PROJEKT NA ZAJĘCIA NR 5: WYSIWYG: CIP/CI (Continous Integration Pipeline/Continuous Improvement)

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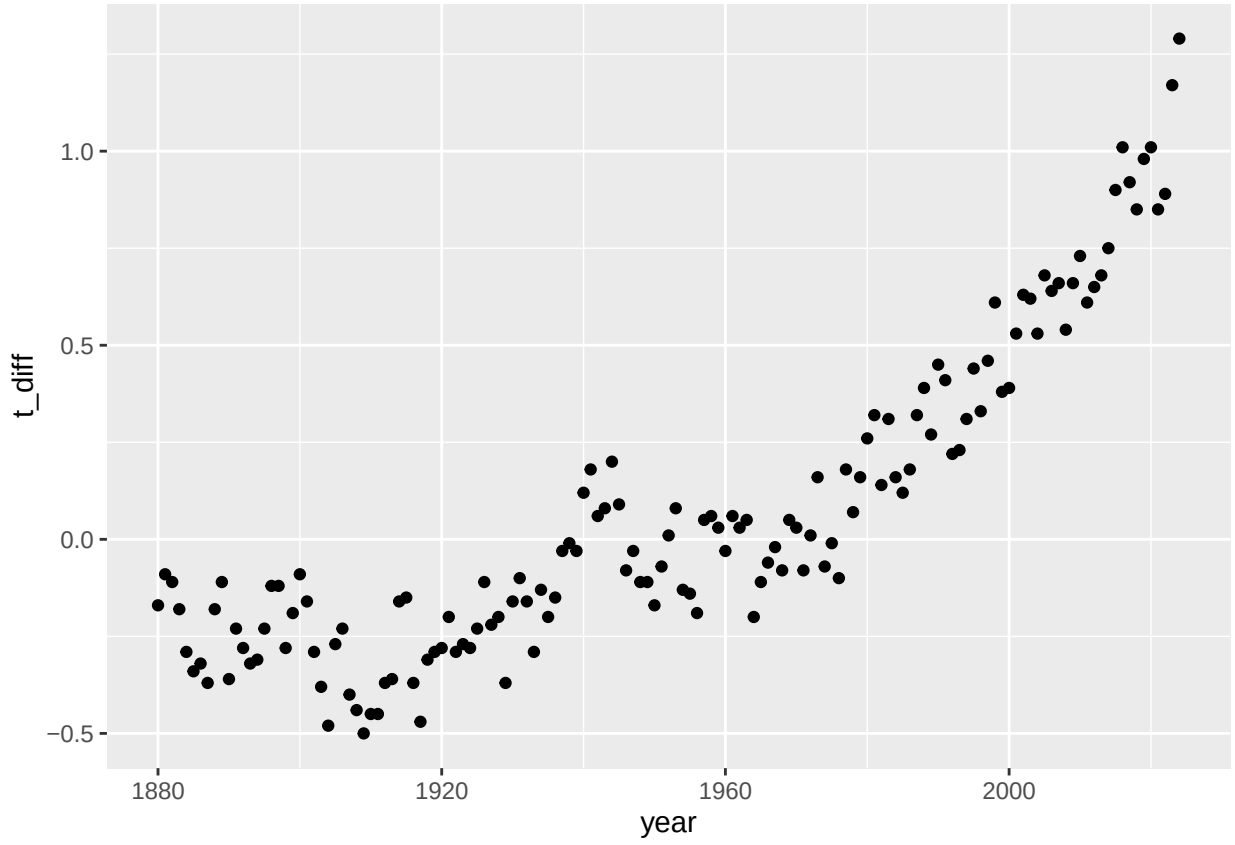
Cel: Stworzenie najładniejszego wykresu wizualizującego zbiór danych. Sposób osiągnięcia tego celu: stworzenie wykresu i wprowadzenie szeregu świadomych i celowych ulepszeń do proponowanej wizualizacji.

1. Wybierz dane i stwórz dowolny wykres (relatywnie podstawowy, załącz go do wizualizacji).
2. Wprowadź jedno graficzne ulepszenie tego wykresu. Przykładowe: dopasowanie długości osi y, dodanie tytułu, sformatowanie tytułu, zmiana symboli, poprawa czcionki na wykresie.
3. Dołącz aktualną wersję wykresu do wizualizacji wraz z komentarzem opisującym (1) co zostało zmienione i (2) w jaki sposób ta konkretna modyfikacja ma ulepszyć wizualizację danych.
4. Powtórz kroki 2 i 3. Minimalna liczba powtórzeń: 19

Downloaded data from: https://data.giss.nasa.gov/gistemp/tabledata_v4/T_AIRS/GLB.Ts+dSST.csv (Global-mean monthly, seasonal, and annual means, 2002-present, updated through most recent month)

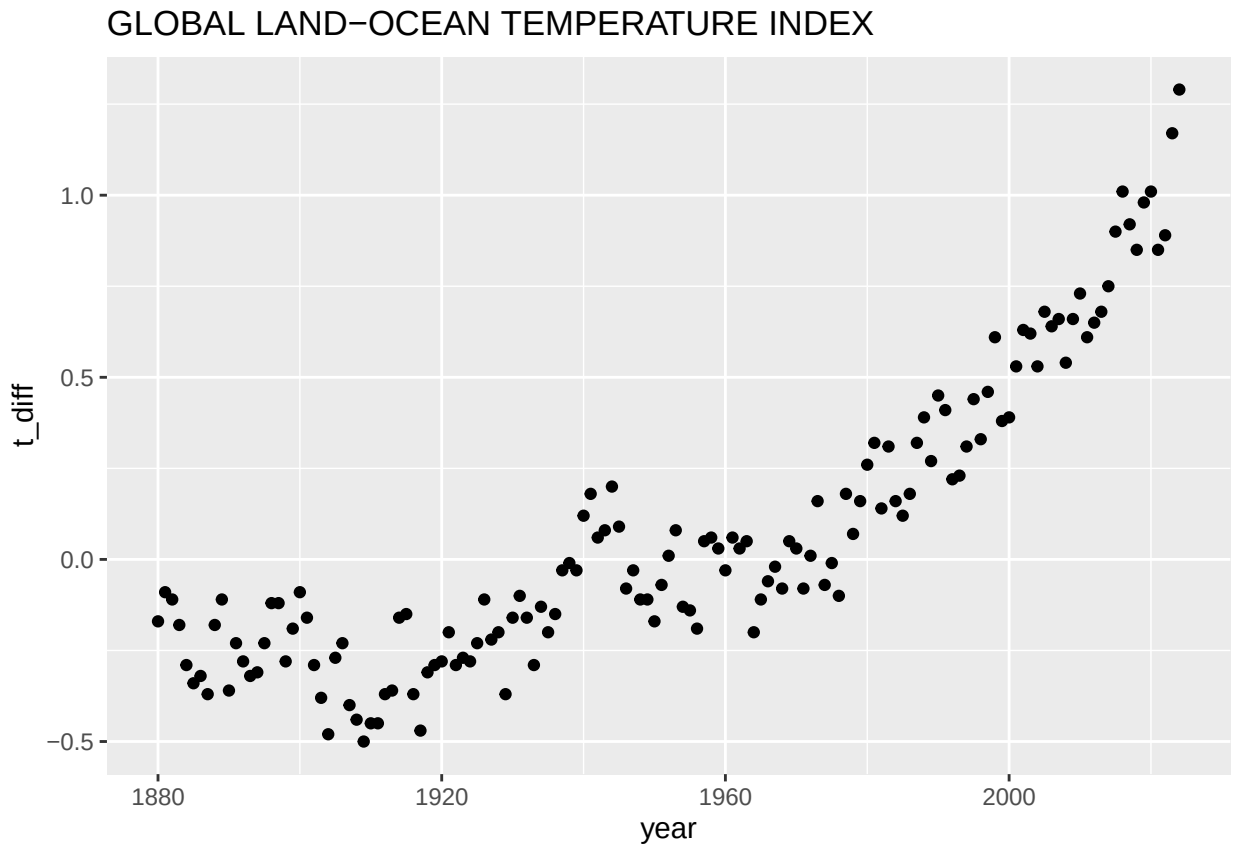
```
library(tidyverse)
temperature_data <- read_csv("data/GLB.Ts+dSST.csv", skip=1, na = "***") %>%
  select(year = Year, t_diff = `J-D`) %>%
  drop_na()
```

