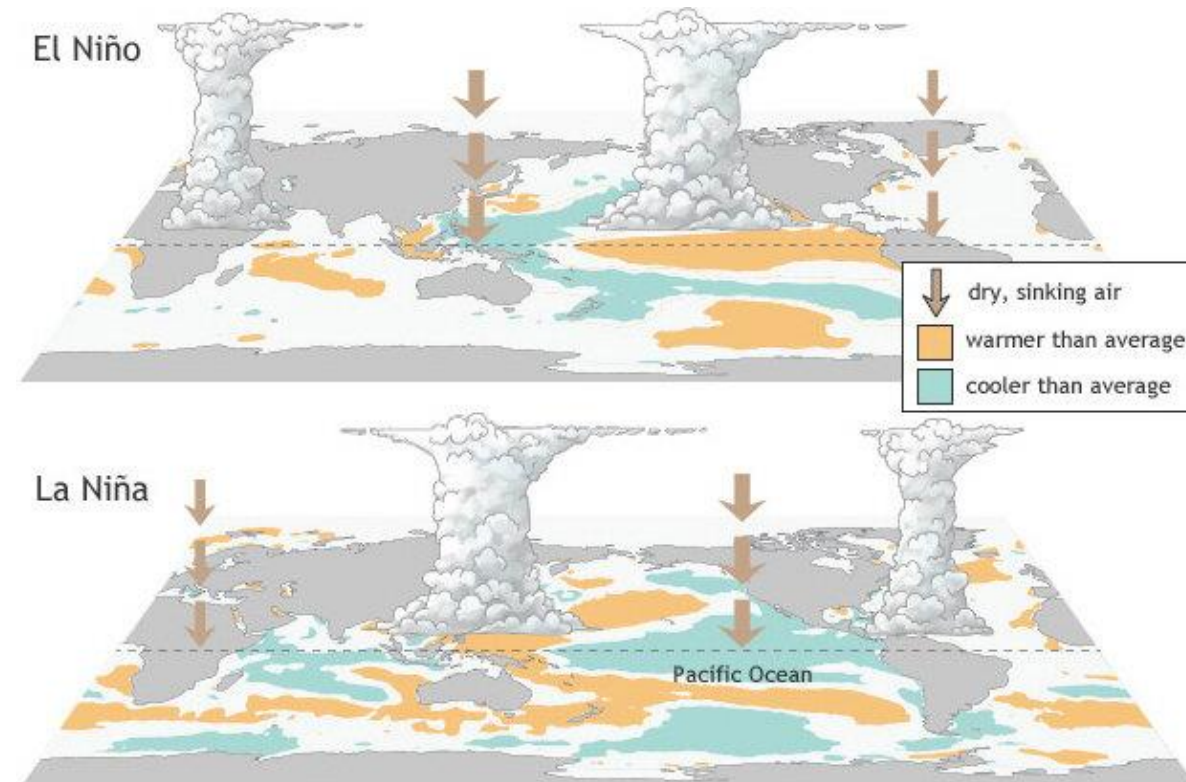
Content

- 1. basic information about ENSO (El Niño–Southern Oscillation)**
 - definition and impact to world climate
- 2. task assignment**

ENSO (El Niño–Southern Oscillation)

- one of the **most important climate phenomena on Earth** due to its **ability to change the global atmospheric circulation**
- **influences temperature and precipitation across the globe**

1. El Niño: A warming of the ocean surface, or above-average sea surface temperatures (SST), in the central and eastern tropical Pacific Ocean. Over Indonesia, rainfall tends to become reduced while rainfall increases over the tropical Pacific Ocean. The low-level surface winds, which normally blow from east to west along the equator (“easterly winds”), instead weaken or, in some cases, start blowing the other direction (from west to east or “westerly winds”).
2. La Niña: A cooling of the ocean surface, or below-average sea surface temperatures (SST), in the central and eastern tropical Pacific Ocean. Over Indonesia, rainfall tends to increase while rainfall decreases over the central tropical Pacific Ocean. The normal easterly winds along the equator become even stronger.
3. Neutral: Neither El Niño or La Niña. Often tropical Pacific SSTs are generally close to average. However, there are some instances when the *ocean* can look like it is in an El Niño or La Niña state, but the atmosphere is not playing along (or vice versa).



