

# *Užijí planeta v budoucnu lidstvo?*



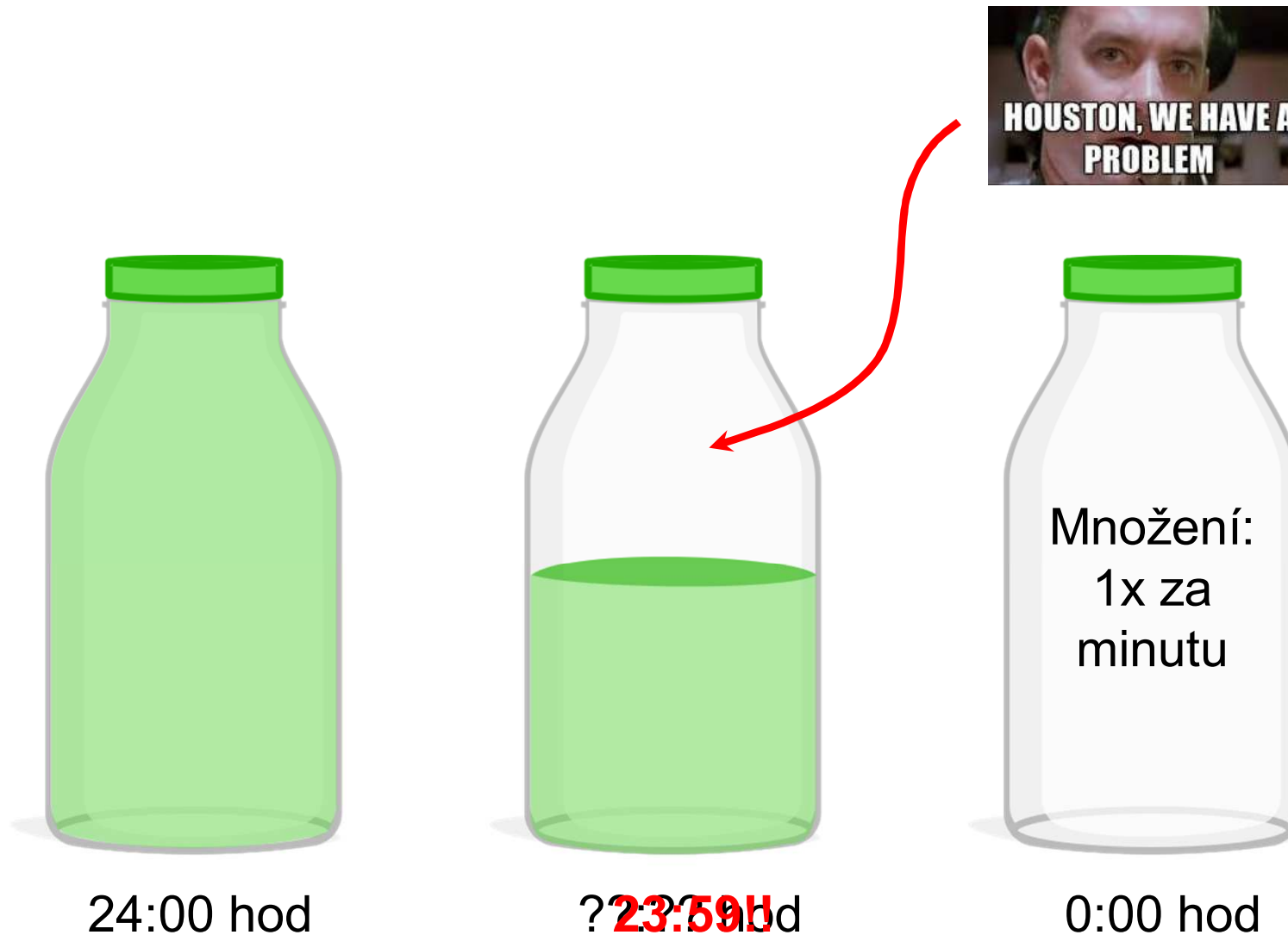
Alexander Ač, Ústav výzkumu globální změny v.v.i., AV ČR

*V roce 2100 bude žít na planetě až 11 miliard lidí*

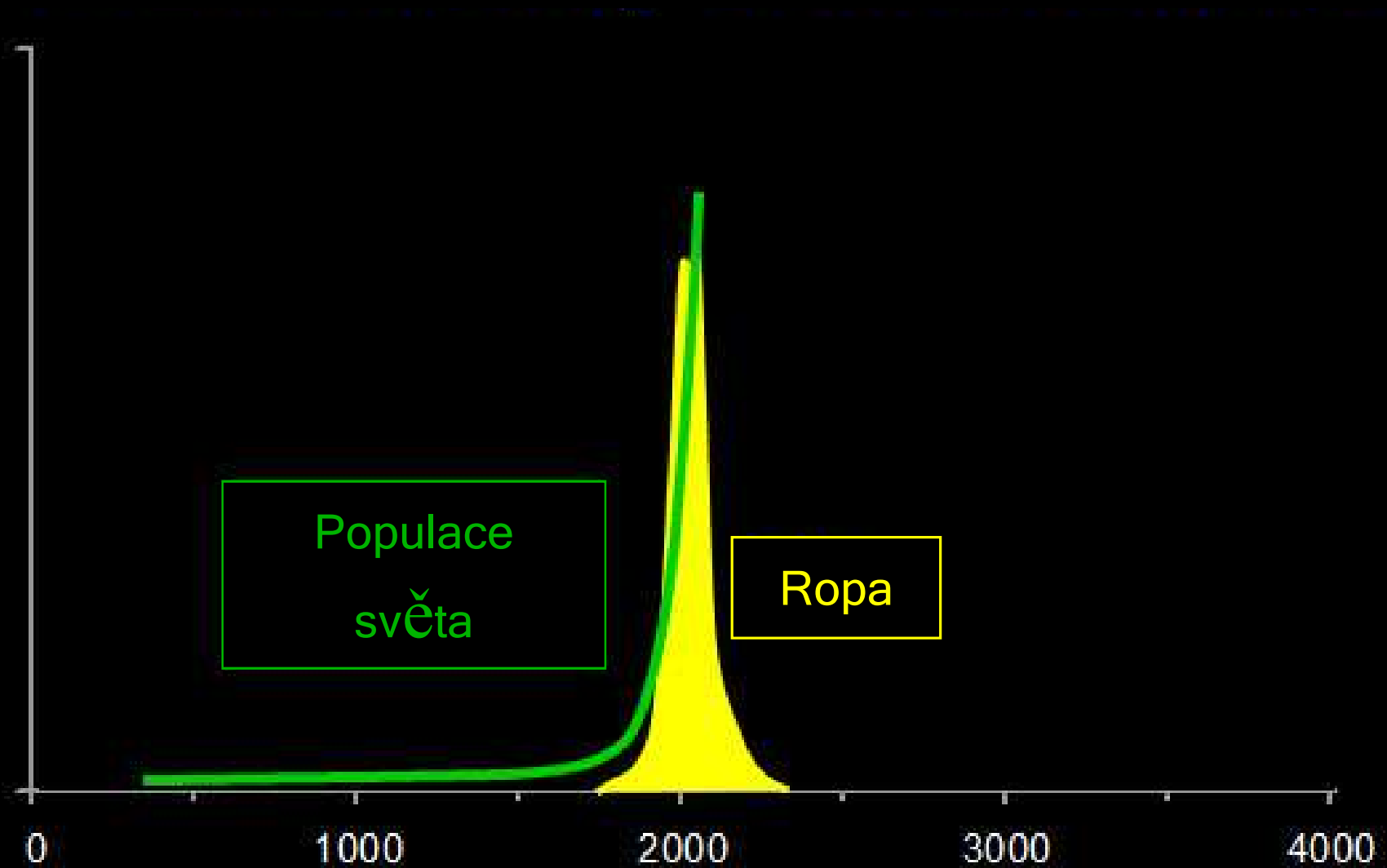


# *Exponenciální růst vs. technologie*

Pravidlo 70 – jednoduchý výpočet času potřebného na zdvojnásobení kvantity:  $70/10\% = 7$  let



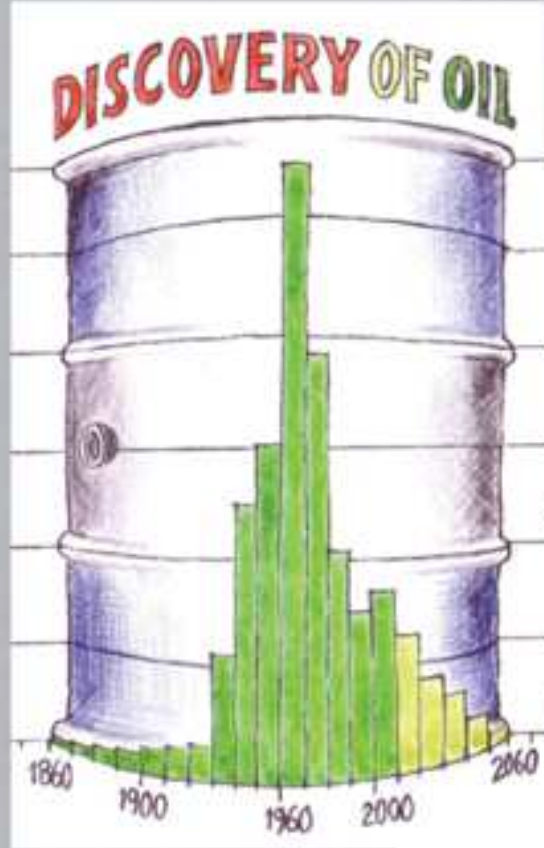
# *Stručná historie ropy a lidstva*



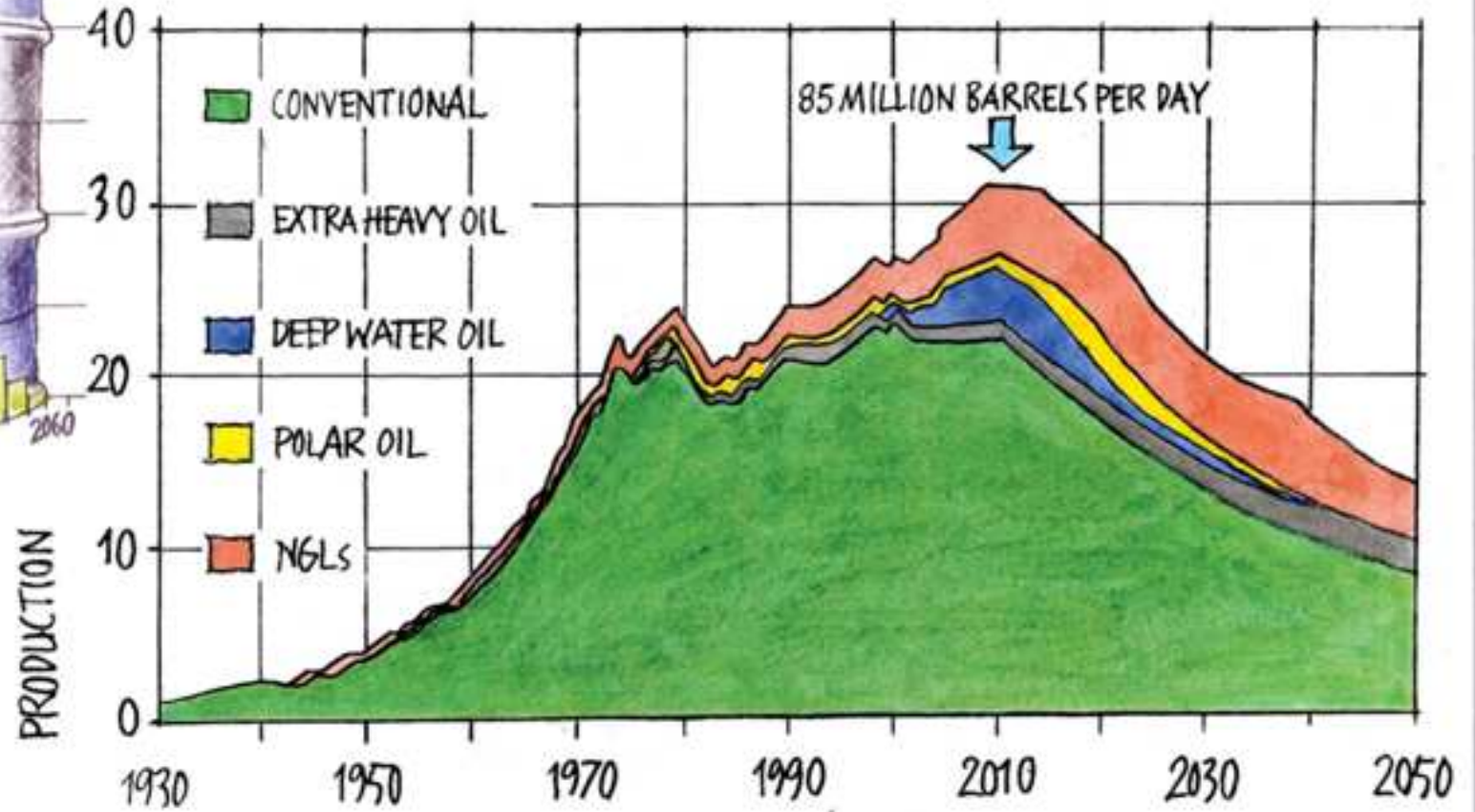


1 deci ropy!

# Těžit můžeme jen to, co jsme objevili



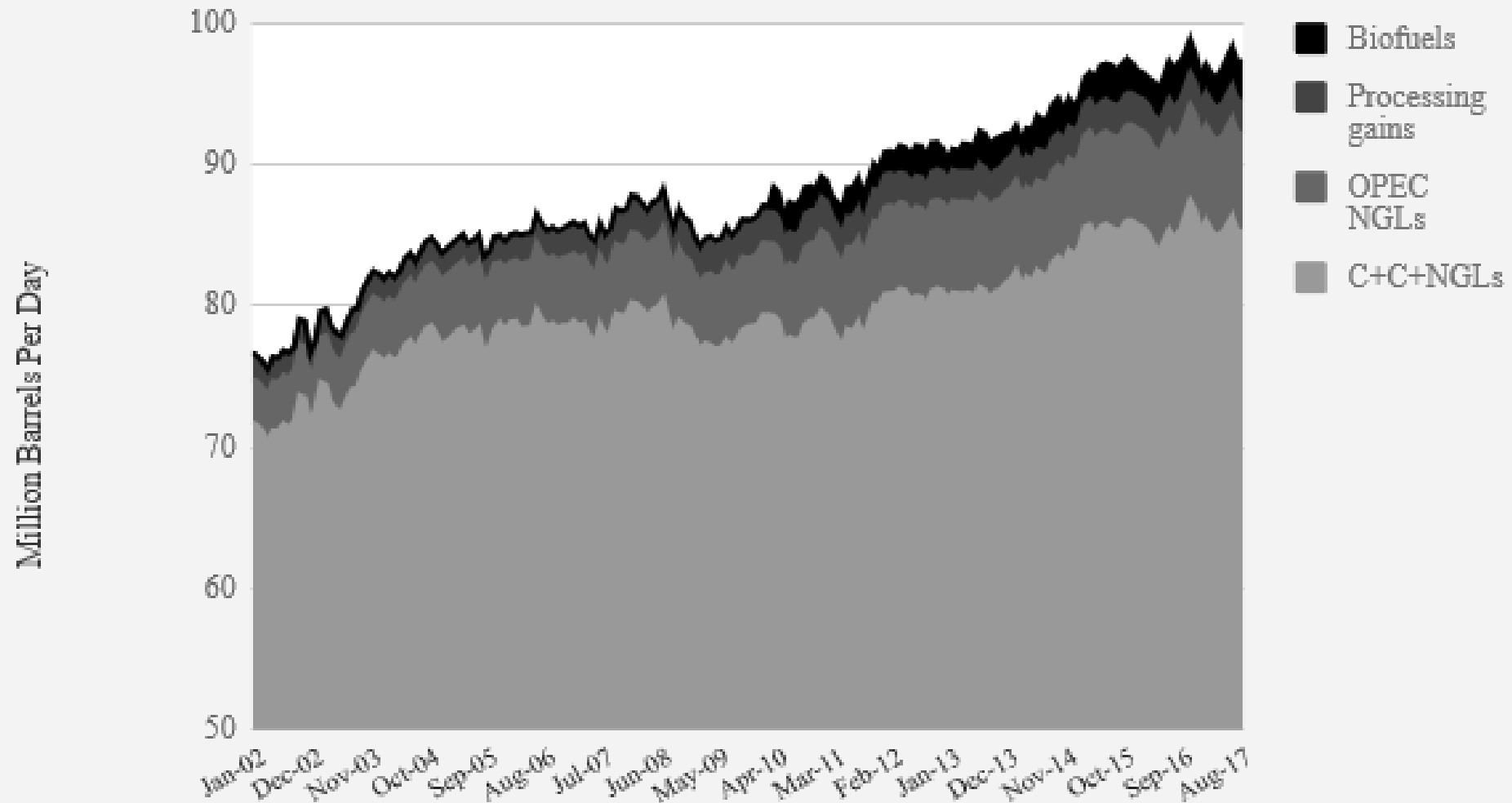
## Peak Oil



10.4

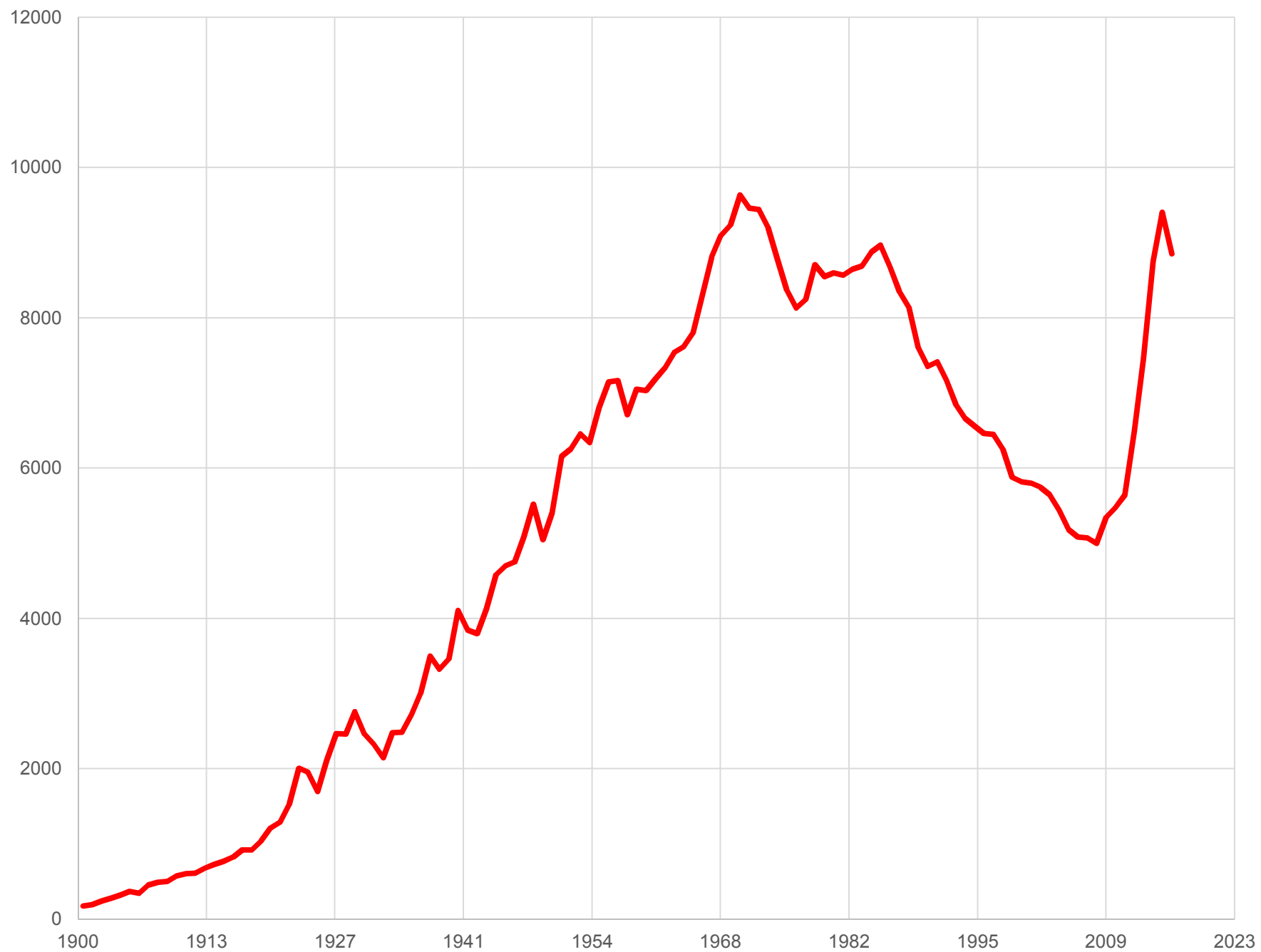


# *Globální těžba ropy (tekutých paliv)*



Energy Matters: euanmearns.com: IEA monthly data

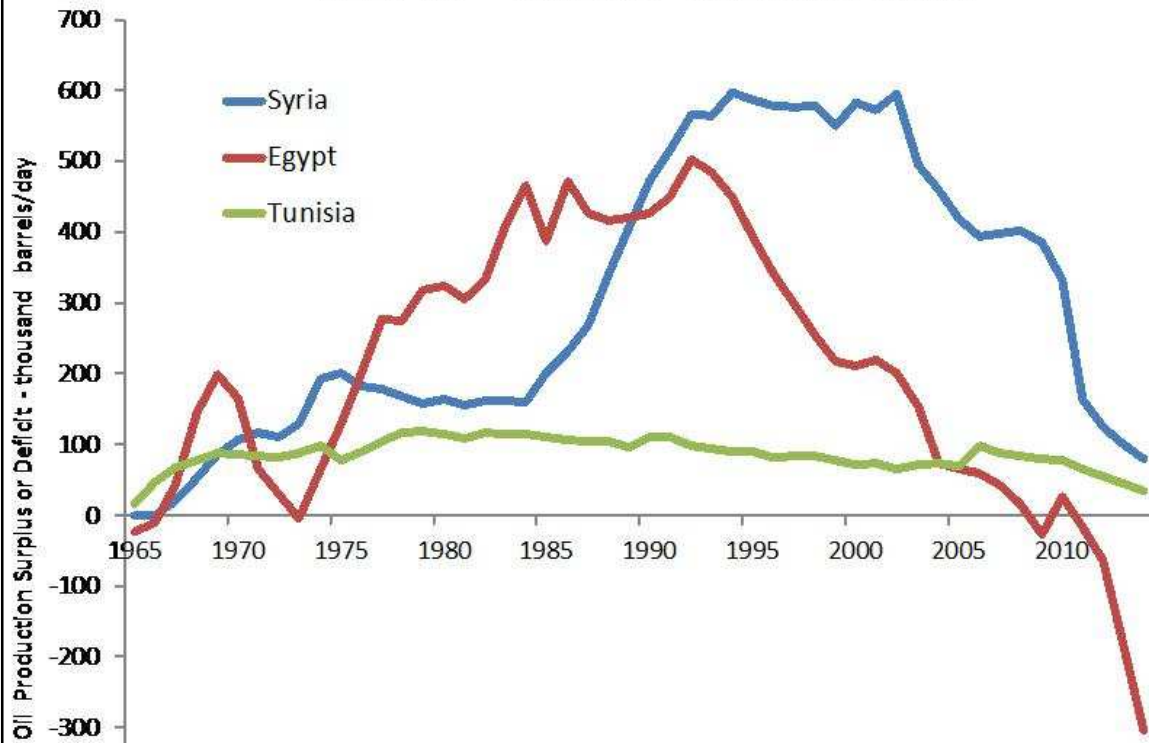
# Ťěžba ropy v USA (1900-2016)





