



A klímaváltozással kapcsolatos alapvető tények, mérési adatok (a 4. IPCC jelentés és ami mögötte van)

Jánosi Imre

Kármán Környezeti Áramlások Hallgatói Laboratórium,
Komplex Rendszerek Fizikája Tanszék
Eötvös Loránd Tudományegyetem, Budapest

janosi@lecso.elte.hu
<http://lecso.elte.hu>

New Orleans, 2005. aug. 31.



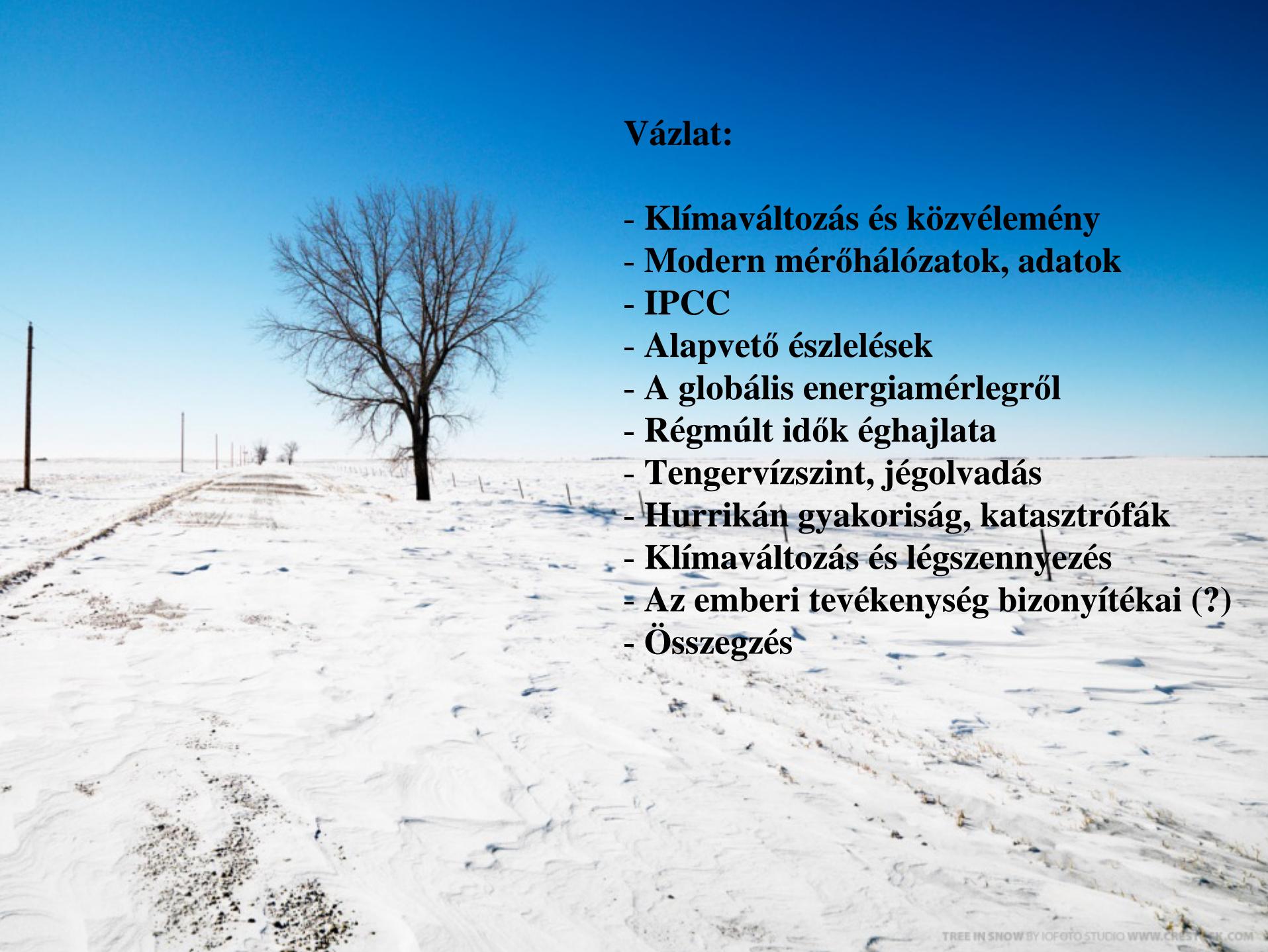










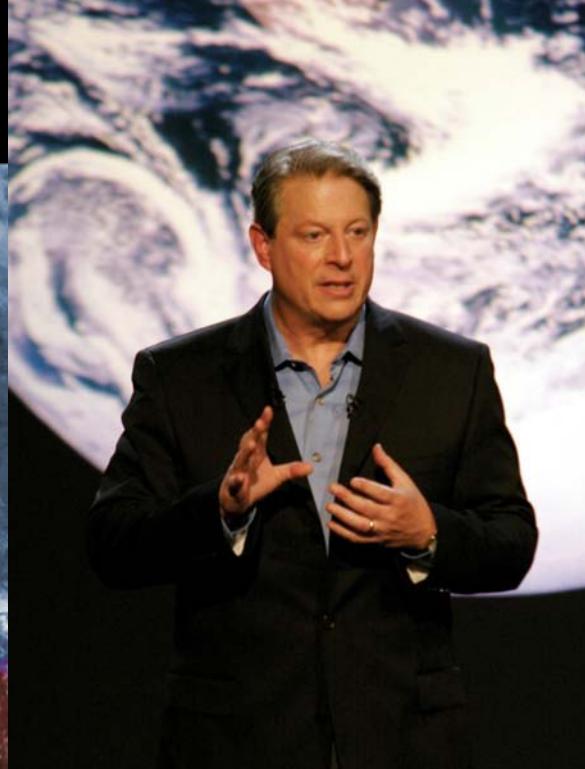
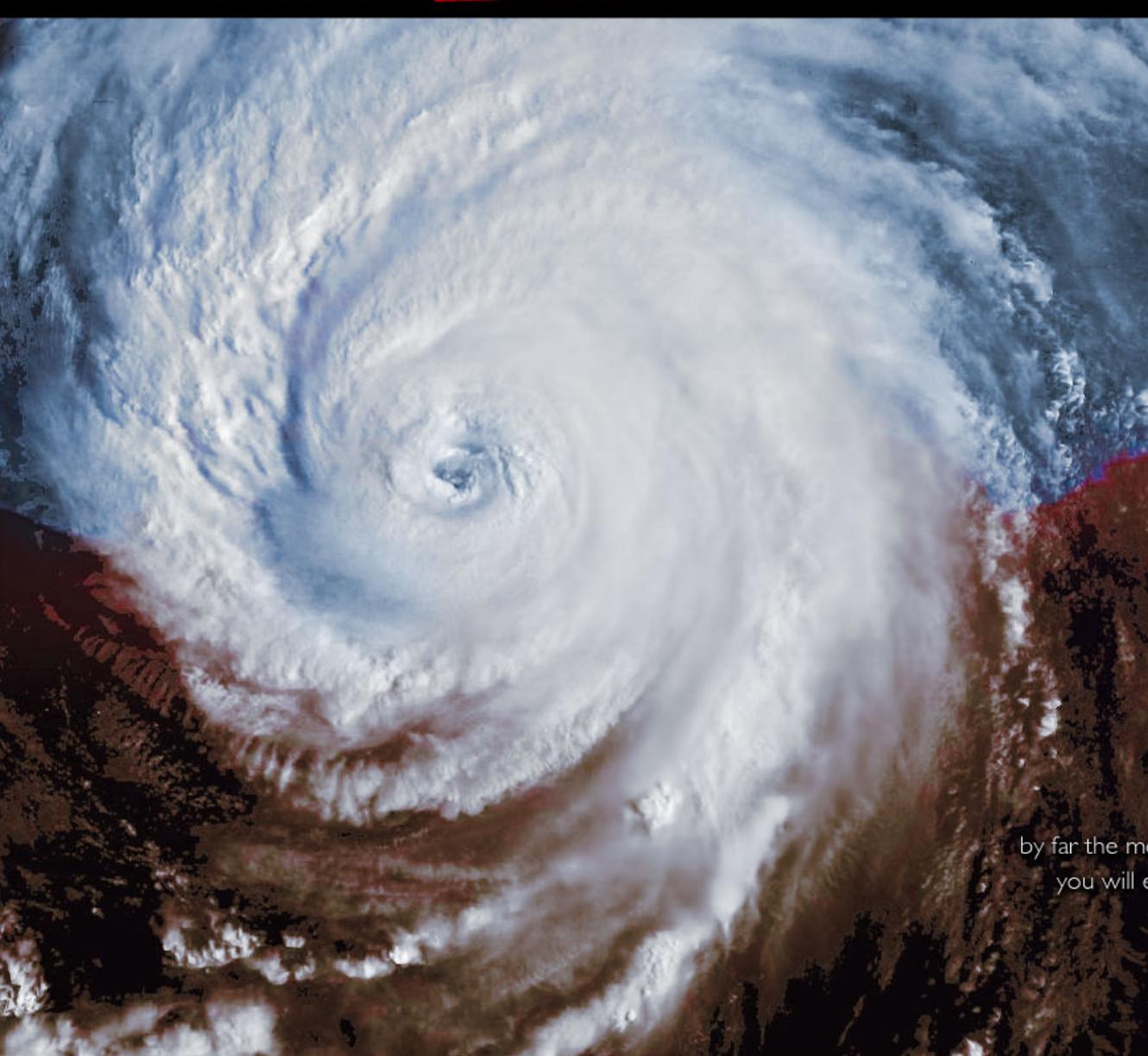


Vázlat:

- Klímaváltozás és közvélemény
- Modern mérőhálózatok, adatok
- IPCC
- Alapvető észlelések
- A globális energiamérlegről
- Régmúlt idők éghajlata
- Tengervízszint, jégolvadás
- Hurrikán gyakoriság, katasztrófák
- Klímaváltozás és légszennyezés
- Az emberi tevékenység bizonyítékai (?)
- Összegzés

aninconvenienttruth

A GLOBAL **WARNING**



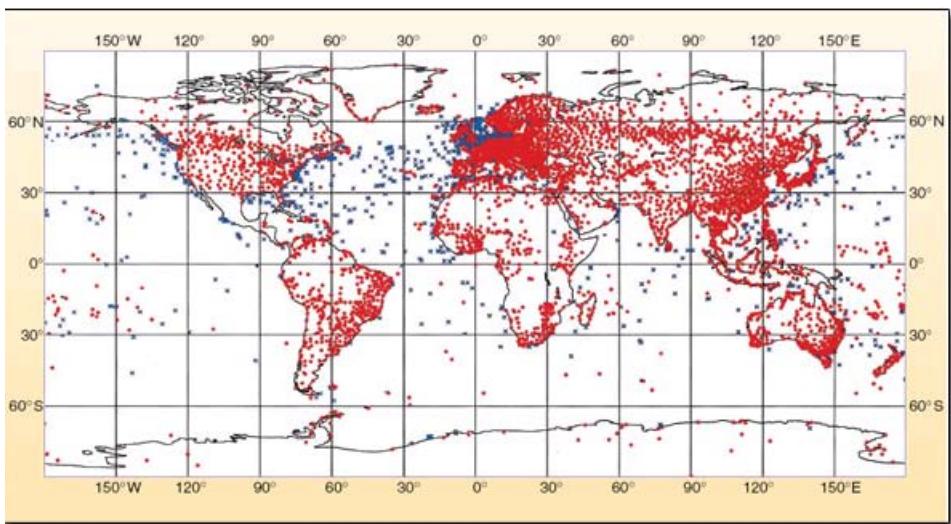
by far the most terrifying film
you will ever see.