Task assignment

- in the first part of the assignment, you will create a **bar graph in Excel** according to the instructions
- according to the resulting graph, you write **in which years El-Nino and La-Nina occurred**
- in the second part of the assignment, you will try to find out **how ENSO affects temperature and precipitation in your country**

First part of the assignment

- the **Southern Oscillation Index (SOI)** can be used to assess whether El-Nino or La-Nina is occurring
- the SOI is a standardized index based on observed **sea level pressure (SLP) differences between Tahiti and Darwin, Australia**
- data and more information on the index can be found at this link:
<https://www.ncei.noaa.gov/access/monitoring/enso/soi>
- after clicking on the link, this page will open



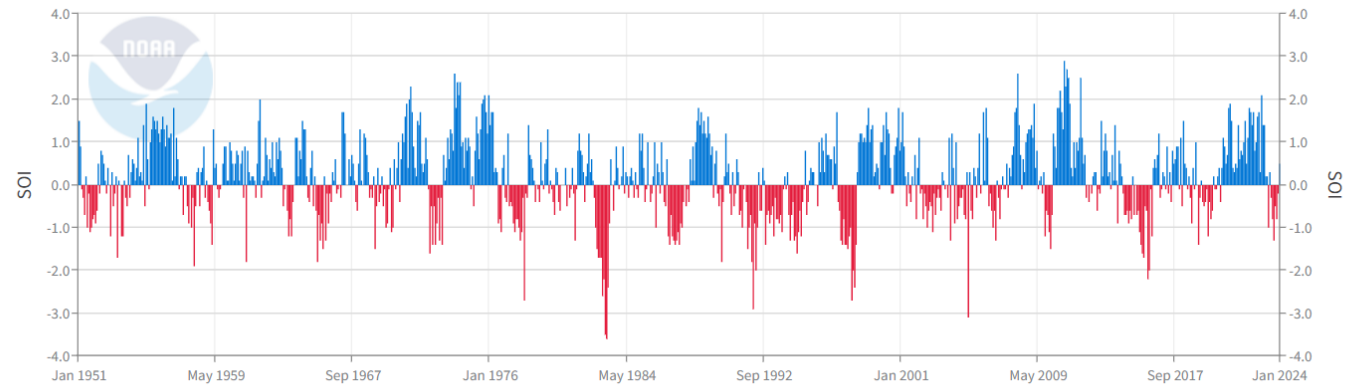
The screenshot shows the NOAA National Centers for Environmental Information website. The header includes the NOAA logo and the text 'National Centers for Environmental Information' and 'NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'. The main title is 'El Niño/Southern Oscillation (ENSO)'. There is a search bar for 'Search Monitoring Products'. The navigation menu includes 'Home / Climate Monitoring / ENSO / SOI'. The page content is titled 'Southern Oscillation Index (SOI)' and includes a detailed description of the index, its purpose, and how it is calculated. The text mentions that the SOI is a standardized index based on observed sea level pressure (SLP) differences between Tahiti and Darwin, Australia. It also notes that the SOI is one measure of the large-scale fluctuations in air pressure occurring between the western and eastern tropical Pacific. The page includes a search bar and a navigation menu.

First part of the assignment

- on the page that opens, scroll down and click on the link as shown in the image

(positive) SOI values coincide with abnormally warm (cold) ocean waters across the eastern tropical Pacific typical of El Niño (La Niña) episodes. The [methodology used to calculate SOI is available below](#). More information can be found at the [Climate Prediction Center SOI page](#).

Southern Oscillation Index (SOI)



Source: <https://www.cpc.ncep.noaa.gov/data/indices/soi>

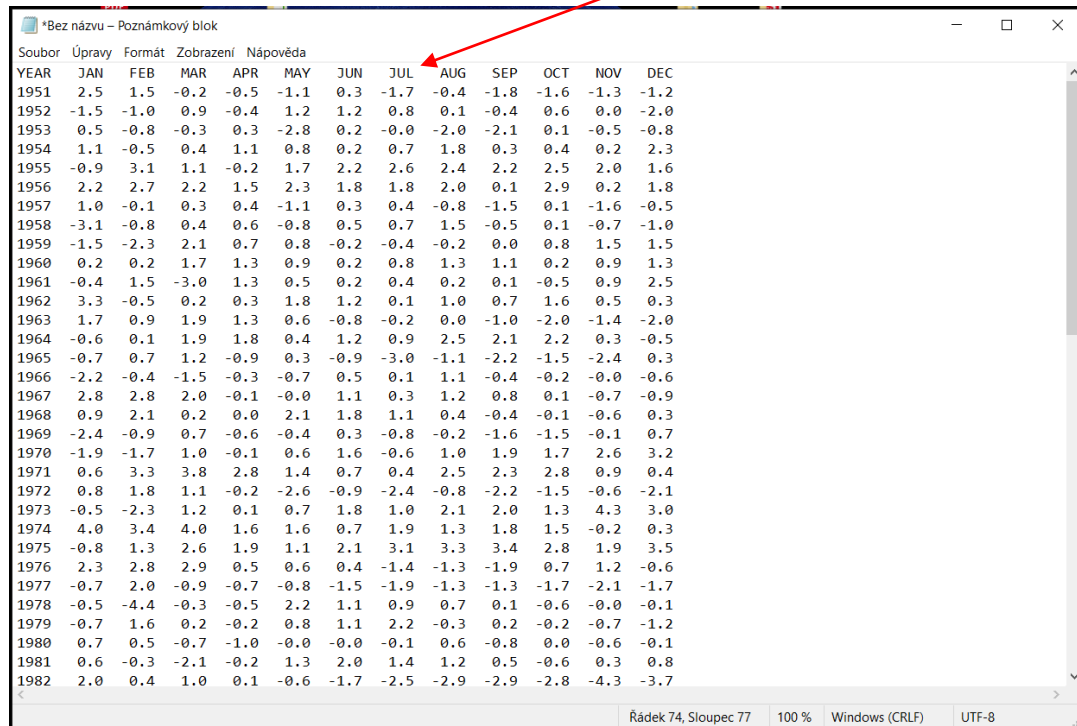
View Data

Calculation of SOI

Note the anomalies are departures from the 1981-2010 base period.