# Některé státy s klesající těžbou ropy

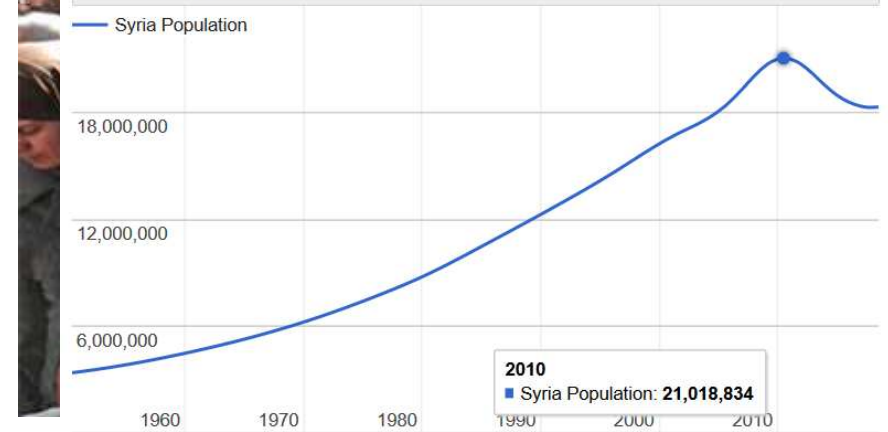
Peak Oil - Collapse - Syria, Egypt, Tunisia



Syria Population (LIVE)

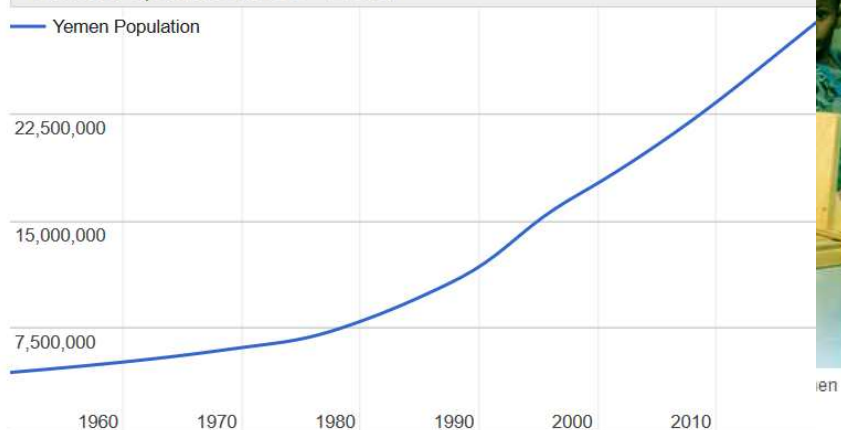
**18,275,535**

Syria Population (1950 - 2018)

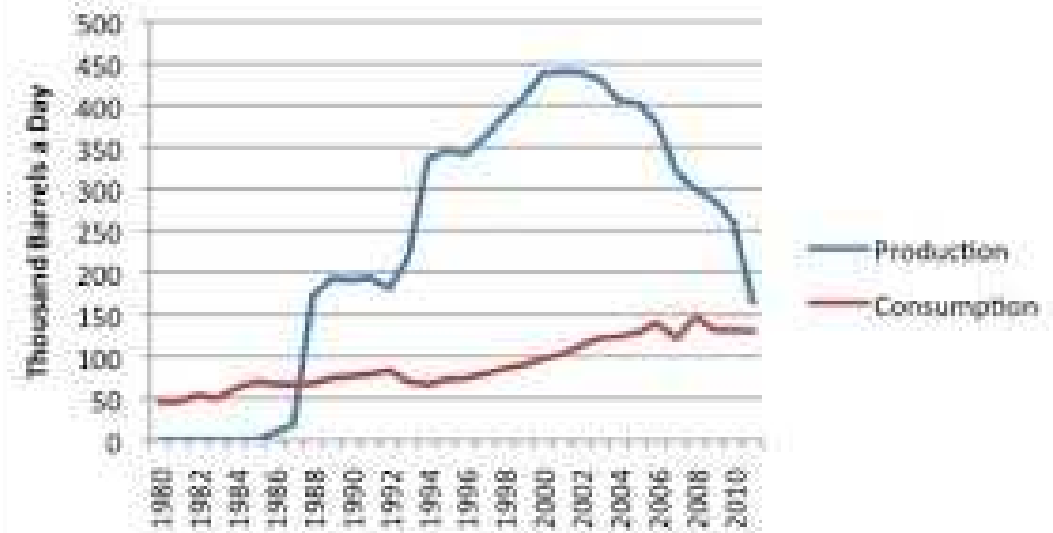


**28,507,792**

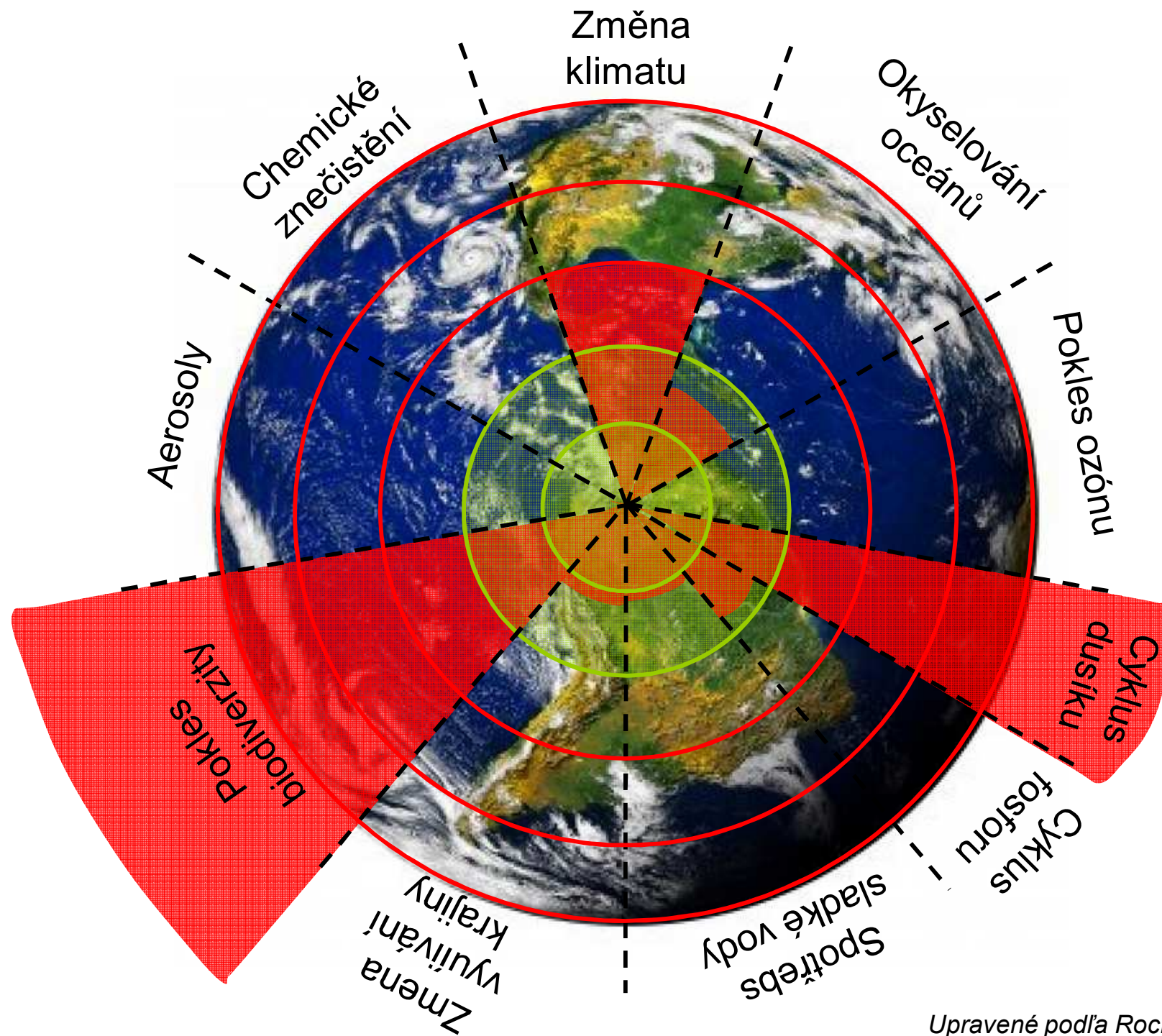
Yemen Population (1950 - 2018)



Yemen - Oil Production and Consumption



# Změna klimatu „pouze“ jedna z výzev



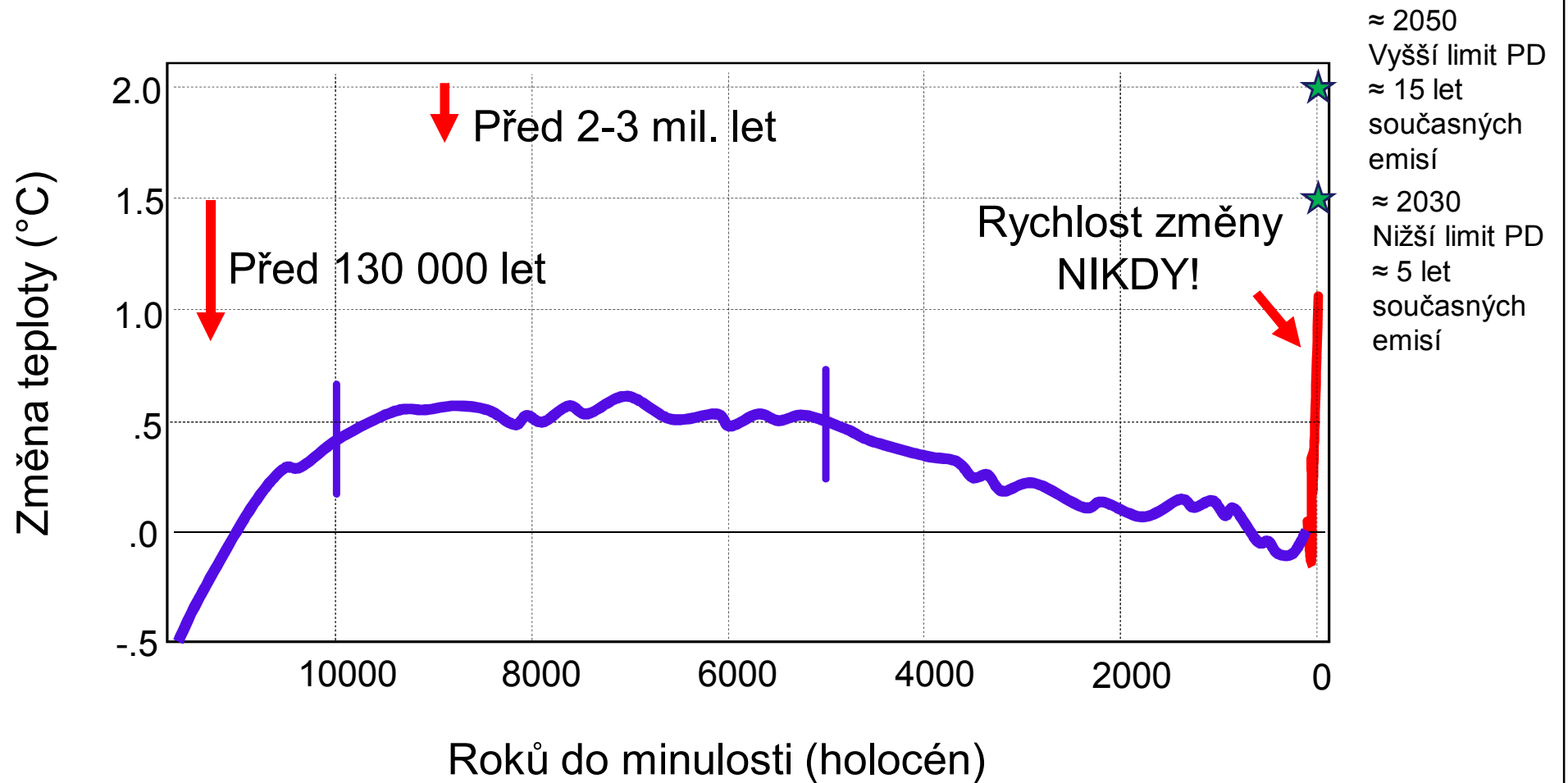
# 'We should be on the offensive' – James Hansen calls for wave of climate lawsuits

Veteran climate scientist says litigation campaign against government and fossil fuels companies is essential alongside political mobilisation in fighting 'growing, mortal threat' of global warming



 James Hansen in Bonn: he and his fellow Nasa researchers first raised the alarm about global warming in the 1980s. Photograph: Friedemann Vogel/EPA

- Kde jsme dnes?



- Kde budeme (pokud se nic **zásadně** nezmění)?

PERSPECTIVE

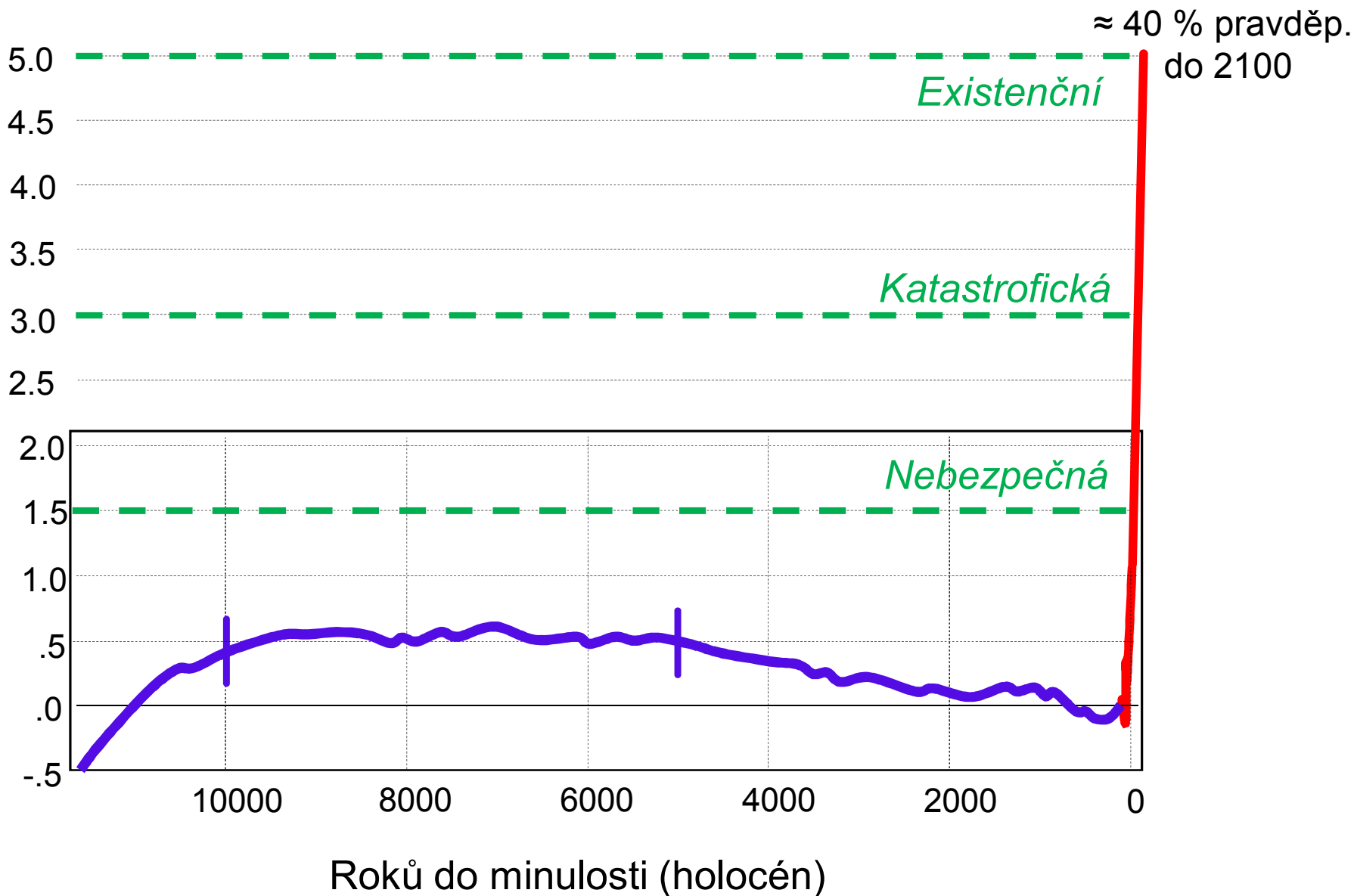
Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes

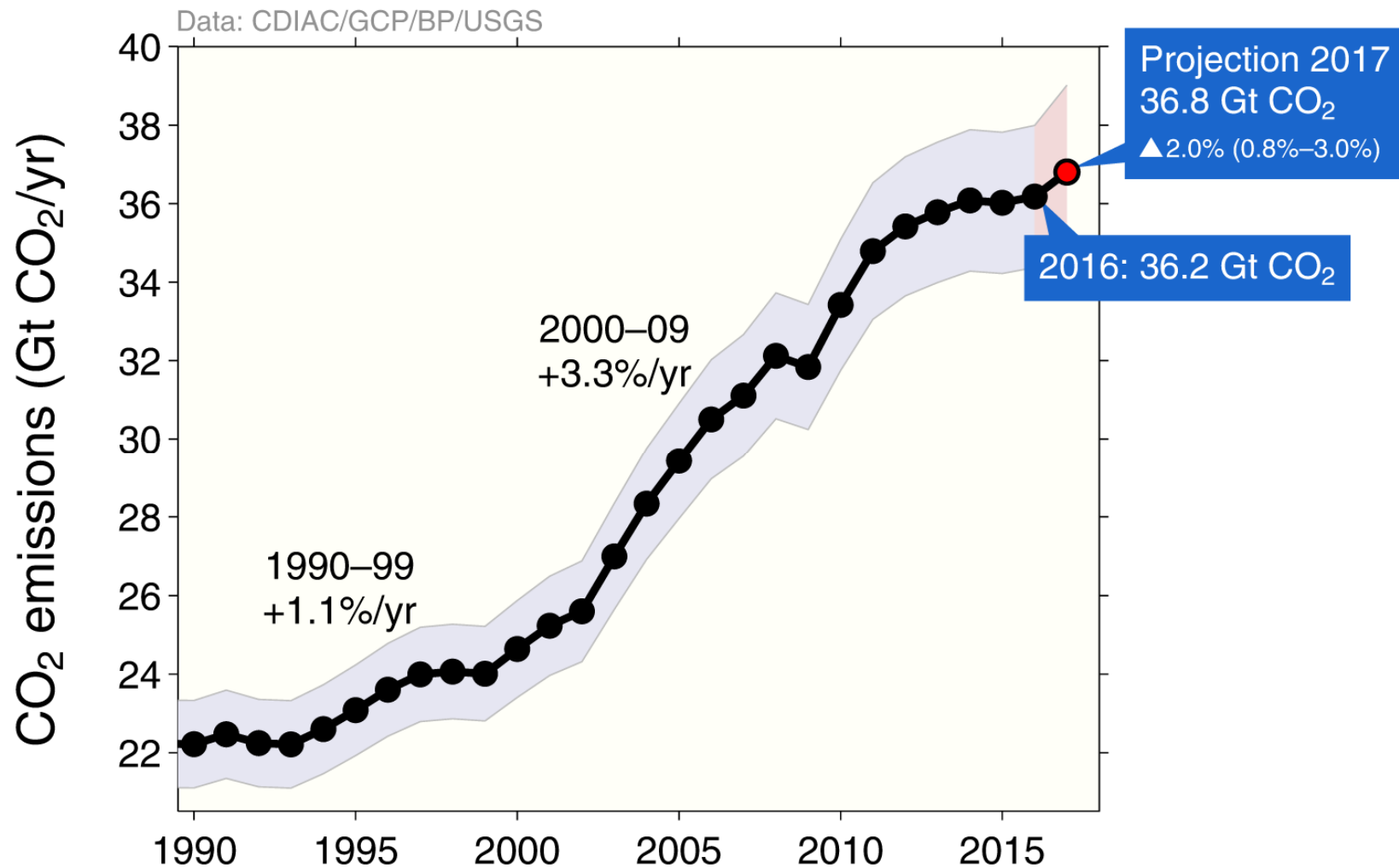
Yangyang Xu<sup>1</sup> and Veerabhadran Ramanathan<sup>1</sup>

Edited by Susan Solomon, Massachusetts Institute of Technology, Cambridge, MA, and approved August 11, 2017 (received for review ...)

