

# Klimatske promjene u svijetu i Hrvatskoj - činjenice

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Državni hidrometeorološki zavod



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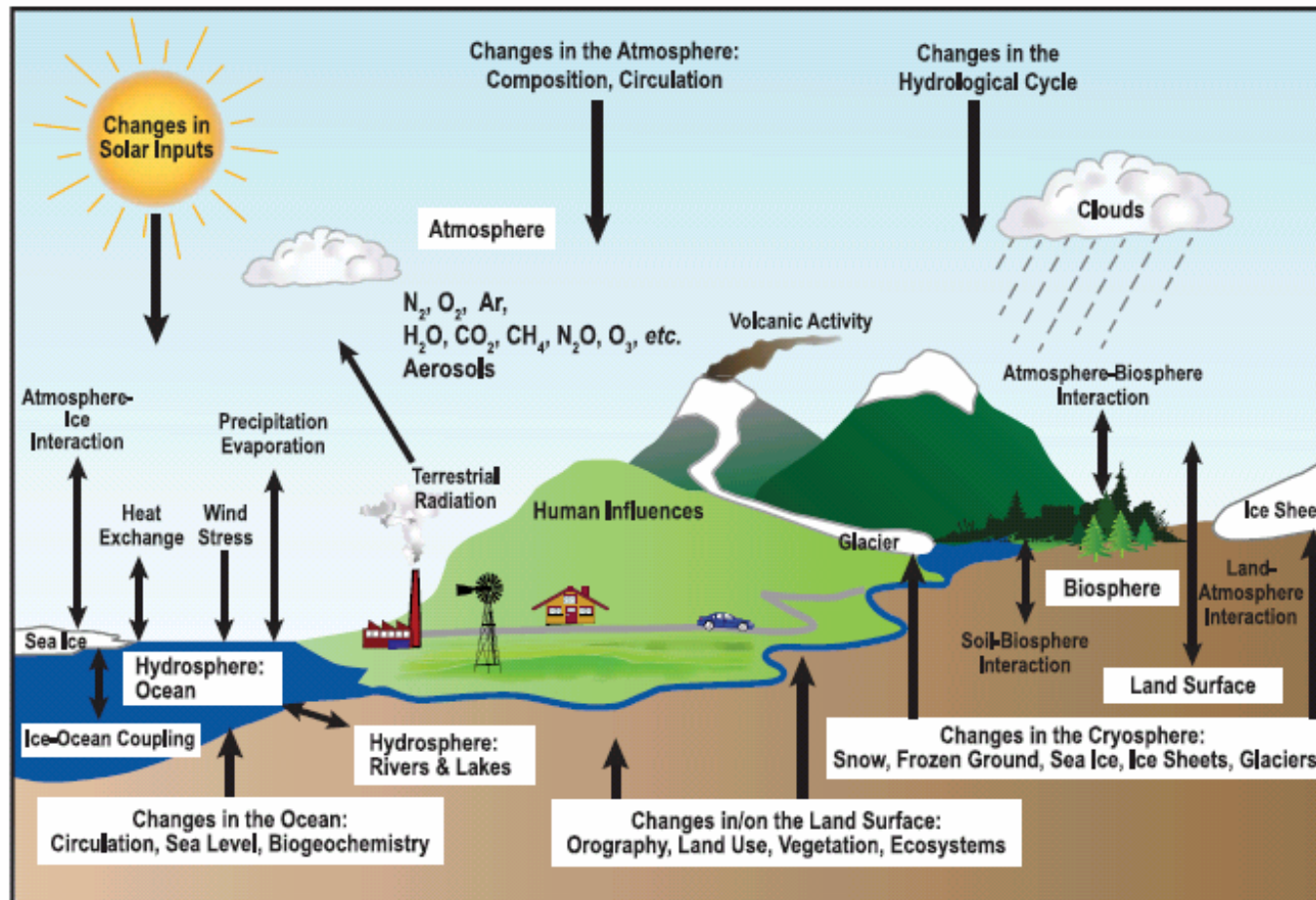
WMD, 23. ožujka 2011.

# SADRŽAJ

1. Klimatski sustav
2. Paleoklimatologija
3. Recentno globalno zatopljenje
4. Recentno zatopljenje u Hrvatskoj
5. Globalni klimatski scenarij
6. Zaključak



# 1. Klimatski sustav



FAQ 1.2, Figure 1. Schematic view of the components of the climate system, their processes and interactions.

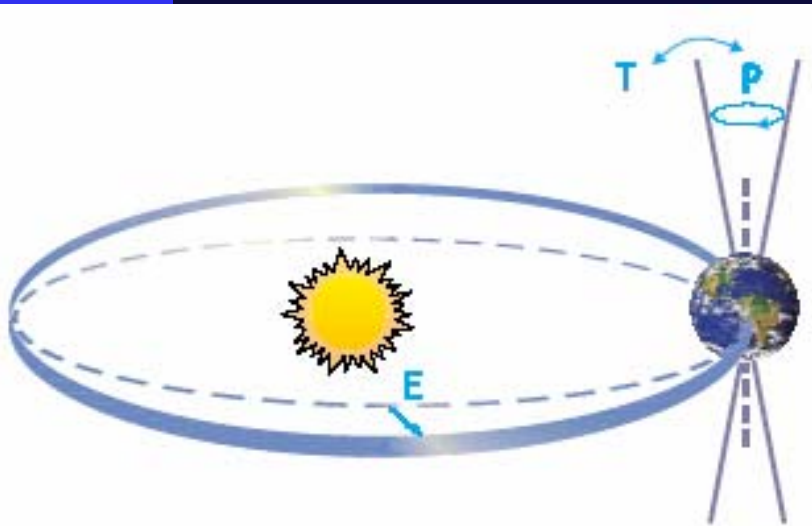
**Komponente: atmosfera, litosfera, hidrosfera, kriosfera, biosfera i zračenje.**