First part of the assignment

- a data page will then open
- **highlight** these dates for the period 1951–2023 and **copy** to a **Notepad (*.txt)**
- **save** this file



*Bez názvu – Poznámkový blok

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1951	2.5	1.5	-0.2	-0.5	-1.1	0.3	-1.7	-0.4	-1.8	-1.6	-1.3	-1.2
1952	-1.5	-1.0	0.9	-0.4	1.2	1.2	0.8	0.1	-0.4	0.6	0.0	-2.0
1953	0.5	-0.8	-0.3	0.3	-2.8	0.2	-0.0	-2.0	-2.1	0.1	-0.5	-0.8
1954	1.1	-0.5	0.4	1.1	0.8	0.2	0.7	1.8	0.3	0.4	0.2	2.3
1955	-0.9	3.1	1.1	-0.2	1.7	2.2	2.6	2.4	2.2	2.5	2.0	1.6
1956	2.2	2.7	2.2	1.5	2.3	1.8	1.8	2.0	0.1	2.9	0.2	1.8
1957	1.0	-0.1	0.3	0.4	-1.1	0.3	0.4	-0.8	-1.5	0.1	-1.6	-0.5
1958	-3.1	-0.8	0.4	0.6	-0.8	0.5	0.7	1.5	-0.5	0.1	-0.7	-1.0
1959	-1.5	-2.3	2.1	0.7	0.8	-0.2	-0.4	-0.2	0.0	0.8	1.5	1.5
1960	0.2	0.2	1.7	1.3	0.9	0.2	0.8	1.3	1.1	0.2	0.9	1.3
1961	-0.4	1.5	-3.0	1.3	0.5	0.2	0.4	0.2	0.1	-0.5	0.9	2.5
1962	3.3	-0.5	0.2	0.3	1.8	1.2	0.1	1.0	0.7	1.6	0.5	0.3
1963	1.7	0.9	1.9	1.3	0.6	-0.8	-0.2	0.0	-1.0	-2.0	-1.4	-2.0
1964	-0.6	0.1	1.9	1.8	0.4	1.2	0.9	2.5	2.1	2.2	0.3	-0.5
1965	-0.7	0.7	1.2	-0.9	0.3	-0.9	-3.0	-1.1	-2.2	-1.5	-2.4	0.3
1966	-2.2	-0.4	-1.5	-0.3	-0.7	0.5	0.1	1.1	-0.4	-0.2	-0.0	-0.6
1967	2.8	2.8	2.0	-0.1	-0.0	1.1	0.3	1.2	0.8	0.1	-0.7	-0.9
1968	0.9	2.1	0.2	0.0	2.1	1.8	1.1	0.4	-0.4	-0.1	-0.6	0.3
1969	-2.4	-0.9	0.7	-0.6	-0.4	0.3	-0.8	-0.2	-1.6	-1.5	-0.1	0.7
1970	-1.9	-1.7	1.0	-0.1	0.6	1.6	-0.6	1.0	1.9	1.7	2.6	3.2
1971	0.6	3.3	3.8	2.8	1.4	0.7	0.4	2.5	2.3	2.8	0.9	0.4
1972	0.8	1.8	1.1	-0.2	-2.6	-0.9	-2.4	-0.8	-2.2	-1.5	-0.6	-2.1
1973	-0.5	-2.3	1.2	0.1	0.7	1.8	1.0	2.1	2.0	1.3	4.3	3.0
1974	4.0	3.4	4.0	1.6	1.6	0.7	1.9	1.3	1.8	1.5	-0.2	0.3
1975	-0.8	1.3	2.6	1.9	1.1	2.1	3.1	3.3	3.4	2.8	1.9	3.5
1976	2.3	2.8	2.9	0.5	0.6	0.4	-1.4	-1.3	-1.9	0.7	1.2	-0.6
1977	-0.7	2.0	-0.9	-0.7	-0.8	-1.5	-1.9	-1.3	-1.3	-1.7	-2.1	-1.7
1978	-0.5	-4.4	-0.3	-0.5	2.2	1.1	0.9	0.7	0.1	-0.6	-0.0	-0.1
1979	-0.7	1.6	0.2	-0.2	0.8	1.1	2.2	-0.3	0.2	-0.2	-0.7	-1.2
1980	0.7	0.5	-0.7	-1.0	-0.0	-0.0	-0.1	0.6	-0.8	0.0	-0.6	-0.1
1981	0.6	-0.3	-2.1	-0.2	1.3	2.0	1.4	1.2	0.5	-0.6	0.3	0.8
1982	2.0	0.4	1.0	0.1	-0.6	-1.7	-2.5	-2.9	-2.9	-2.8	-4.3	-3.7