THE FOLLOWING PREVIEW HAS BEEN APPROVED FOR
ALL AUDIENCES
BY THE MOTION PICTURE ASSOCIATION OF AMERICA

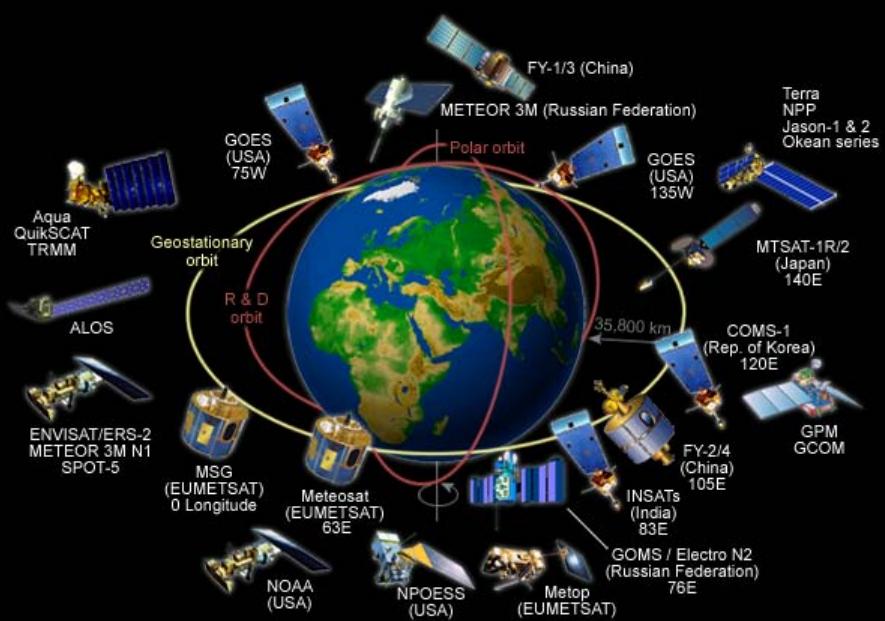
THE PARENTS ADVISORY: PARENTAL MATERIALS



Modern észlelő hálózatok

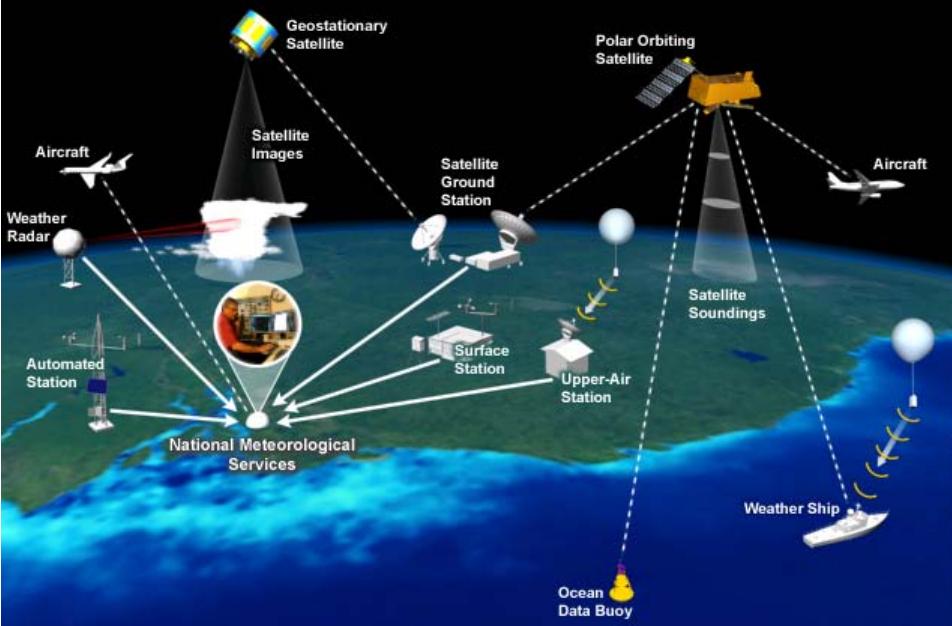


Global Environmental Satellite Observation Network

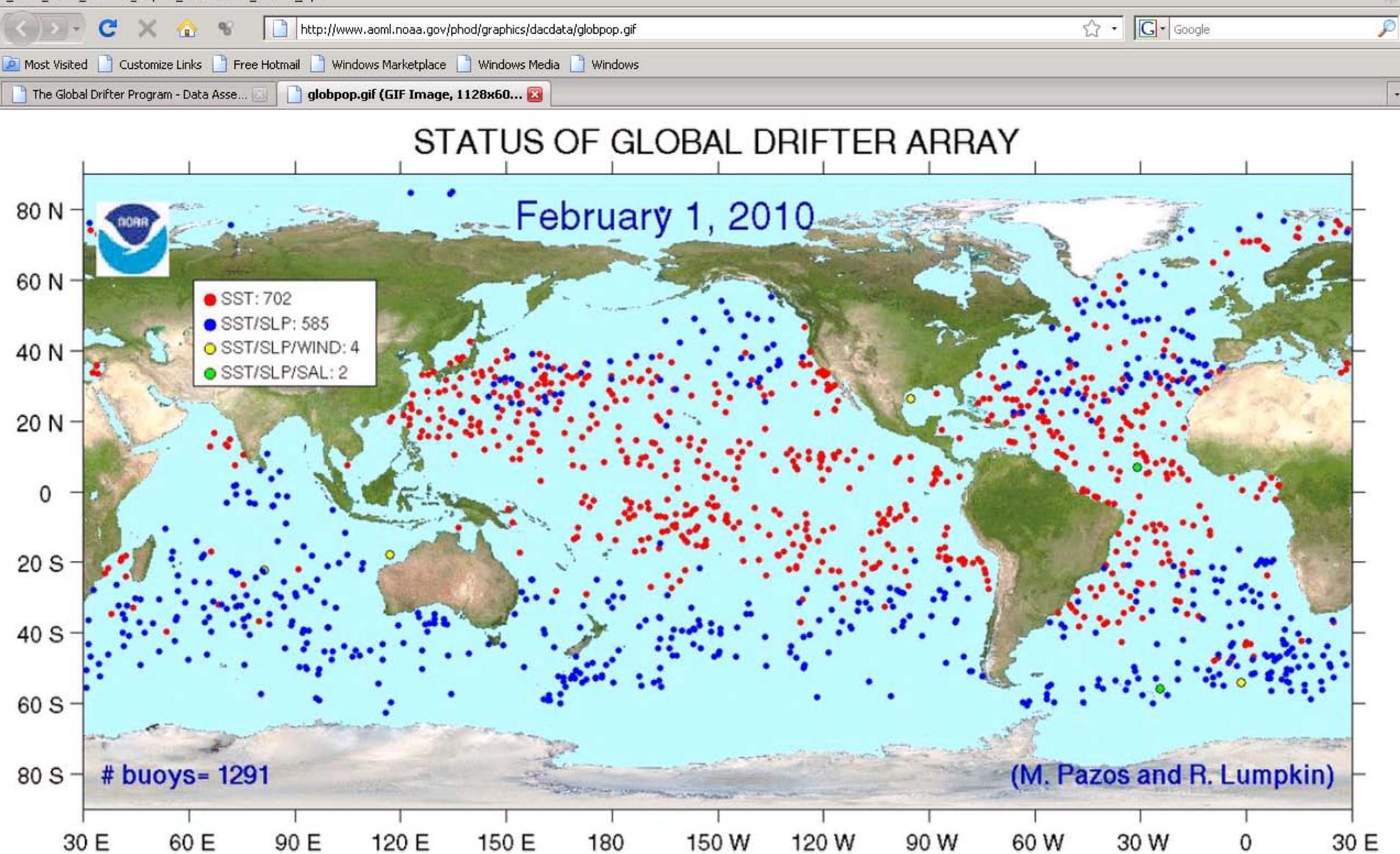


The COMET Program / EUMETSAT / NASA / NOAA / WMO

WMO Global Observing System



WMO / The COMET Program





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NOAA/Global Drifter Program Status, 2009-9-21

 GDP locations

- [AOML](#)
NOAA/Atlantic Oceanographic and
- [Clearwater](#)
Clearwater Oceanographic Instruments 304
- [JIMO](#)
NOAA/Joint Institute for Marine Observations
- [Marlin-Yug](#)
Marlin-Yug, Ltd. 2, Kapitanskaya St.
- [Metocean](#)
Metocean Data Systems 21 Thornhill Drive
- [Pacific Gyre](#)
Pacific Gyre, Inc. 3740 Oceanic Way, Suite 302
- [Technocean](#)
Technocean Inc. 820 NE 24th Lane Ste 112

 Drifter information

- [22116](#)
PTT : 22116 WMO : Date : 2009-Sep-19
- [32012](#)
PTT : 32012 WMO : Date : 2009-Sep-21
- [34173](#)
PTT : 34173 WMO : 56937 Date : 2009-Sep-21
- [34178](#)
PTT : 34178 WMO : 56934 Date : 2009-Sep-21
- [35927](#)
PTT : 35927 WMO : 56525 Date : 2009-Sep-21
- [35938](#)
PTT : 35938 WMO : 56513 Date : 2009-Sep-21
- [35939](#)
PTT : 35939 WMO : 56516 Date : 2009-Sep-21
- [36039](#)
PTT : 36039 WMO : 17517 Date : 2009-Sep-21
- [36043](#)
PTT : 36043 WMO : 17683 Date : 2009-Sep-21
- [36162](#)
PTT : 36162 WMO : 17507 Date : 2009-Sep-21
- [36169](#)

Status of the Global Drifter Array

Rick Lumpkin, NOAA/AOML

[Drogue on](#) [Drogue off](#) Sea surface temperature (SST) SST + Sea level pressure (SLP) SST + SLP + Wind SST + Traffic
 More... Map Satellite Terrain Show labels

75166

PTT : 75166

WMO : 44899

Date : 2009-Sep-21

Location : 57.757N, 8.294W

Experiment Number : 6325

Drifter type : SVP

Manufacturer : Pacific Gyre

Drogue status : ON

Deployment Log Info :

deployed 2008-8-8

at 39.51N, 62.04W

from: LIVORNO EXPRESS

status: good

Time since deployment : 409 days

[Link to trajectory shaded by SST](#)[Link to trajectory shaded by time](#)[Get directions](#) - [Search nearby](#)[Zoom here](#) - [Save to My Maps](#) - [Send](#)100 mi
200 km

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Done



Quick Launch

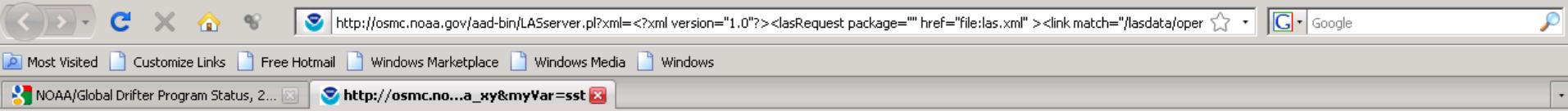
4 Microsoft ...

NOAA/Global...

statfiznap09

EN

<< 11:21 AM



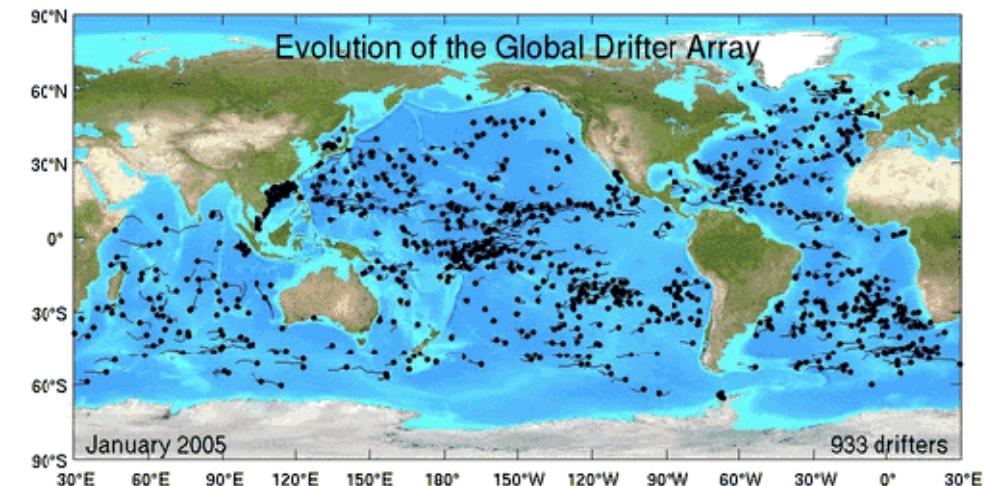
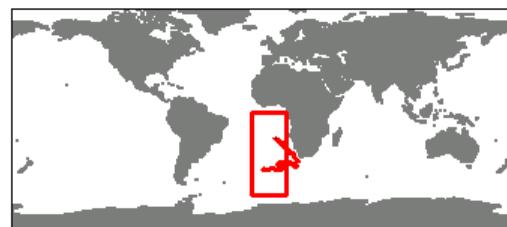
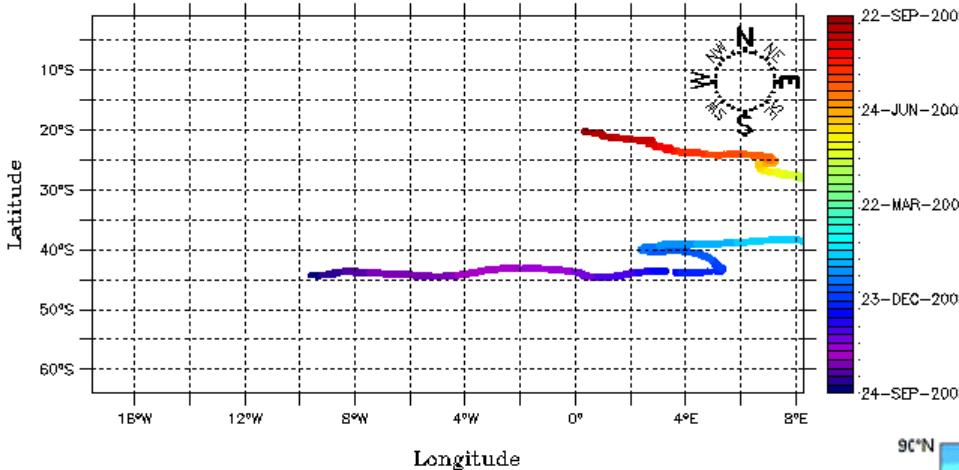
Adopt A Drifter Tracking page

Longitude: 17.51999W(-17.52) to 8.279E(8.28)

Latitude: 64S to 0.889S

Stations observing Sea Surface Temperature

Number of Observations: 16680



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|  Climate Indicators air temperature, drought ... |  Spectral / Engineering radar, visible imagery ... |
|  Cryosphere frozen ground, sea ice ... |  Sun-Earth Interactions auroras, solar activity ... |
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Show All Titles for **ATMOSPHERE** (5931)

AEROSOLS (676) 
aerosol extinction, sulfate particles, aerosol optical depth/thickness, aerosol backscatter, aerosol particle properties...

ATMOSPHERIC RADIATION (1556) 
solar radiation, shortwave radiation, longwave radiation, heat flux, outgoing longwave radiation...

ATMOSPHERIC TEMPERATURE (2754) 
air temperature, surface air temperature, maximum/minimum temperature, temperature anomalies, temperature profiles...

ATMOSPHERIC WATER VAPOR (2265) 
humidity, water vapor, dew point temperature, precipitable water, evaporation...

ALITUDE (792) 
geopotential height, tropopause, station height, barometric altitude, planetary boundary layer height...