## 2. Paleoklimatologija



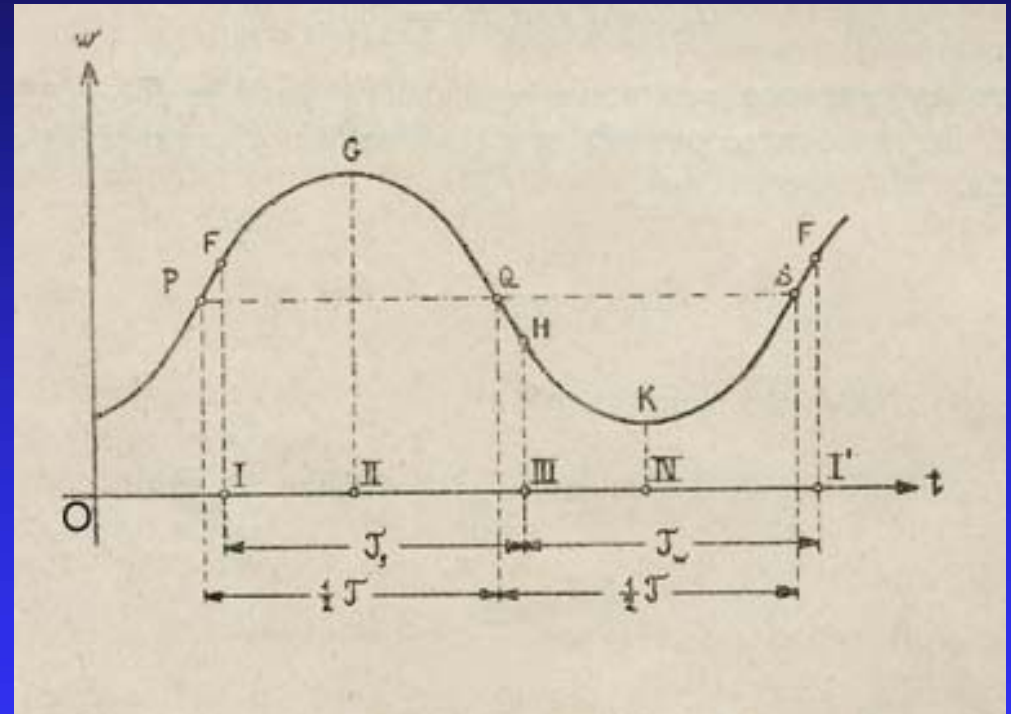
- Bavi se astronomskom teorijom klimatskih promjena
- Rođen 1879 u Dalju, Hrvatska
- Gimnazija u Osijeku 1896
- Građevnincki fakultet u Beču 1902
- 1904, s 25 godina postaje Ph.D. (doktor tehničkih znanosti)
- 1909 postaje predavač na Sveučilištu u Beogradu

## 2. Paleoklimatologija



**FAQ 6.1, Figure 1.** Schematic of the Earth's orbital changes (Milankovitch cycles) that drive the ice age cycles. 'T' denotes changes in the tilt (or obliquity) of the Earth's axis, 'E' denotes changes in the eccentricity of the orbit (due to variations in the minor axis of the ellipse), and 'P' denotes precession, that is, changes in the direction of the axis tilt at a given point of the orbit. Source: Rahmstorf and Scheinhaber (2006).

### Promjene elemenata vrtnje Zemlje



- godina je podijeljena u dva jednaka dijela: topli i hladni
- ljetne temperature su važne za ledena doba



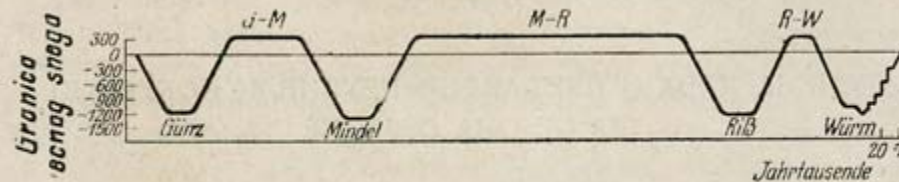
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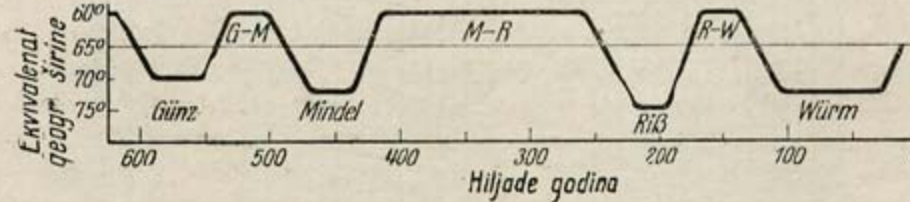
## Geolozi upotrebljavaju morene za proučavanje ledenih doba