Rádek 74, Sloupec 77 100 % Windows (CRLF) UTF-8

(STAND TAHITI - STAND DARWIN) SEA LEVEL PRESS ANOMALY

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1951	2.5	1.5	-0.2	-0.5	-1.1	0.3	-1.7	-0.4	-1.8	-1.6	-1.3	-1.2
1952	-1.5	-1.0	0.9	-0.4	1.2	1.2	0.8	0.1	-0.4	0.6	0.0	-2.0
1953	0.5	-0.8	-0.3	0.3	-2.8	0.2	-0.0	-2.0	-2.1	0.1	-0.5	-0.8
1954	1.1	-0.5	0.4	1.1	0.8	0.2	0.7	1.8	0.3	0.4	0.2	2.3
1955	-0.9	3.1	1.1	-0.2	1.7	2.2	2.6	2.4	2.2	2.5	2.0	1.6
1956	2.2	2.7	2.2	1.5	2.3	1.8	1.8	2.0	0.1	2.9	0.2	1.8
1957	1.0	-0.1	0.3	0.4	-1.1	0.3	0.4	-0.8	-1.5	0.1	-1.6	-0.5
1958	-3.1	-0.8	0.4	0.6	-0.8	0.5	0.7	1.5	-0.5	0.1	-0.7	-1.0
1959	-1.5	-2.3	2.1	0.7	0.8	-0.2	-0.4	-0.2	0.0	0.8	1.5	1.5
1960	0.2	0.2	1.7	1.3	0.9	0.2	0.8	1.3	1.1	0.2	0.9	1.3
1961	-0.4	1.5	-3.0	1.3	0.5	0.2	0.4	0.2	0.1	-0.5	0.9	2.5
1962	3.3	-0.5	0.2	0.3	1.8	1.2	0.1	1.0	0.7	1.6	0.5	0.3
1963	1.7	0.9	1.9	1.3	0.6	-0.8	-0.2	0.0	-1.0	-2.0	-1.4	-2.0
1964	-0.6	0.1	1.9	1.8	0.4	1.2	0.9	2.5	2.1	2.2	0.3	-0.5
1965	-0.7	0.7	1.2	-0.9	0.3	-0.9	-3.0	-1.1	-2.2	-1.5	-2.4	0.3
1966	-2.2	-0.4	-1.5	-0.3	-0.7	0.5	0.1	1.1	-0.4	-0.2	-0.0	-0.6
1967	2.8	2.8	2.0	-0.1	-0.0	1.1	0.3	1.2	0.8	0.1	-0.7	-0.9
1968	0.9	2.1	0.2	0.0	2.1	1.8	1.1	0.4	-0.4	-0.1	-0.6	0.3
1969	-2.4	-0.9	0.7	-0.6	-0.4	0.3	-0.8	-0.2	-1.6	-1.5	-0.1	0.7
1970	-1.9	-1.7	1.0	-0.1	0.6	1.6	-0.6	1.0	1.9	1.7	2.6	3.2
1971	0.6	3.3	3.8	2.8	1.4	0.7	0.4	2.5	2.3	2.8	0.9	0.4
1972	0.8	1.8	1.1	-0.2	-2.6	-0.9	-2.4	-0.8	-2.2	-1.5	-0.6	-2.1
1973	-0.5	-2.3	1.2	0.1	0.7	1.8	1.0	2.1	2.0	1.3	4.3	3.0
1974	4.0	3.4	4.0	1.6	1.6	0.7	1.9	1.3	1.8	1.5	-0.2	0.3
1975	-0.8	1.3	2.6	1.9	1.1	2.1	3.1	3.3	3.4	2.8	1.9	3.5
1976	2.3	2.8	2.9	0.5	0.6	0.4	-1.4	-1.3	-1.9	0.7	1.2	-0.6
1977	-0.7	2.0	-0.9	-0.7	-0.8	-1.5	-1.9	-1.3	-1.3	-1.7	-2.1	-1.7
1978	-0.5	-4.4	-0.3	-0.5	2.2	1.1	0.9	0.7	0.1	-0.6	-0.0	-0.1
1979	-0.7	1.6	0.2	-0.2	0.8	1.1	2.2	-0.3	0.2	-0.2	-0.7	-1.2
1980	0.7	0.5	-0.7	-1.0	-0.0	-0.0	-0.1	0.6	-0.8	0.0	-0.6	-0.1
1981	0.6	-0.3	-2.1	-0.2	1.3	2.0	1.4	1.2	0.5	-0.6	0.3	0.8
1982	2.0	0.4	1.0	0.1	-0.6	-1.7	-2.5	-2.9	-2.9	-2.8	-4.3	-3.7