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point()
```



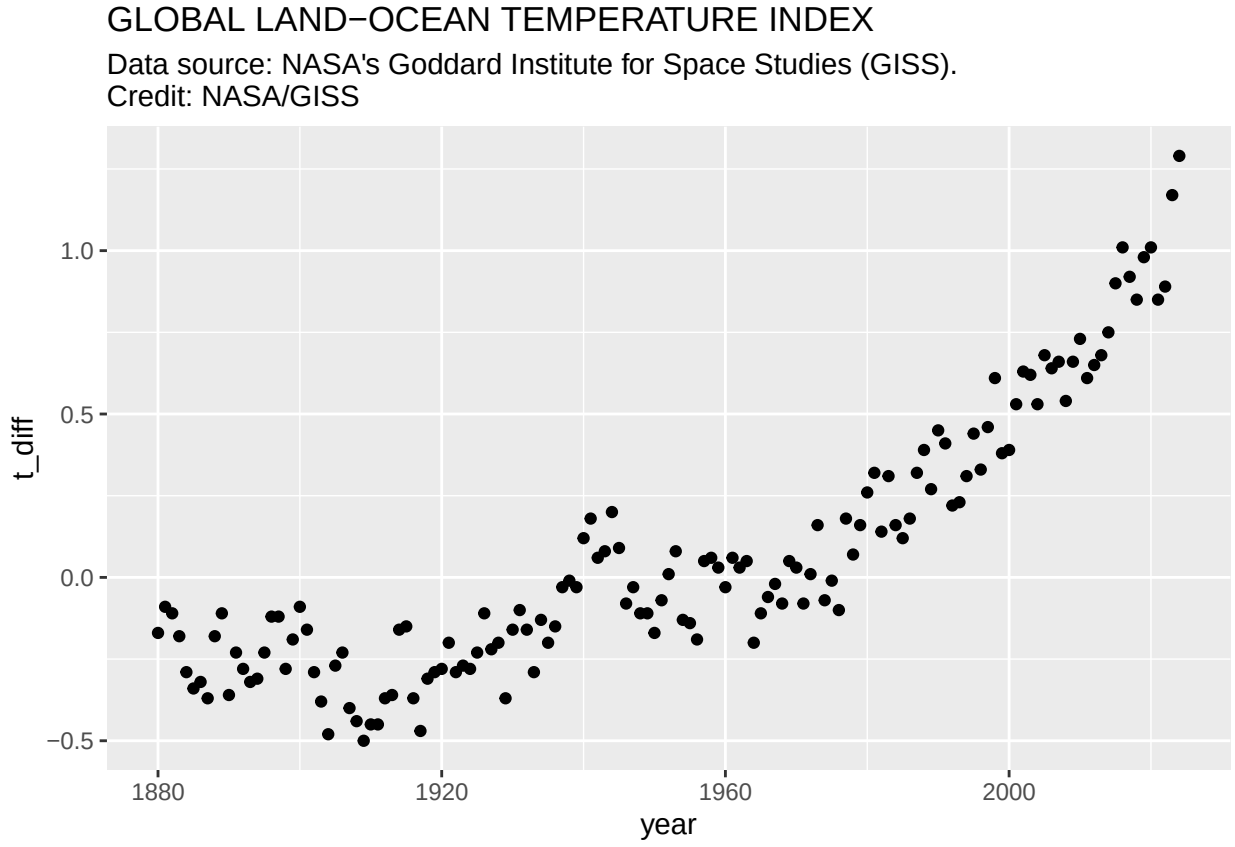
Dodanie tytułu by przyciągnąć uwagę i nadać kontekst:

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point() +
  labs(
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX"
  )
```



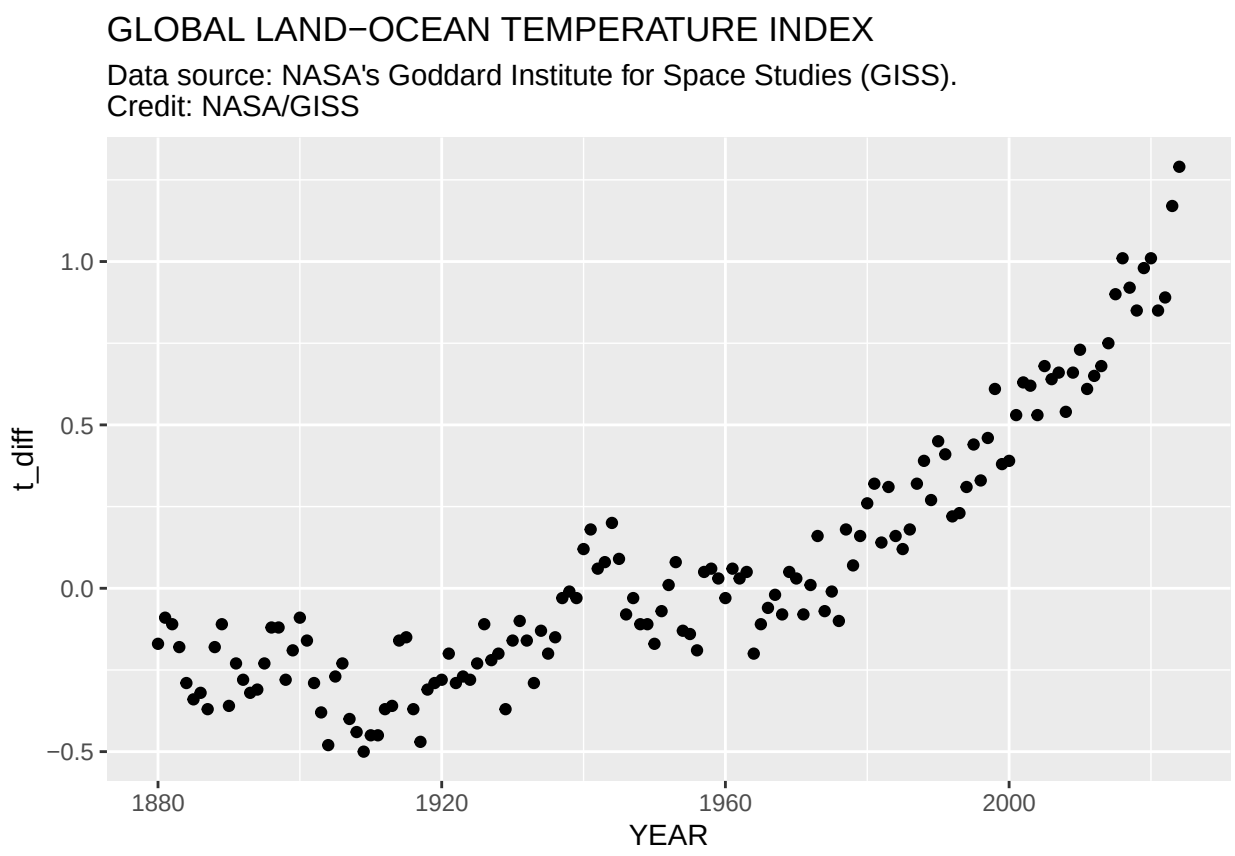
Dodanie podtytułu ze źródłem danych:

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point() +
  labs(
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  )
```



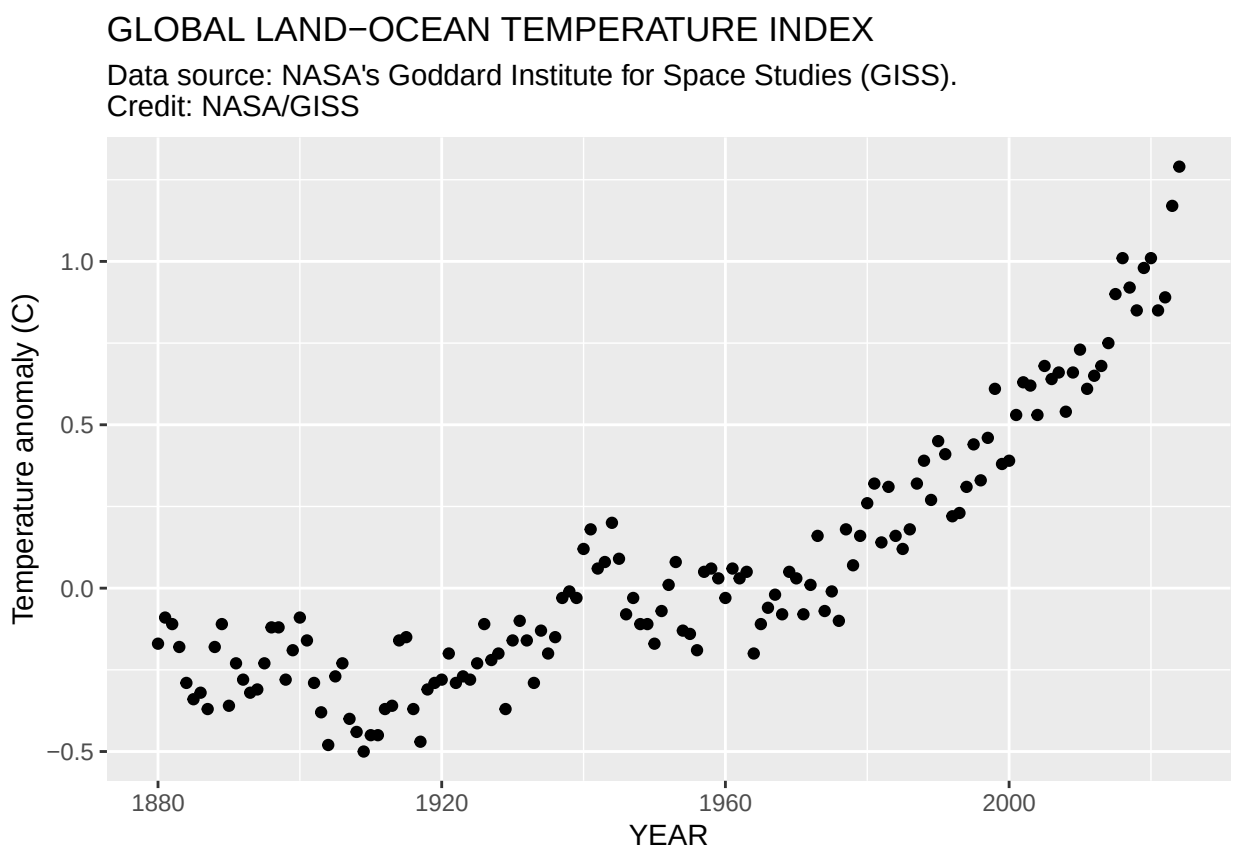
Dodanie opisu osi OX:

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point() +
  labs(
    x = "YEAR",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  )
```