## 2. Paleoklimatologija



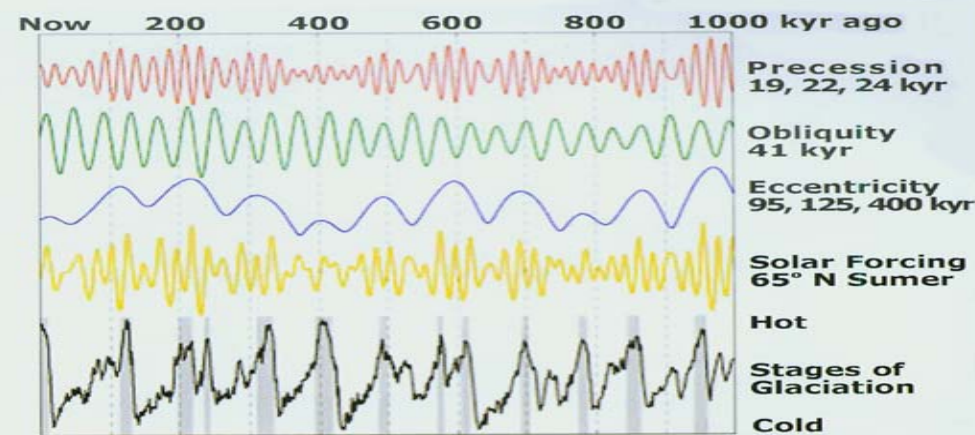
### Razdioba ledenih i međuledenih doba (Prema Penck, 1932)



### Grenland



### Ozračenja Zemlje za paralelu 65° (prema Milanković, 1948)



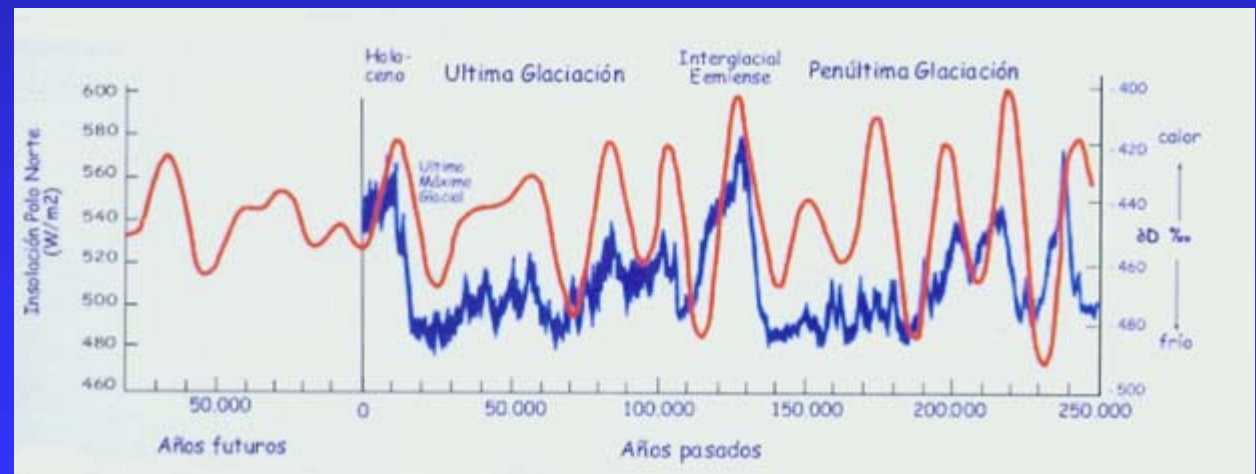
## 2. Paleoklimatologija



### Bušenje leda na Grenlandu



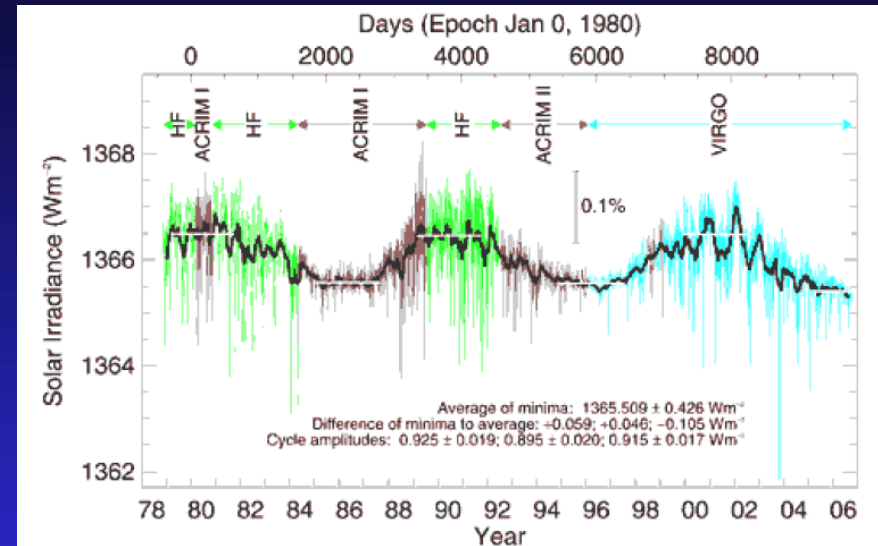
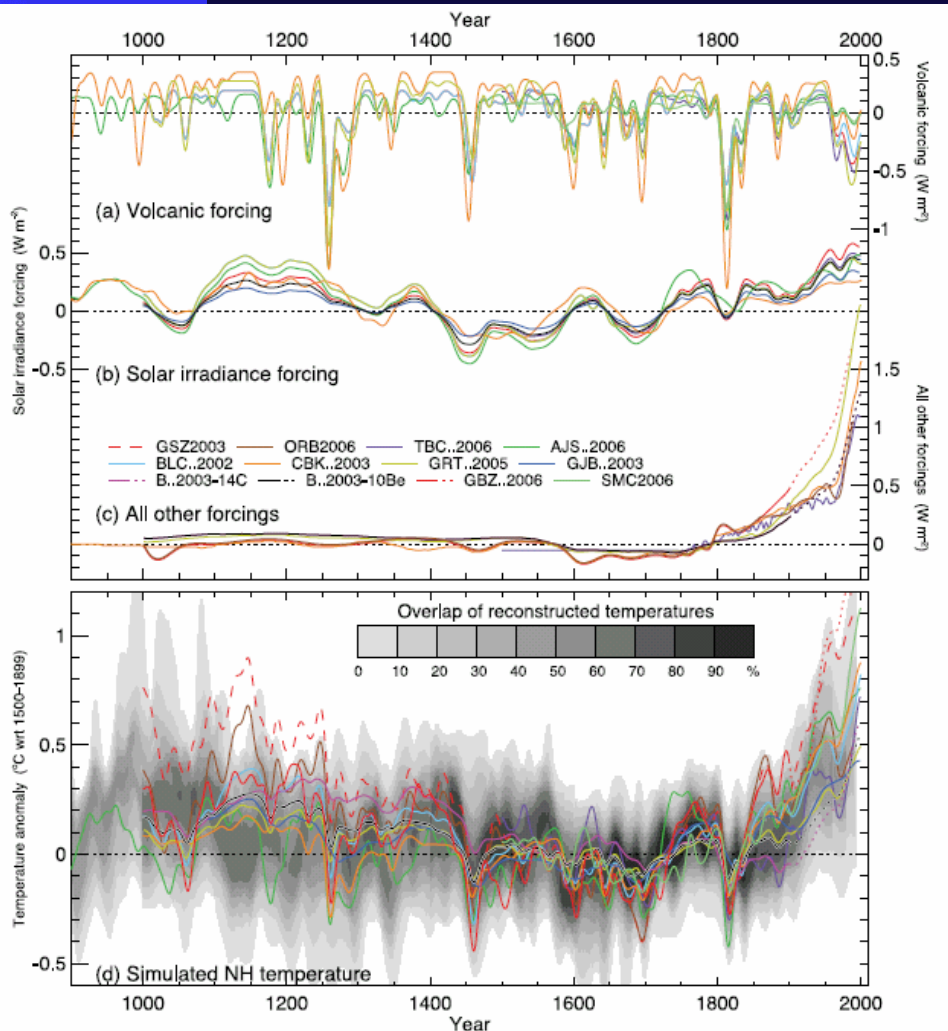
**Milankovićeve krivulje dozačenja za sjeverni pol za zadnjih 250 i budućih 80 tisuća godina. Ledeno doba za 20-tak tisuća godina?**