First part of the assignment

If your Excel works with decimal comma (not decimal points), you need to **replace the points with commas** in your *.txt file:

1. Open your *.txt file
2. Replace: CTRL+H
3. Save the file

The screenshot shows a Notepad window titled '*SOI - Poznámkový blok' containing a table of data. The table has columns for years (1951-1978) and months (JAN-DEC). A 'Nahradit' dialog box is open, showing the replacement of a period with a comma. The 'Nahradit' button is highlighted with a red box, and a red arrow points from the second step of the list to this button.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1951	2.5	1.5	-0.2	-0.5	-1.1	0.3	-1.7	-0.4	-1.8	-1.6	-1.3	-1.2
1952	-1.5	-1.0	0.9	-0.4	1.2	1.2	0.8	0.1	-0.4	0.6	0.0	-2.0
1953	0.5	-0.8	-0.3	0.3	-2.8	0.2	-0.0	-2.0	-2.1	0.1	-0.5	-0.8
1954	0.3	0.4	0.2	2.3	2.2	2.5	2.0	1.6	0.1	2.9	0.2	1.8
1955	-0.1	1.5	0.1	-1.6	-0.5	0.1	-1.6	-0.5	-1.5	0.1	-0.7	-1.0
1956	-0.5	0.1	1.5	1.5	0.0	0.8	1.5	1.5	1.1	0.2	0.9	1.3
1957	0.1	-0.5	0.9	2.5	0.7	1.6	0.5	0.3	0.7	1.6	0.5	0.3
1958	-1.0	-2.0	-1.4	-2.0	-0.6	0.1	0.9	2.5	2.1	2.2	0.3	-0.5
1959	-0.6	0.7	1.2	-0.9	0.3	-0.9	-3.0	-1.1	-2.2	-1.5	-2.4	0.3
1960	-2.2	-0.4	-1.5	-0.3	-0.7	0.5	0.1	1.1	-0.4	-0.2	-0.0	-0.6
1961	2.8	2.8	2.0	-0.1	-0.0	1.1	0.3	1.2	0.8	0.1	-0.7	-0.9
1962	0.9	2.1	0.2	0.0	2.1	1.8	1.1	0.4	-0.4	-0.1	-0.6	0.3
1963	-2.4	-0.9	0.7	-0.6	-0.4	0.3	-0.8	-0.2	-1.6	-1.5	-0.1	0.7
1964	-1.9	-1.7	1.0	-0.1	0.6	1.6	-0.6	1.0	1.9	1.7	2.6	3.2
1965	0.6	3.3	3.8	2.8	1.4	0.7	0.4	2.5	2.3	2.8	0.9	0.4
1966	0.8	1.8	1.1	-0.2	-2.6	-0.9	-2.4	-0.8	-2.2	-1.5	-0.6	-2.1
1967	-0.5	-2.3	1.2	0.1	0.7	1.8	1.0	2.1	2.0	1.3	4.3	3.0
1968	4.0	3.4	4.0	1.6	1.6	0.7	1.9	1.3	1.8	1.5	-0.2	0.3
1969	-0.8	1.3	2.6	1.9	1.1	2.1	3.1	3.3	3.4	2.8	1.9	3.5
1970	2.3	2.8	2.9	0.5	0.6	0.4	-1.4	-1.3	-1.9	0.7	1.2	-0.6
1971	-0.7	2.0	-0.9	-0.7	-0.8	-1.5	-1.9	-1.3	-1.3	-1.7	-2.1	-1.7
1972	0.5	4.4	0.2	0.5	2.2	1.1	0.0	0.7	0.1	0.6	0.0	0.1

First part of the assignment

- open the **Excel** program and **upload** the saved data to Excel according to the images (File – Open – Browse – All files – select your *.txt file – Open)

1

2

3

4

5

All files

The image illustrates the process of opening a file in Microsoft Excel. It is divided into five numbered steps:

- Step 1:** The Excel ribbon is shown with the **Soubor** (File) tab highlighted in red.
- Step 2:** The **Otevřít** (Open) option in the File menu is highlighted in red.
- Step 3:** The **Procházet** (Browse) option in the file explorer sidebar is highlighted in red.
- Step 4:** A file named **SOI_data** is selected in the file explorer window, highlighted in red.
- Step 5:** The **Všechny soubory** (All files) file type filter is selected in the file explorer, highlighted in red.

Arrows indicate the flow from the Excel ribbon to the menu, then to the file explorer, and finally to the file selection and filter options.

First part of the assignment

- now **click** next few times and then **finish**

Průvodce importem textu (1/3)

Průvodce převodem textu zjistil, že data jsou pevné šířky.
Zvolte datový typ, který datům odpovídá nejlépe, a potom klikněte na tlačítko Další.