ATMOSPHERIC CHEMISTRY (1166) 
oxygen compounds, carbon and hydrocarbon compounds, trace gases/trace species, nitrogen compounds, sulfur compounds...

ATMOSPHERIC WINDS (2282) 
surface winds, upper level winds, vertical wind motion, wind profiles, vorticity...

CLOUDS (1249) 
cloud amount/frequency, cloud types, cloud liquid water/ice, cloud height, cloud top pressure...

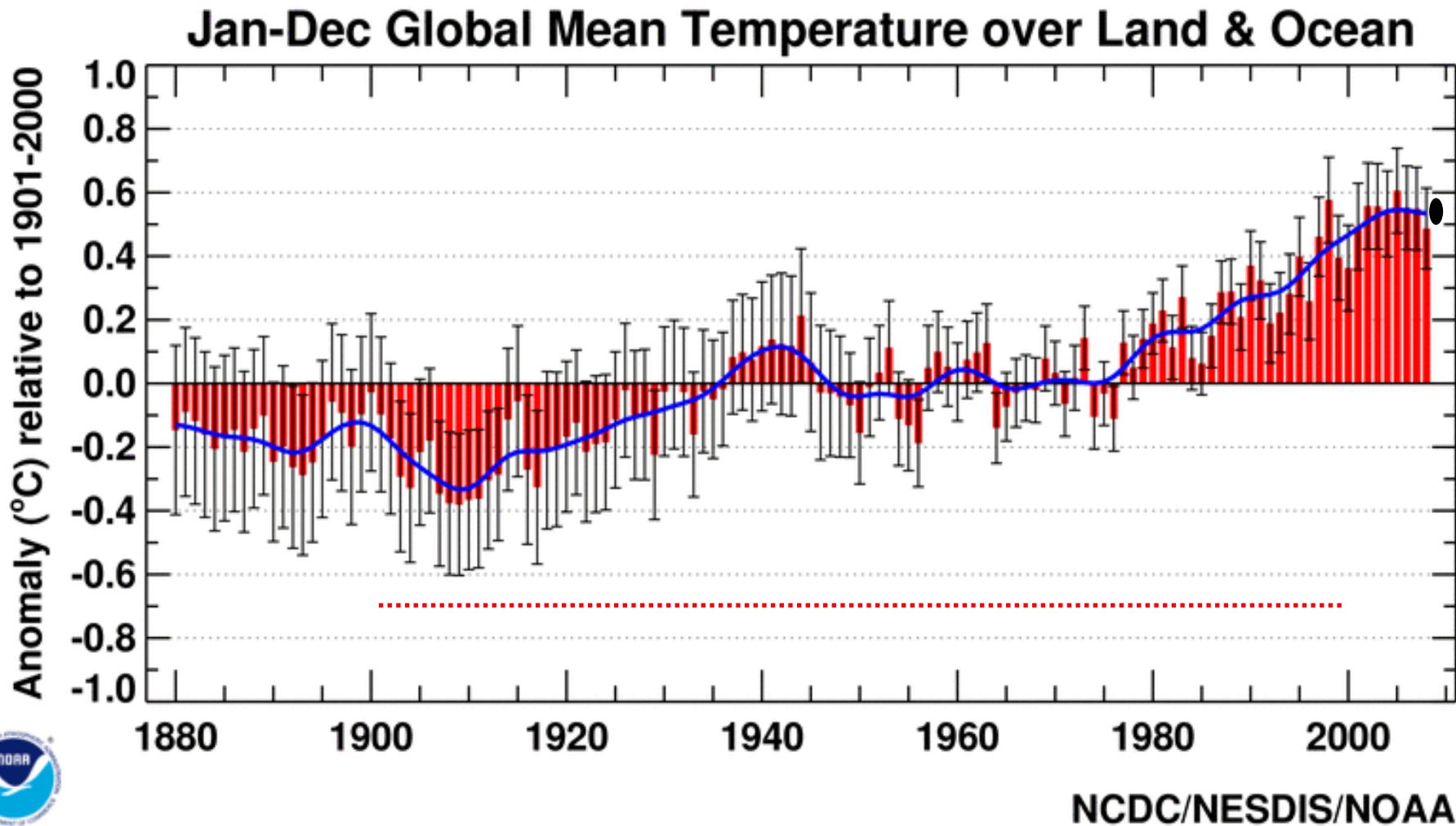
PRECIPITATION (2006) 
precipitation amount, rain, snow, precipitation rate, precipitation anomalies...

ATMOSPHERIC PHENOMENA (646) 
storms, hurricanes, lightning, fog, cyclones...

Globális felmelegedés

| | |
|---------|--------|
| 2009 6 | 0.6061 |
| 2009 7 | 0.5685 |
| 2009 8 | 0.6102 |
| 2009 9 | 0.6167 |
| 2009 10 | 0.5750 |
| 2009 11 | 0.6011 |
| 2009 12 | 0.4898 |

<http://www.ncdc.noaa.gov/oa/climate/research/anomalies/index.html>



Globális felmelegedés

Intergovernmental Panel on Climate Change

Politikai motiváció a háttérben

ENSZ, 1988 (nem testület!)



Három munkacsoport + centrumok

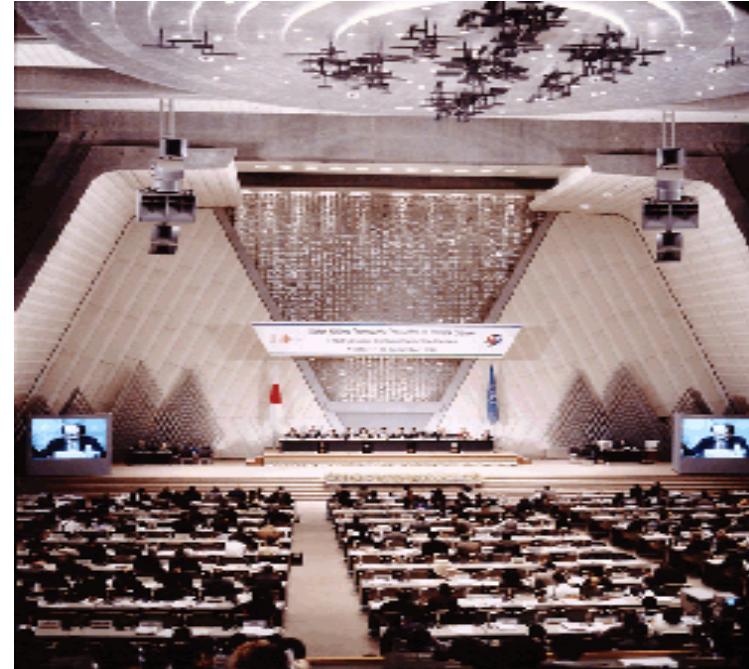
Négy nagy jelentés (1990-2007)

Megjelent tudományos közlemények alapján,
önálló kutatások nem folynak

75%-a a WG1 IPCC (2007) szerzőinek nem vett
részt a WG1 IPCC (2001)-ben

WG1 Report (The Physical Science Basis): 2004-2007
152 szerző, ~450 közreműködő, ~600 szakértő bíráló,
30,000+ megjegyzés, ~5000 irodalmi hivatkozás

Tudomány konszenzus alapján (?!?!?)





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IPCC honoured with the
2007 Nobel Peace Prize

IPCC
Phone: +41-22-730-8208 /84/54
Email: IPCC-Sec@wmo.int

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Moving towards the Fifth Assessment Report (AR5)

The IPCC has started work on the preparation of its Fifth Assessment Report (AR5). We are currently looking for experts who can act as authors:

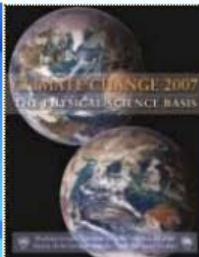
- | [AR5 Overview](#)
- | [Letter to Governments \(PDF\)](#)
- | [Letter to Organizations \(PDF\)](#)
- | [AR5 nominations portal](#)

The **Fourth Assessment Report (AR4)** was released in 2007, and it consists of four volumes: the three IPCC Working Groups (WGs) Reports and a Synthesis Report (SYR)... [[More](#)]

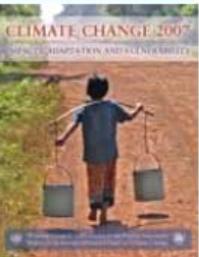
The AR4 Synthesis Report



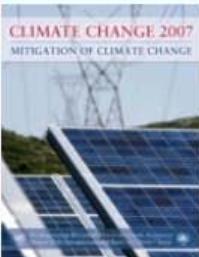
WG I
The Physical
Science Basis



WG II
Impacts,
Adaptation and
Vulnerability



WG III
Mitigation of
Climate Change



IPCC 31st Plenary Session
Bali, Indonesia

26-29 October 2009

Approved outlines of WG
contributions to AR5

- | [Doc. 19 - WG I - Outline](#)
- | [Doc. 20, Rev. 1 - WG II - Outline](#)
- | [Doc. 21 - WG III - Outline](#)

Draft Report of the 31st Session
([PDF](#))

News

| [IPCC statement on trends in
disaster losses](#)
Issued on 25 January 2010

Melting of Himalayan glaciers:
| [IPCC statement](#)
Issued on 20 January 2010

IPCC Special Report on
Managing the Risks of Extreme
Events and Disasters to Advance
Climate Change Adaptation
| [List of Lead Authors](#)
[More](#) ...

The IPCC is very pleased that:

| **Dr Christopher Field**, Co-chair
Working Group II, receives a
Heinz Award for his contributions
toward understanding the
impacts of climate change on the
earth's ecosystems.
| [Read more](#)

| **Sir John T. Houghton**, Co-chair
of IPCC Working Group I from
1988 to 2002, receives
**"Albert Einstein" World Award
of Science**
| [RMetS press release](#)
[World Cultural Council](#)

IPCC at the UNITED NATIONS CLIMATE CHANGE CONFERENCE - COP 15



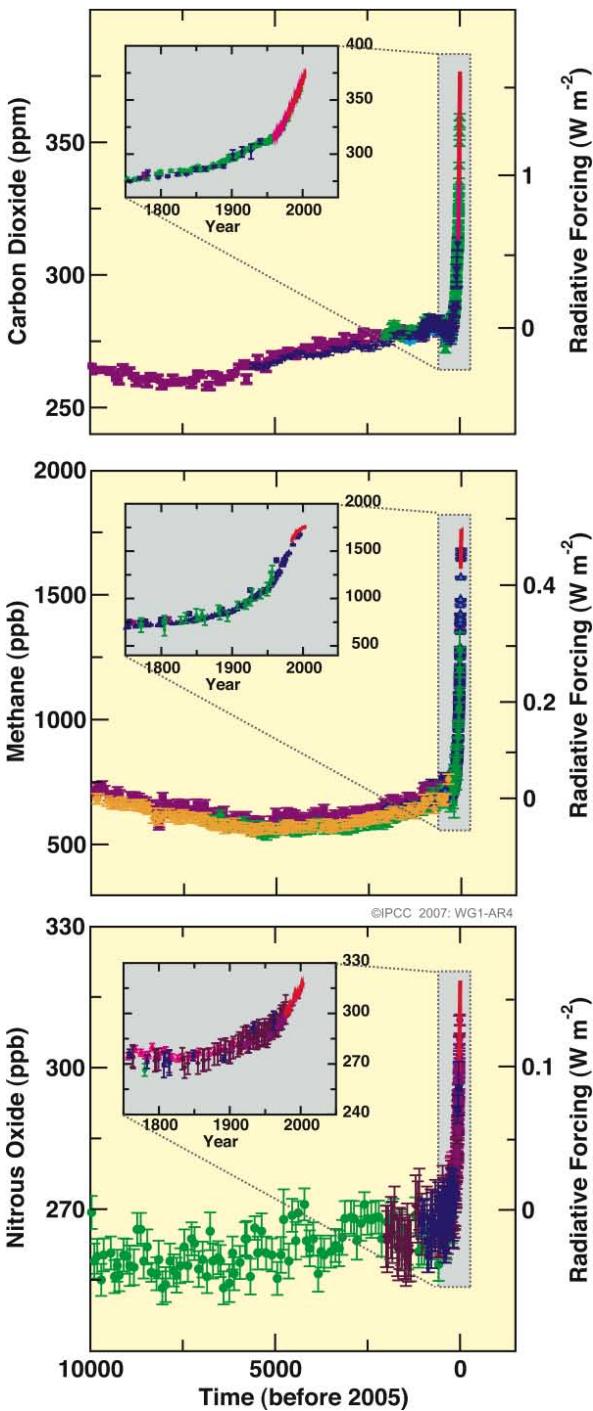
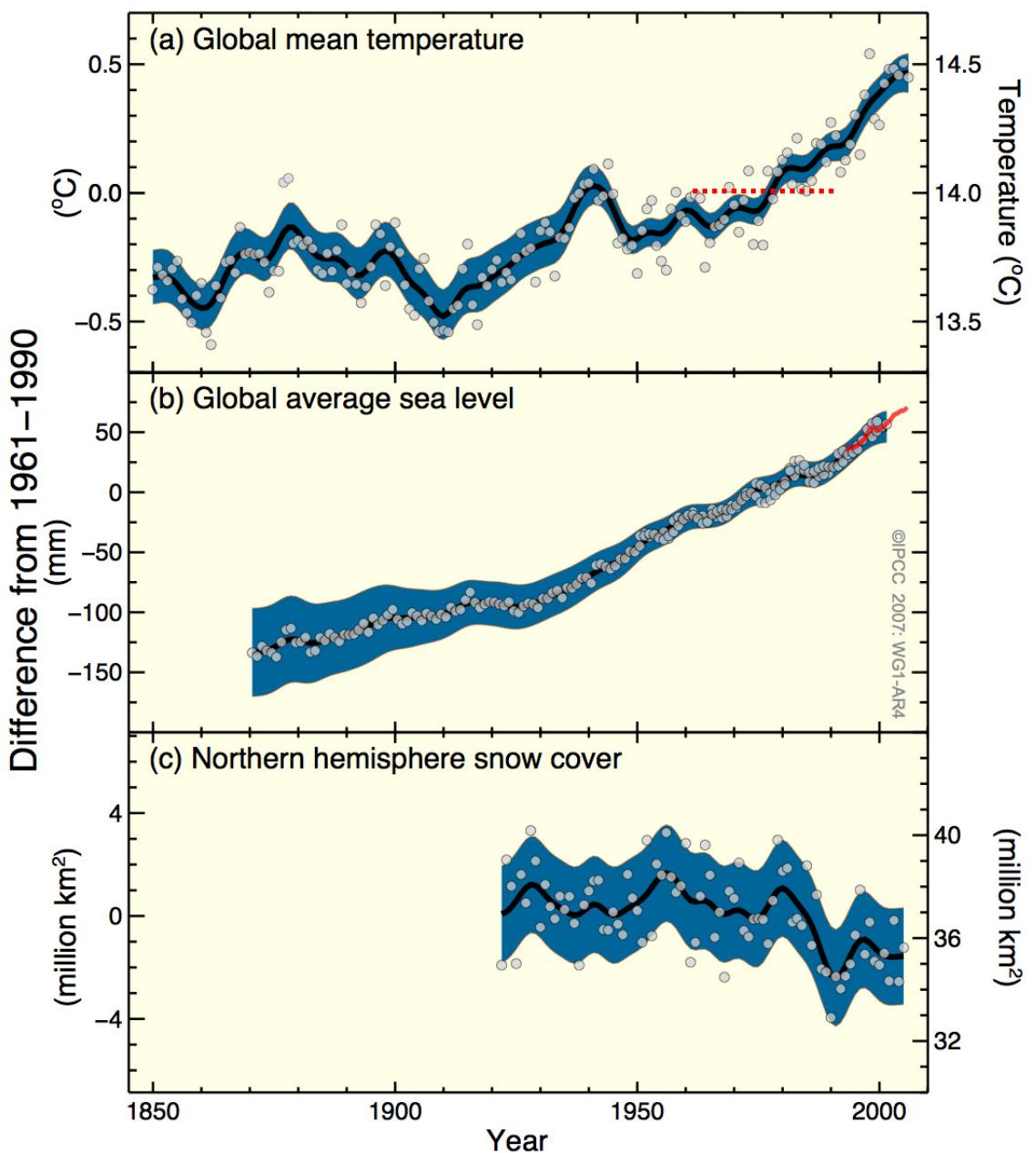
Copenhagen, Denmark, 7 December 2009