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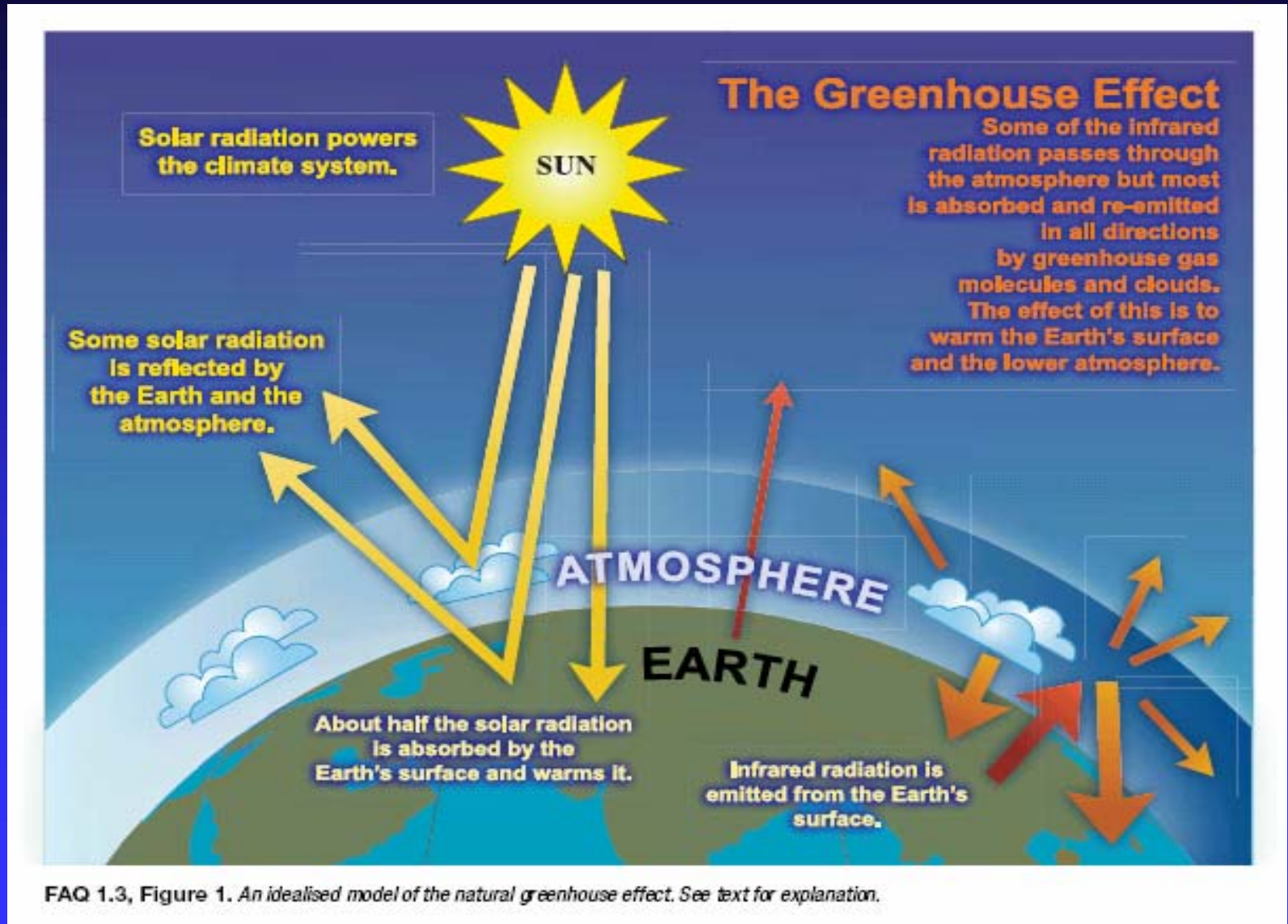
# Posljednjih 1000 godina (Holocen)



Je li Sunčeva konstanta  
konstanta?