Zdrojový datový typ

Vyberte typ souboru, který datům nejlépe odpovídá:

Oddělovač - Pole jsou oddělena speciálními znaky (čárka, tabulátor).
 Pevná šířka - Pole jsou zarovnána do sloupců a jsou oddělena mezerami.

Začátek importu na řádku: 1 Typ souboru: 852: Středoevropské jazyky (DOS)

Data obsahují záhlaví.

Náhled souboru C:\Users\ACER\Desktop\SOI\SOI_data.txt.

1	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2	1951	2.5	1.5	-0.2	-0.5	-1.1	0.3	-1.7	-0.4	-1.8	-1.6	-1.3	-1.2
3	1952	-1.5	-1.0	0.9	-0.4	1.2	1.2	0.8	0.1	-0.4	0.6	0.0	-2.0
4	1953	0.5	-0.8	-0.3	0.3	-2.8	0.2	-0.0	-2.0	-2.1	0.1	-0.5	-0.8
5	1954	1.1	-0.5	0.4	1.1	0.8	0.2	0.7	1.8	0.3	0.4	0.2	2.3
6	1955	-0.9	3.1	1.1	-0.2	1.7	2.2	2.6	2.4	2.2	2.5	2.0	1.6

Buttons: Storno, < Zpět, **Další >**, **Dokončit**

First part of the assignment

- after uploading the data to Excel, calculate the **annual SOI averages (Mean)** as shown in the image

The screenshot shows the Microsoft Excel interface with the following details:

- File Name:** SOI_data
- Formula Bar:** N2 contains the formula `=PRŮMĚR(B2:M2)`.
- Spreadsheet Data:**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Mean
2	1951	2.5	1.5	-0.2	-0.5	-1.1	0.3	-1.7	-0.4	-1.8	-1.6	-1.3	-1.2	-0.46
3	1952	-1.5	-1	0.9	-0.4	1.2	1.2	0.8	0.1	-0.4	0.6	0	-2.2	-0.04
4	1953	0.5	-0.8	-0.3	0.3	-2.8	0.2	0	-2	-2.1	0.1	-0.5	-0.8	-0.68
5	1954	1.1	-0.5	0.4	1.1	0.8	0.2	0.7	1.8	0.3	0.4	0.2	2.4	0.73
6	1955	-0.9	3.1	1.1	-0.2	1.7	2.2	2.6	2.4	2.2	2.5	2	1.6	1.69
7	1956	2.2	2.7	2.2	1.5	2.3	1.8	1.8	2	0.1	2.9	0.2	1.8	1.79
8	1957	1	-0.1	0.3	0.4	-1.1	0.3	0.4	-0.8	-1.5	0.1	-1.6	-0.9	-0.26
9	1958	-3.1	-0.8	0.4	0.6	-0.8	0.5	0.7	1.5	-0.5	0.1	-0.7	-1.1	-0.26
10	1959	-1.5	-2.3	2.1	0.7	0.8	-0.2	-0.4	-0.2	0	0.8	1.5	1.3	0.23
11	1960	0.2	0.2	1.7	1.3	0.9	0.2	0.8	1.3	1.1	0.2	0.9	1.3	0.84
12	1961	-0.4	1.5	-3	1.3	0.5	0.2	0.4	0.2	0.1	-0.5	0.9	2.4	0.31
13	1962	3.3	-0.5	0.2	0.3	1.8	1.2	0.1	1	0.7	1.6	0.5	0.3	0.88
14	1963	1.7	0.9	1.9	1.3	0.6	-0.8	-0.2	0	-1	-2	-1.4	-2.1	-0.08
15	1964	-0.6	0.1	1.9	1.8	0.4	1.2	0.9	2.5	2.1	2.2	0.3	-0.3	1.03
16	1965	-0.7	0.7	1.2	-0.9	0.3	-0.9	-3	-1.1	-2.2	-1.5	-2.4	0.3	-0.85
17	1966	-2.2	-0.4	-1.5	-0.3	-0.7	0.5	0.1	1.1	-0.4	-0.2	0	-0.6	-0.38
18	1967	2.8	2.8	2	-0.1	0	1.1	0.3	1.2	0.8	0.1	-0.7	-0.9	0.78
19	1968	0.9	2.1	0.2	0	2.1	1.8	1.1	0.4	-0.4	-0.1	-0.6	0.3	0.65
20	1969	-2.4	-0.9	0.7	-0.6	-0.4	0.3	-0.8	-0.2	-1.6	-1.5	-0.1	0.7	-0.57
21	1970	-1.9	-1.7	1	-0.1	0.6	1.6	-0.6	1	1.9	1.7	2.6	3.2	0.78
22	1971	0.6	3.3	3.8	2.8	1.4	0.7	0.4	2.5	2.3	2.8	0.9	0.4	1.83
23	1972	0.8	1.8	1.1	-0.2	-2.6	-0.9	-2.4	-0.8	-2.2	-1.5	-0.6	-2.1	-0.80
24	1973	-0.5	-2.3	1.2	0.1	0.7	1.8	1	2.1	2	1.3	4.3	3.3	1.23
25	1974	4	3.4	4	1.6	1.6	0.7	1.9	1.3	1.8	1.5	-0.2	0.3	1.83
26	1975	-0.8	1.3	2.6	1.9	1.1	2.1	3.1	3.3	3.4	2.8	1.9	3.3	2.18
27	1976	2.3	2.8	2.9	0.5	0.6	0.4	-1.4	-1.3	-1.9	0.7	1.2	-0.6	0.52