| [Speech](#) by the IPCC Chairman
Mr R.K. Pachauri at the
Welcoming Ceremony

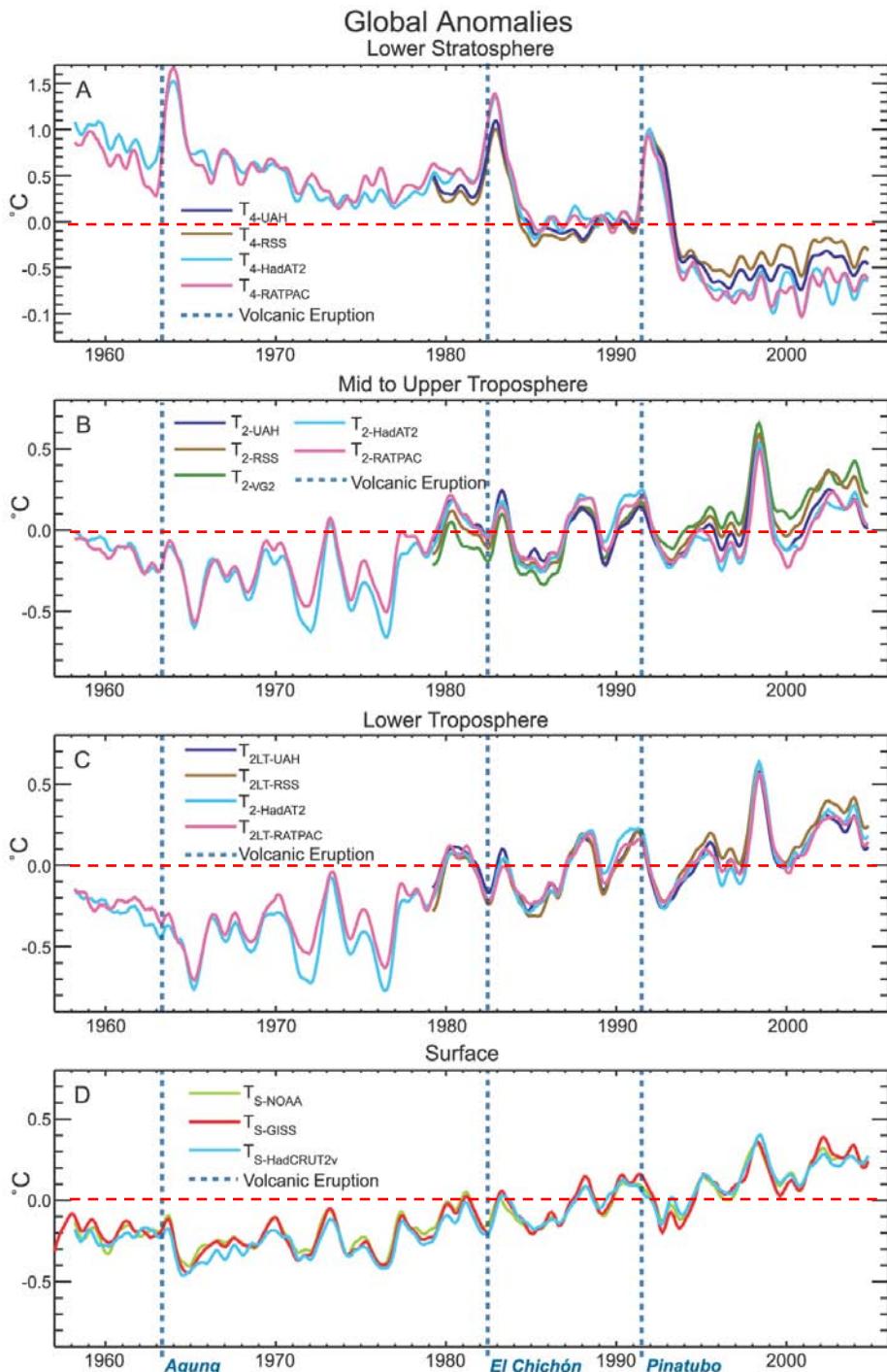
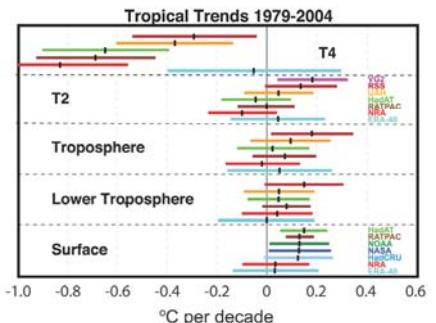
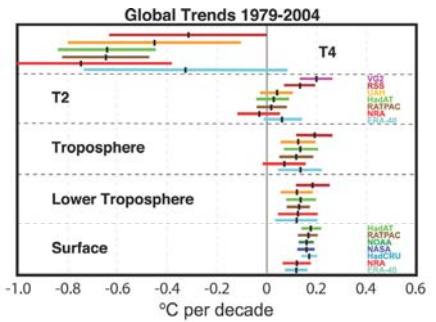
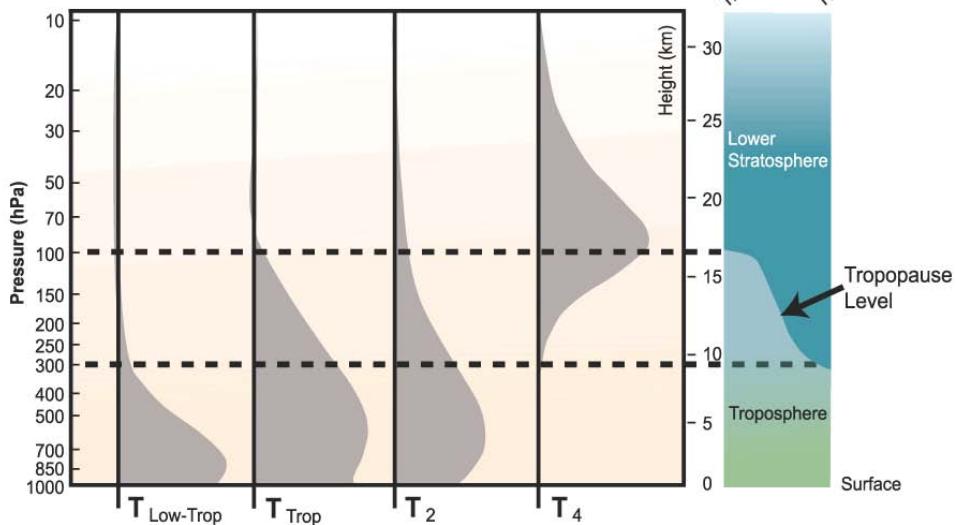
Side Event on "IPCC Findings and
Activities and their Relevance for the
UNFCCC Process", 8 December 2009

- | [Agenda](#)
- | [Presentations](#)
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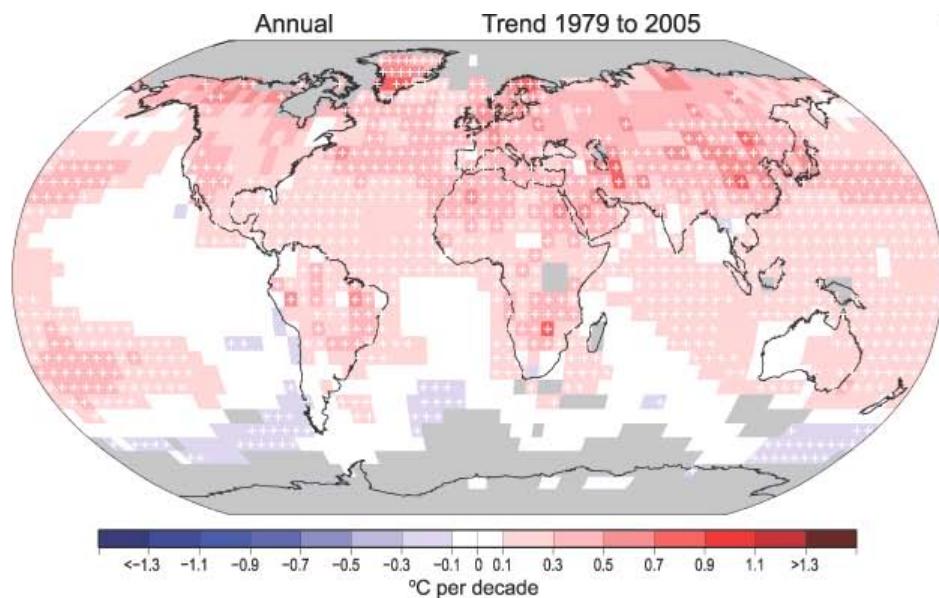
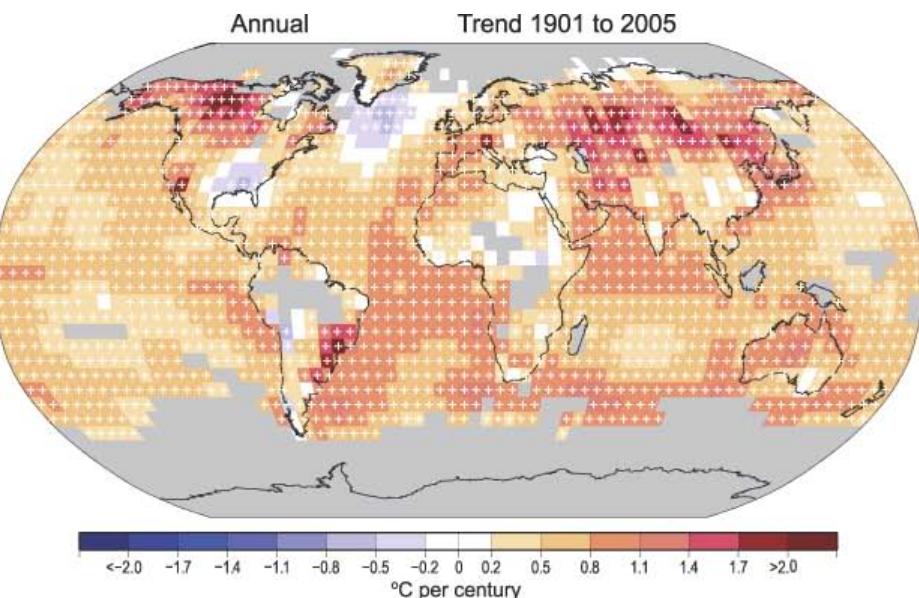
Globális felmelegedés