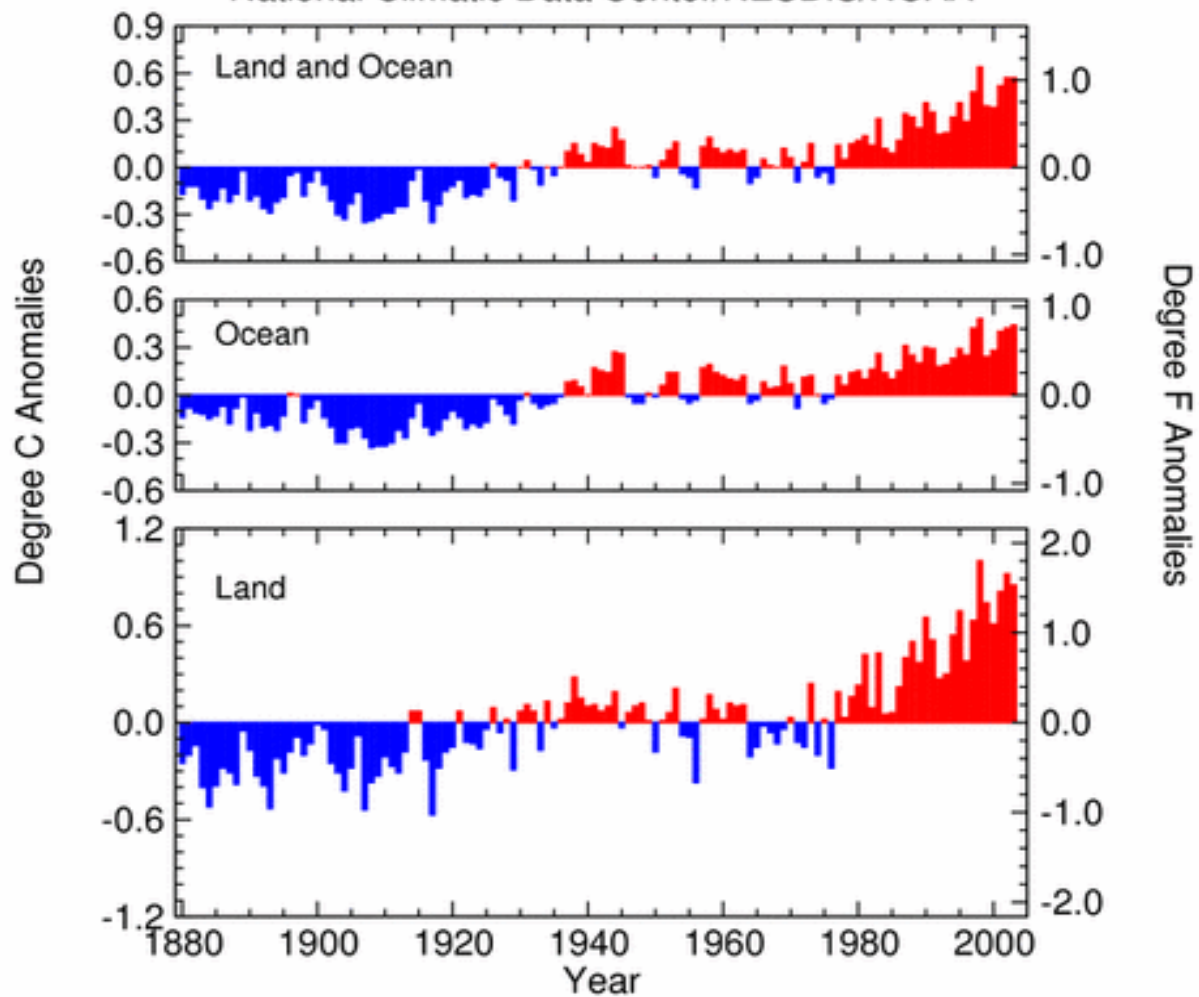
# Efekt staklenika



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# Jan - Dec Global Surface Mean Temp Anomalies

National Climatic Data Center/NESDIS/NOAA



# ARKTIK

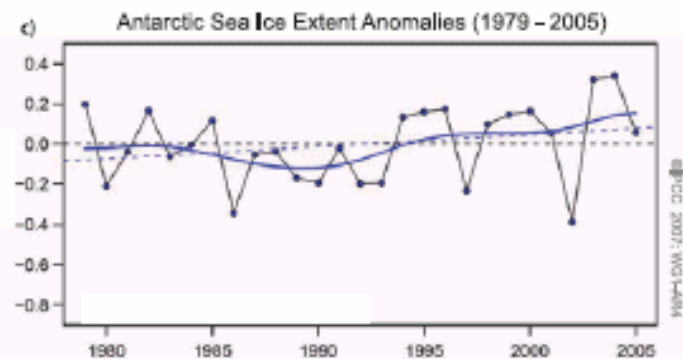
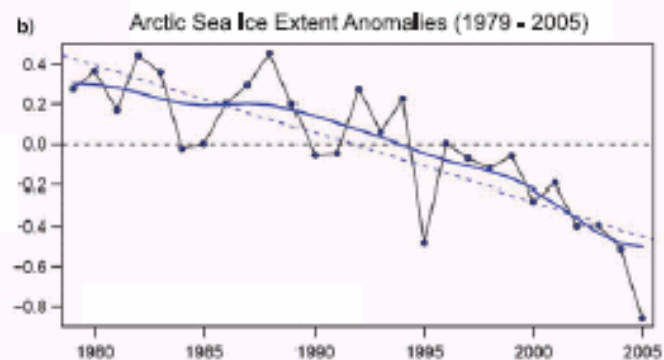