First part of the assignment

- highlight the column with annual averages (Mean) and years (via Ctrl) and then follow the steps in the image

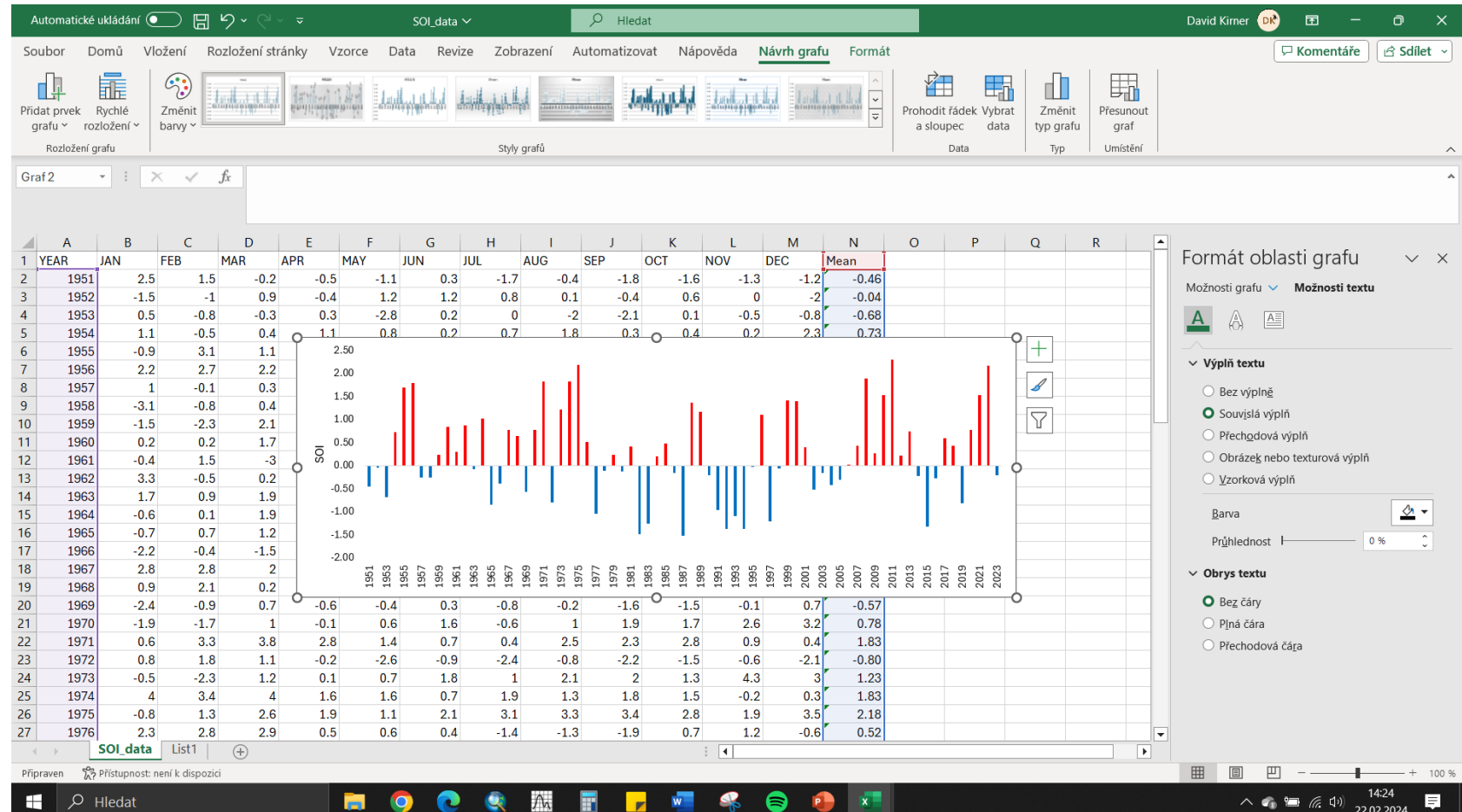
The screenshot shows the Microsoft Excel interface with the following elements:

- Excel Ribbon:** The 'Vložení' (Insert) tab is active. The 'Doporučené grafy' (Recommended Charts) icon is highlighted with a red box and the number '2'.
- Chart Wizard:** The 'Vložit graf' (Insert Chart) dialog box is open. The 'Doporučené grafy' (Recommended Charts) tab is selected. A line chart is highlighted with a red box and the number '3'. The 'OK' button is highlighted with a red box and the number '4'.
- Data Table:** The table below shows monthly data from 1951 to 1976, with a 'Mean' column for annual averages.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Mean
1951	2.5	1.5	-0.2	-0.5	-1.1	0.3	-1.7	-0.4	-1.8	-1.6	-1.3	-0.2	-0.46
1952	-1.5	-1	0.9	-0.4	1.2	1.2	0.8	0.1	-0.4	0.6	0	-2	-0.04
1953	0.5	-0.8	-0.3	0.3	-2.8	0.2	0	-2	-2.1	0.1	-0.5	-0.8	-0.68
1954	1.1	-0.5	0.4	1.1	0.8	0.2	0.7	1.8	0.3	0.4	0.2	2.3	0.73
1955	-0.9	3.1	1.1	-0.2	1.7	2.2	2.6	2.4	2.2	2.5	2	1.6	1.69
1956	2.2	2.7	2.2	1.5	2.3	1.8	1.8	2	0.1	2.9	0.2	1.8	1.79
1957	1	-0.1	0.3	0.4	-1.1	0.3	0.4	-0.8	-1.5	0.1	-1.6	-0.5	-0.26
1958	-3.1	-0.8	0.4	0.6	-0.8	0.5	0.7	1.5	-0.5	0.1	-0.7	-1	-0.26
1959	-1.5	-2.3	2.1	0.7	0.8	-0.2	-0.4	-0.2	0	0.8	1.5	1.5	0.23
1960	0.2	0.2	1.7	1.3	0.9	0.2	0.8	1.3	1.1	0.2	0.9	1.3	0.84
1961	-0.4	1.5	-3	1.3	0.5	0.2	0.4	0.2	0.1	-0.5	0.9	2.5	0.31
1962	3.3	-0.5	0.2	0.3	1.8	1.2	0.1	1	0.7	1.6	0.5	0.3	0.88
1963	1.7	0.9	1.9	1.3	0.6	-0.8	-0.2	0	-1	-2	-1.4	-2	-0.08
1964	-0.6	0.1	1.9	1.8	0.4	1.2	0.9	2.5	2.1	2.2	0.3	-0.5	1.03
1965	-0.7	0.7	1.2	-0.9	0.3	-0.9	-3	-1.1	-2.2	-1.5	-2.4	0.3	-0.85
1966	-2.2	-0.4	-1.5	-0.3	-0.7	0.5	0.1	1.1	-0.4	-0.2	0	-0.6	-0.38
1967	2.8	2.8	2	-0.1	0	1.1	0.3	1.2	0.8	0.1	-0.7	-0.9	0.78
1968	0.9	2.1	0.2	0	2.1	1.8	1.1	0.4	-0.4	-0.1	-0.6	0.3	0.65
1969	-2.4	-0.9	0.7	-0.6	-0.4	0.3	-0.8	-0.2	-1.6	-1.5	-0.1	0.7	-0.57
1970	-1.9	-1.7	1	-0.1	0.6	1.6	-0.6	1	1.9	1.7	2.6	3.2	0.78
1971	0.6	3.3	3.8	2.8	1.4	0.7	0.4	2.5	2.3	2.8	0.9	0.4	1.83
1972	0.8	1.8	1.1	-0.2	-2.6	-0.9	-2.4	-0.8	-2.2	-1.5	-0.6	-2.1	-0.80
1973	-0.5	-2.3	1.2	0.1	0.7	1.8	1	2.1	2	1.3	4.3	3	1.23
1974	4	3.4	4	1.6	1.6	0.7	1.9	1.3	1.8	1.5	-0.2	0.3	1.83
1975	-0.8	1.3	2.6	1.9	1.1	2.1	3.1	3.3	3.4	2.8	1.9	3.5	2.18
1976	2.3	2.8	2.9	0.5	0.6	0.4	-1.4	-1.3	-1.9	0.7	1.2	-0.6	0.52

First part of the assignment

- now you have a **graph** that you can **modify** as needed
- by SOI values, determine **in which years El-Nino and La-Nina have occurred since 2000**



Second part of the assignment

- in the second part, you will look at **how ENSO affects temperatures and rainfall in your country** or the region where your country is located
- click this link:
<https://climexp.knmi.nl/effects.cgi?id=someone@somewhere#temperature>
- the **Niño3.4 index** is used here to evaluate ENSO:
Positive index values indicate *El-Nino* and **negative index** values *La-Nina* (this is the opposite of SOI)
- on the page you will find **several maps** with an explanation of the color difference. Write a **short report** on the effect of ENSO on **precipitation** and **temperature** in **your country** or the region where your country is located during each season.

Thank you for your attention