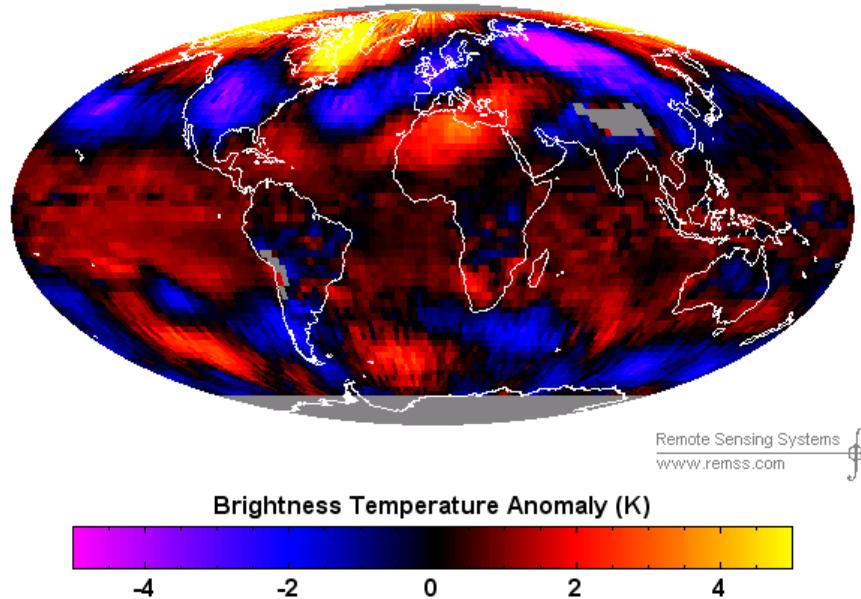
Globális felmelegedés



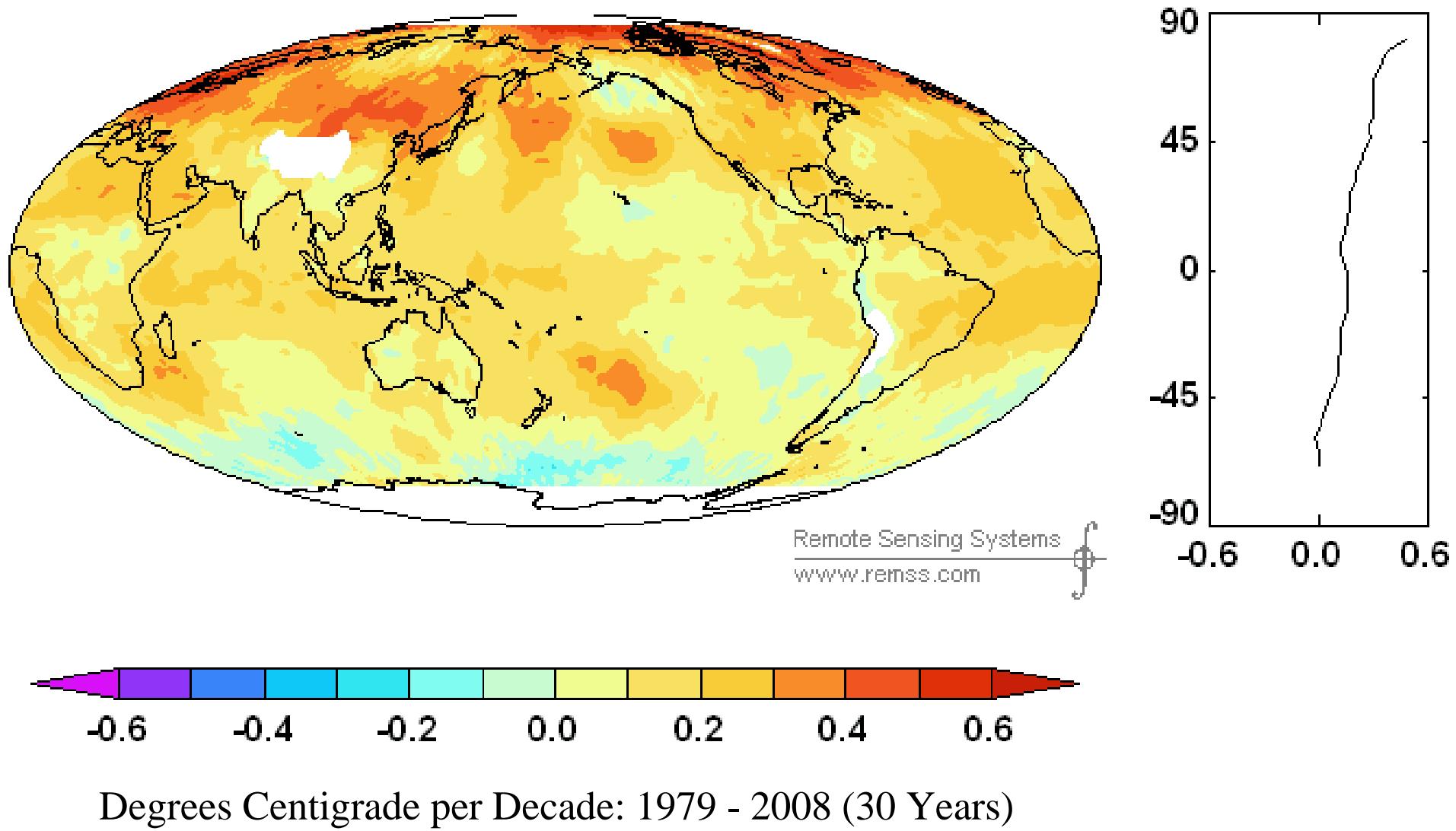
Globális felmelegedés



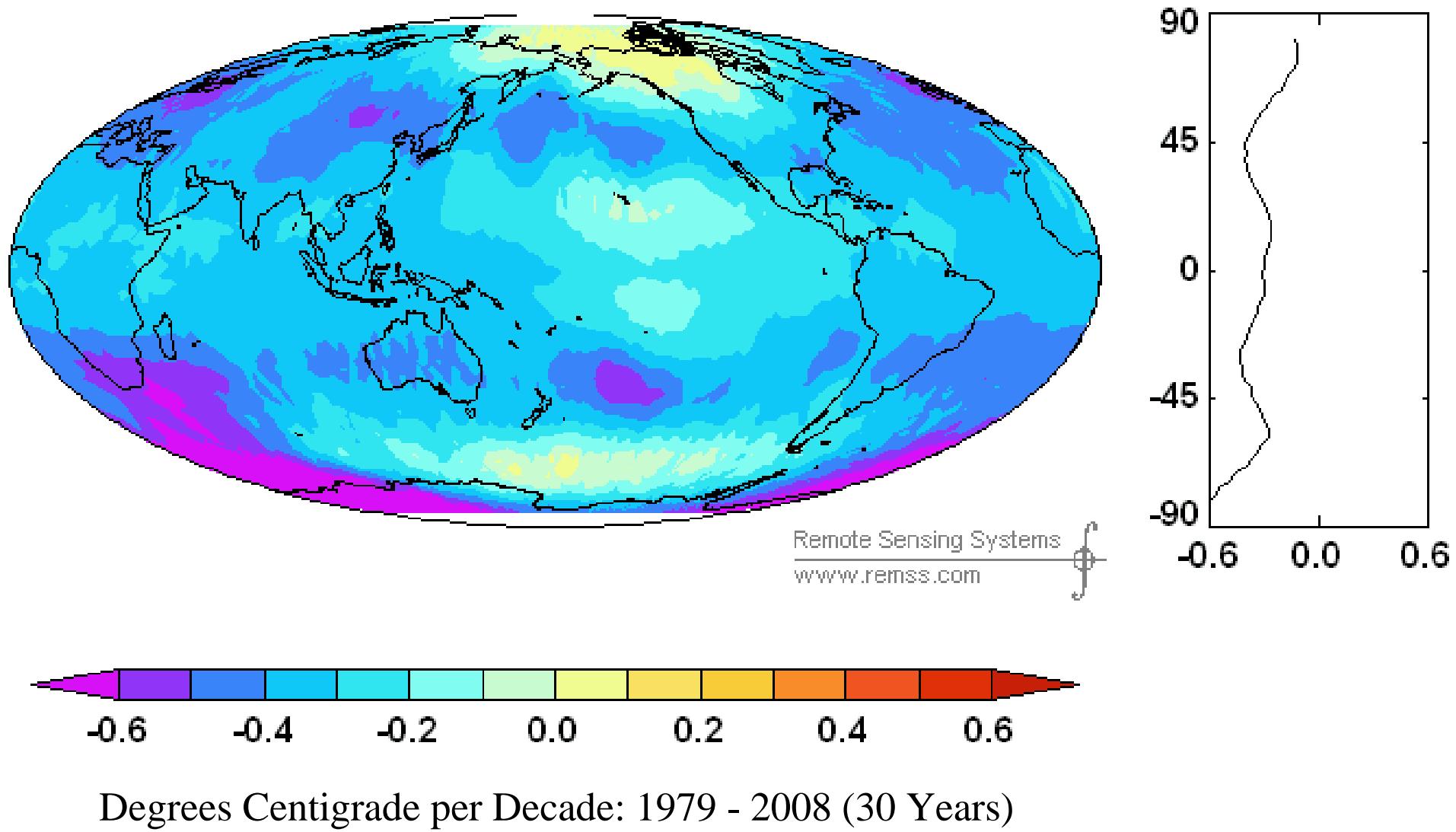
MSU/AMSU Channel TLT Brightness Temperature Anomaly, December, 2009



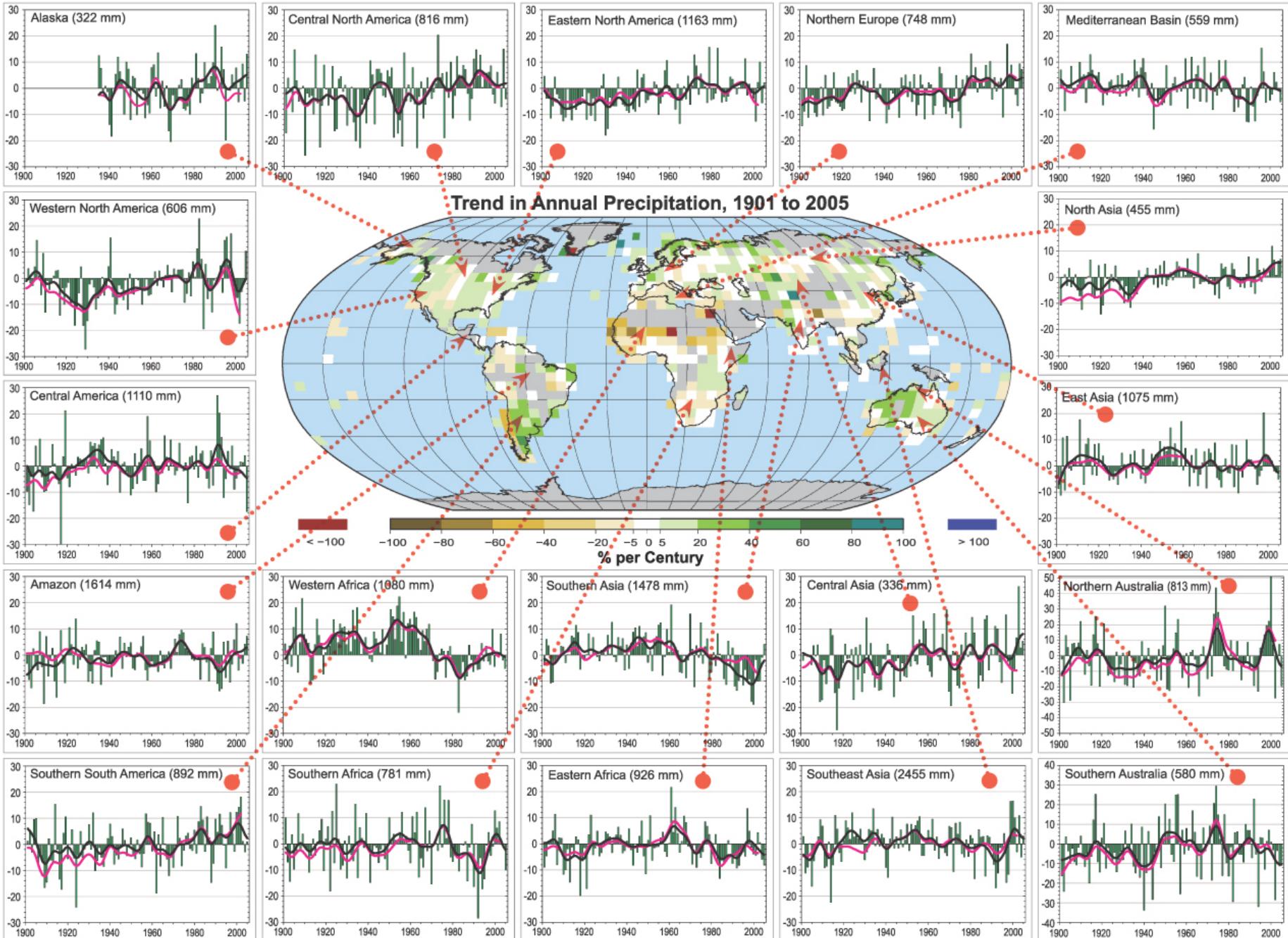
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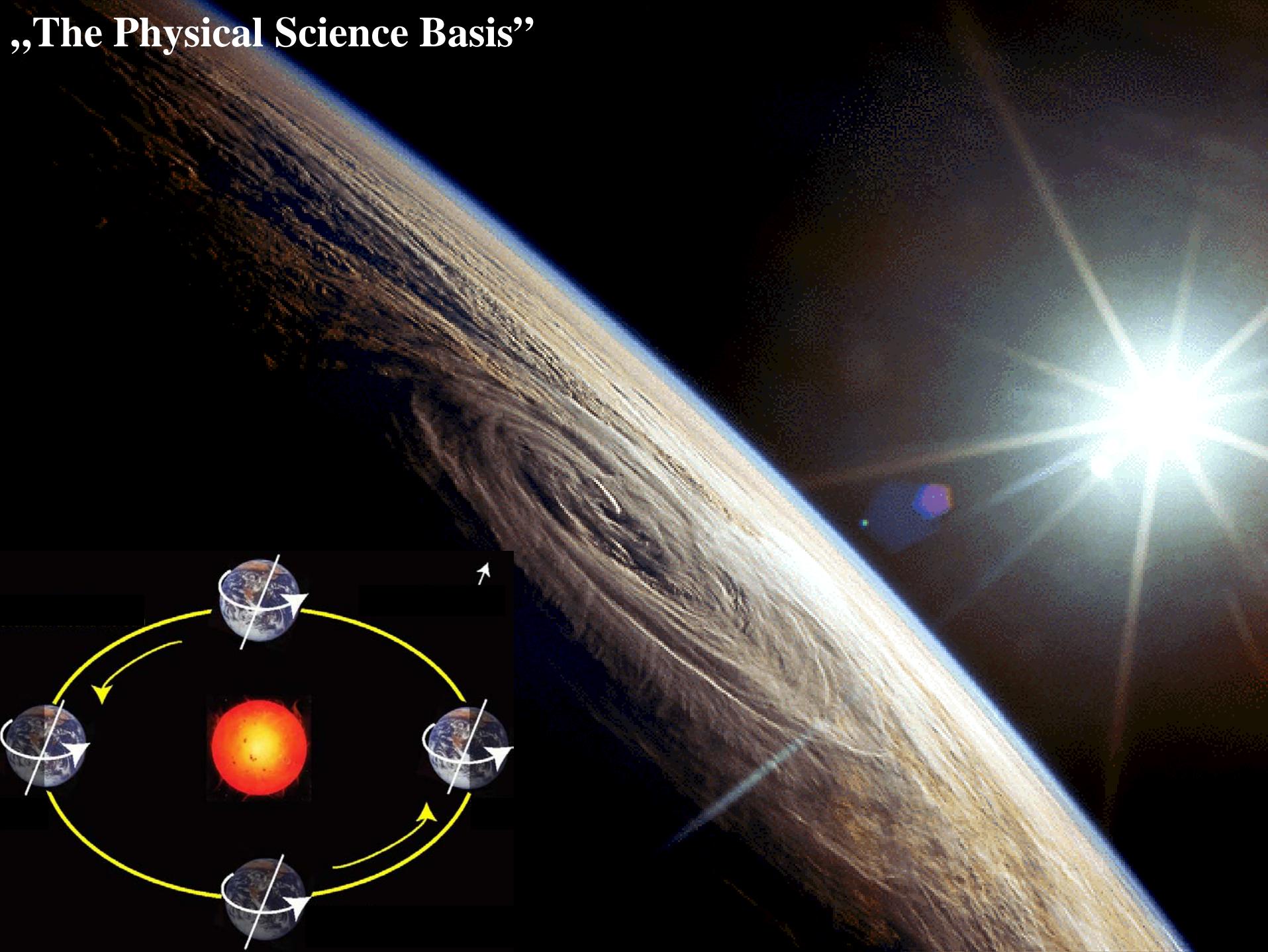
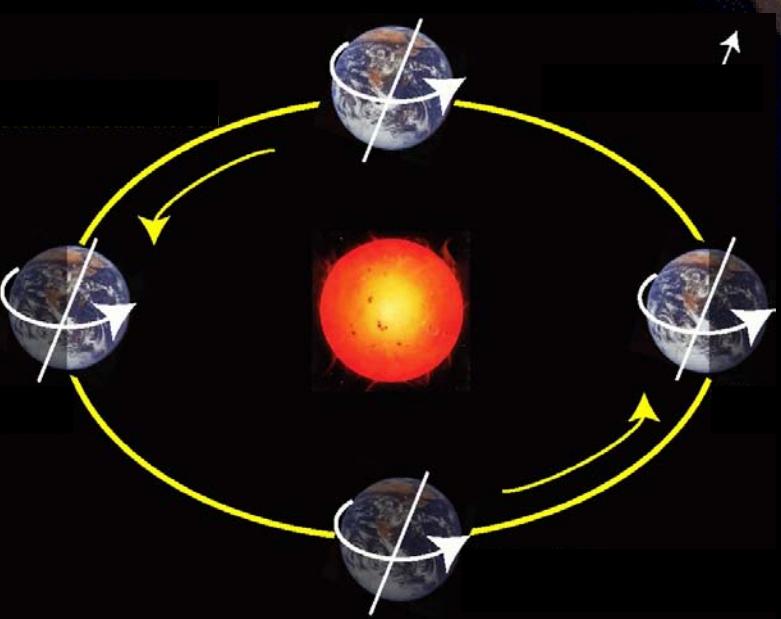
Globális felmelegedés