Ljeto 1983



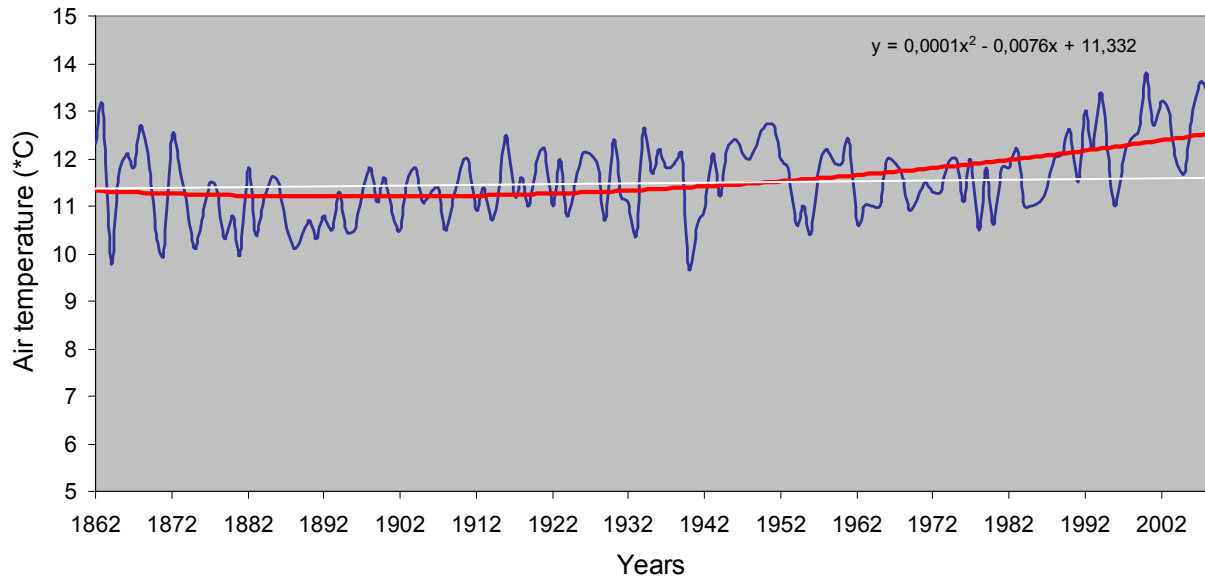
Ljeto 2003

# ARKTIK

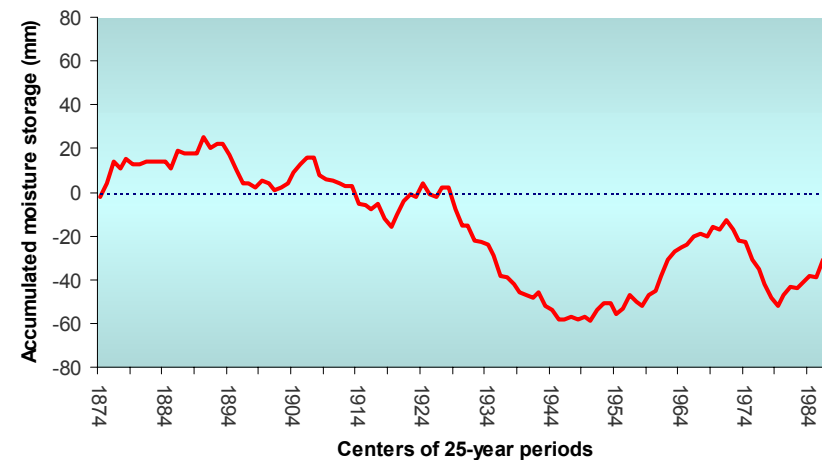
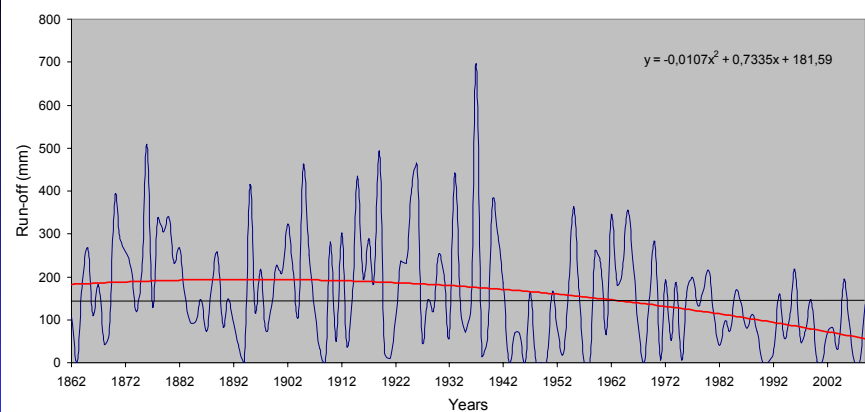