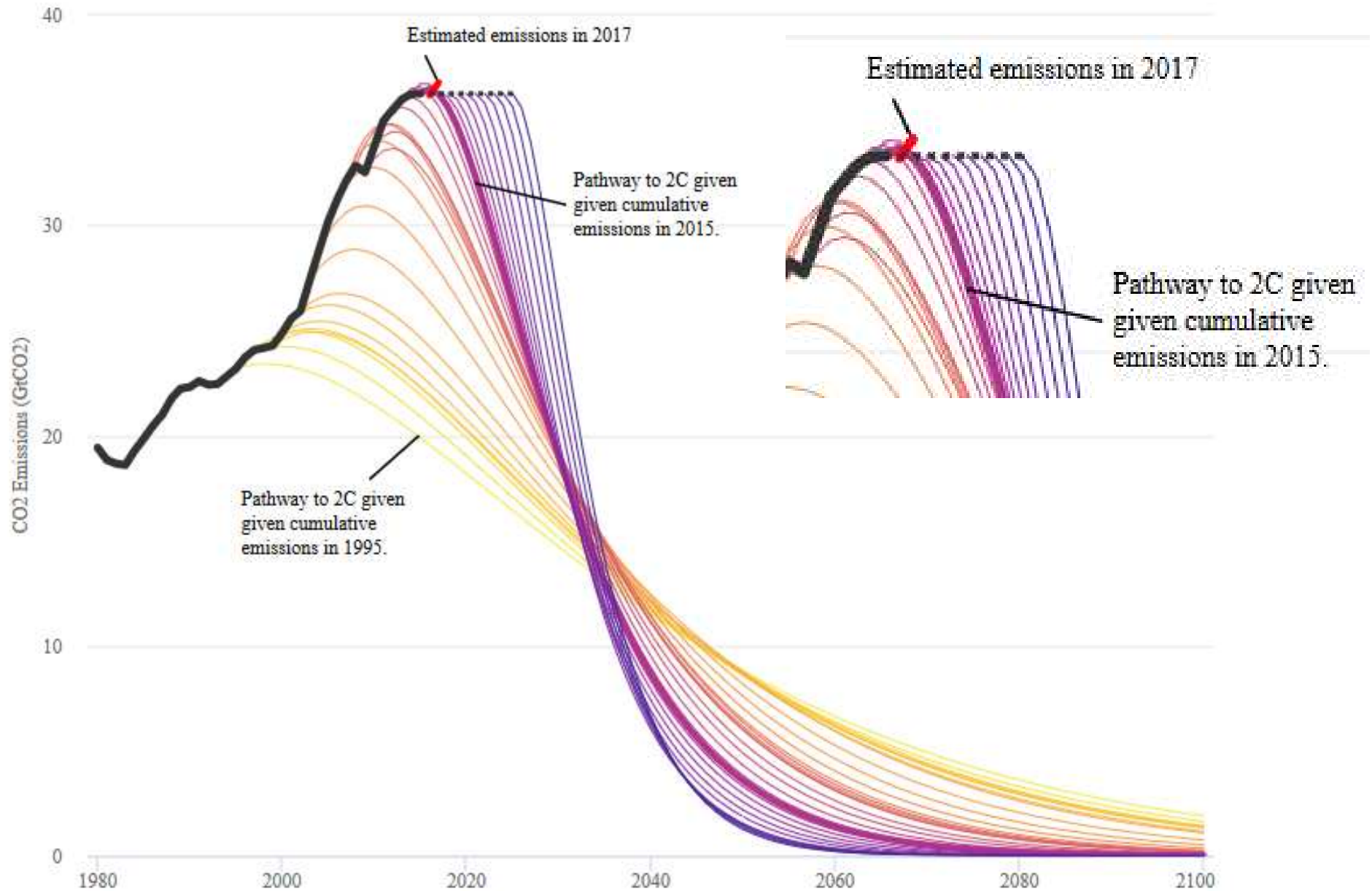
PNAS

Změna teploty ( °C)





To limit warming to 2C, global emissions must fall more quickly if they peak later

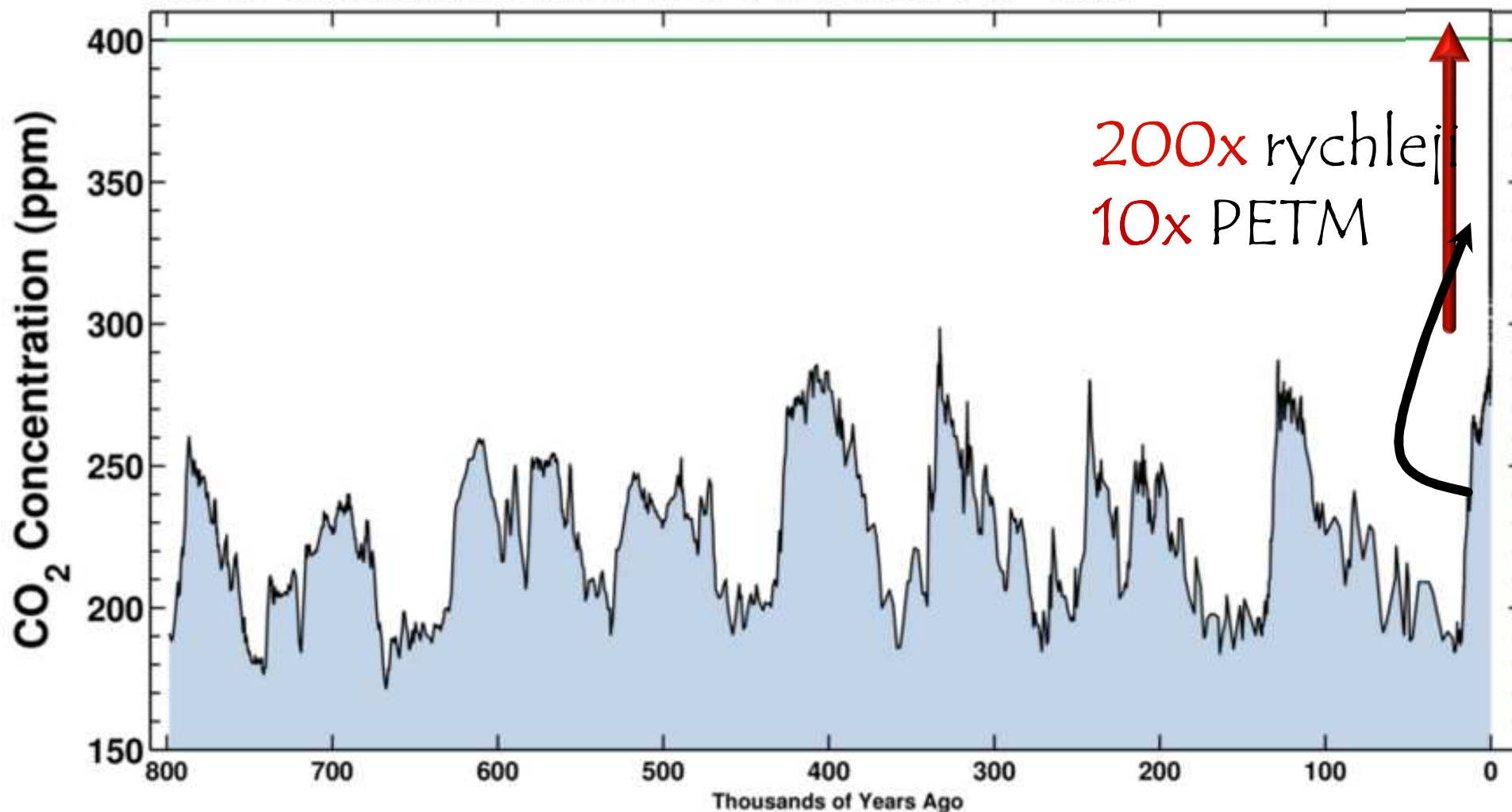


Koncentrace  $\text{CO}_2$  je na úrovni jako před 15-20 miliony let

Latest  $\text{CO}_2$  reading  
August 01, 2016

403.31 ppm

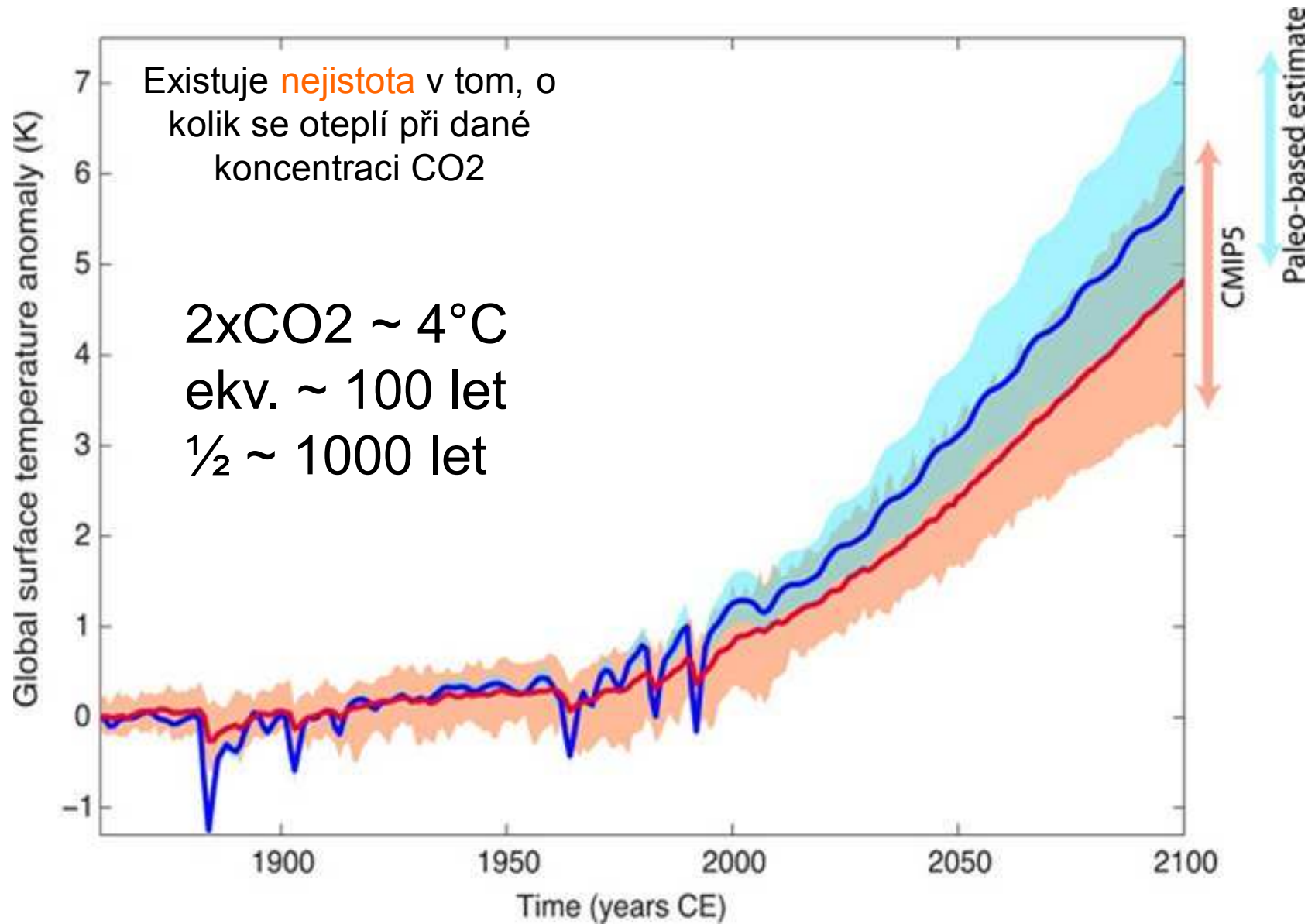
Carbon dioxide concentration at Mauna Loa Observatory





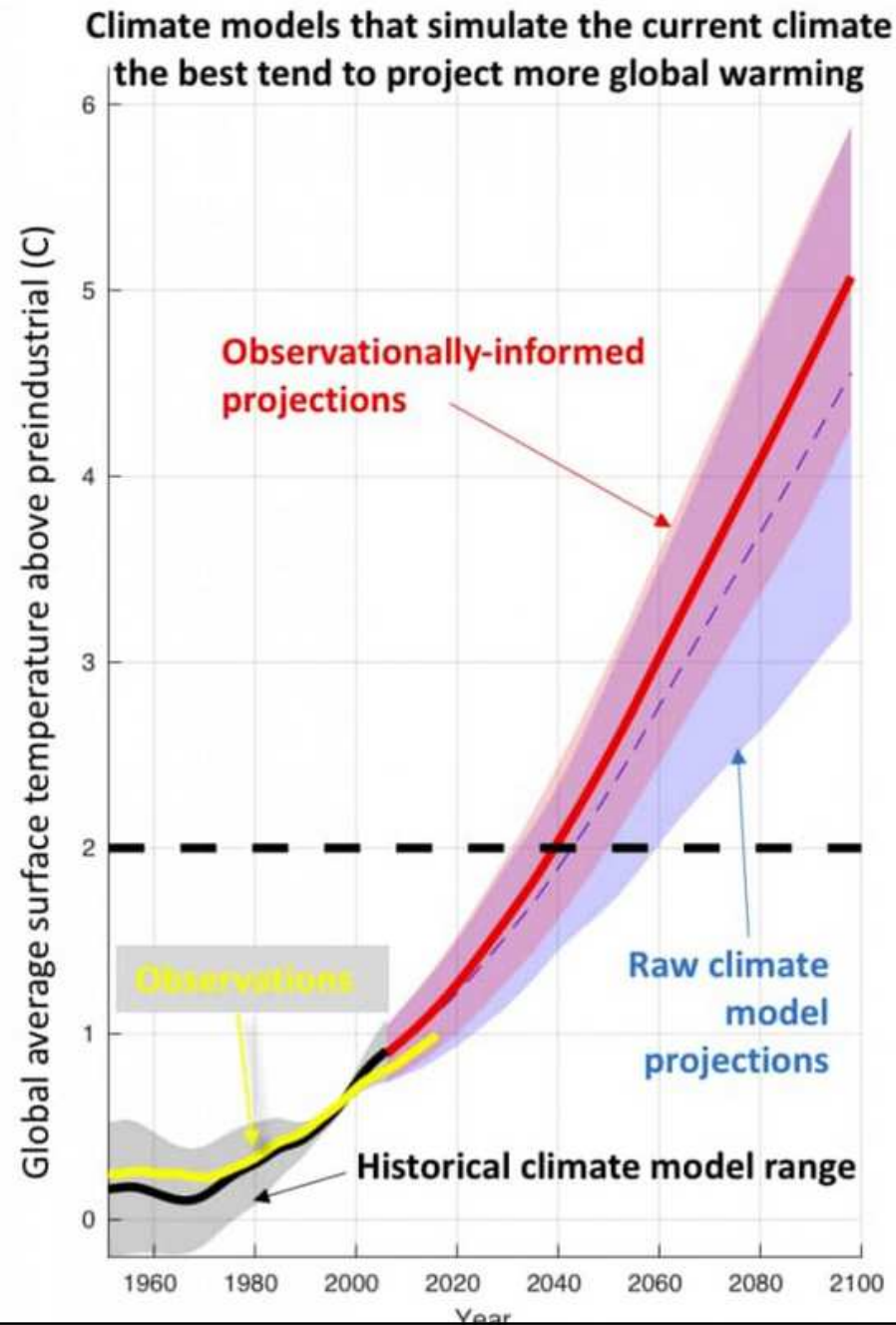
# Výhled růstu globální teploty do konce století #1

*paleo-klima*



# *Výhled růstu globální teploty do konce století #2*

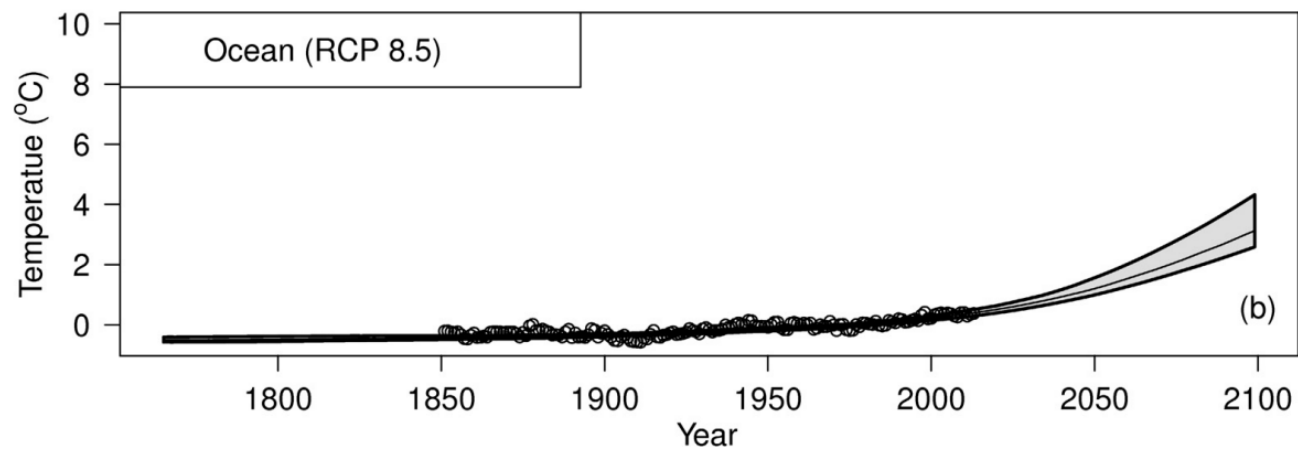
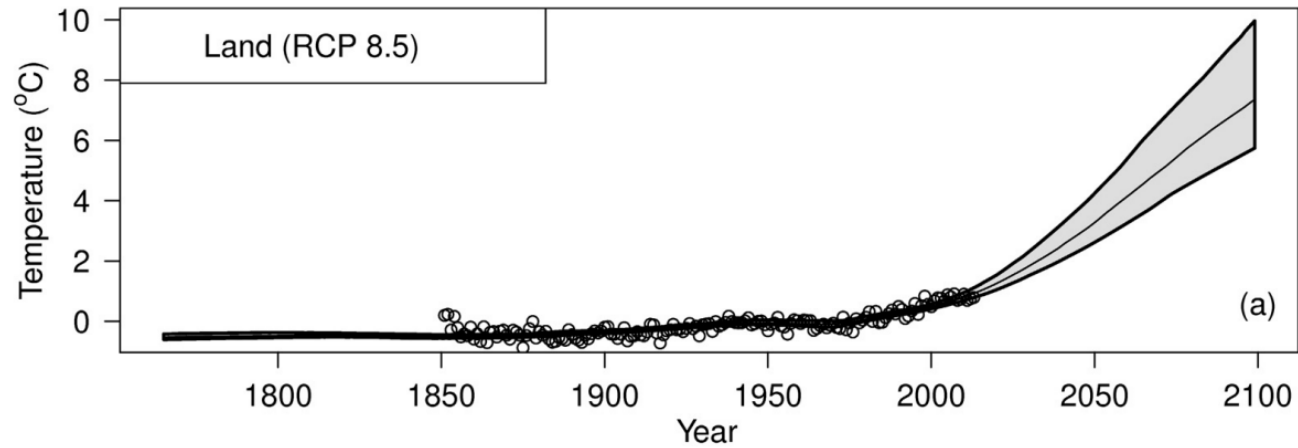
## *klimatické modely*



2xCO<sub>2</sub> ~ 3,7 °C

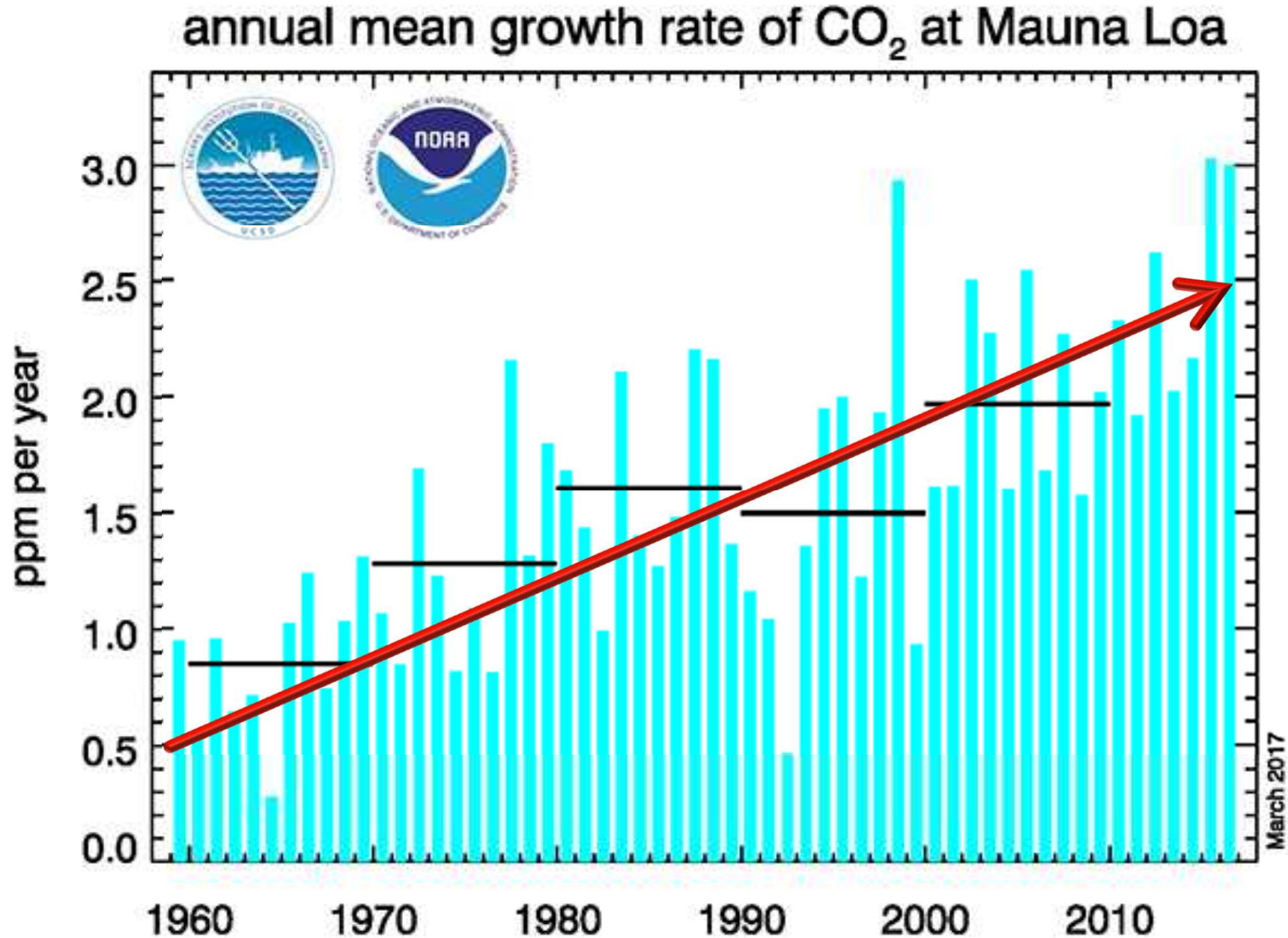
# *Výhled růstu globální teploty do konce století #3*