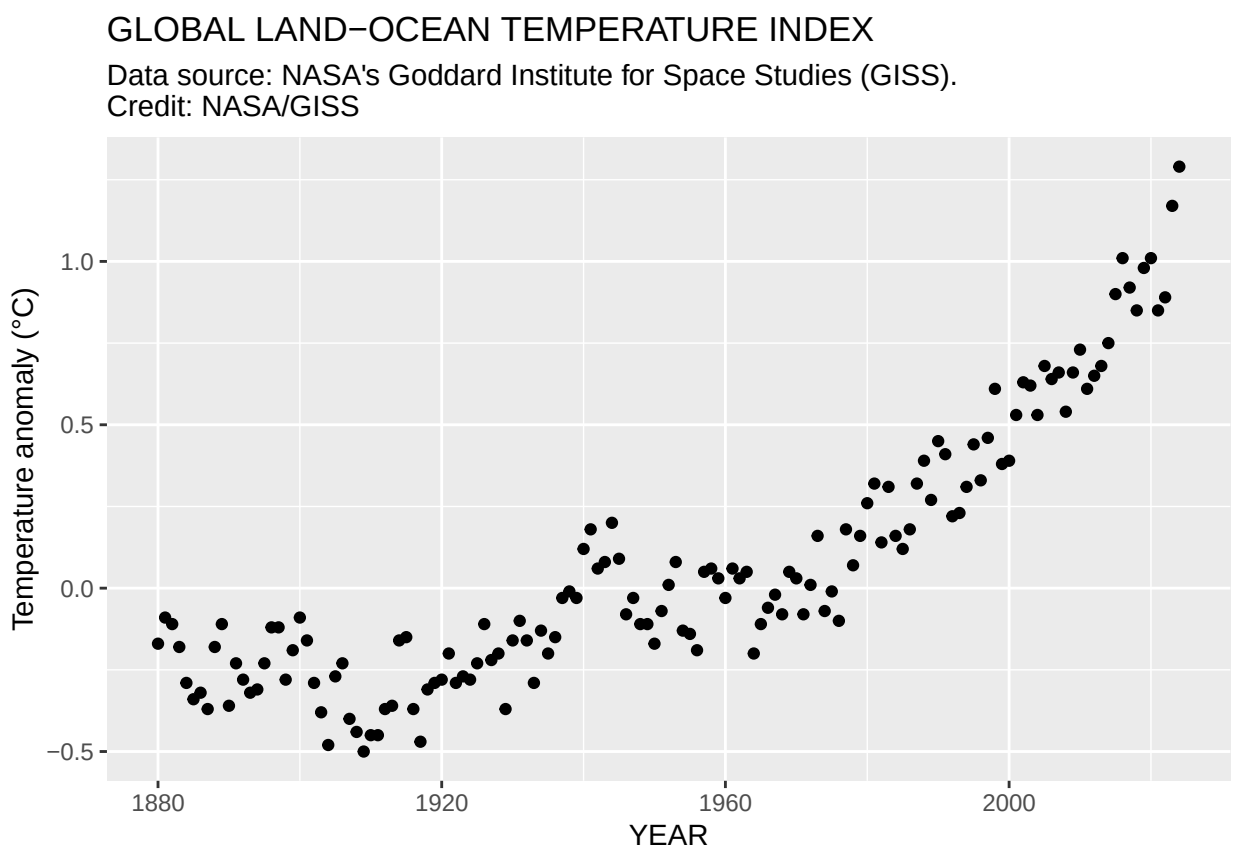
Dodanie opisu osi OY:

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point() +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  )
```



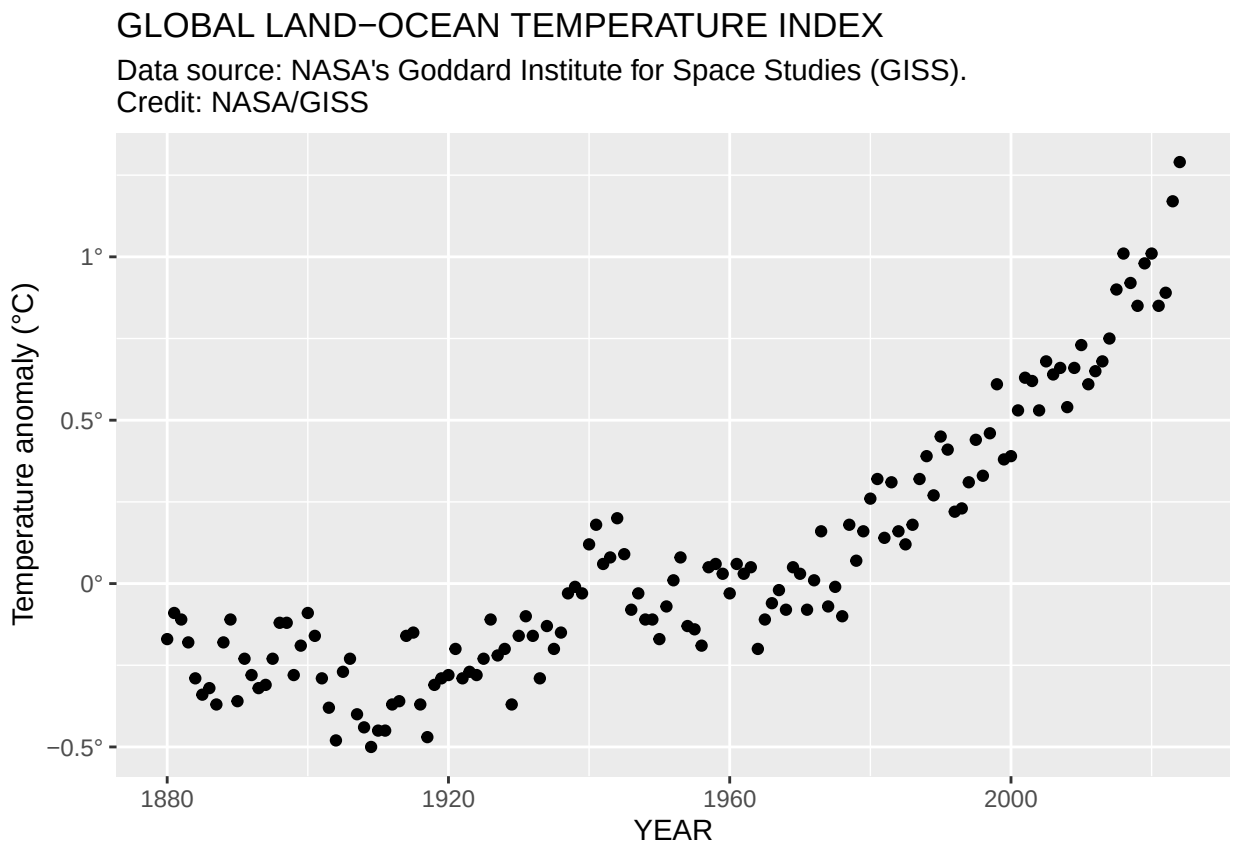
Dodanie znaku stopnia do opisu osi OY:

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point() +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  )
```



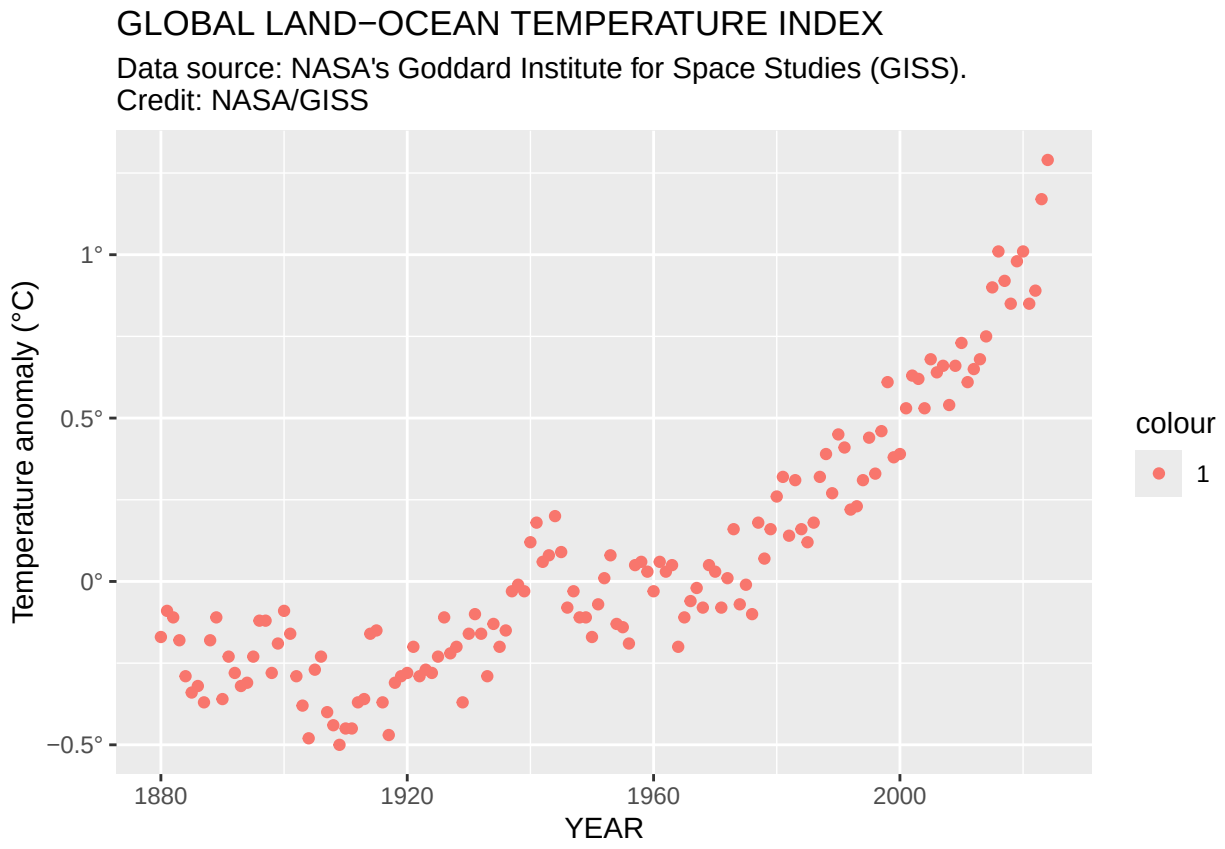
Dodanie znaku stopnia do znaczników osi OY:

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point() +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
    scale_y_continuous(labels = ~ paste0(.x, "°"))
```



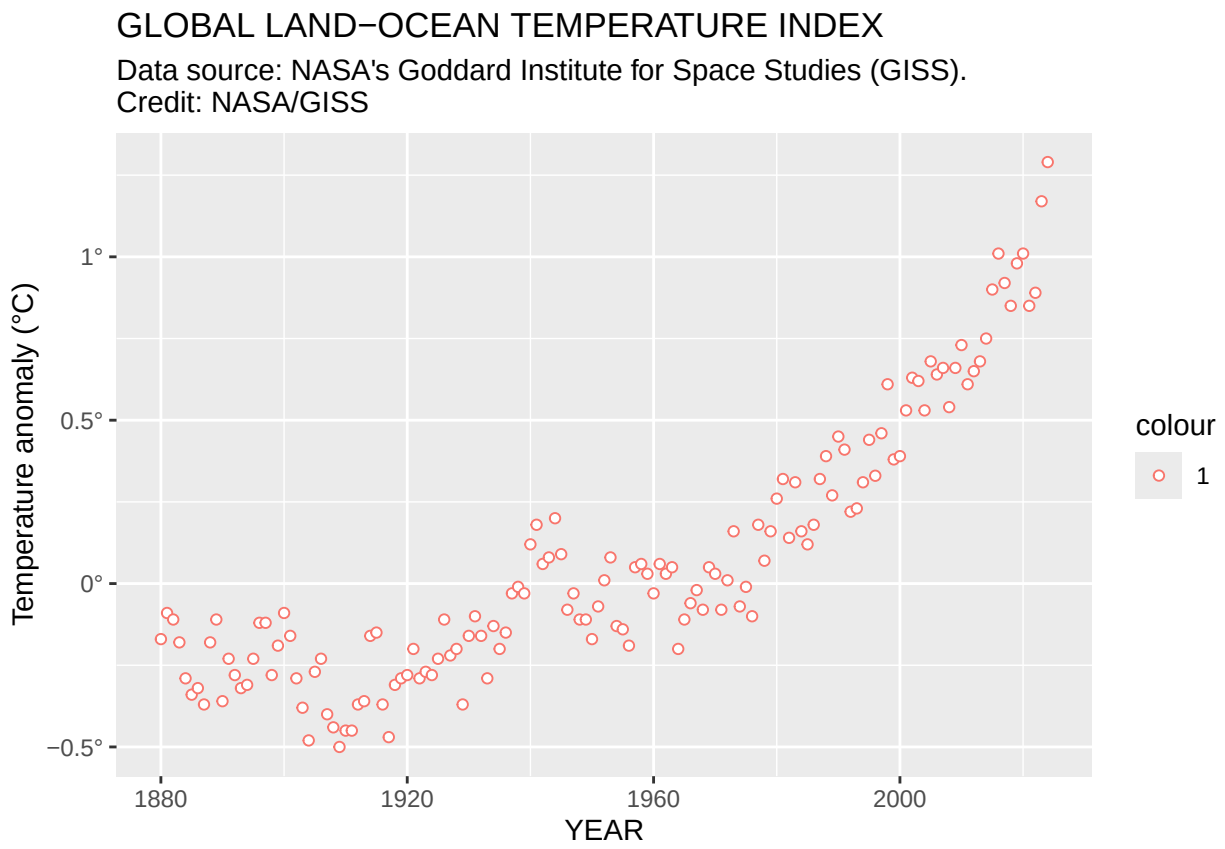
Pokolorowanie punktów (by się wyróżniały) i z jakiegoś powodu inna pisownia colour w legendzie, a inna w argumencie geom_pointa

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point(fill="white", aes(color = "1")) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
    scale_y_continuous(labels = ~ paste0(.x, "°"))
```



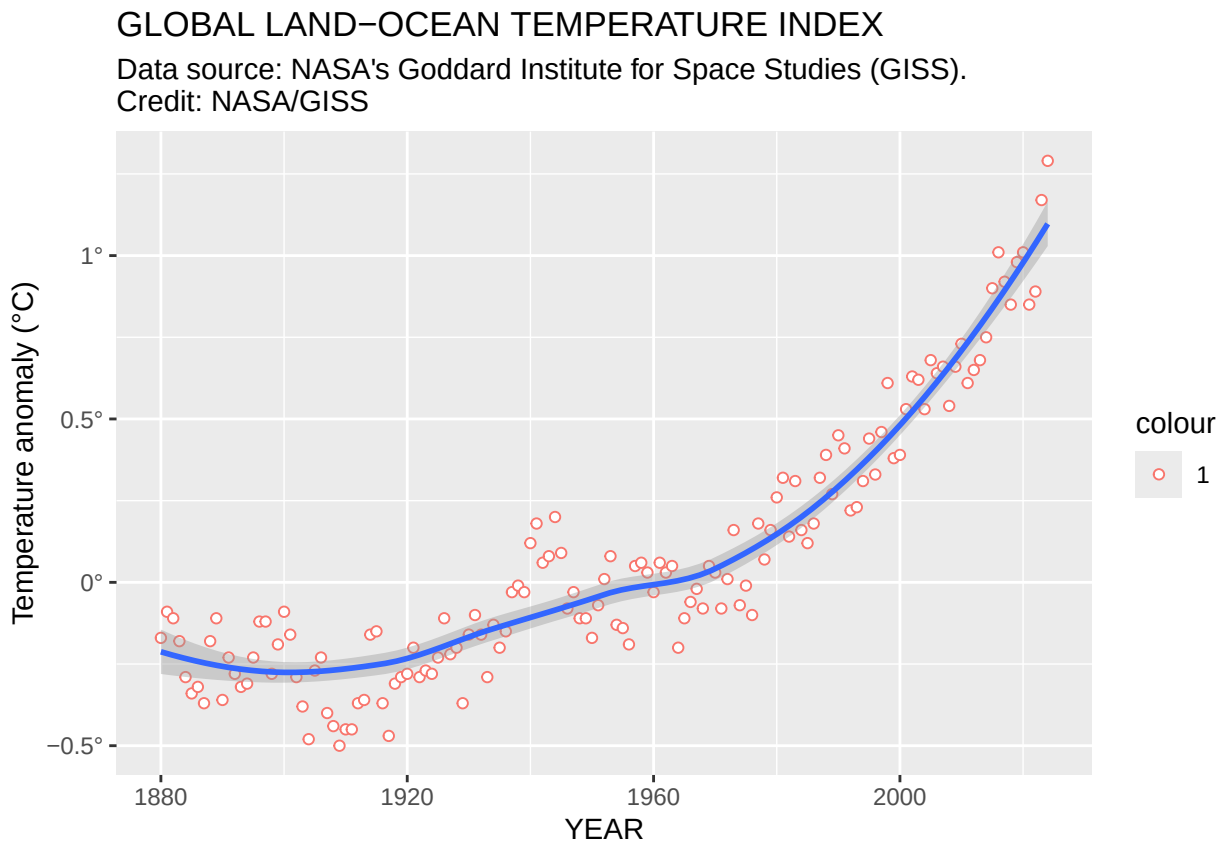
Zmiana kształtu punktów by się wyróżniały