# ANTARKTIK

## 4. Recentno zatopljenje u Hrvatskoj



**Srednje godišnje temperature zraka za Zagreb-Grič u usporedbi s prosjekom 1961-1990**

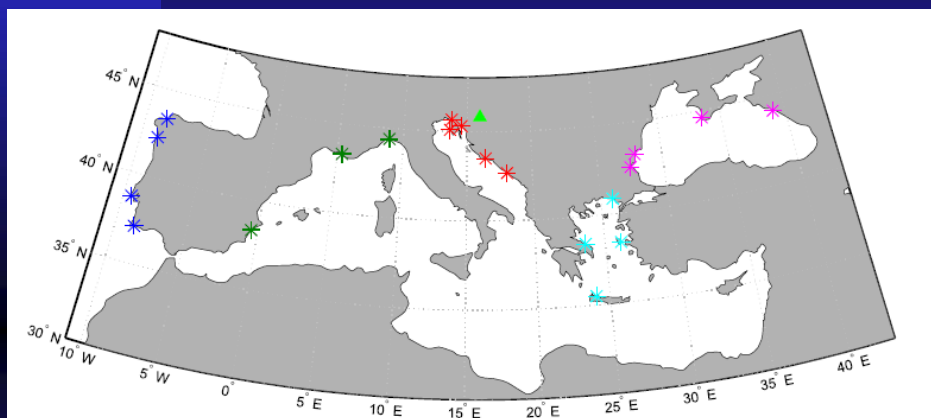


**Godišnje vrijednosti površinskog otjecanja**

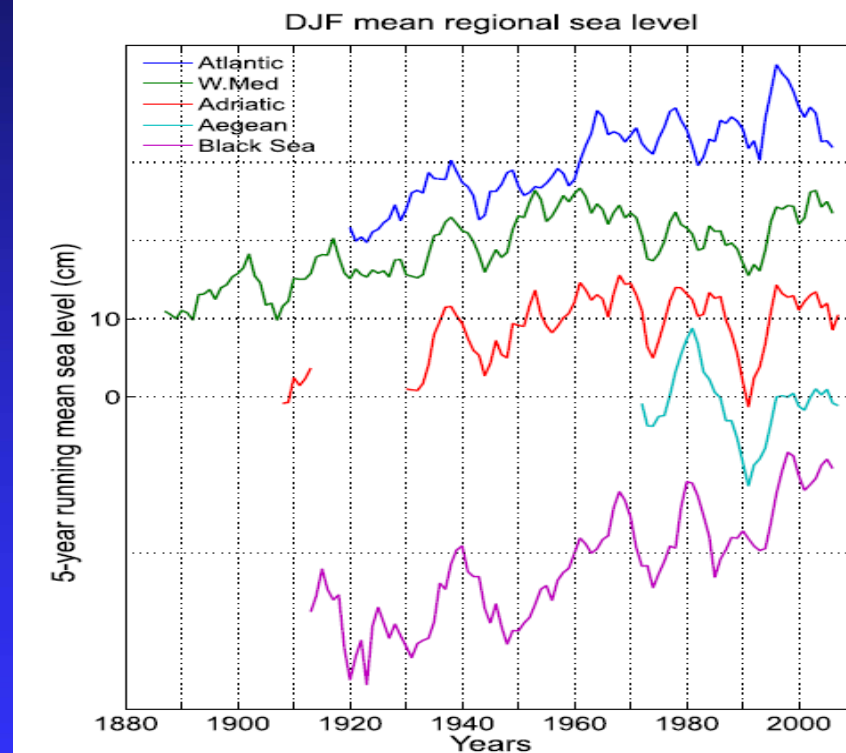
**Kumulativne anomalije vlage u tlu, 25-godišnjeg kliznog srednjaka**



## 4. Recentno zatopljenje u Hrvatskoj



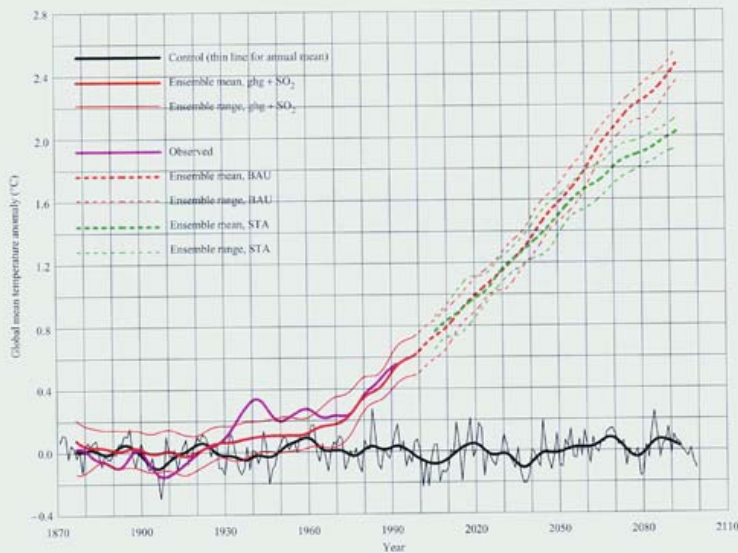
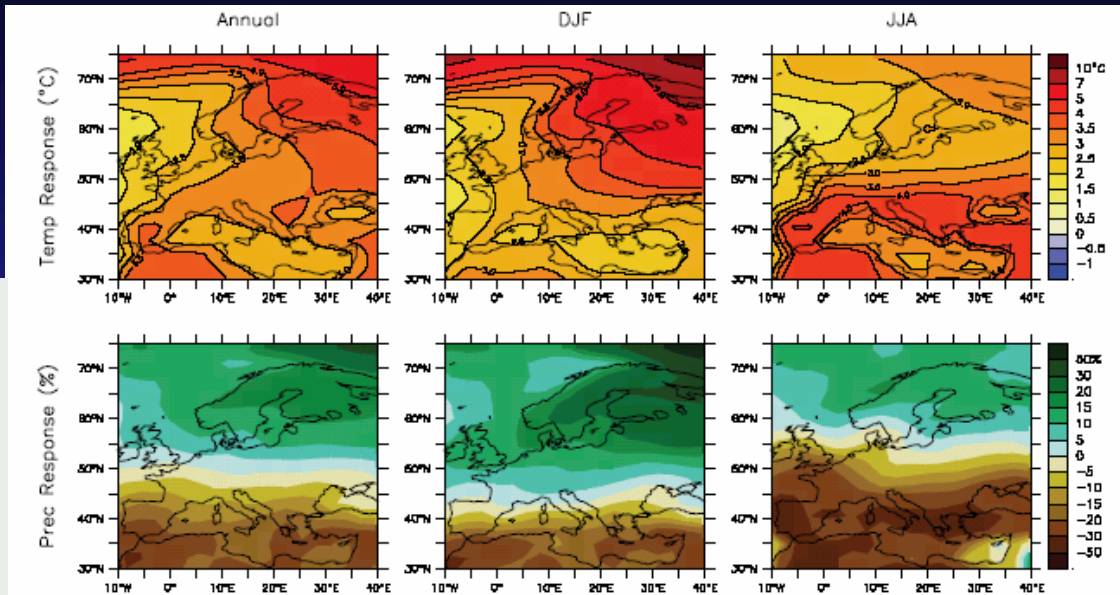
**Položaj mareografa na Sredozemlju i dijelu Atlantika**