*merená teplota*

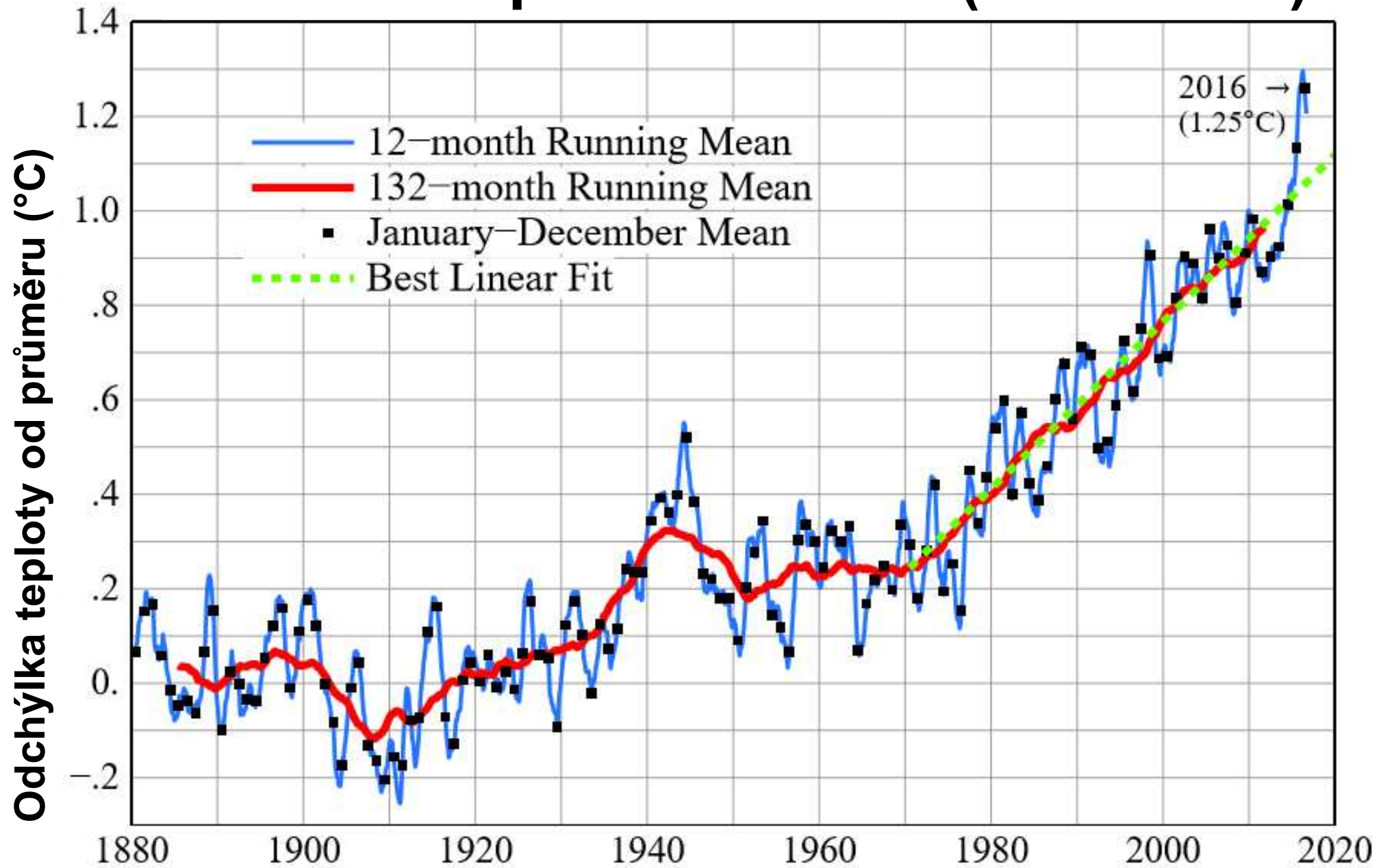


**2xCO<sub>2</sub> ~ 4 °C**

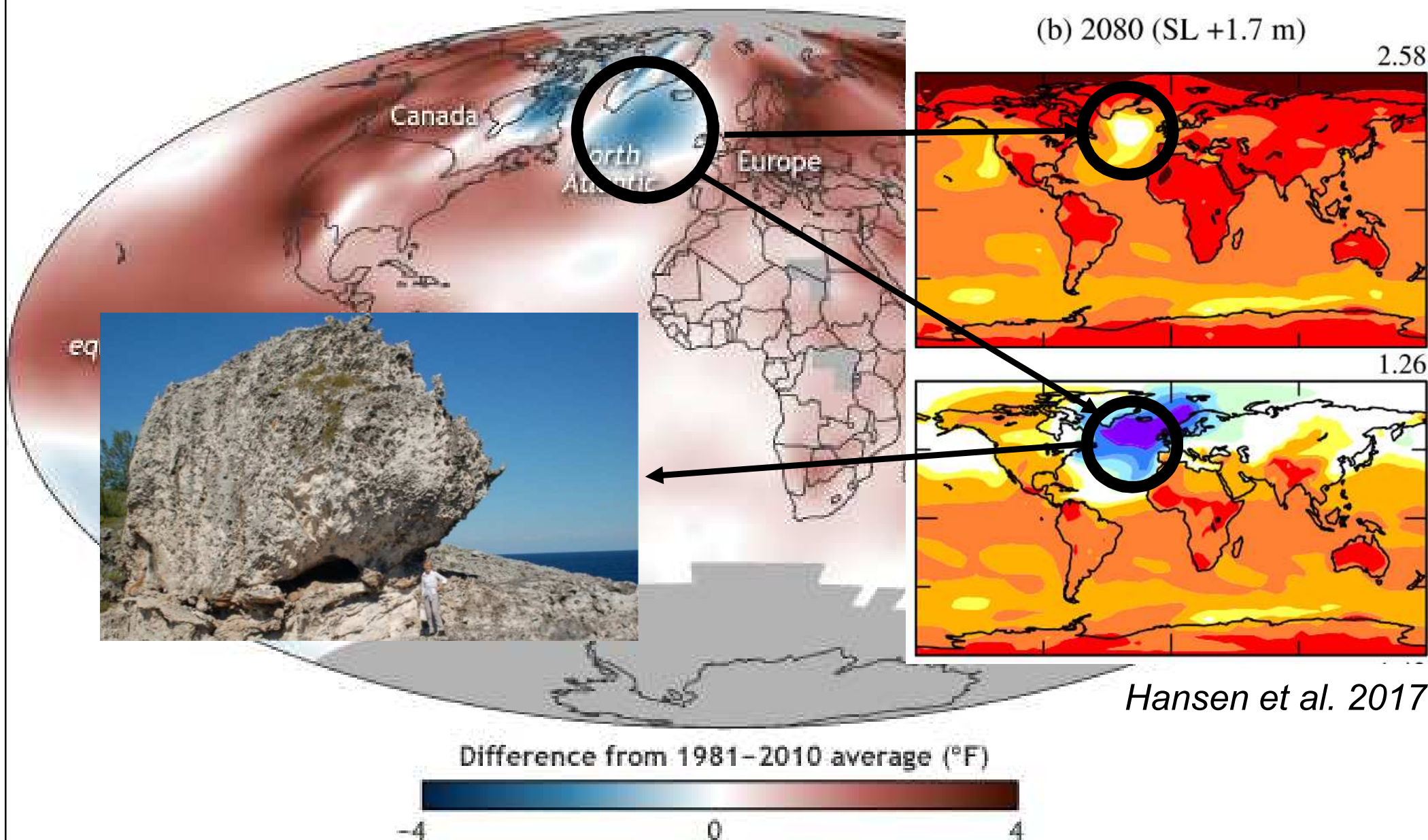
*Růst koncentrace  $\text{CO}_2$  v posledních 2 letech rekordní*



# Globální teplota vzduchu (1880-2017)

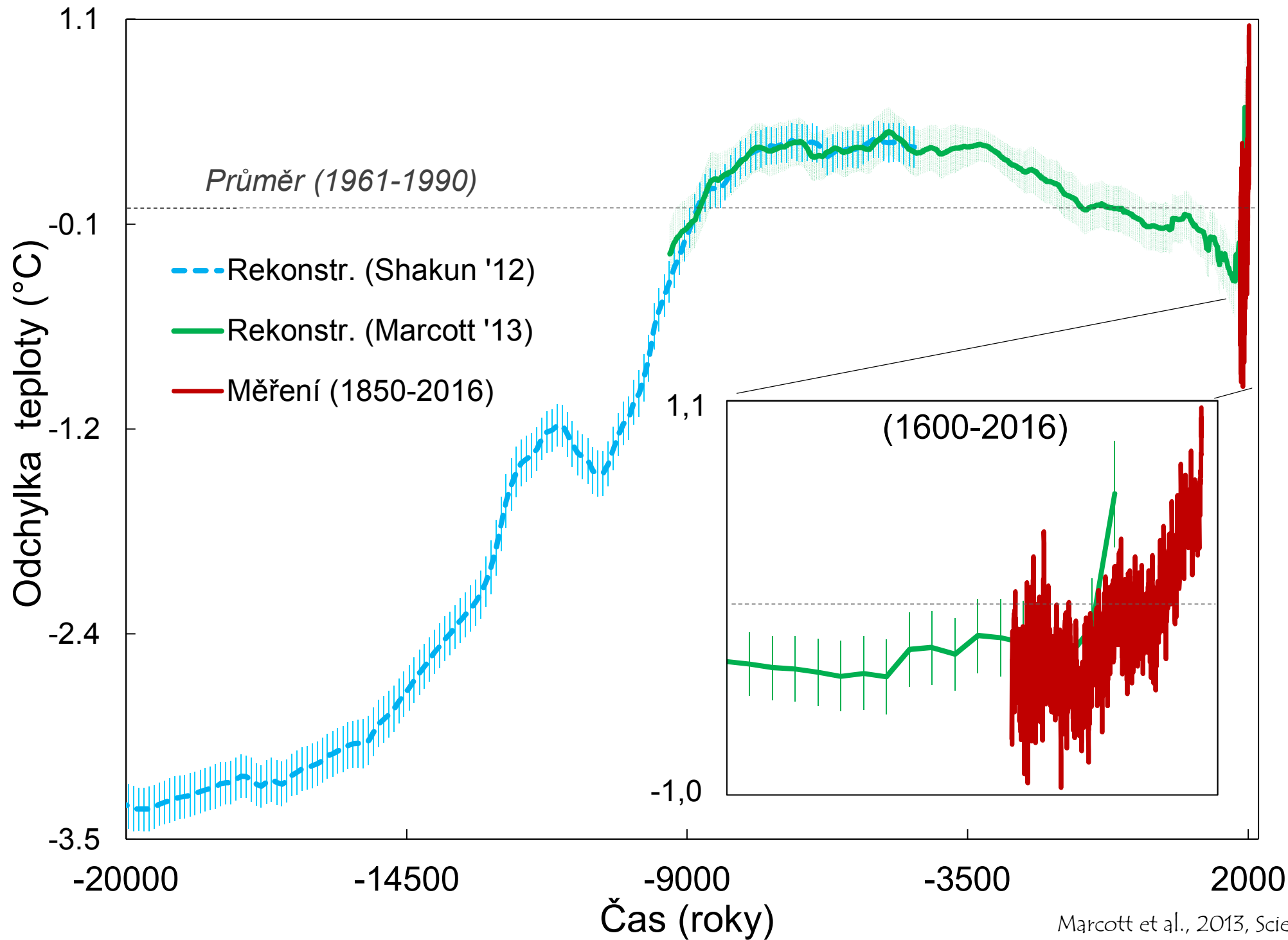


# Globální teplota v roce 2015



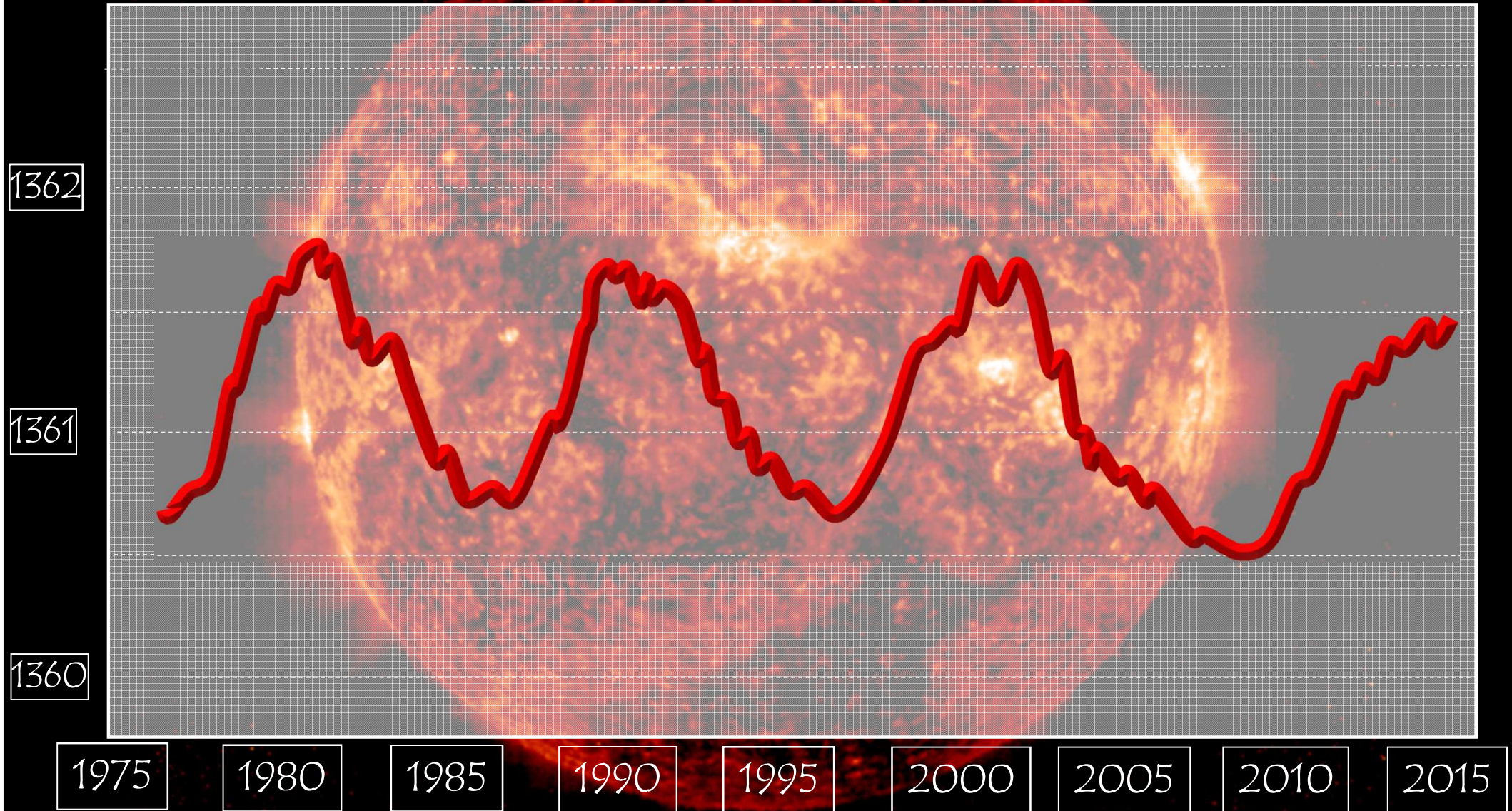
Hansen et al. 2017

# *Globální teplota za posledních 22 000 let*



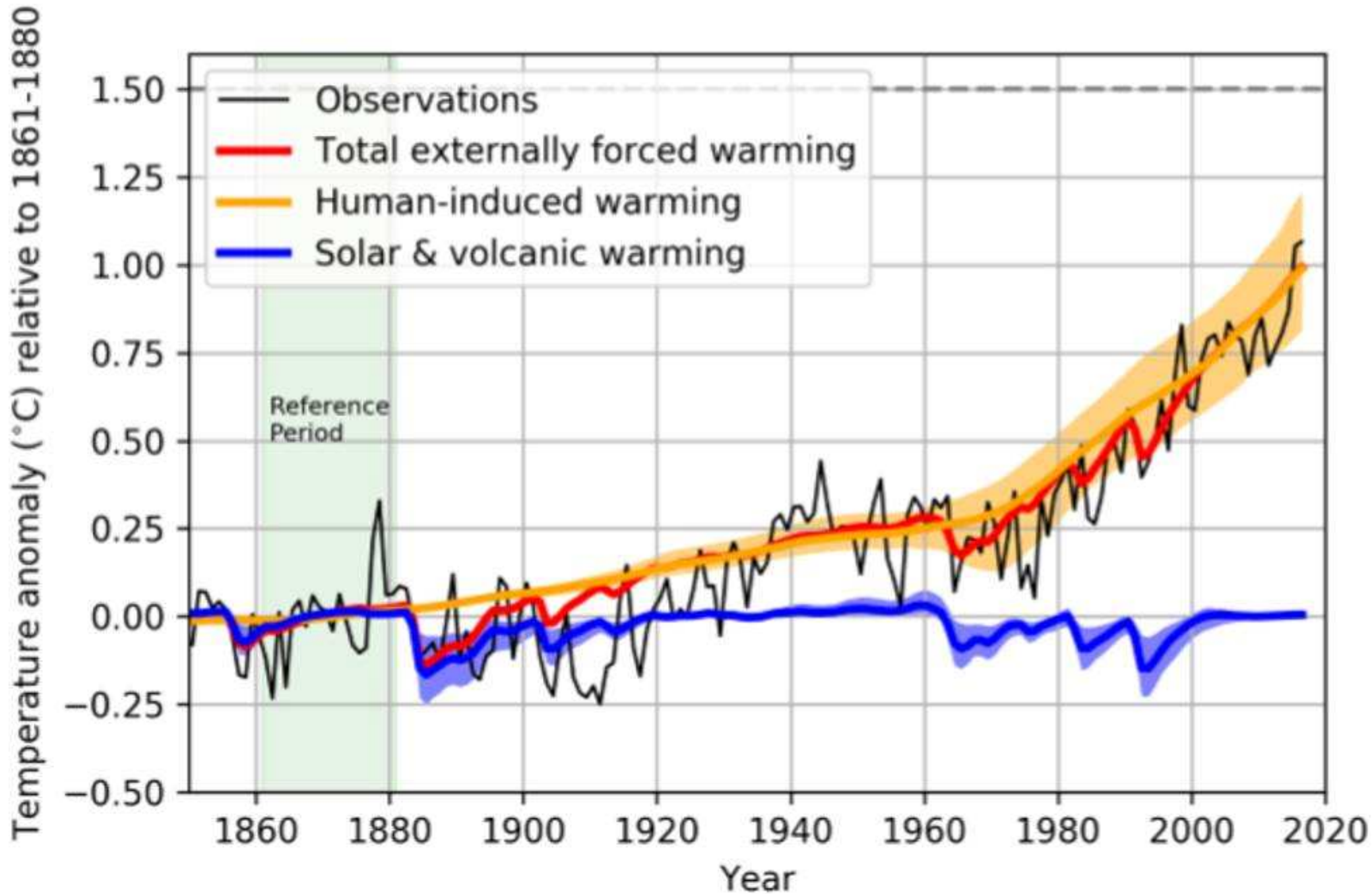
# *Stojí za globálním oteplováním Slunce?*

Celková sluneční ozáření ( $\text{W}/\text{m}^2$ )