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
    geom_point(fill="white", aes(color = "1"), shape=21) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
    scale_y_continuous(labels = ~ paste0(.x, "°"))
```



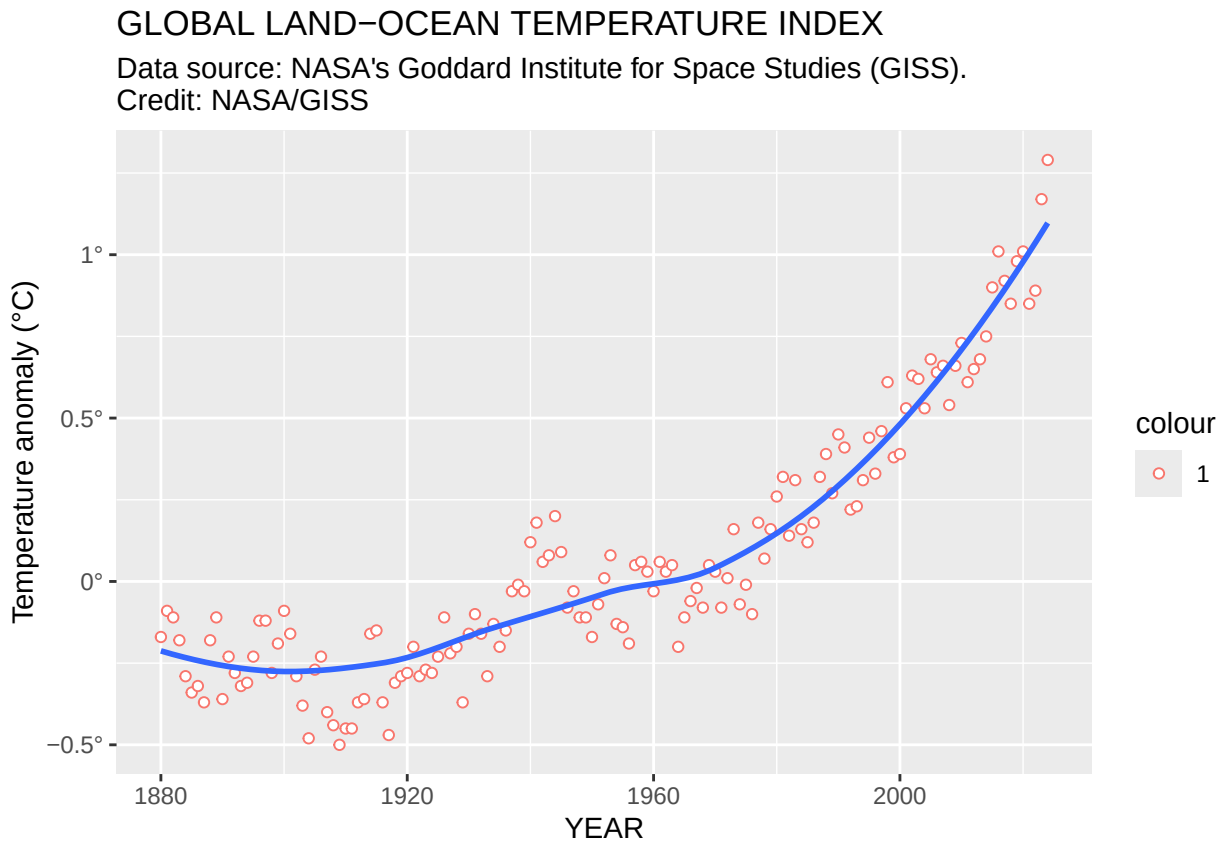
Dodanie linii trendu by pomóc odbiorcy zauważyć trend w danych (domyślna metoda “curved loess” regresji lokalnej)

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_point(fill="white", aes(color = "1"), shape=21) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  geom_smooth() +
  scale_y_continuous(labels = ~ paste0(.x, "°"))
```



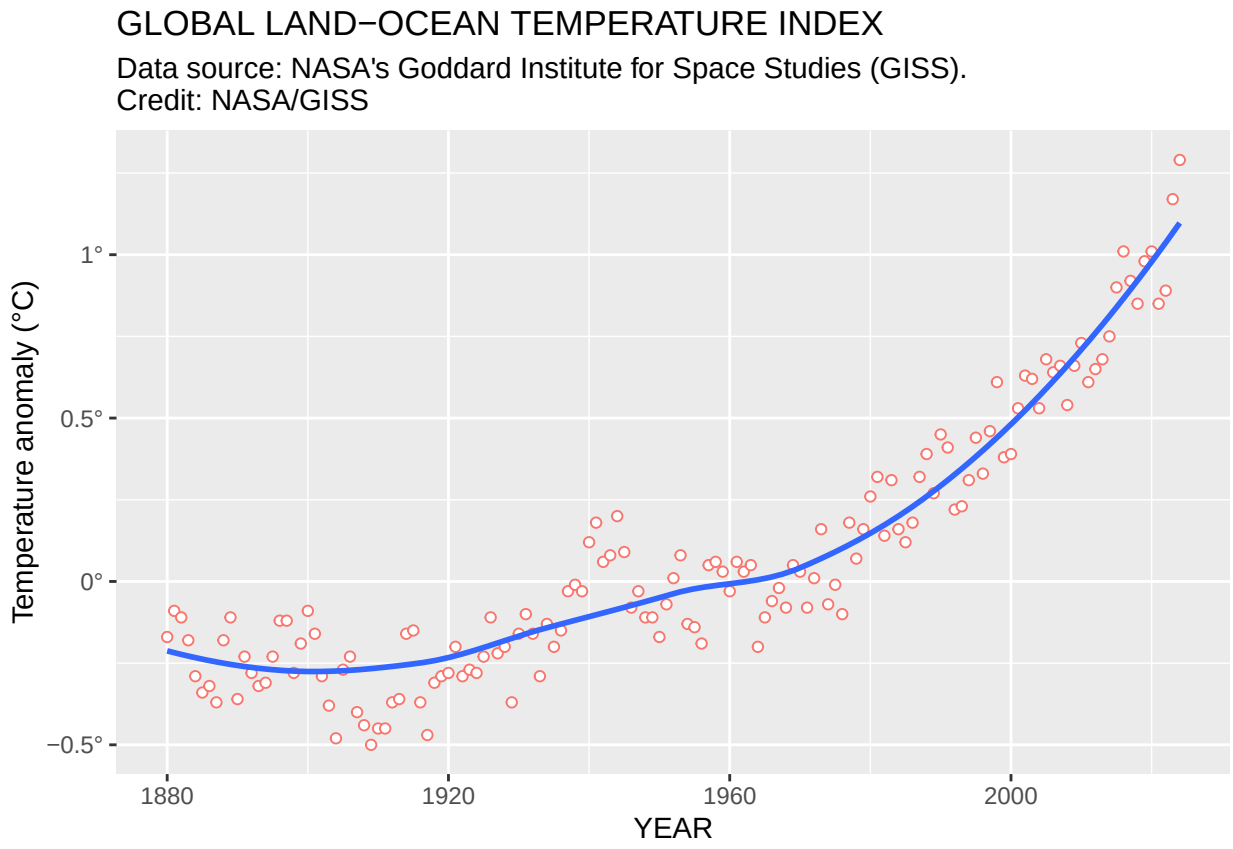
Zdecydowałem się ukryć przedział ufności z otoczenia linii trendu by uprościć wykres

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_point(fill="white", aes(color = "1"), shape=21) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  geom_smooth(se=FALSE) +
  scale_y_continuous(labels = ~ paste0(.x, "°"))
```



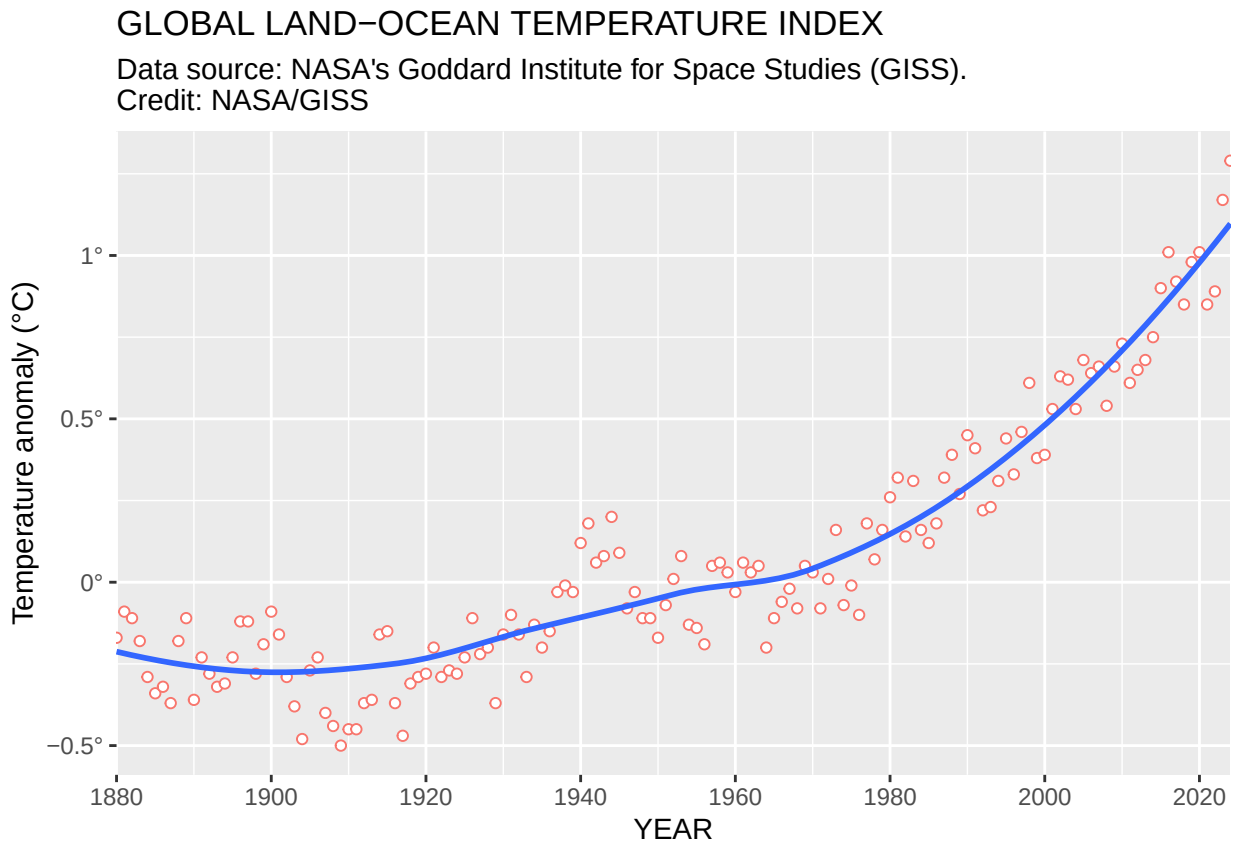
Usunąłem tę legendę - dopiero zauważyłem, że jest niepotrzebna i irytująca

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  geom_smooth(se=FALSE) +
  scale_y_continuous(labels = ~ paste0(.x, "°"))
```