**Trend promjene morske razine (Orlić i Pasarić, 2010).**

# 5. Globalni klimatski scenarij

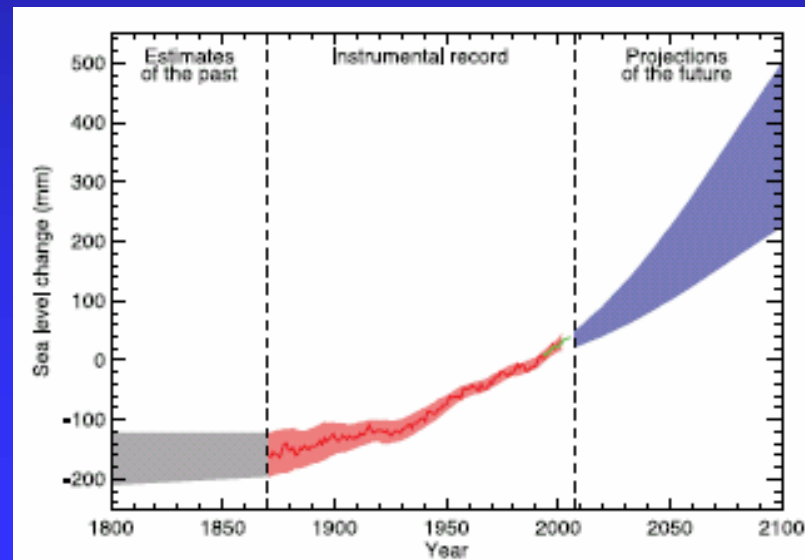
Projekcije temperature zraka i količine oborine u Europi: godišnje, zimske i ljetne.



Scenarij globalnog zatopljenja vrlo vjerojatno pod utjecajem ljudskog djelovanja.



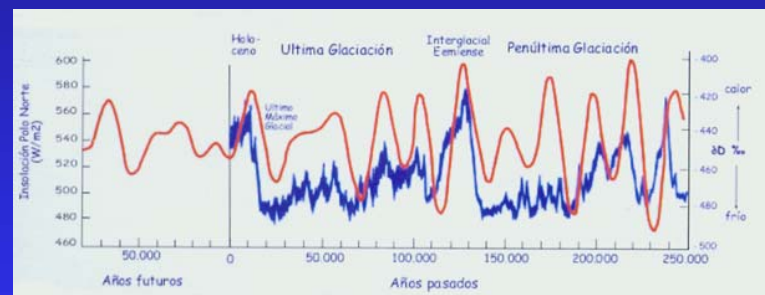
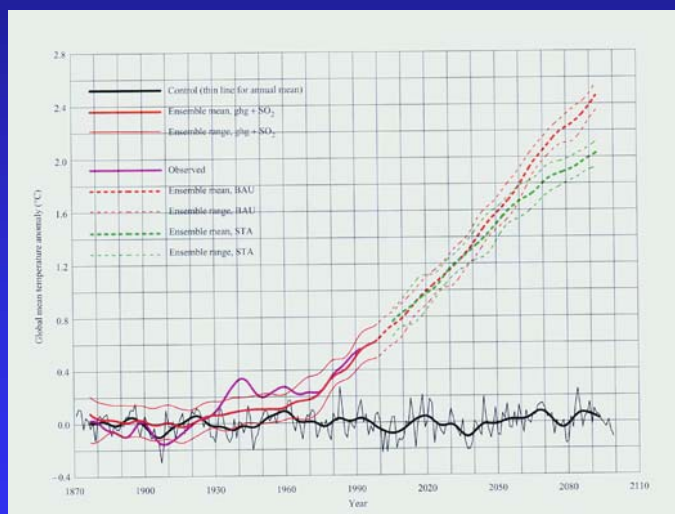
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Porast morske razine

## 6. ZAKLJUČAK

Nema sukoba između astronomske teorije sekularnih klimatskih promjena i teorije recentnog globalnog zatopljenja samo je riječ o različitim vremenskim ljestvicama



**70000 godina**

**100 godina**