*Kolik % oteplování má na svědomí člověk? Přibližně 100!*



# *Důsledky změny klimatu*



# *Korálové útesy*

0,1 % plochy = 25 % druhu



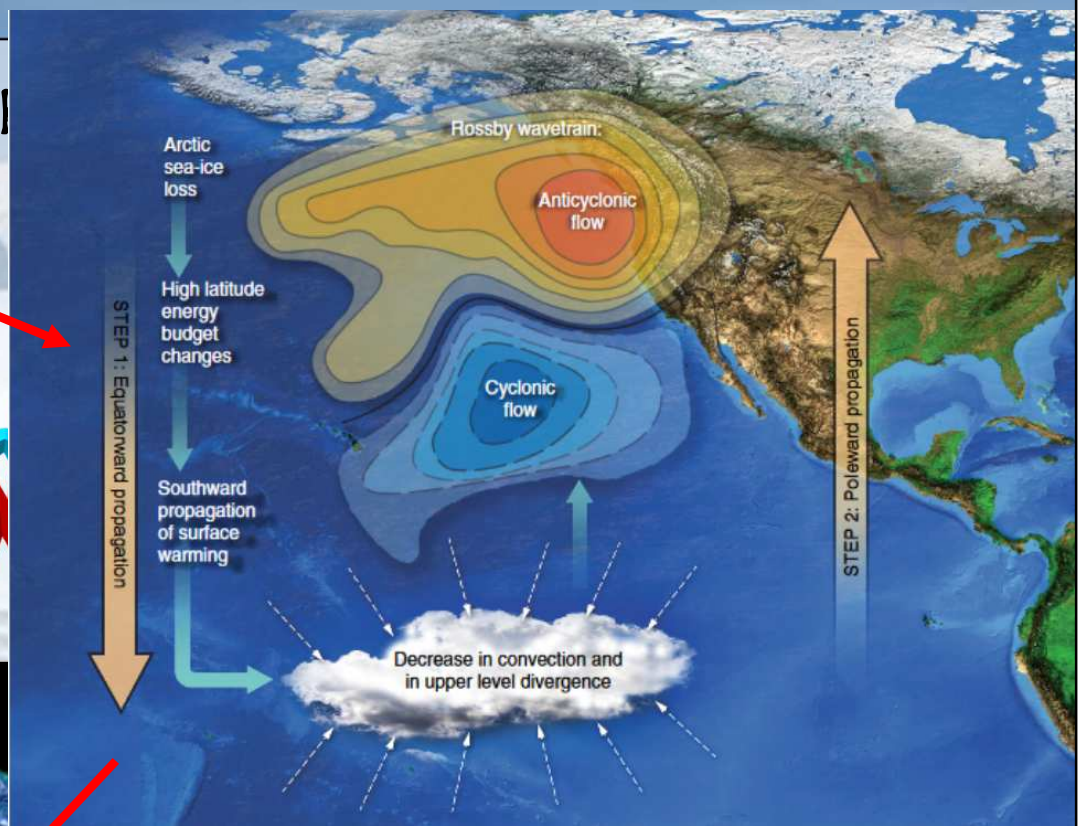
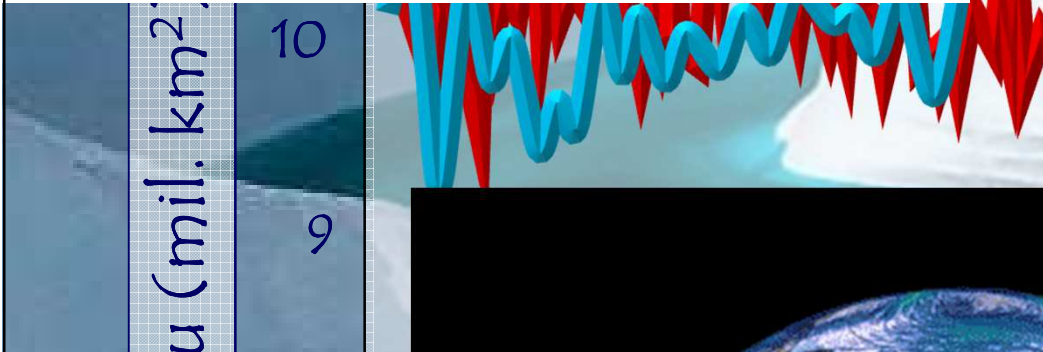


ARTICLE

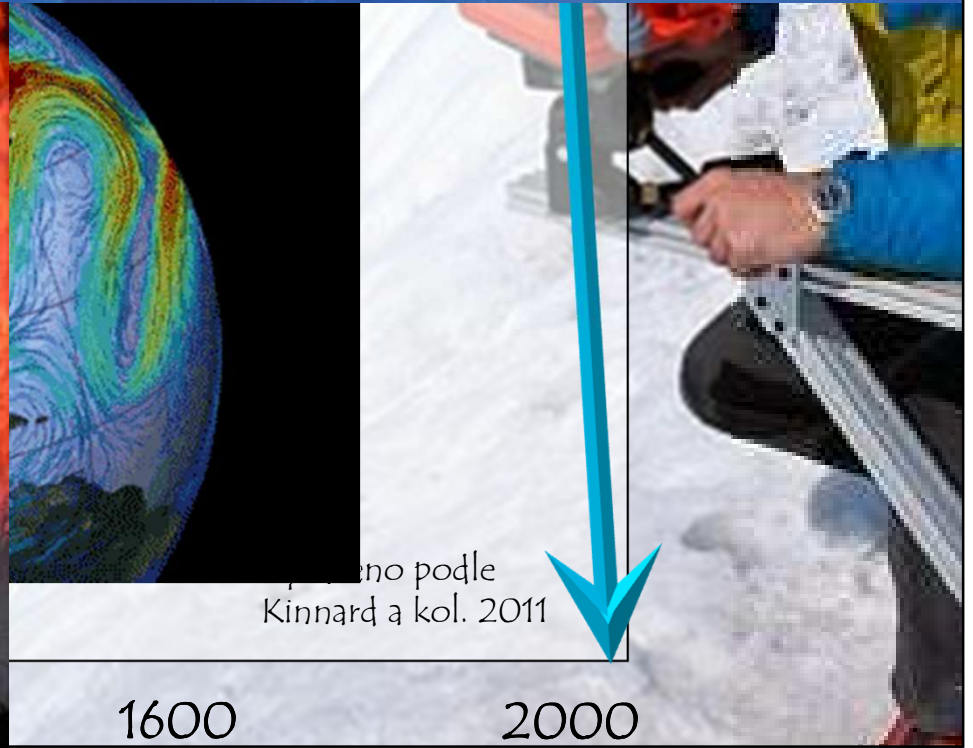
DOI: 10.1038/s41467-017-01907-4 OPEN

# Future loss of Arctic sea-ice cover could drive a substantial decrease in California's rainfall

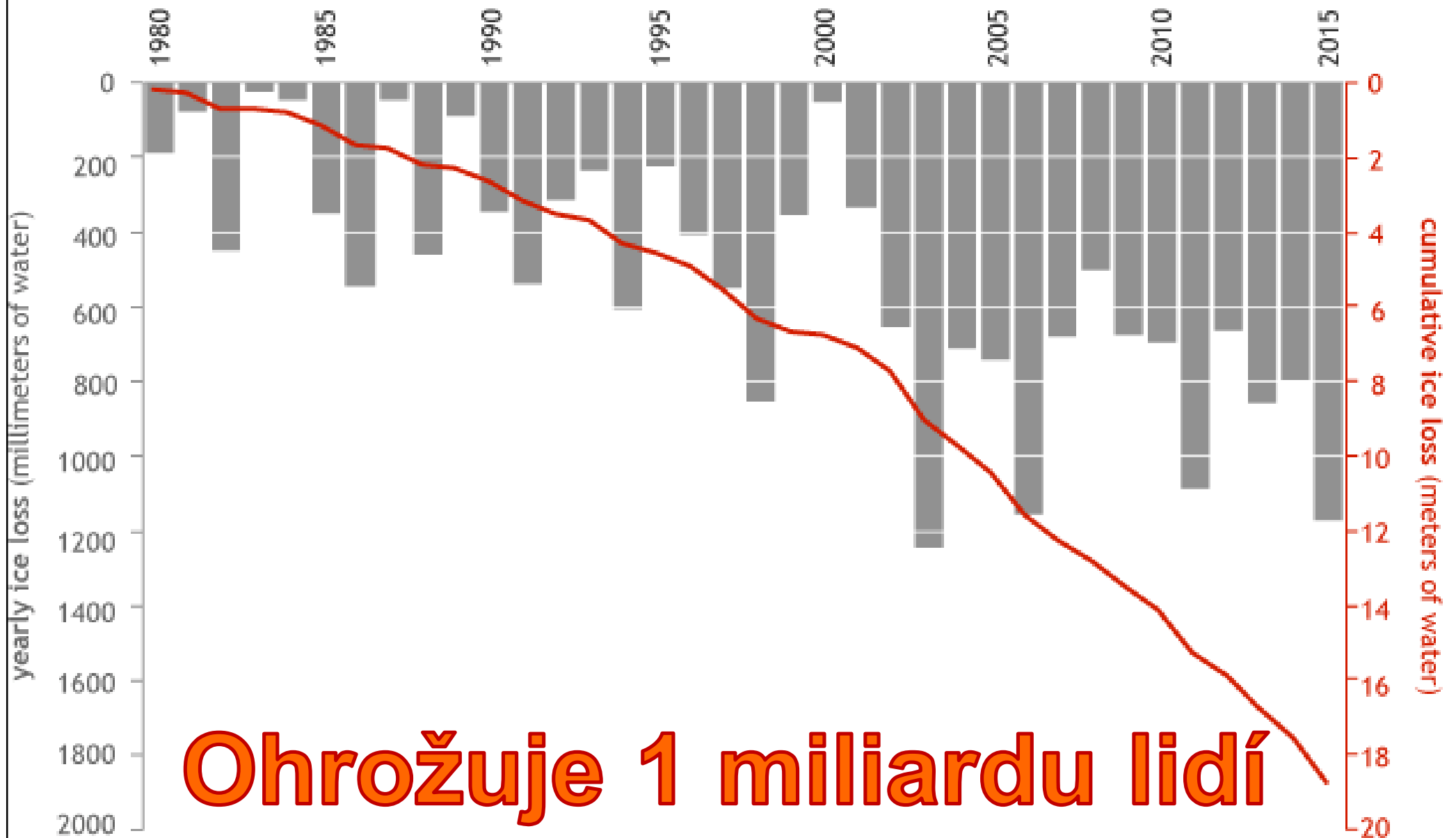
Ivana Cvijanovic<sup>1</sup>, Benjamin D. Santer<sup>1</sup>, Céline Bonfils<sup>1</sup>, Donald D. Lucas<sup>1</sup>, John C.H. Chiang<sup>2</sup> & Susan Zimmerman<sup>3</sup>