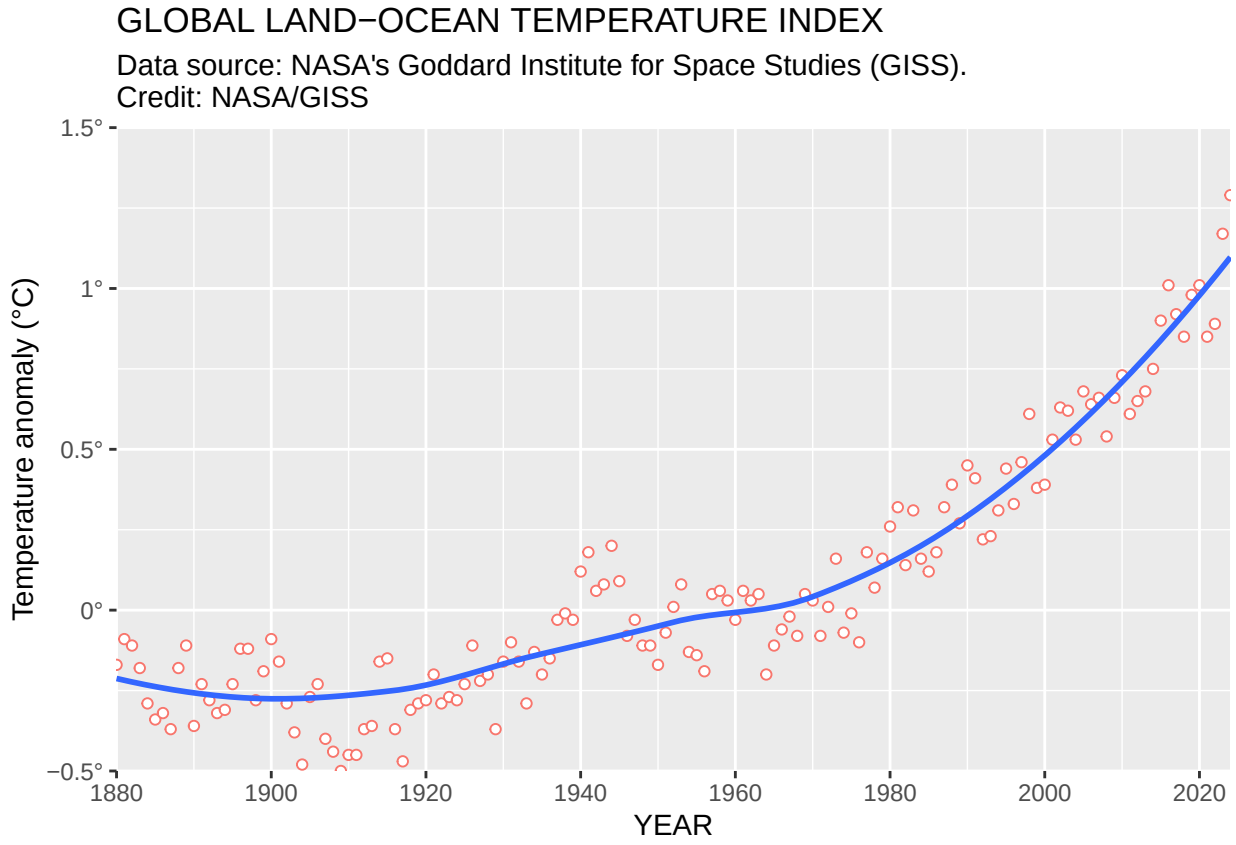
Zmieniłem rozmieszczenie znaczników - istotne jest dla mnie by czytelnik widział, że dane są aktualne aż do br.

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"))
```



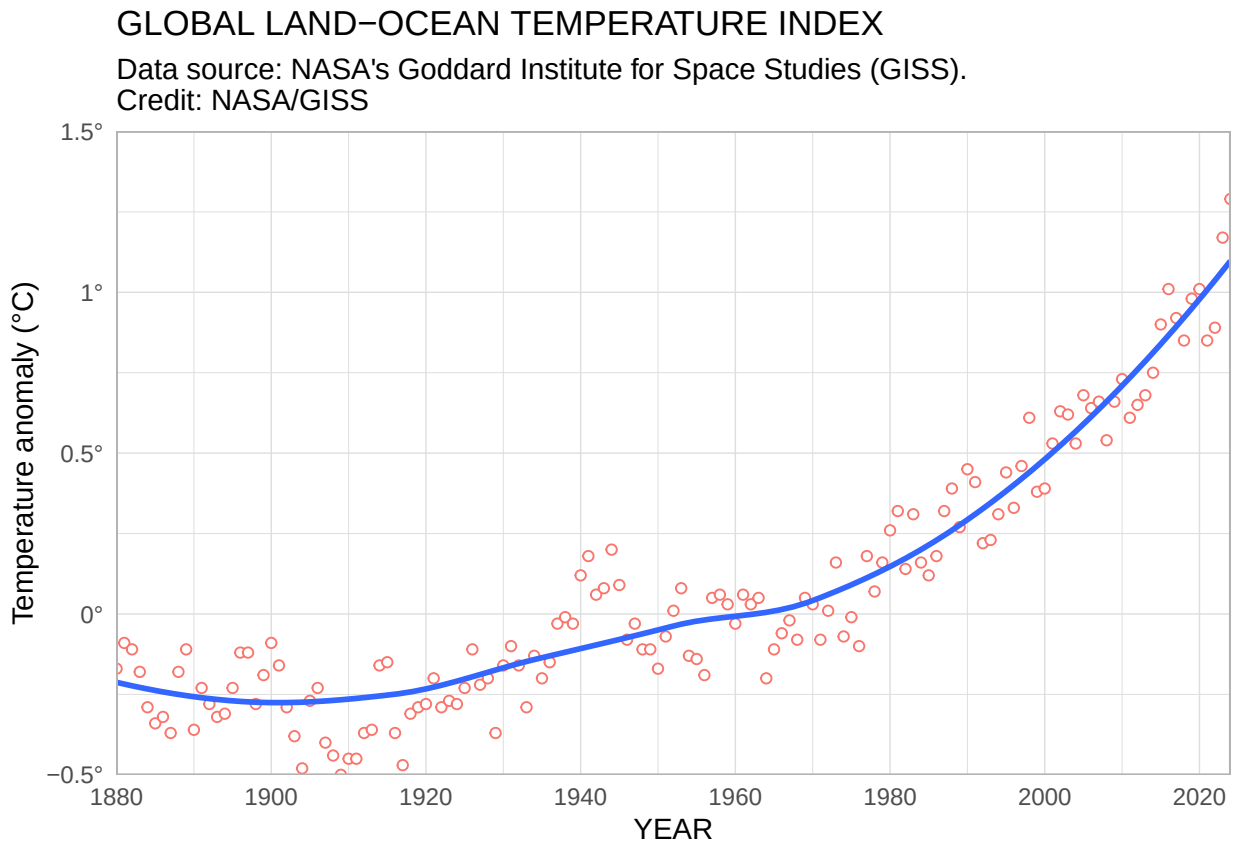
Oś OY też dopasowałem do występujących w zestawie zakresów zmiennej - zapewne rok 1909 zginie (w zenicie osi OX), ale jest to poświęcenie na które jestem gotów

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0))
```



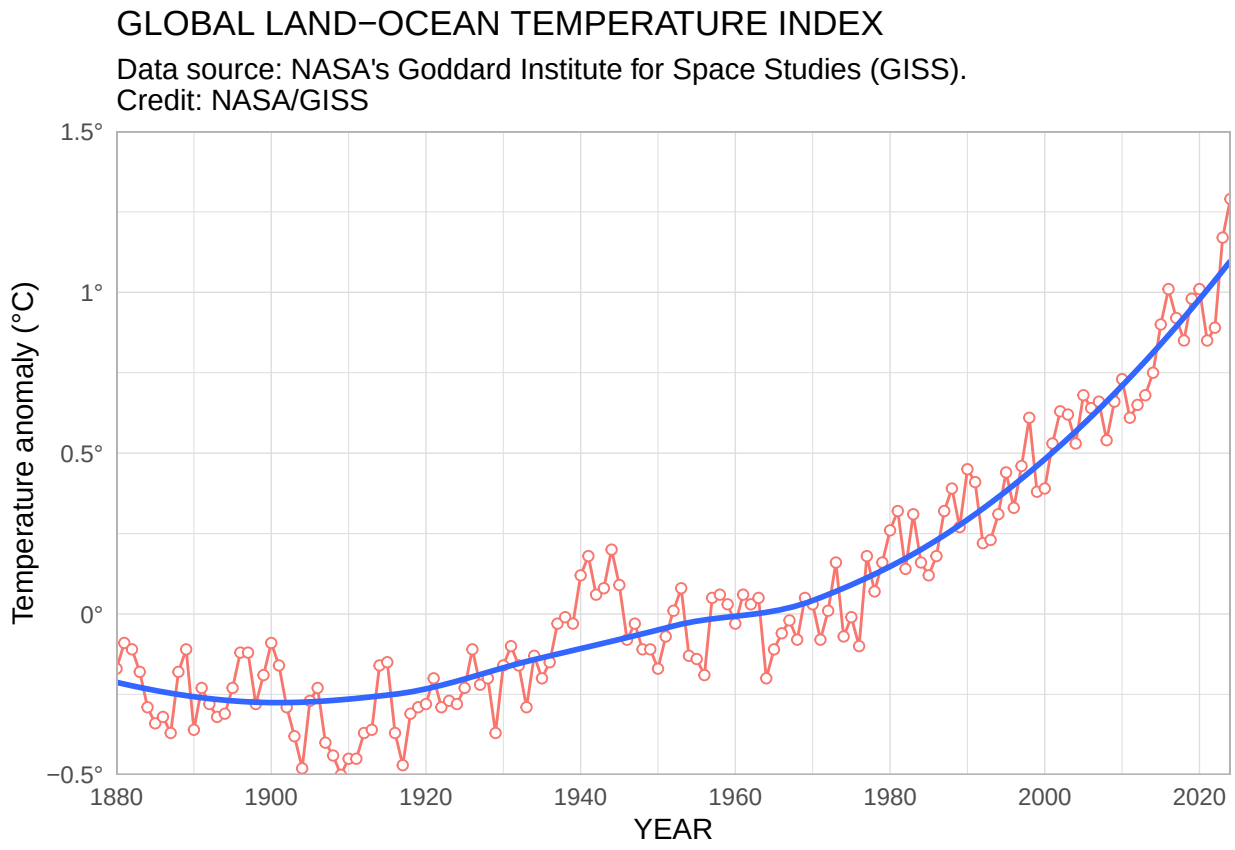
Usunąłem te “ticksy” - dosłownie jak kleszcze albo inne pasożyty wyglądają. Do tego jasne tło da odbiorcy poczucie czystości i “neatness”