Globális felmelegedés



„The Physical Science Basis”



Globális energiamérleg, üvegházhatás

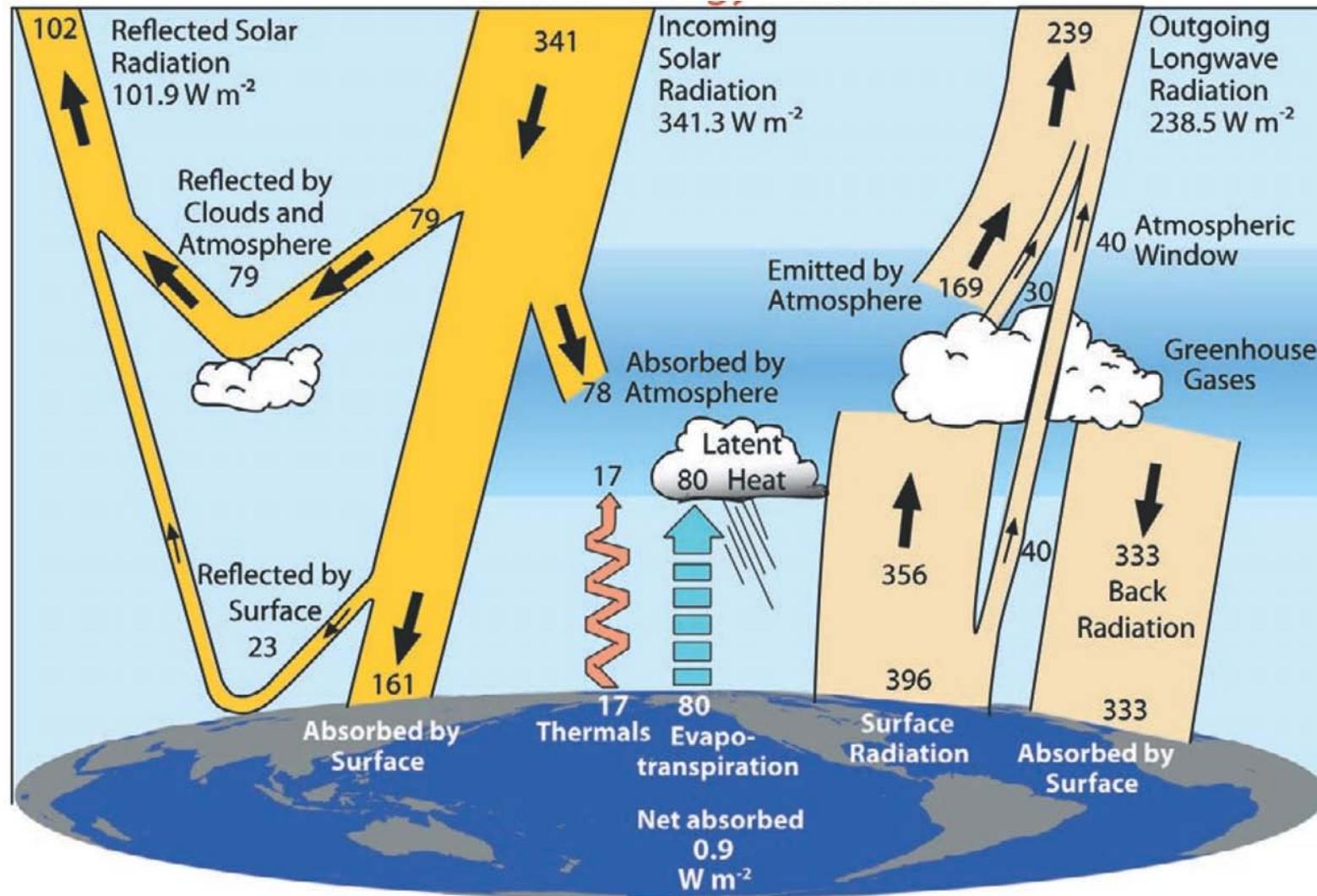
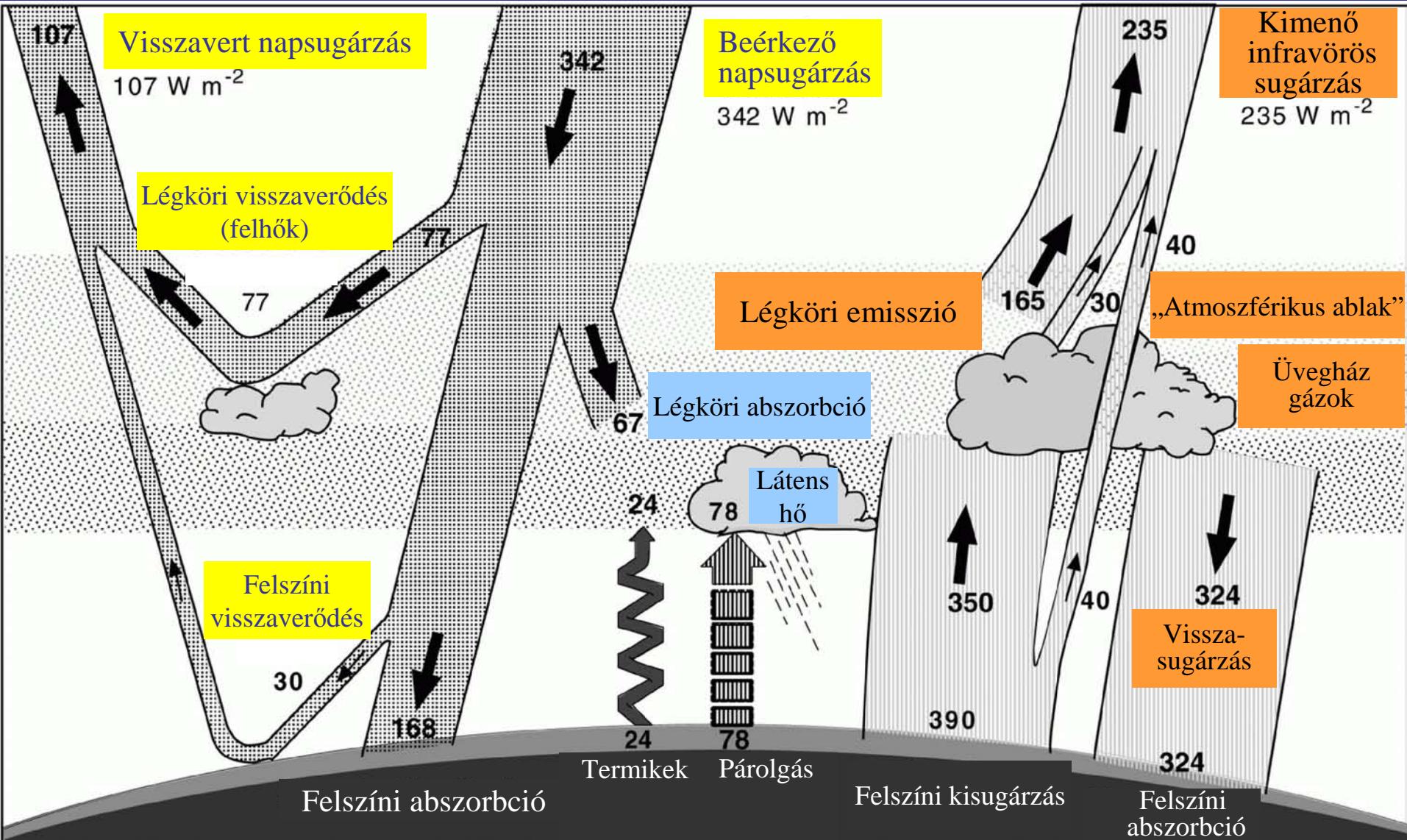
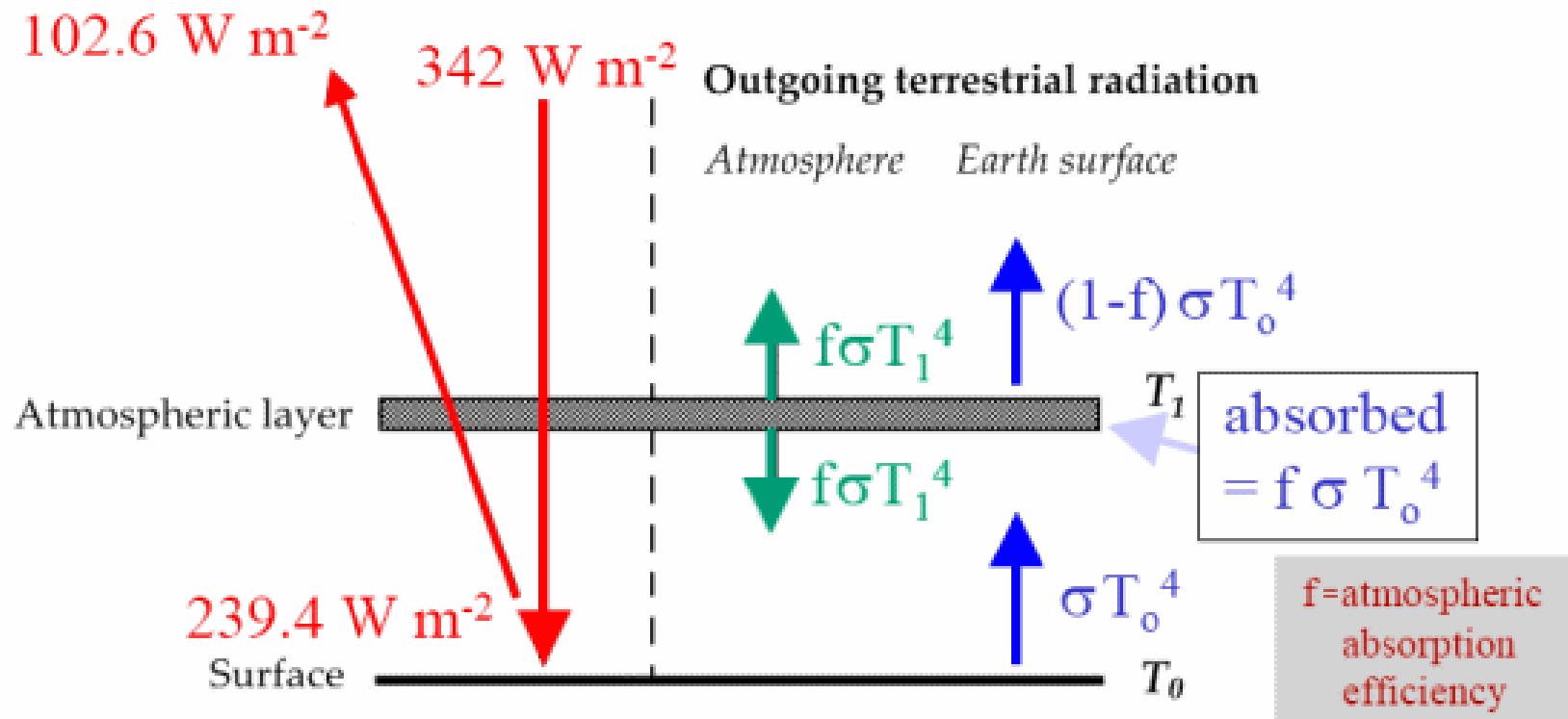