## 1. prosincový megapožár v historii (jižní) Kalifornie



# *Tání pevninských ledovců zrychluje*



**Ohrožuje 1 miliardu lidí**

2016

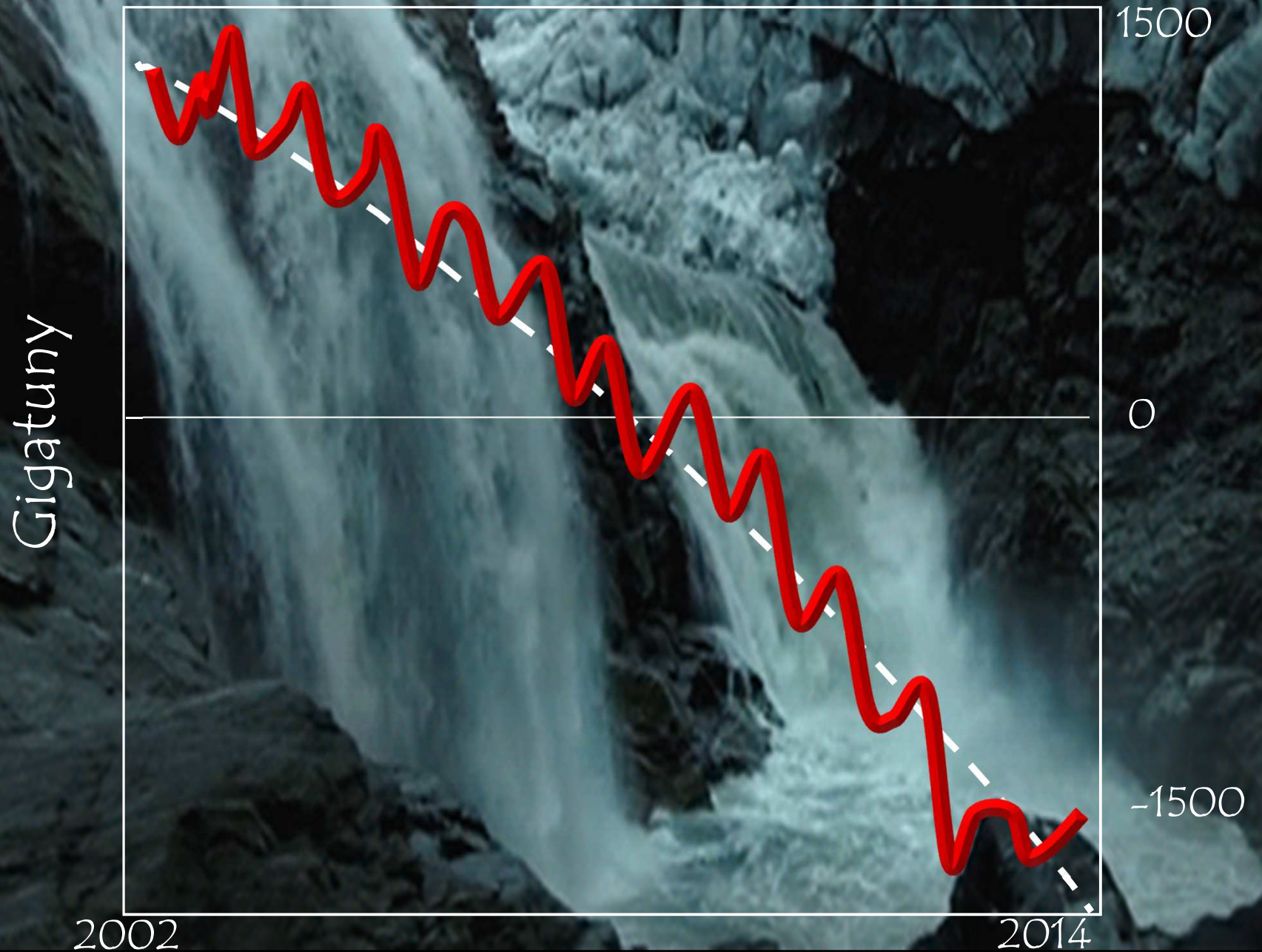


2014

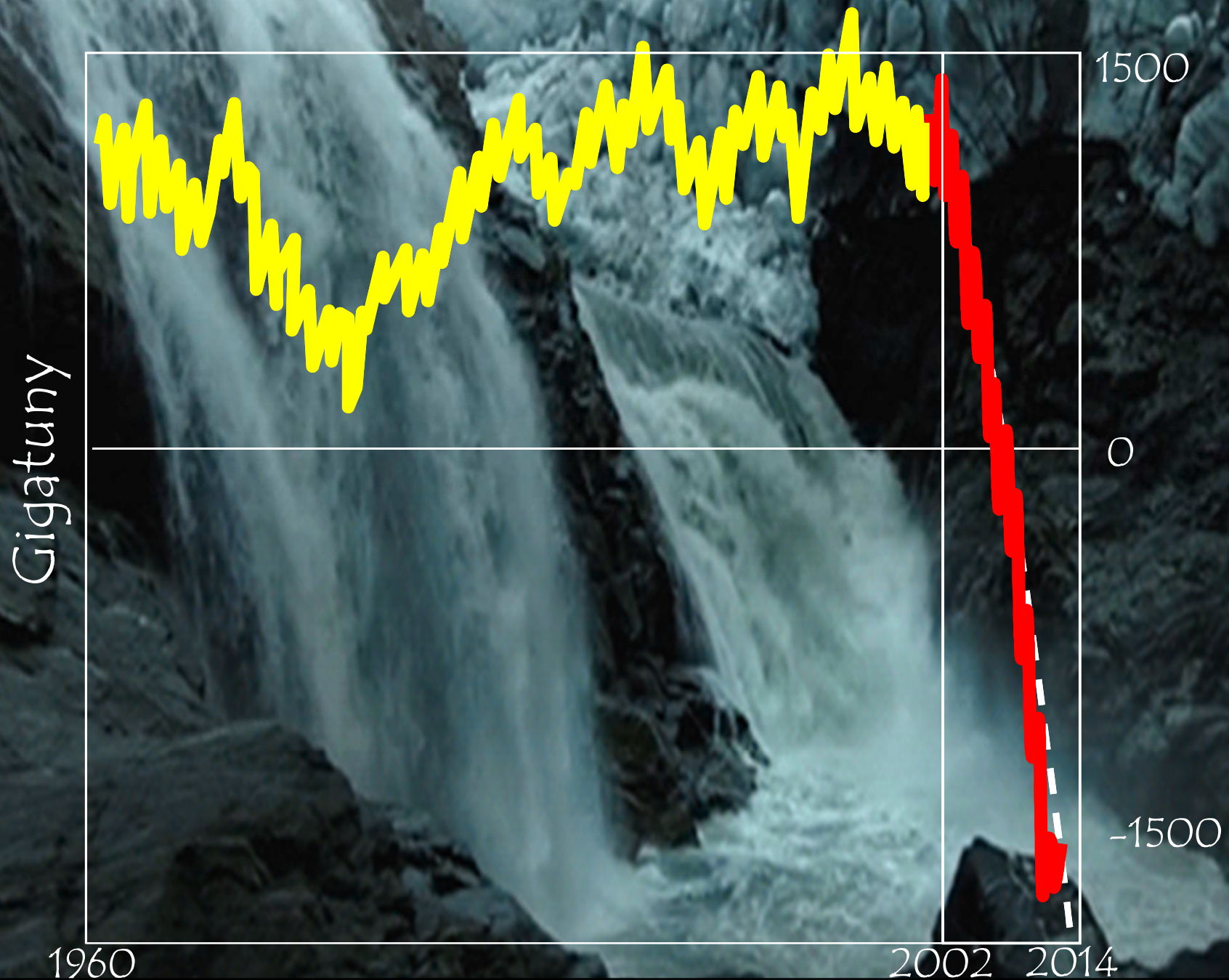




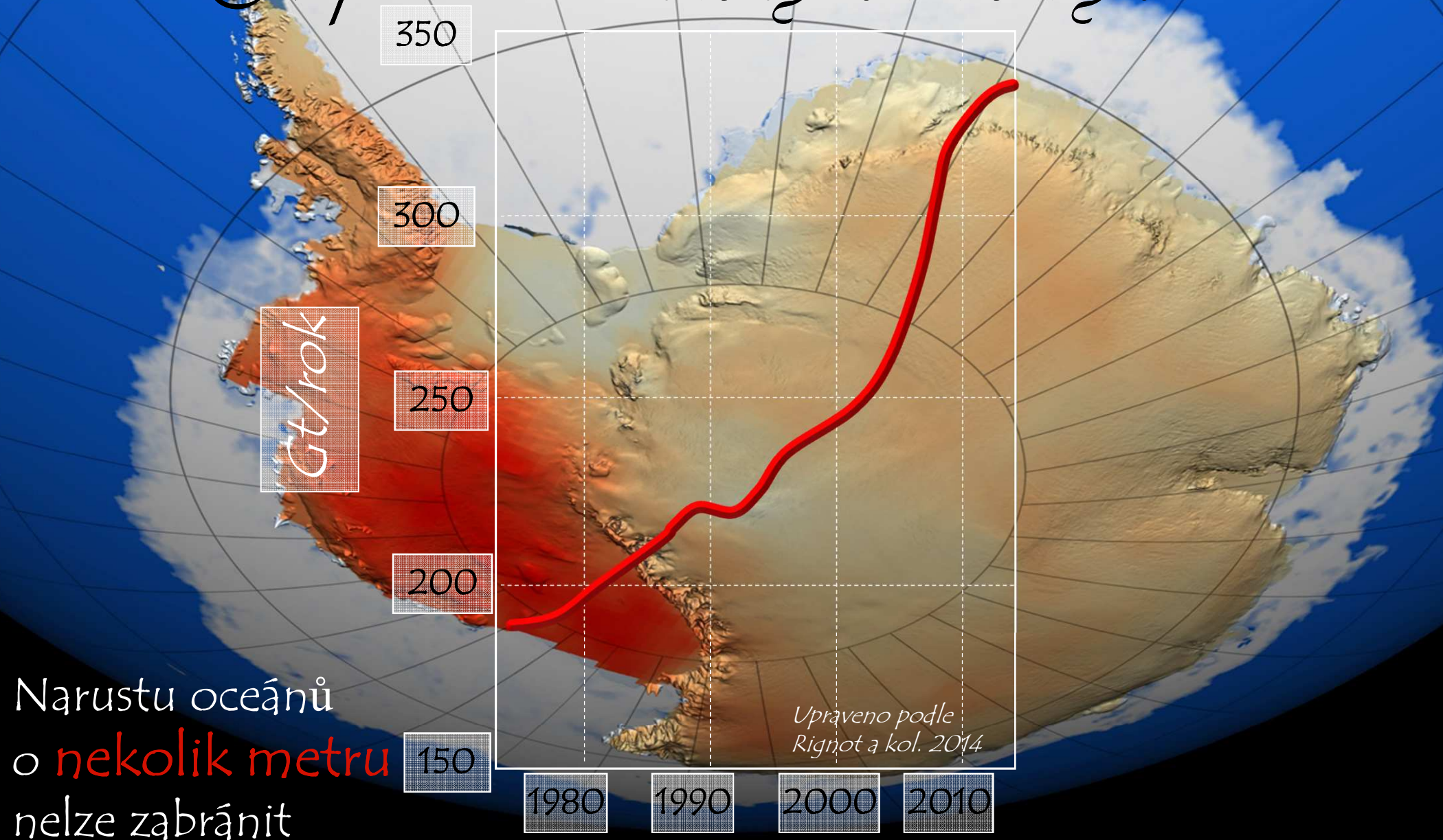
*Táni Gronska se zrychluje*



*Táni Grónska se zrychluje*



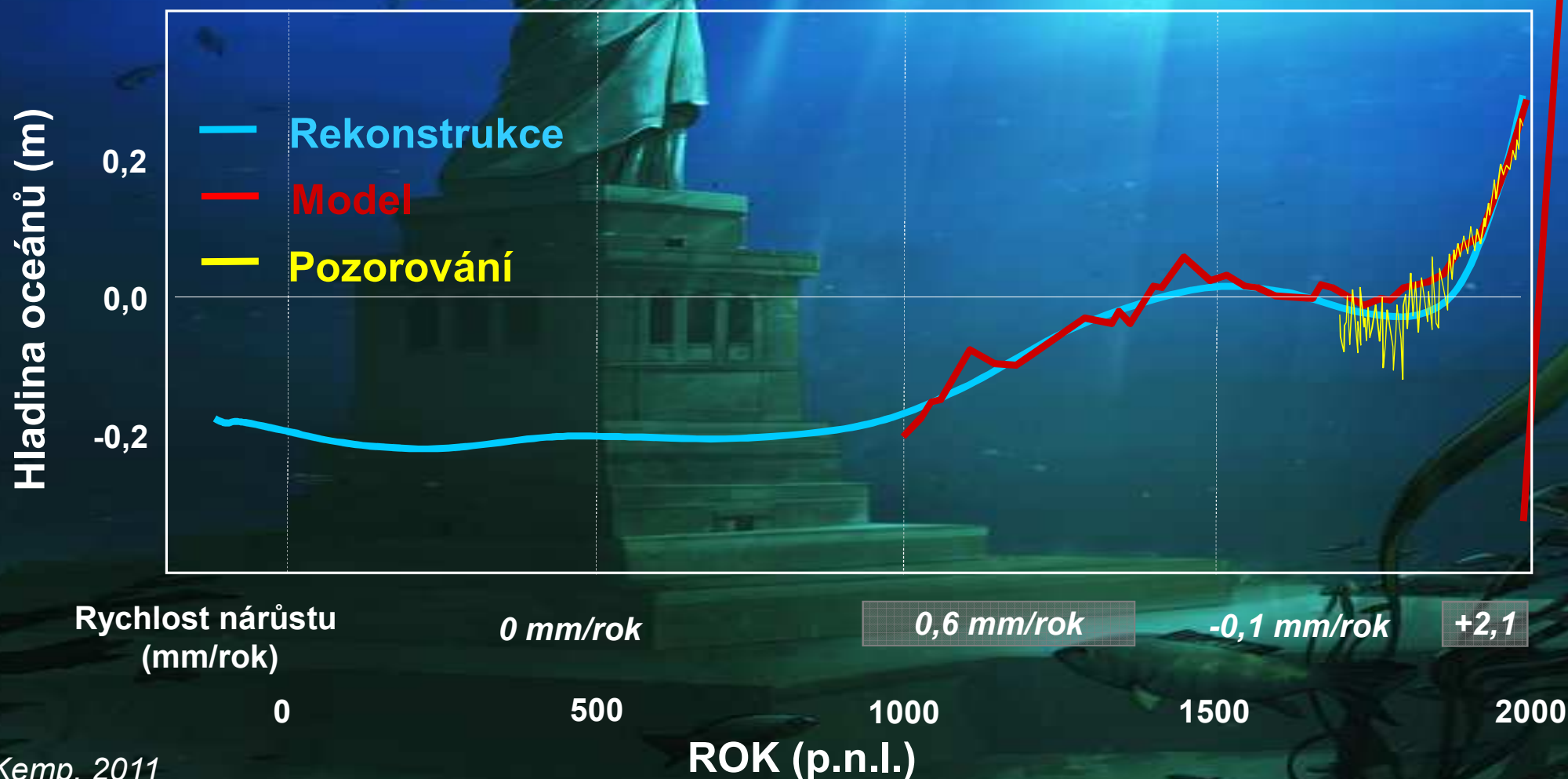
# Západo-antarktický ledovcový štít



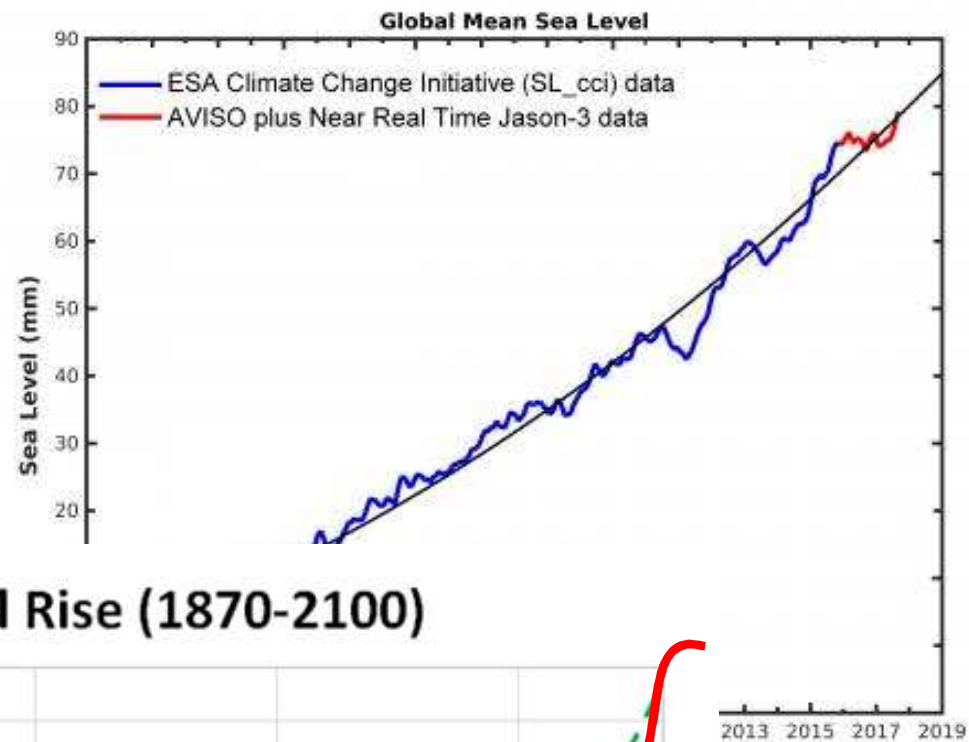
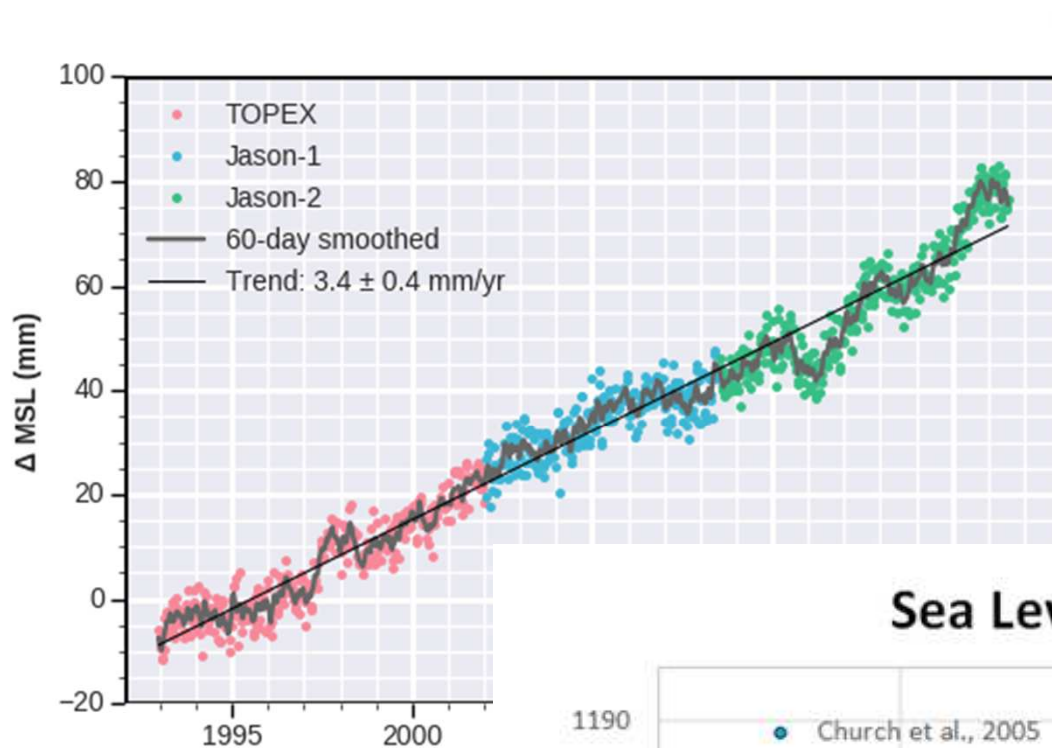
# Nárůst hladin oceánů se zrychluje

Současná rychlost nárůstu je nejvyšší za posledních **6 tisíc let**  
(Lambeck a kol., 2014, PNAS)

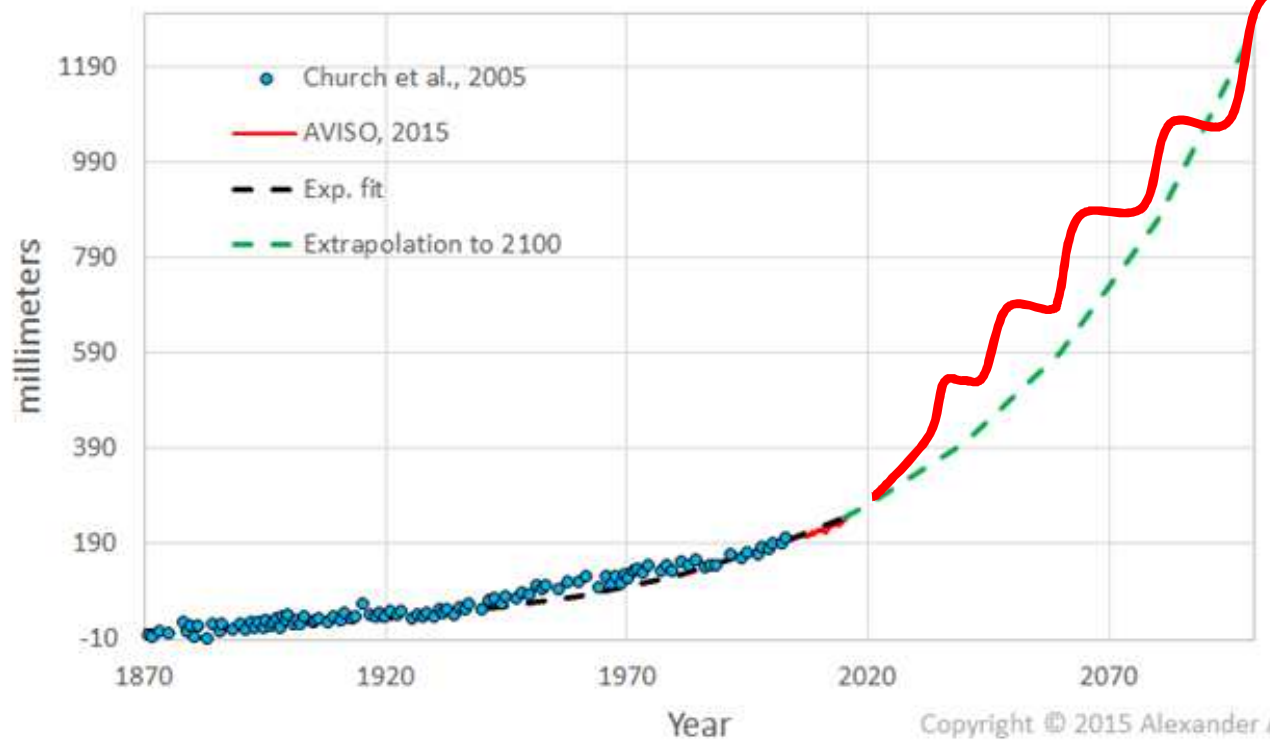
**+1.4 m**  
**do roku 2100**



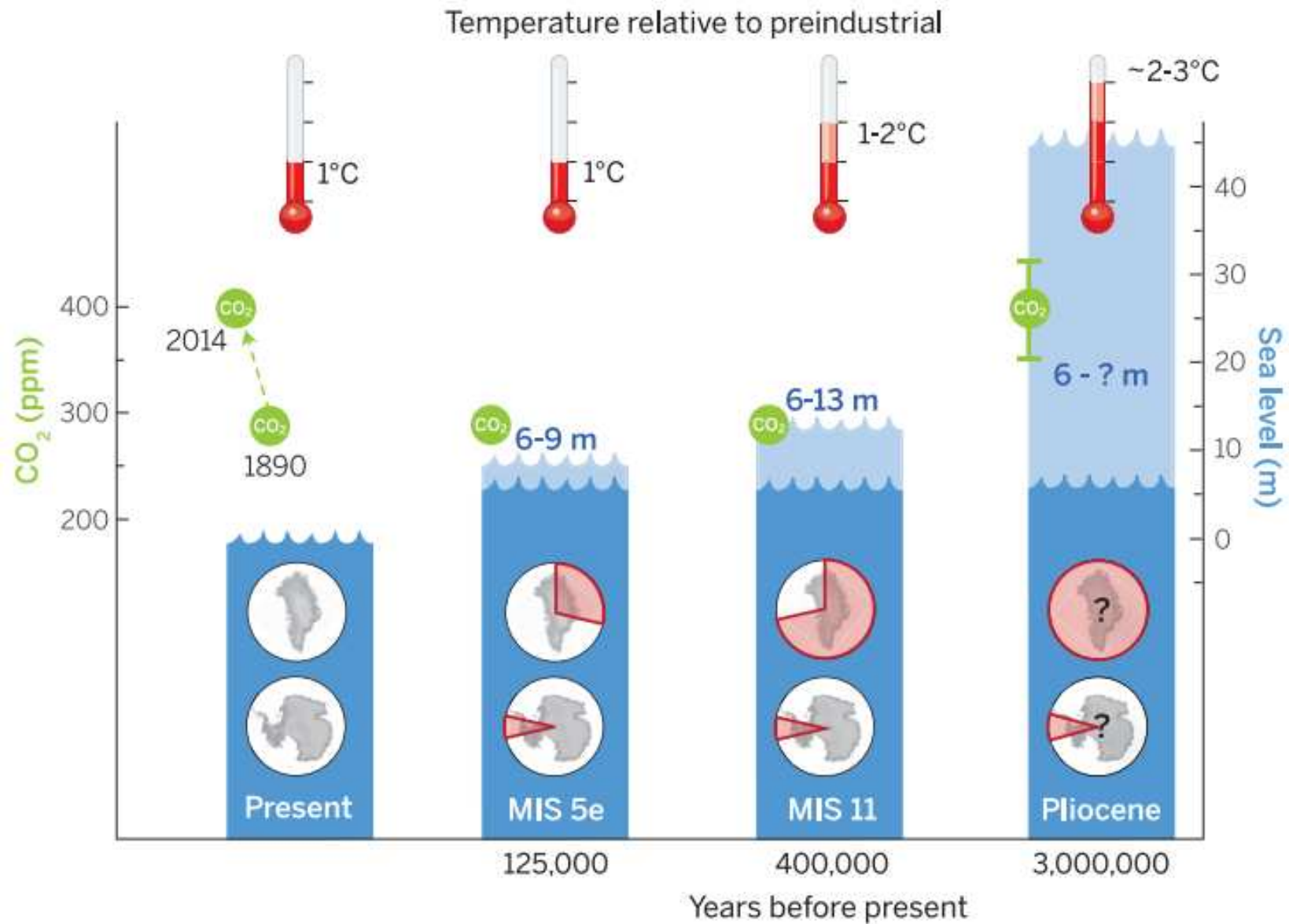
# Nárůst hladin oceánů se zrychluje



## Sea Level Rise (1870-2100)



# Nárůst hladin oceánů v minulosti



# Růst výskytu sucha

34

## Index PDSI

Zem „s lidma“

Zem „bez lidi“

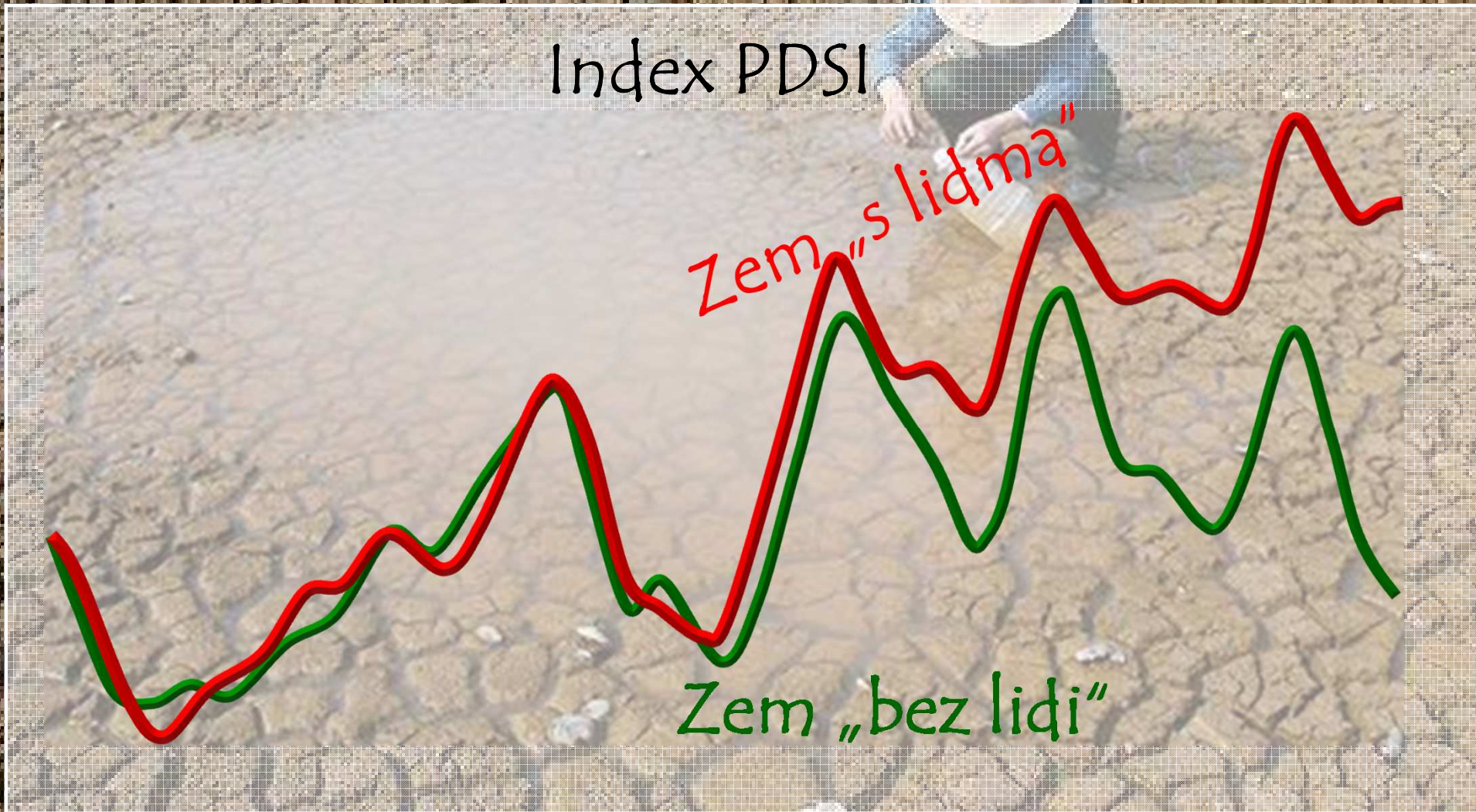
Kontinenty pod vlivem sucha (%)