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank()
  )
```



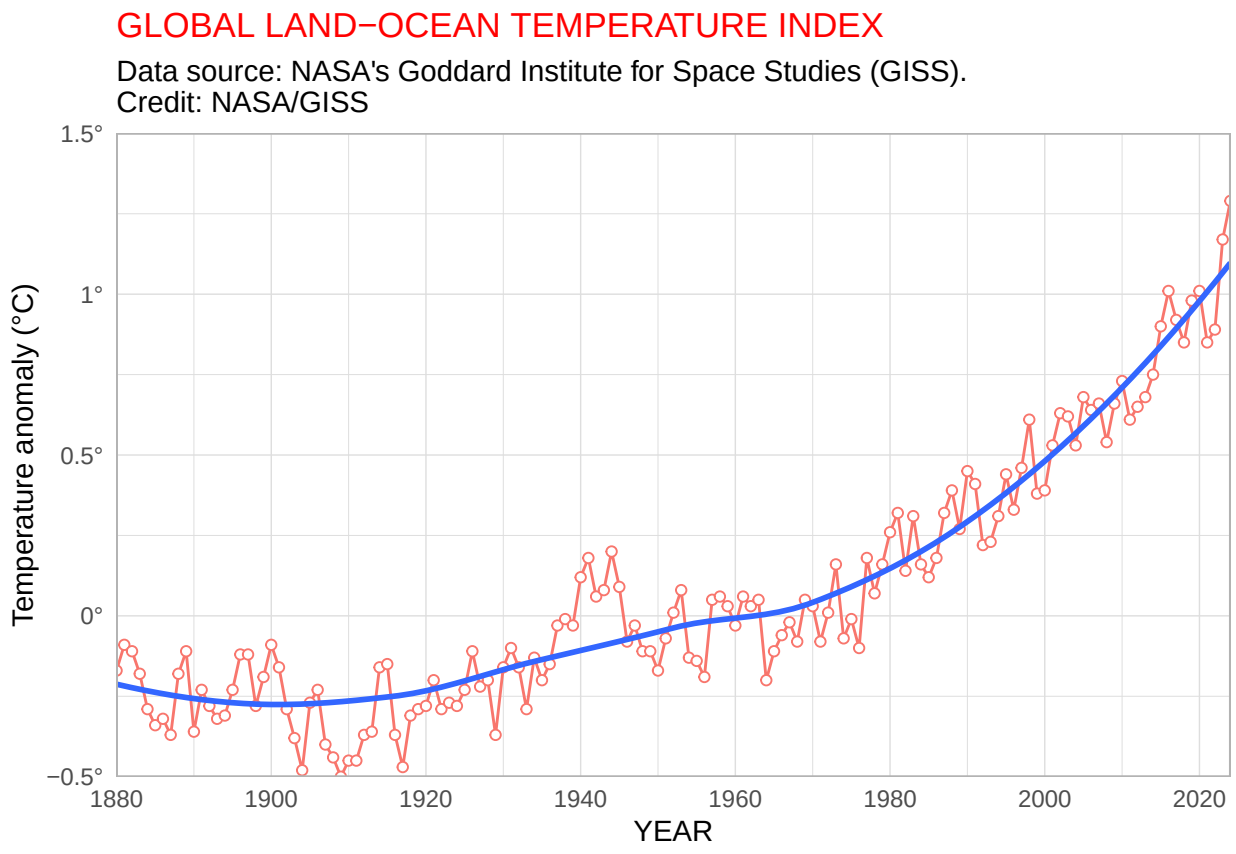
Połączenie punktów danych linią - pomoże zauważyć wahania rok do roku

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_line(aes(color = "1"), size=0.5, show.legend = FALSE) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank()
  )
```



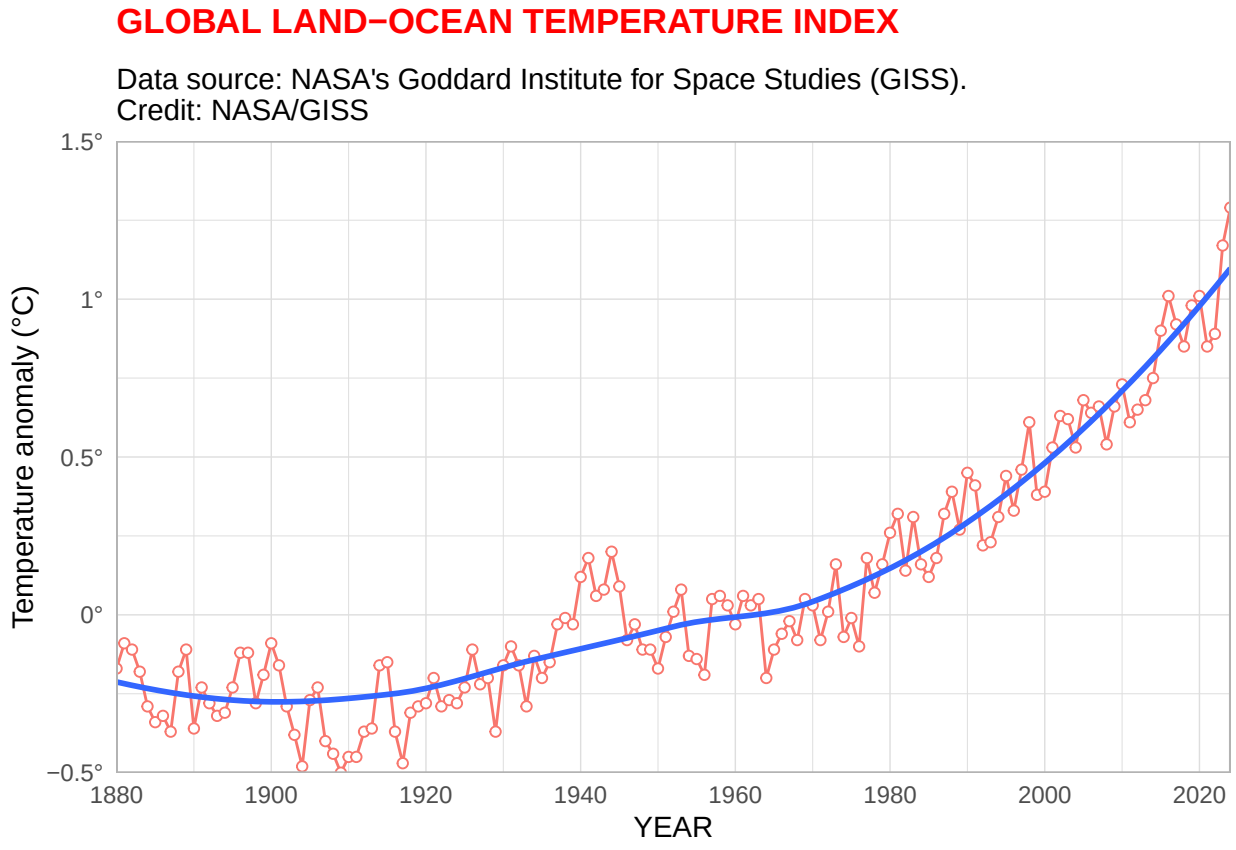
Wyróżniłem tytuł kolorem - źródło danych jest dla odbiorcy drugorzędne