FIG. 1. The global annual mean Earth's energy budget for the Mar 2000 to May 2004 period (W m^{-2}). The broad arrows indicate the schematic flow of energy in proportion to their importance.

Globális energiamérleg, üvegházhatás



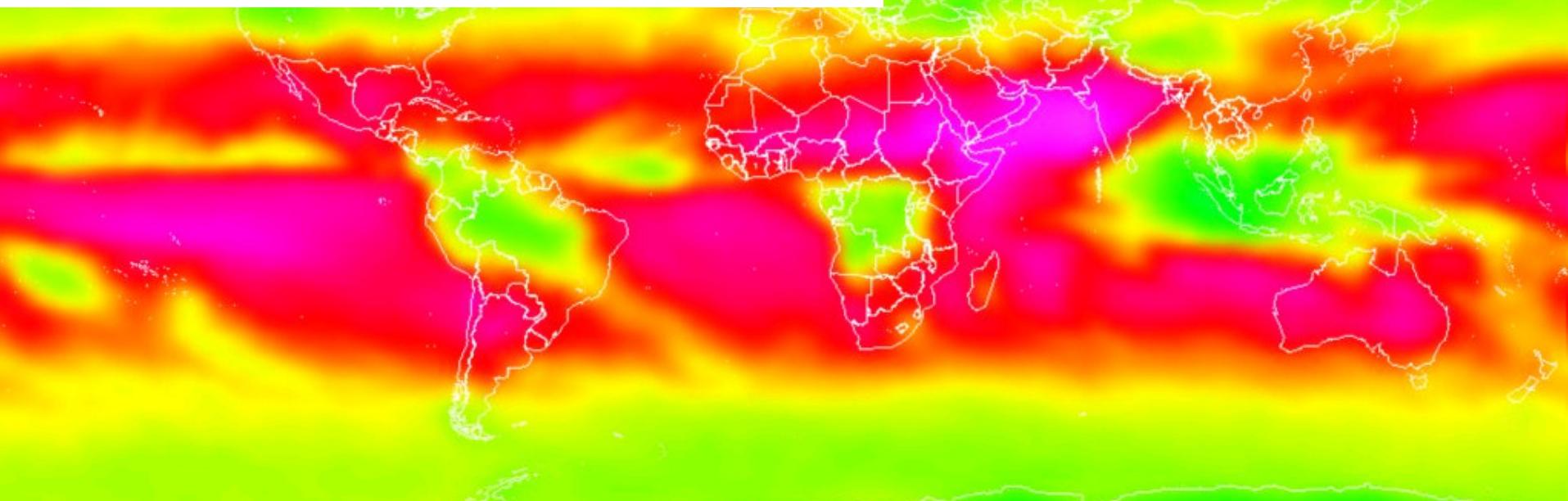
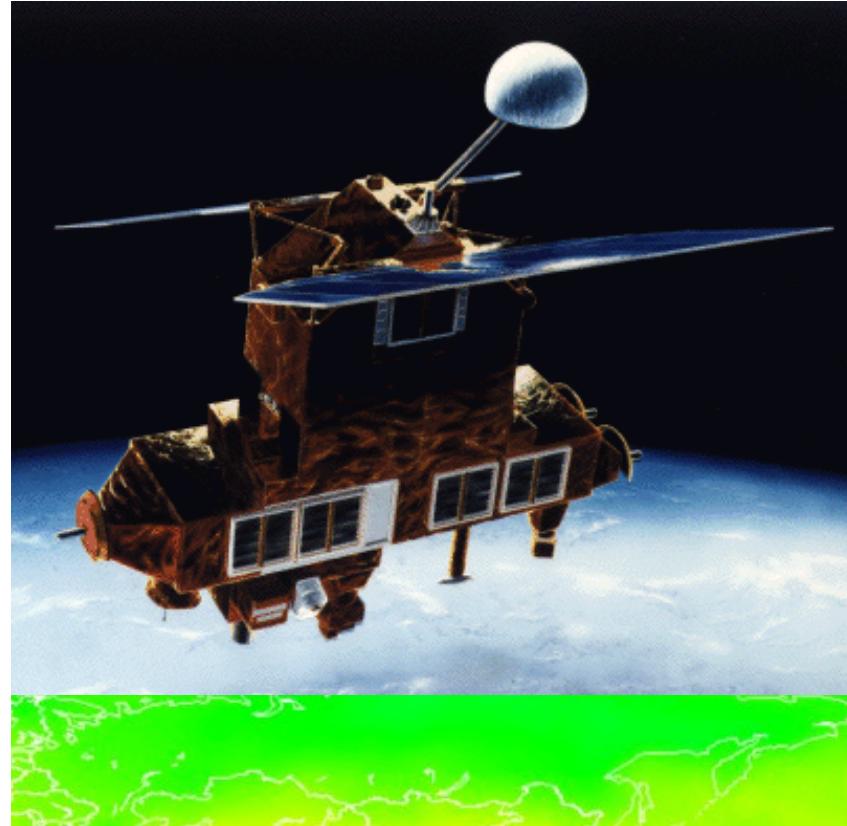
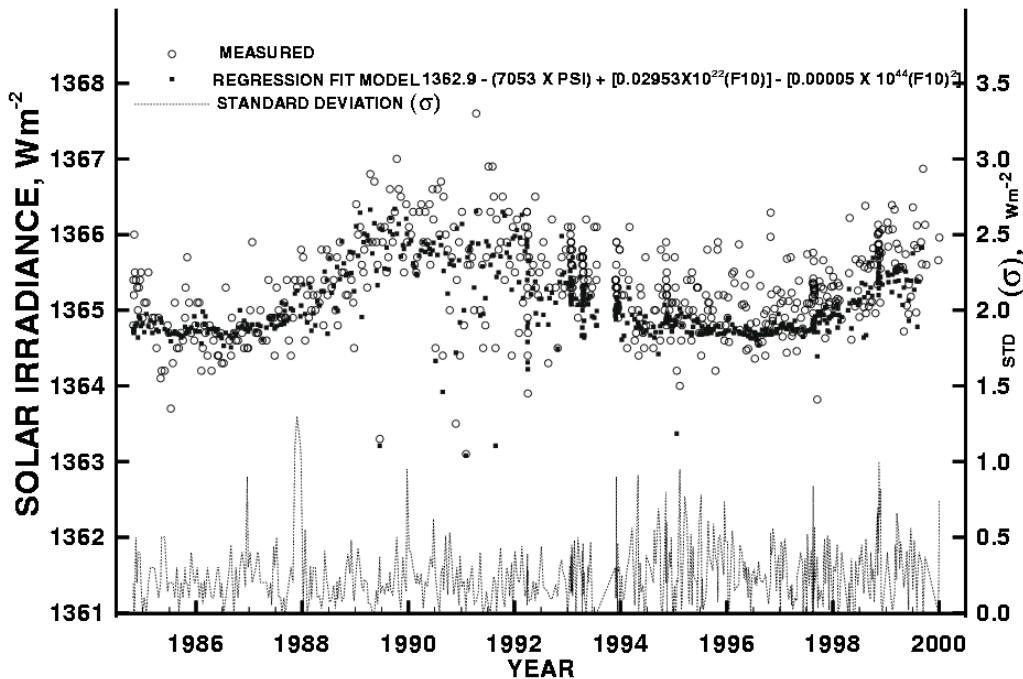
An Idealized Earth + atmosphere



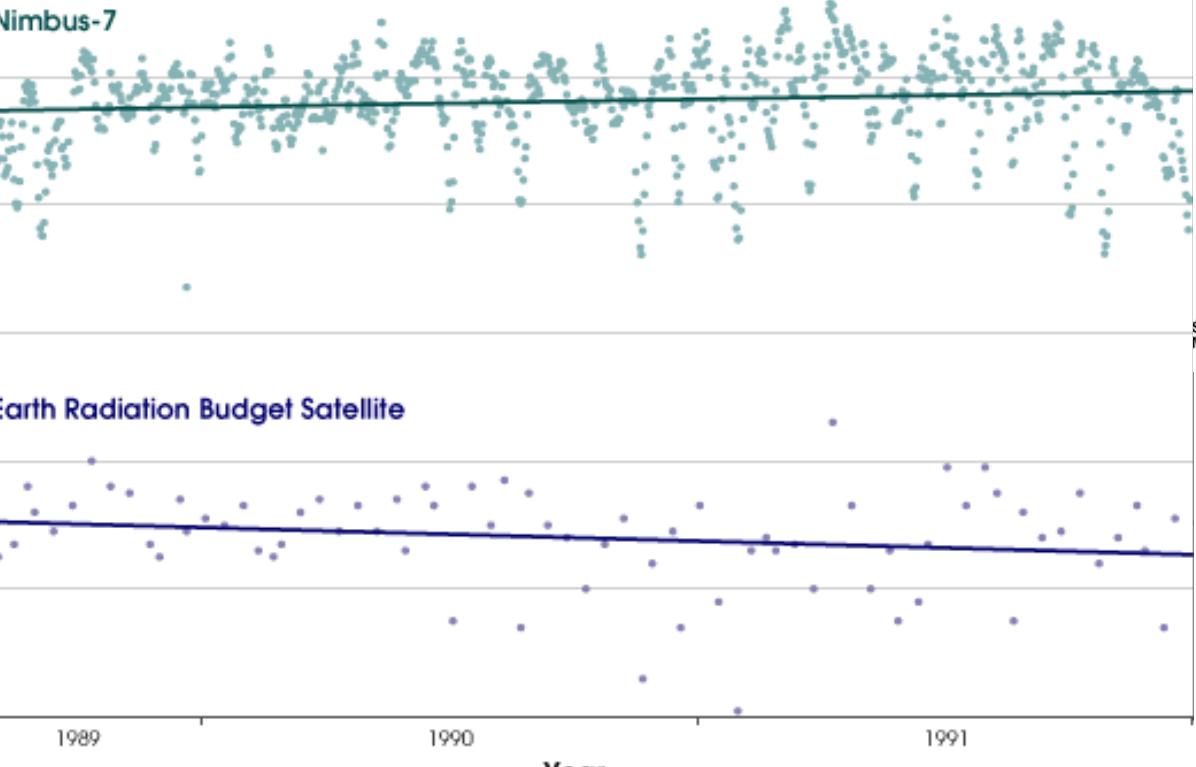
- Solar radiation at surface = 70% of 342 W m^{-2} = 239.4 W m^{-2} ($\sim 255^\circ\text{K}$)
- Infrared flux from surface = σT_0^4
- Absorption of infrared flux by atmosphere = $f \sigma T_0^4$
- Kirchhoff's law: efficiency of absorption = efficiency of emission
- IR flux from atmospheric layer = $f\sigma T_1^4$ (up and down)

$$\text{Flux}_{\uparrow} = \sigma T_0^2 - f\sigma(T_0^2 - T_1^2) \quad (\sim 287^\circ\text{K})$$