14

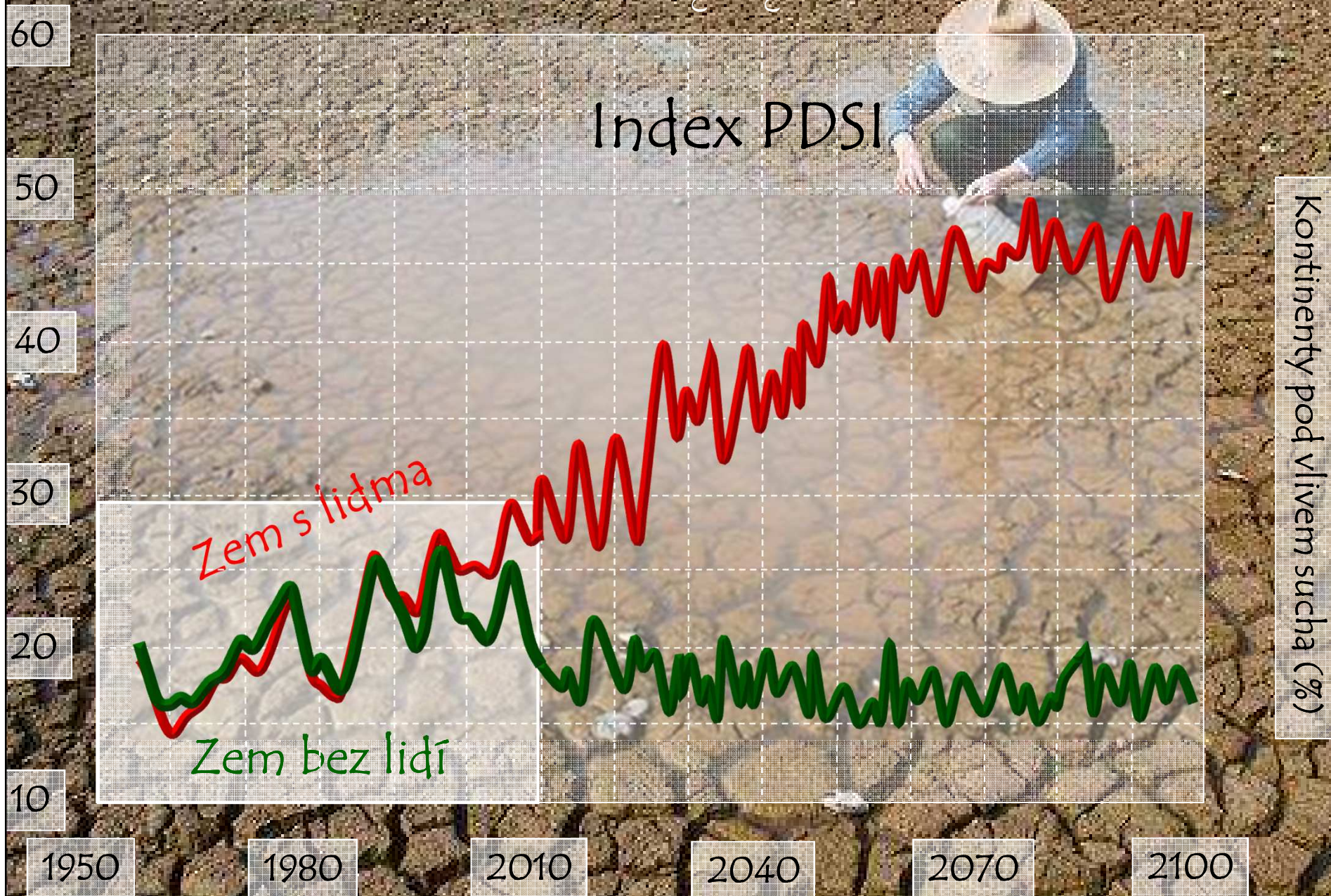
1950

Rok

2010



# Růst výskytu sucha

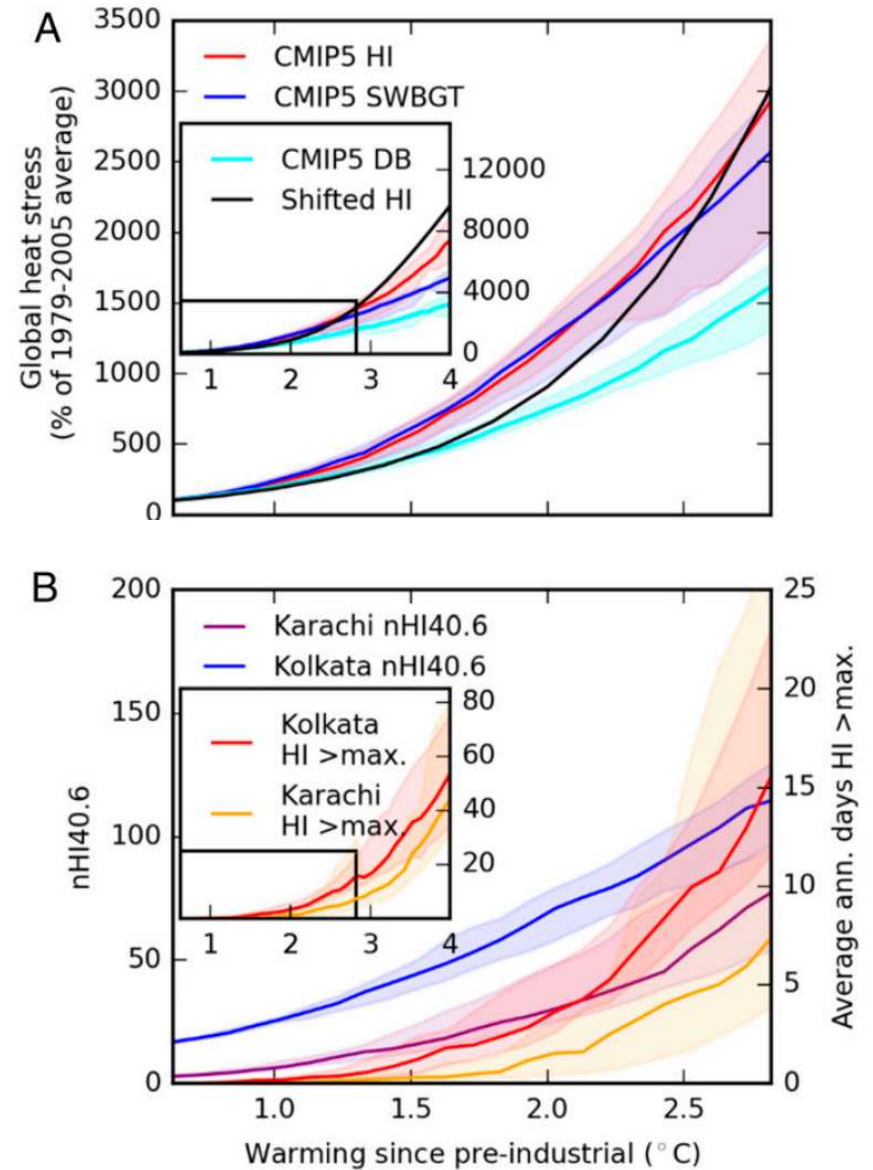




# Budoucnost sucha

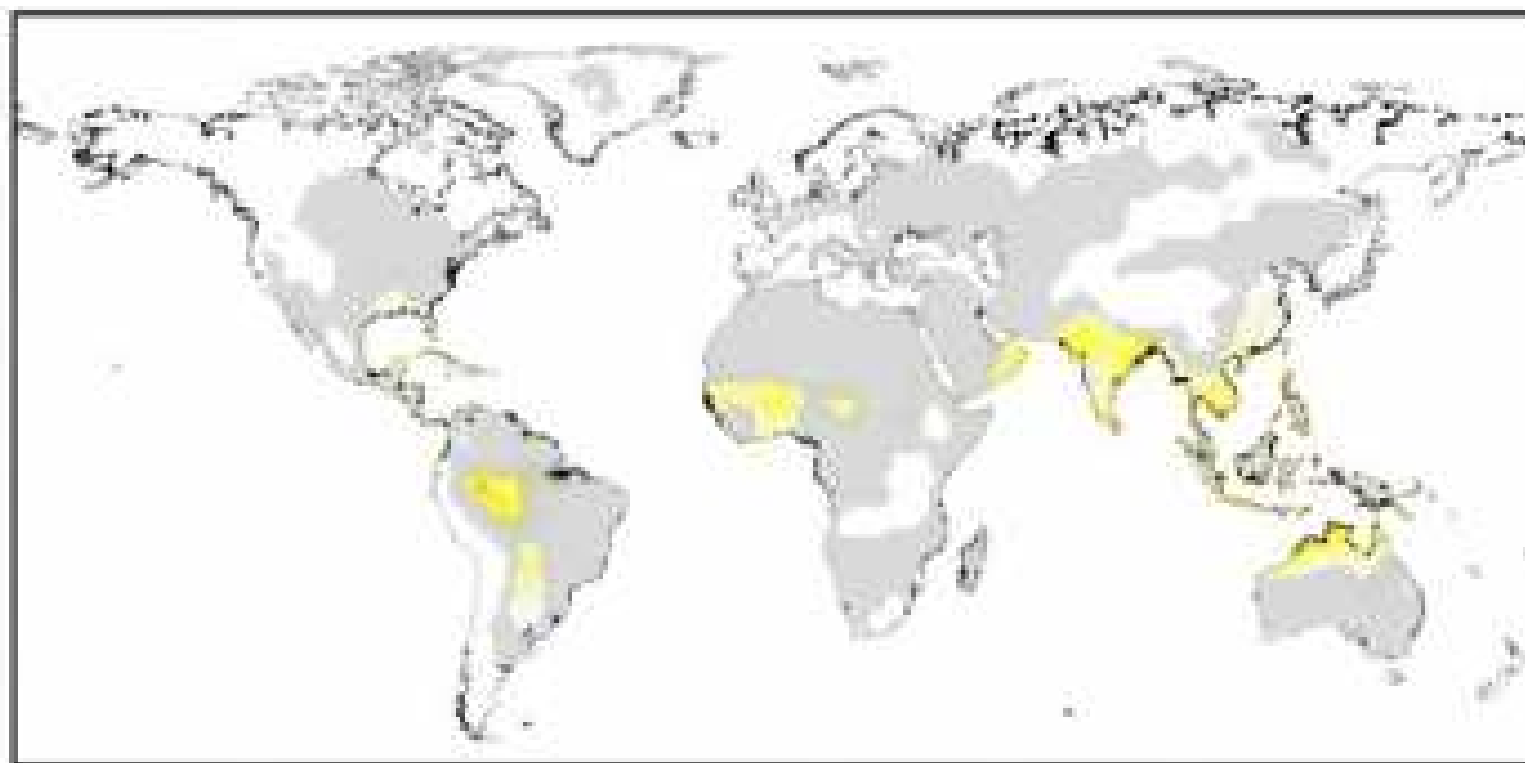


# Why veder



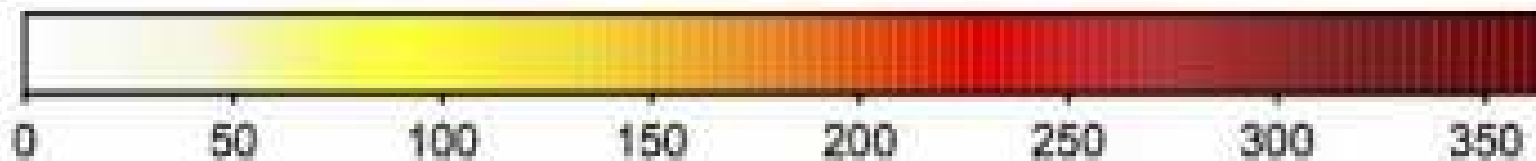
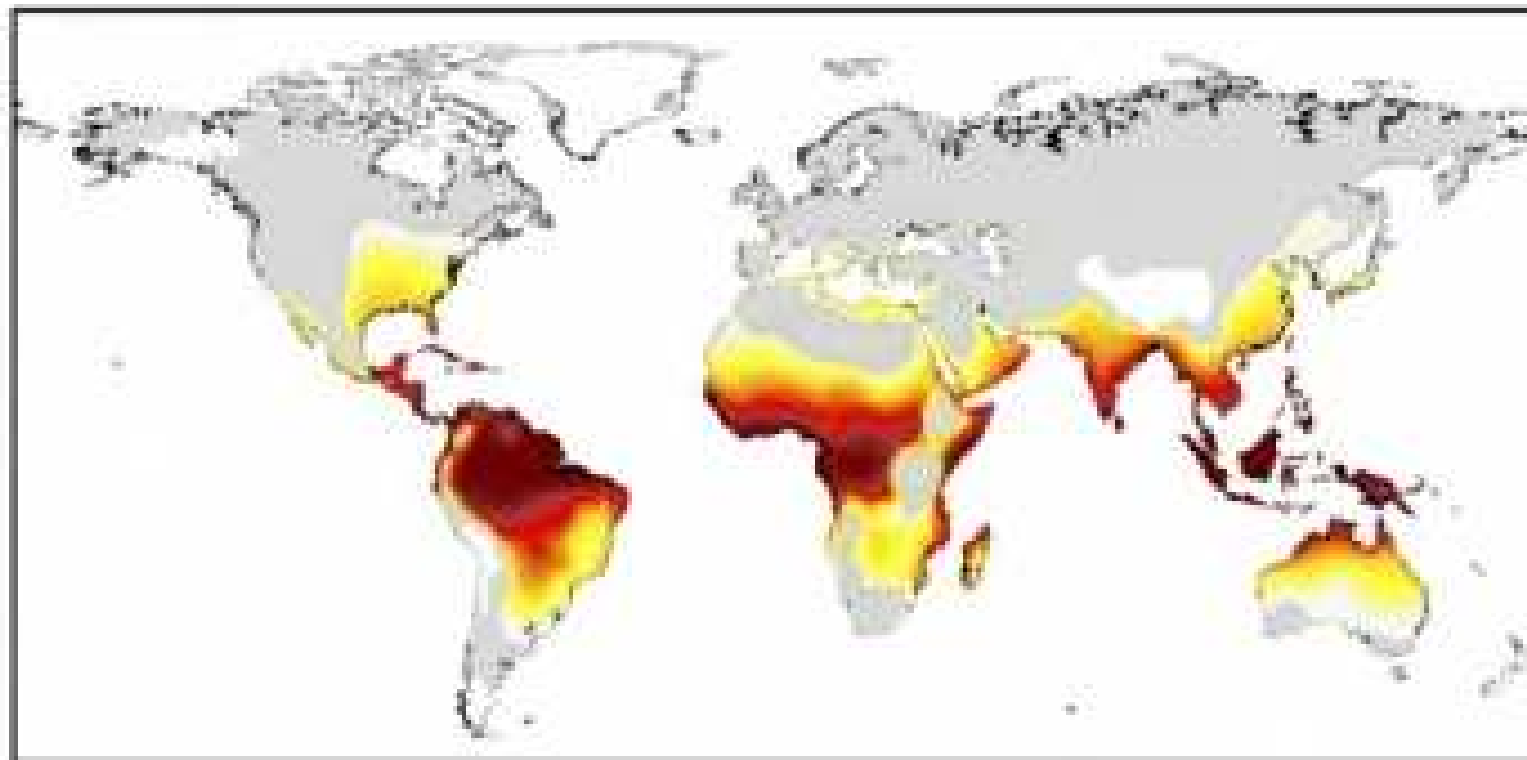
# *Počet dní se smrtelným rizikem z vedra*