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_line(aes(color = "1"), size=0.5, show.legend = FALSE) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank(),
    plot.title = element_text(color="red")
  )
```



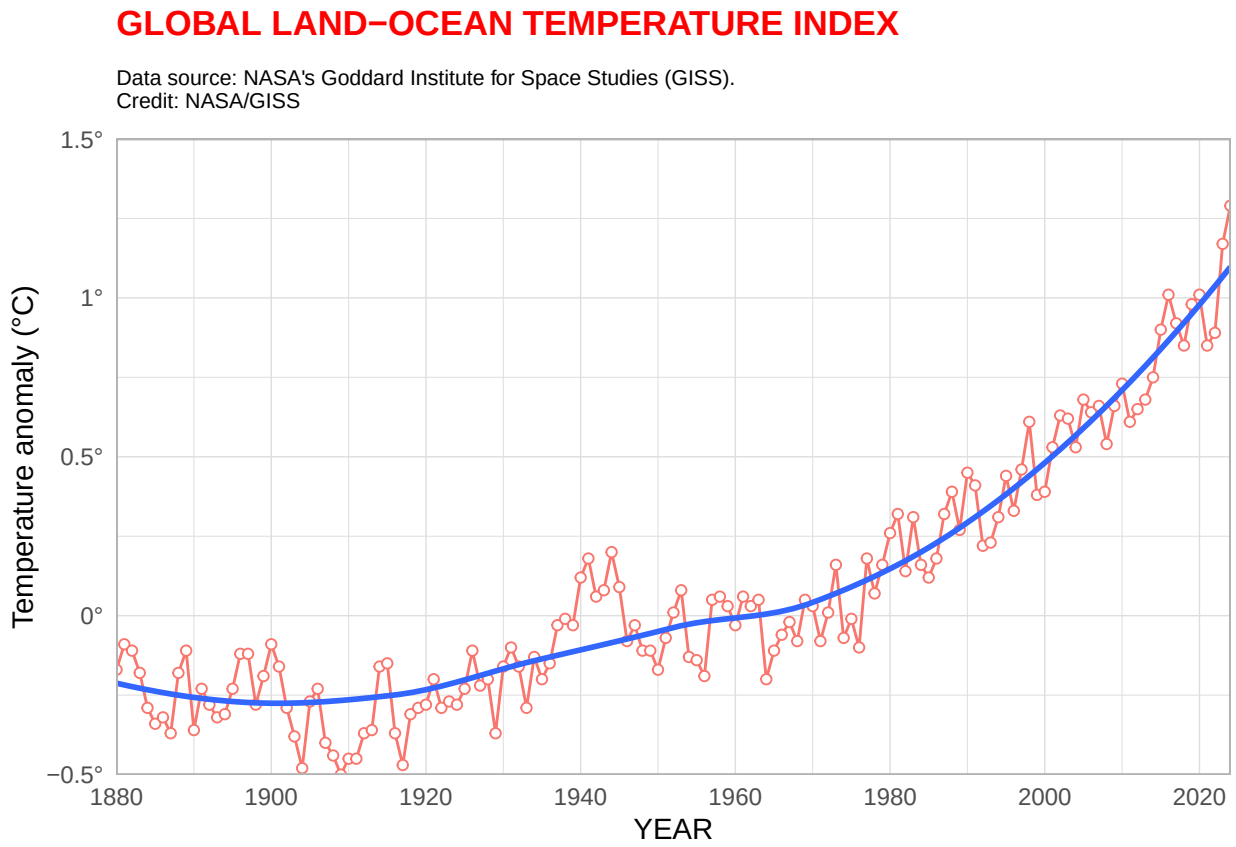
Wyróżniłem tytuł boldem - źródło danych jest dla odbiorcy drugorzędne

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_line(aes(color = "1"), size=0.5, show.legend = FALSE) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank(),
    plot.title = element_text(margin = margin(b=10), color="red", face="bold")
  )
```



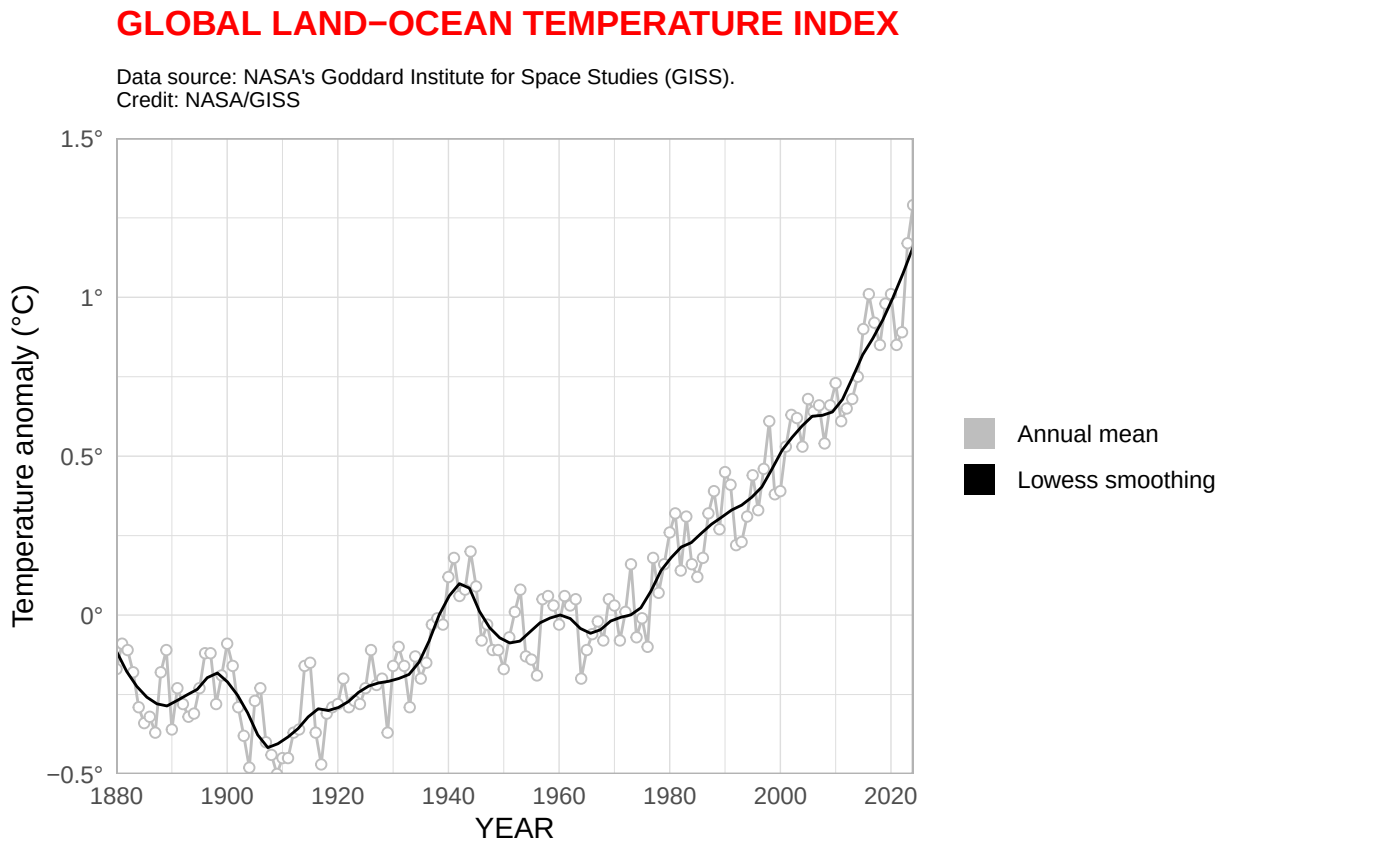
Zmniejszyłem podtytuł - źródło danych jest dla odbiorcy drugorzędne

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_line(aes(color = "1"), size=0.5, show.legend = FALSE) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = FALSE) +
  geom_smooth(se=FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank(),
    plot.title = element_text(margin = margin(b=10), color="red", face="bold"),
    plot.subtitle = element_text(size=8, margin = margin(b=10)),
  )
```



Dodałem legendę odróżniającą same dane od linii trendu

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_line(aes(color = "1"), size=0.5, show.legend = FALSE) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = TRUE) +
  geom_smooth(se=FALSE, aes(color = "2"), size=0.5, span=0.15, show.legend = FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  scale_color_manual(name=NULL,
                     breaks=c(1, 2),
                     values=c("gray", "black"),
                     labels=c("Annual mean", "Lowess smoothing"),
                     guide = guide_legend(override.aes = list(shape=15, size=5))) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank(),
    plot.title = element_text(margin = margin(b=10), color="red", face="bold"),
    plot.subtitle = element_text(size=8, margin = margin(b=10)),
  )
```



Poprawiłem jej położenie, żeby zmniejszyć rozmiar całego obrazu

```
ggplot(temperature_data, aes(x=year, y=t_diff)) +
  geom_line(aes(color = "1"), size=0.5, show.legend = FALSE) +
  geom_point(fill="white", aes(color = "1"), shape=21, show.legend = TRUE) +
  geom_smooth(se=FALSE, aes(color = "2"), size=0.5, span=0.15, show.legend = FALSE) +
  scale_x_continuous(breaks=seq(1880, 2025, 20), expand=c(0,0)) +
  scale_y_continuous(labels = ~ paste0(.x, "°"), limits=c(-0.5, 1.5), expand=c(0,0)) +
  scale_color_manual(name=NULL,
                     breaks=c(1, 2),
                     values=c("gray", "black"),
                     labels=c("Annual mean", "Lowess smoothing"),
                     guide = guide_legend(override.aes = list(shape=15, size=5))) +
  labs(
    x = "YEAR",
    y = "Temperature anomaly (\u00B0C)",
    title = "GLOBAL LAND-OCEAN TEMPERATURE INDEX",
    subtitle = "Data source: NASA's Goddard Institute for Space Studies (GISS).\nCredit: NASA/GISS"
  ) +
  theme_light() +
  theme(
    axis.ticks = element_blank(),
    plot.title = element_text(margin = margin(b=10), color="red", face="bold"),
    plot.subtitle = element_text(size=8, margin = margin(b=10)),
    legend.position = c(0.15, 0.9),
    legend.title = element_text(size=0),
    legend.key.height = unit(10, "pt"),
    legend.margin = margin(0,0,0,0)
  )
```

GLOBAL LAND−OCEAN TEMPERATURE INDEX

Data source: NASA's Goddard Institute for Space Studies (GISS).
Credit: NASA/GISS