20. století

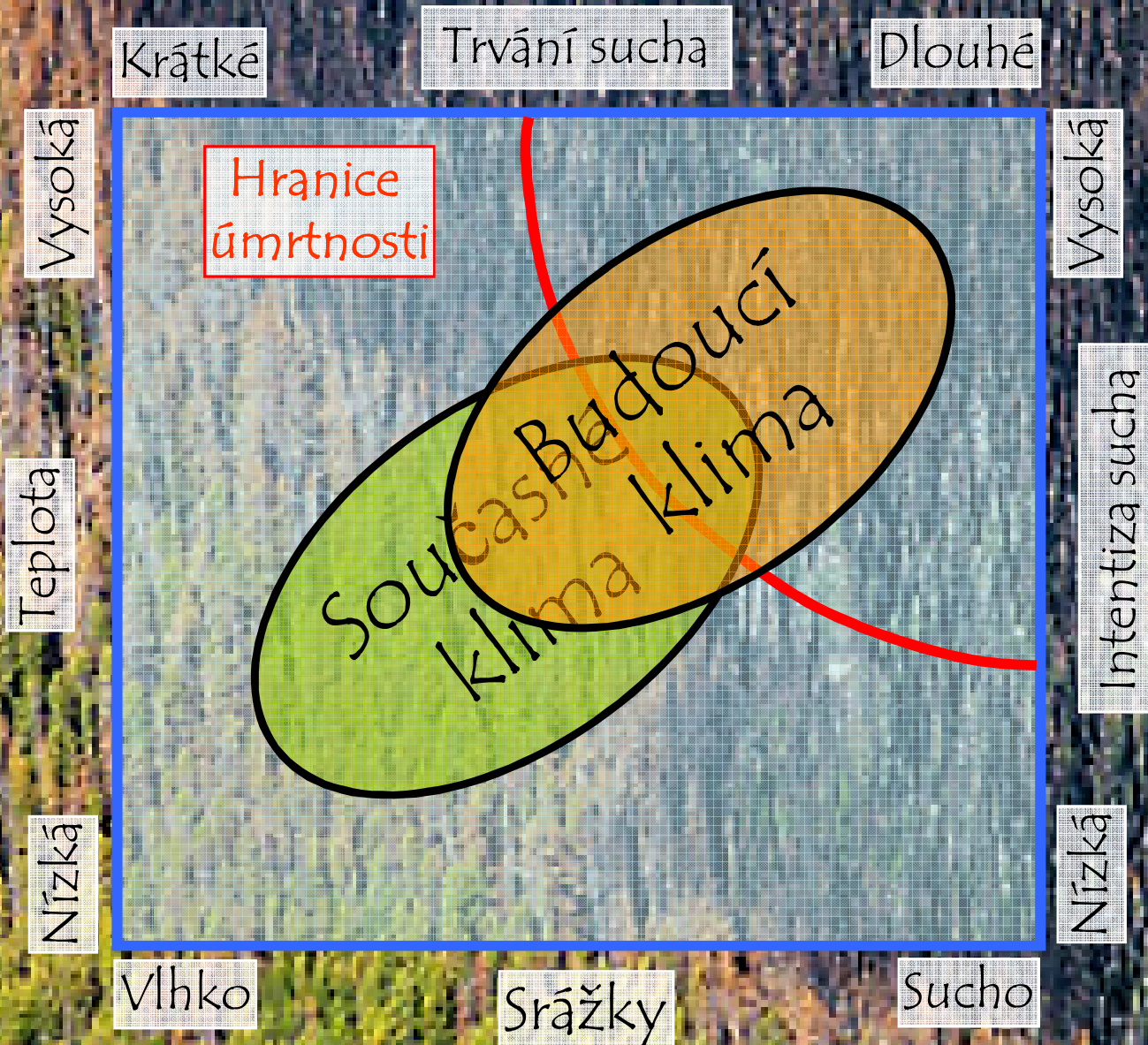


# *Počet dní se smrtelným rizikem z vedra*

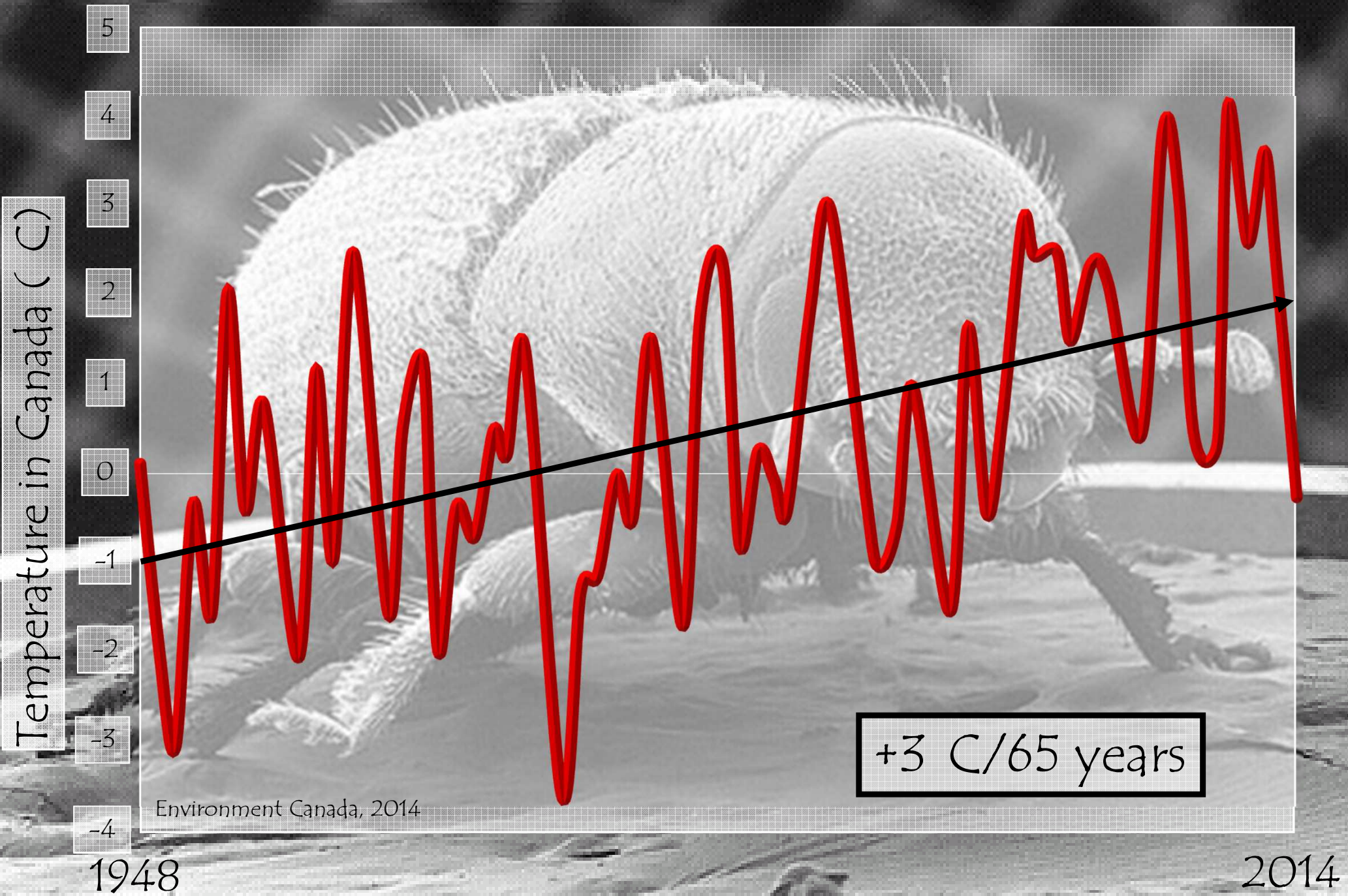
Rok 2100



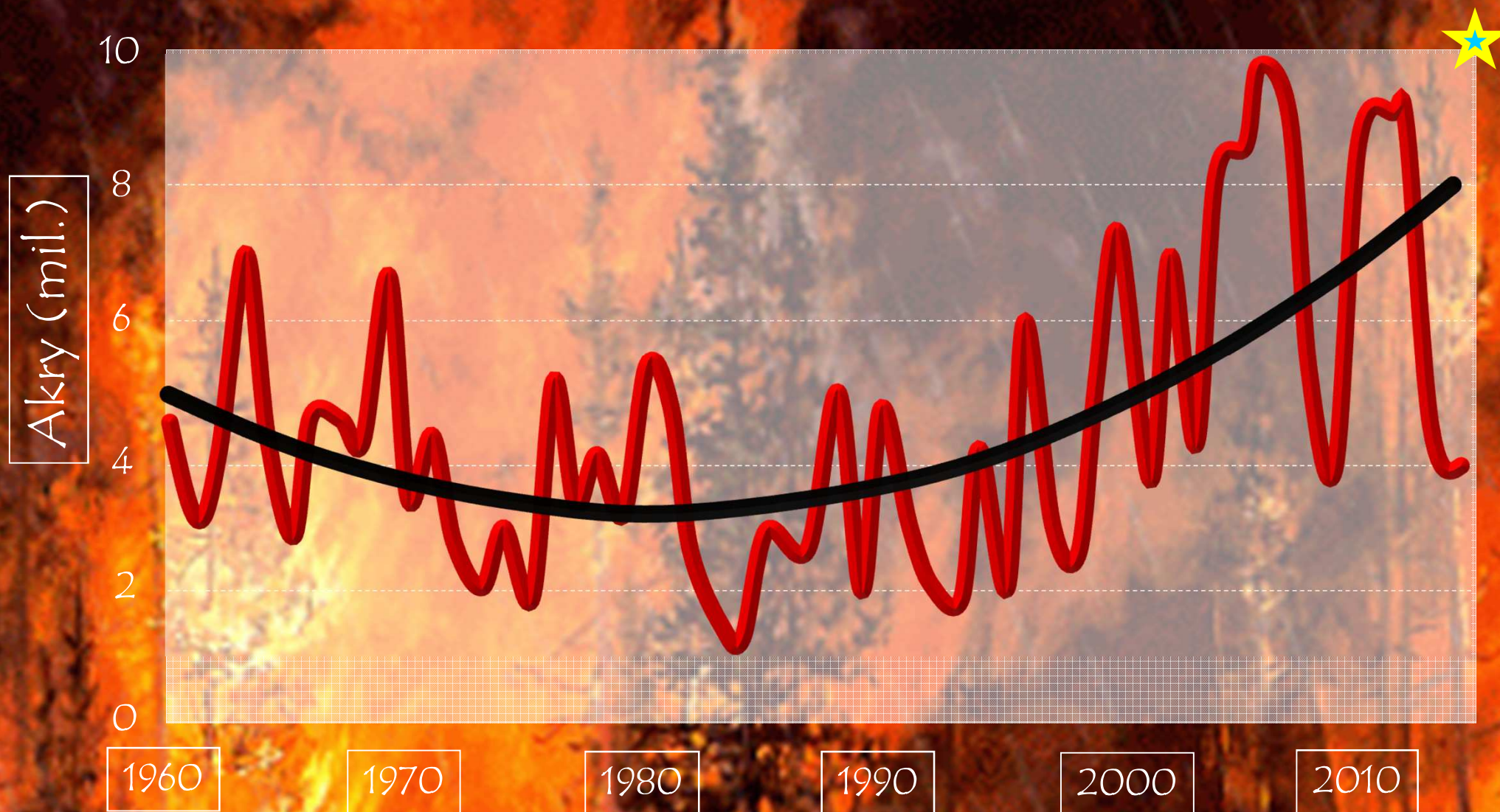
# Schématické znázornění změn v lesích



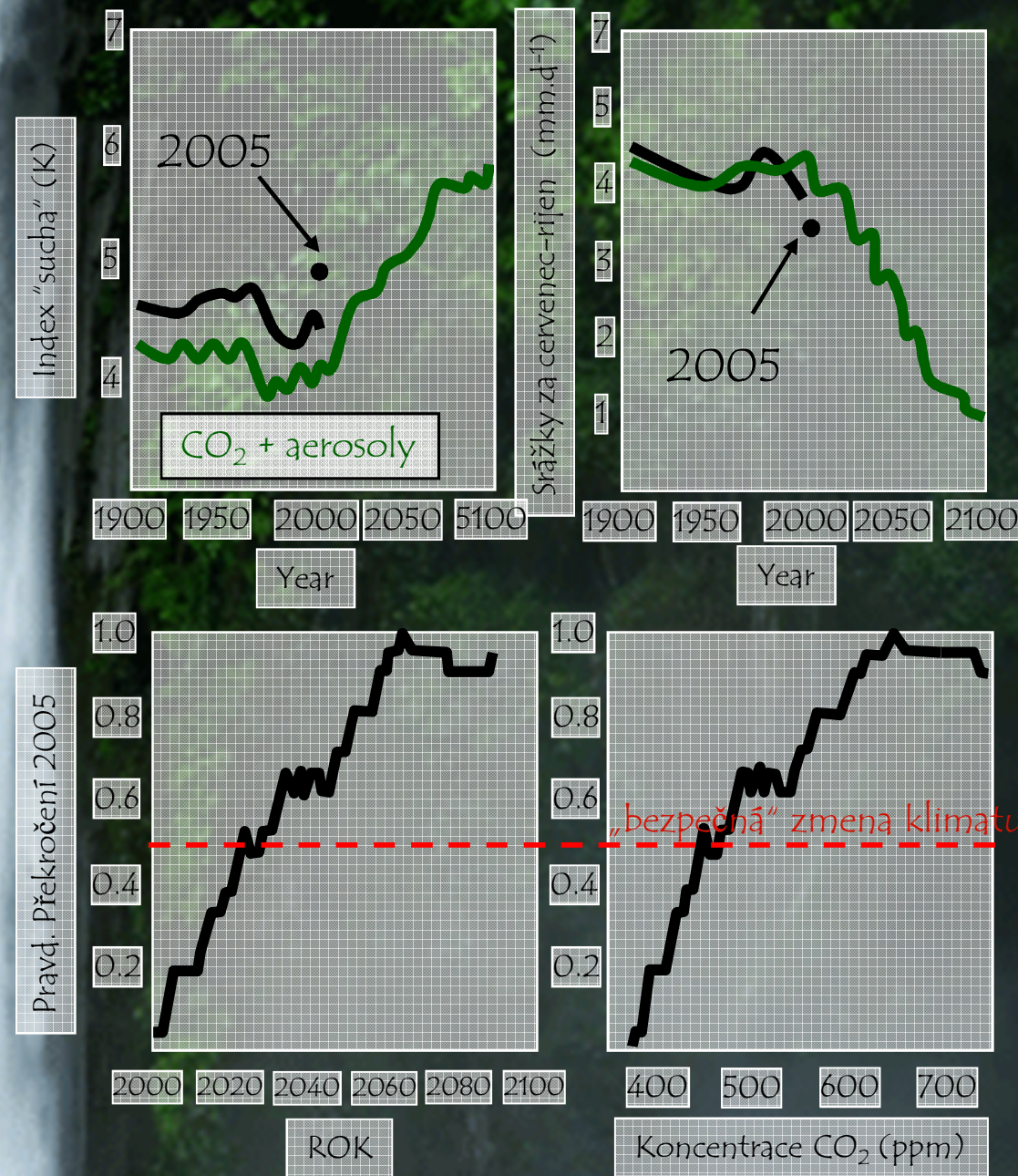
# Winter temperature increase is crucial for insect survival (1948-2014)



# Požáry v USA (1960-2015)



# Amazónie – méně vody, více CO<sub>2</sub>

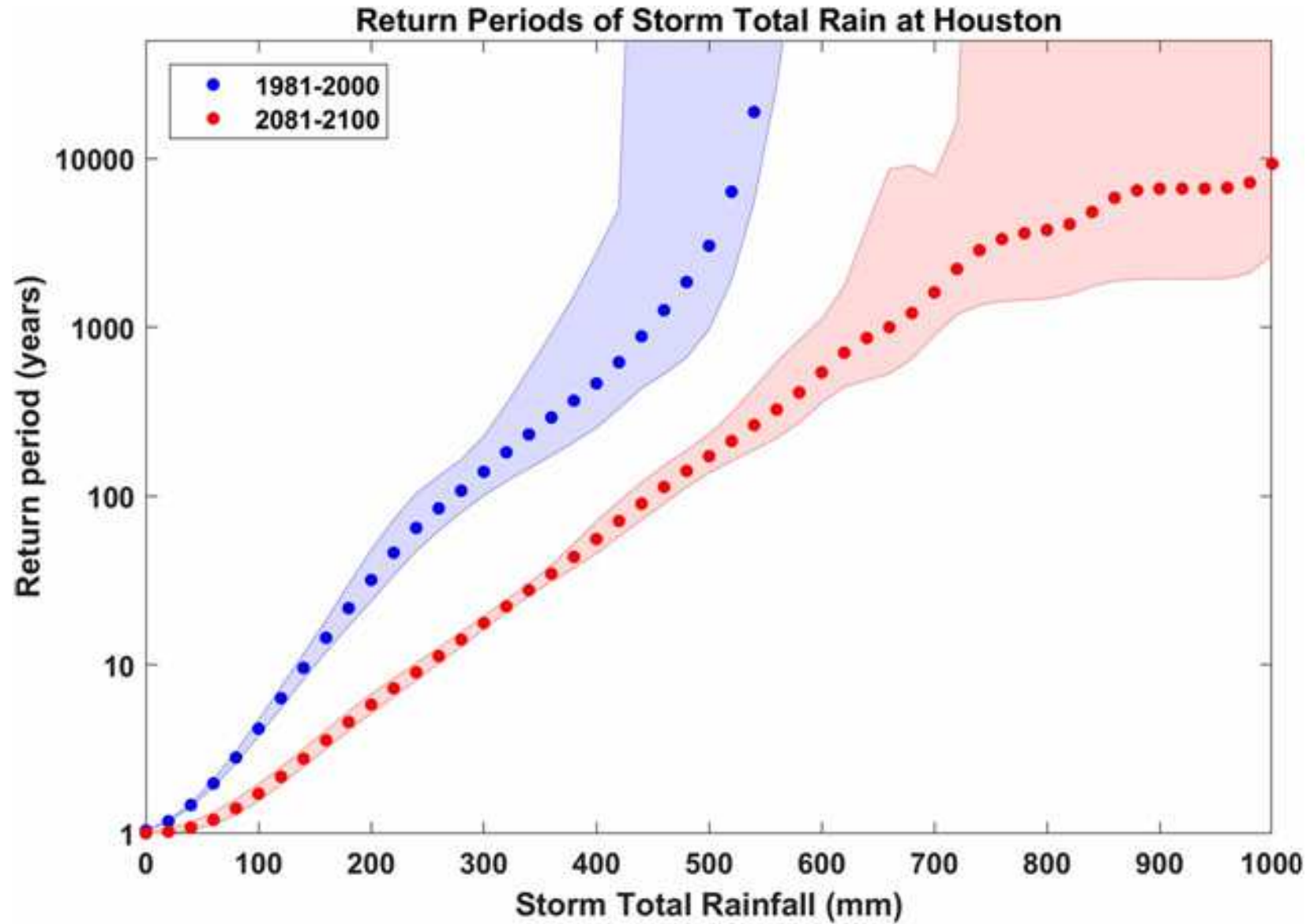




# Extrémní srážky



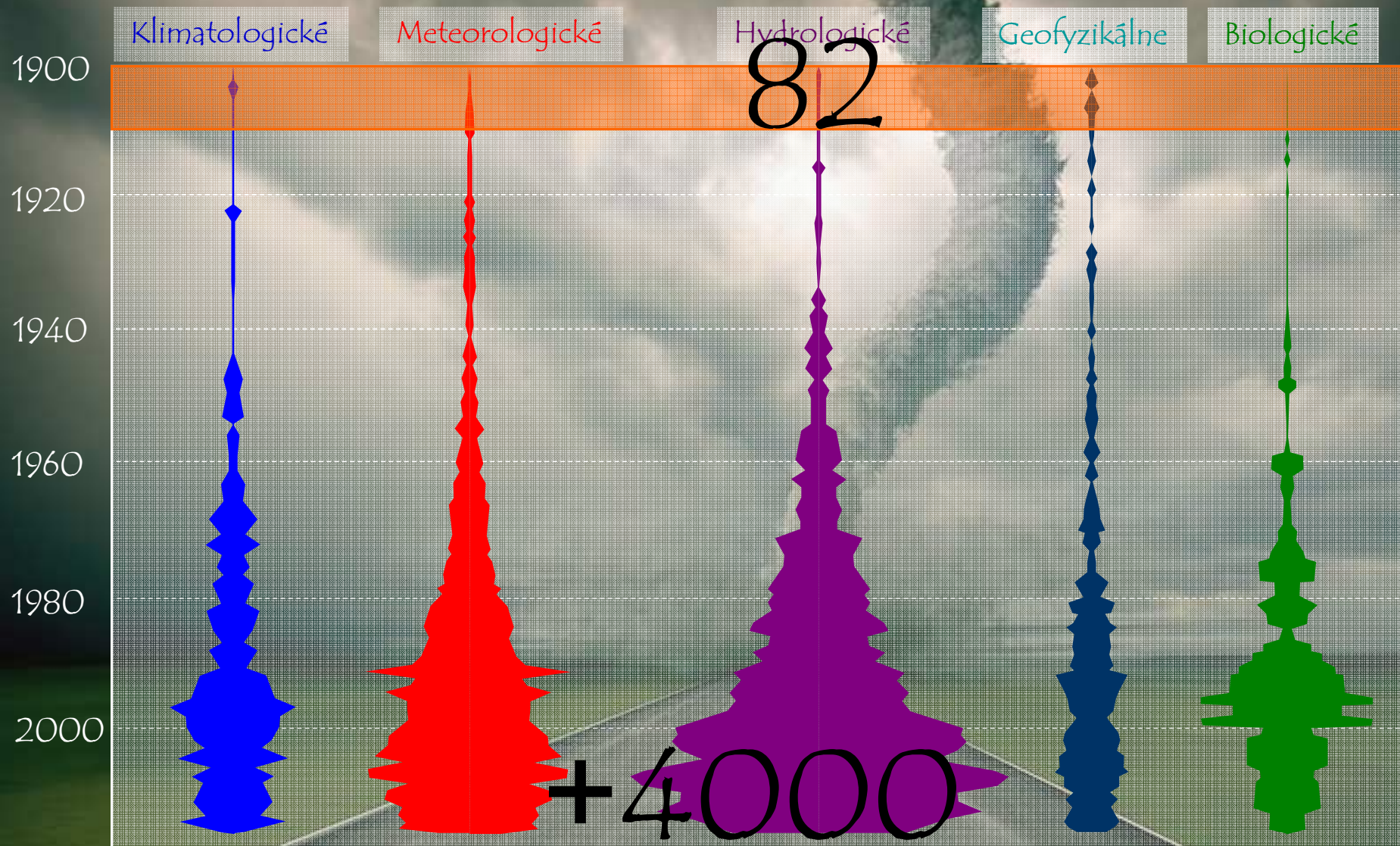
# Extrémní srážky



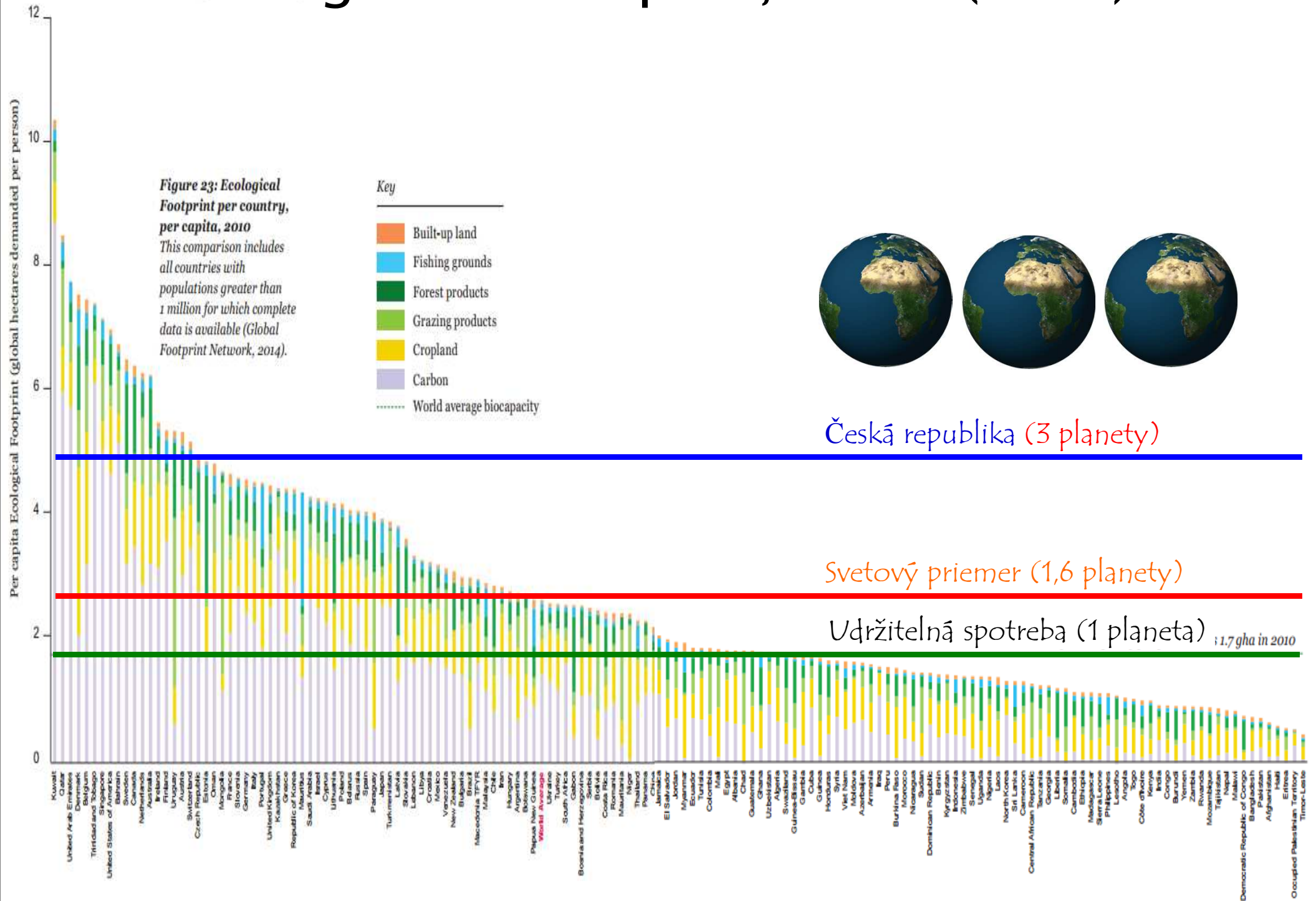
# *Duho a války*



# Globální výskyt přírodních katastrof



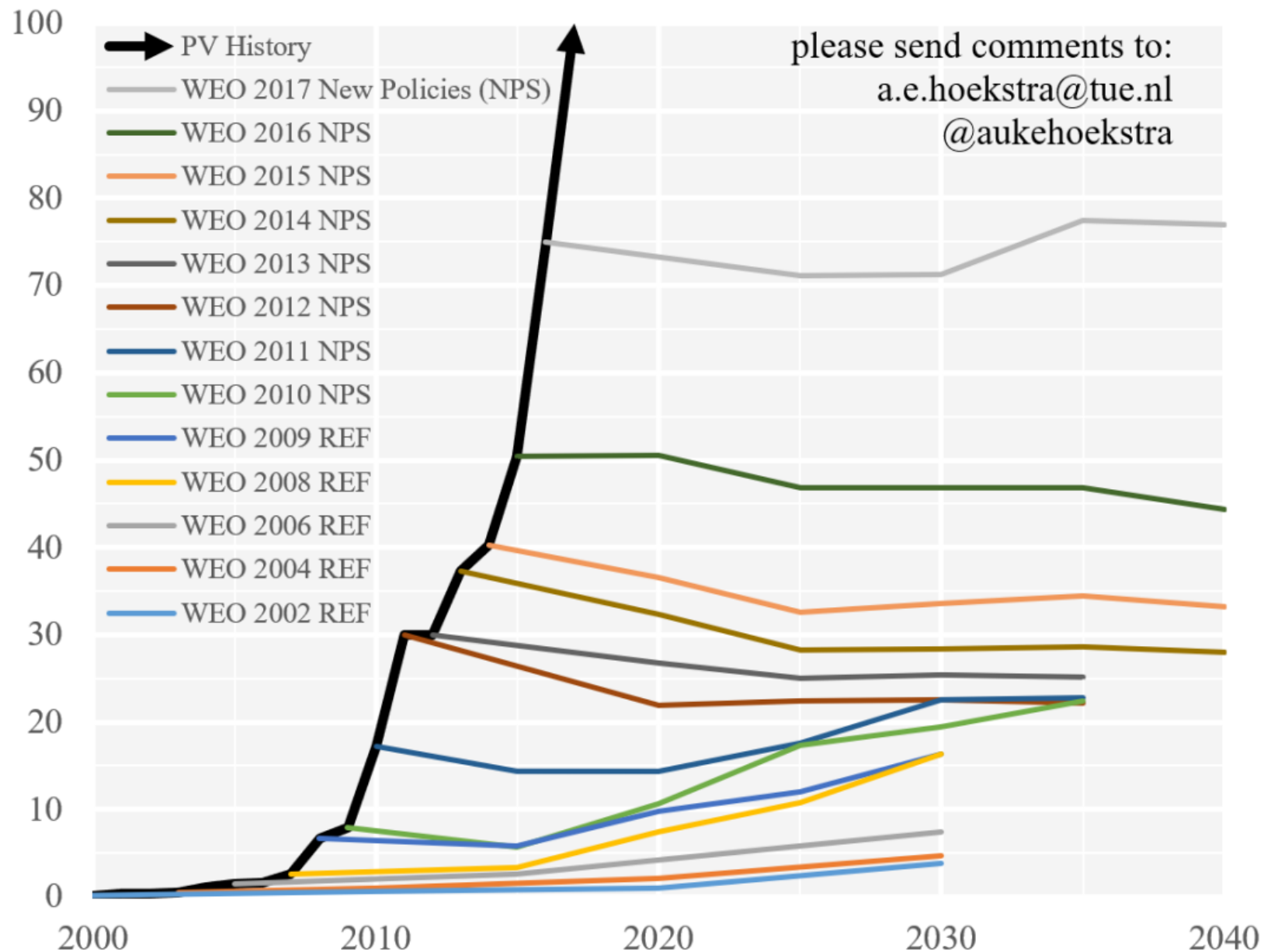
# Living Planet Report, 2014 (WWF)



# Dobré zprávy nakonec?

## Annual PV additions: historic data vs IEA WEO predictions

In GW of added capacity per year - source International Energy Agency - World Energy Outlook





*Ďekuji za pozornost*