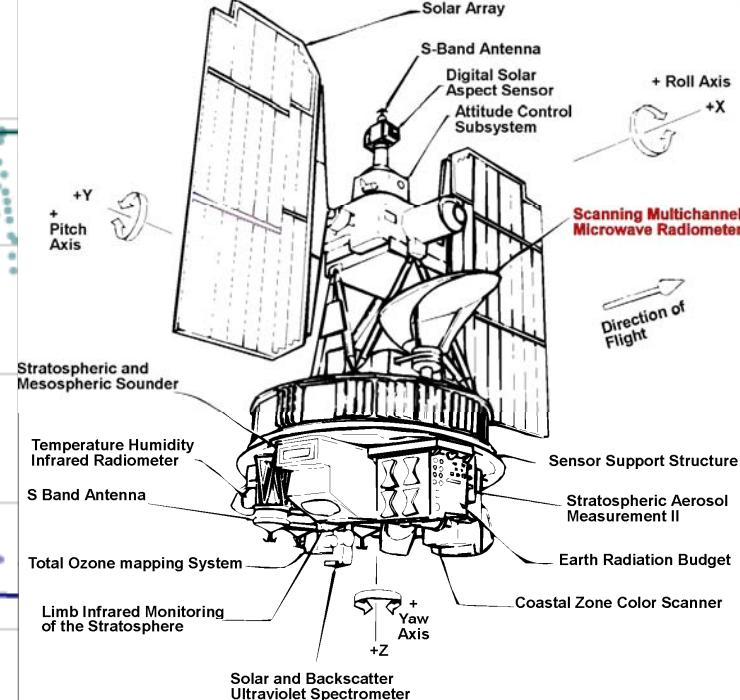
ERBS SOLAR MONITOR



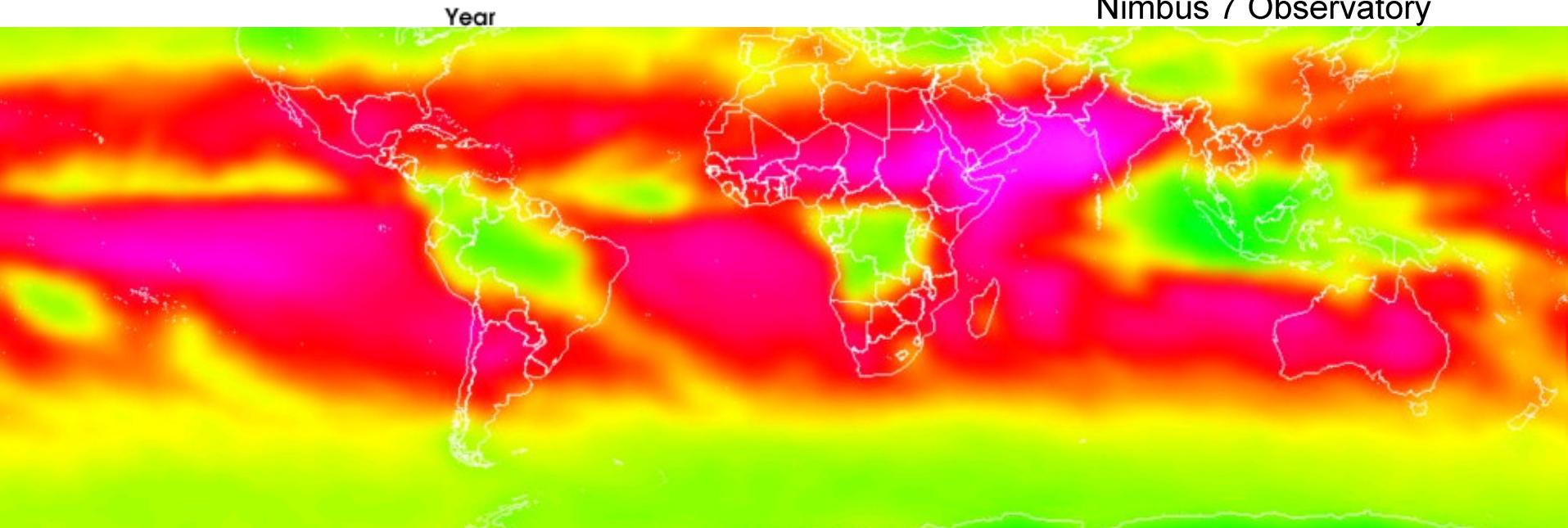
Nimbus-7

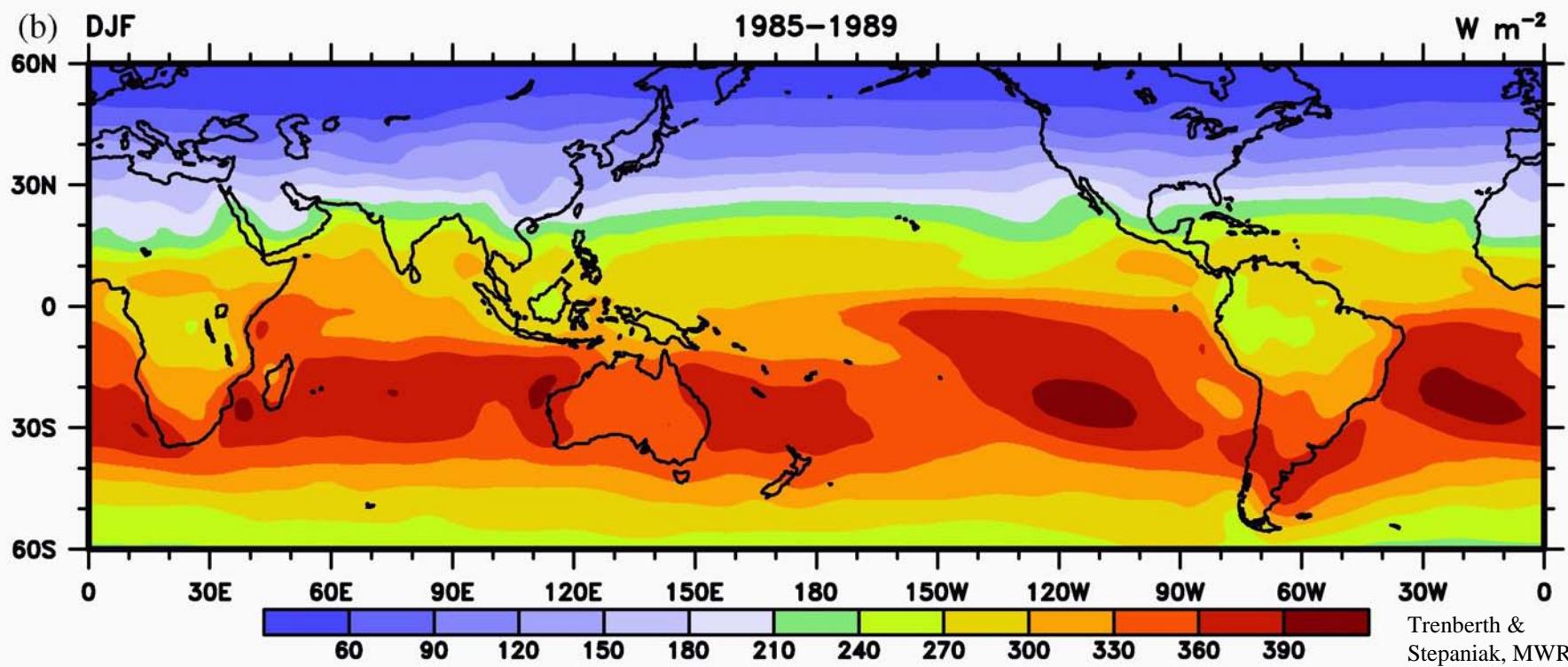
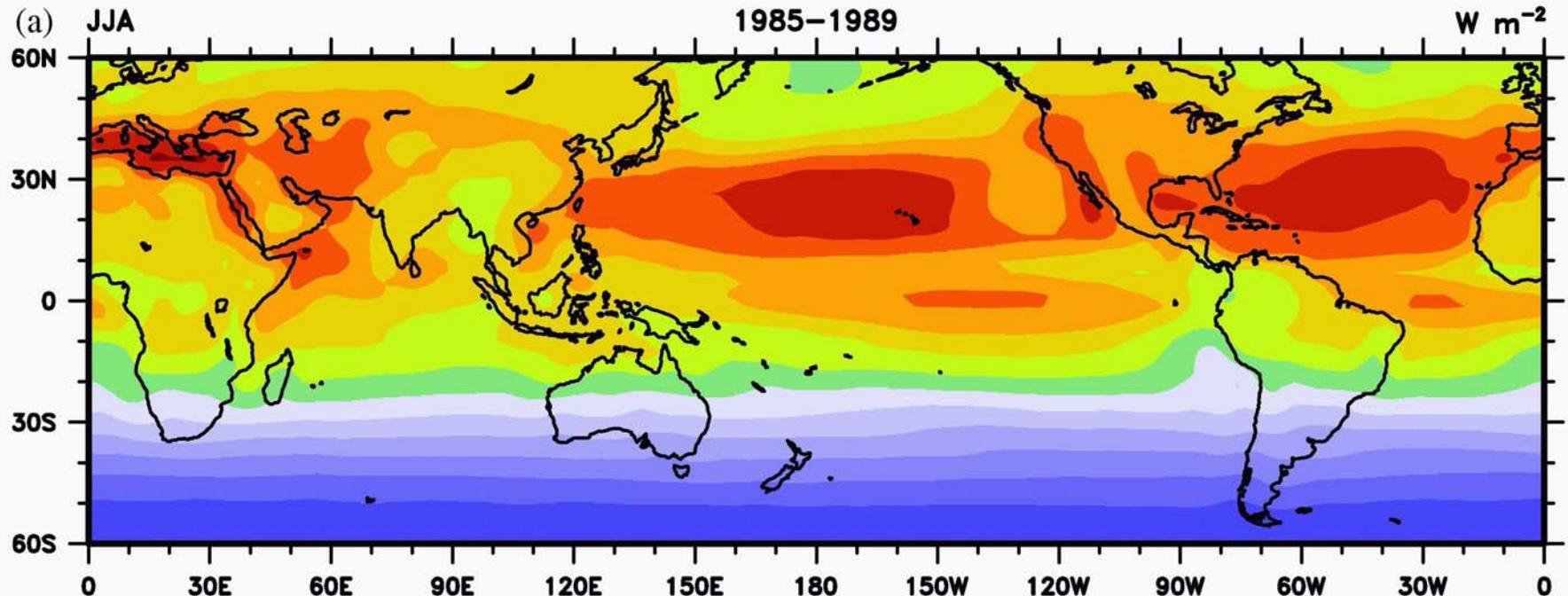


Earth Radiation Budget Satellite

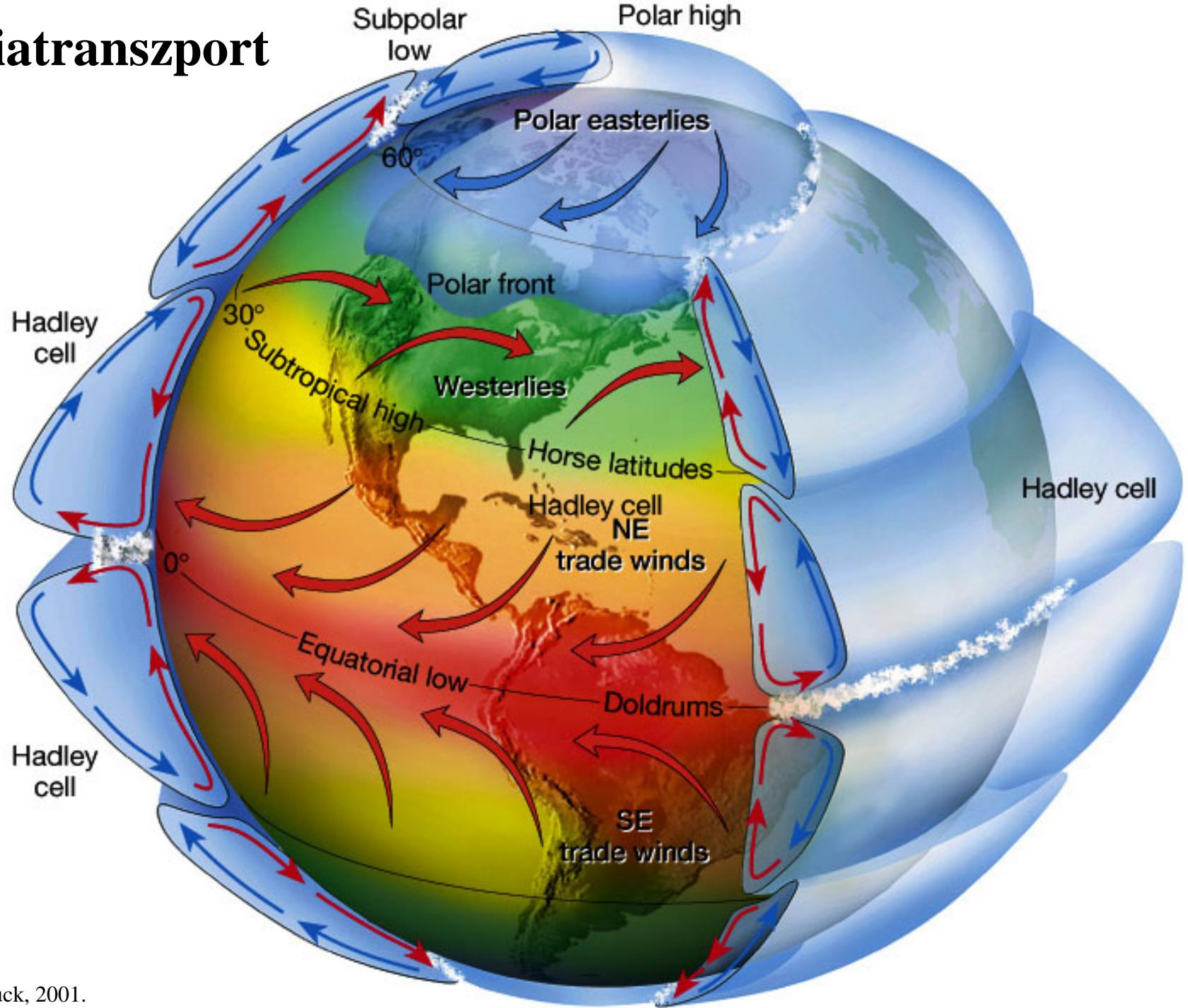


Nimbus 7 Observatory

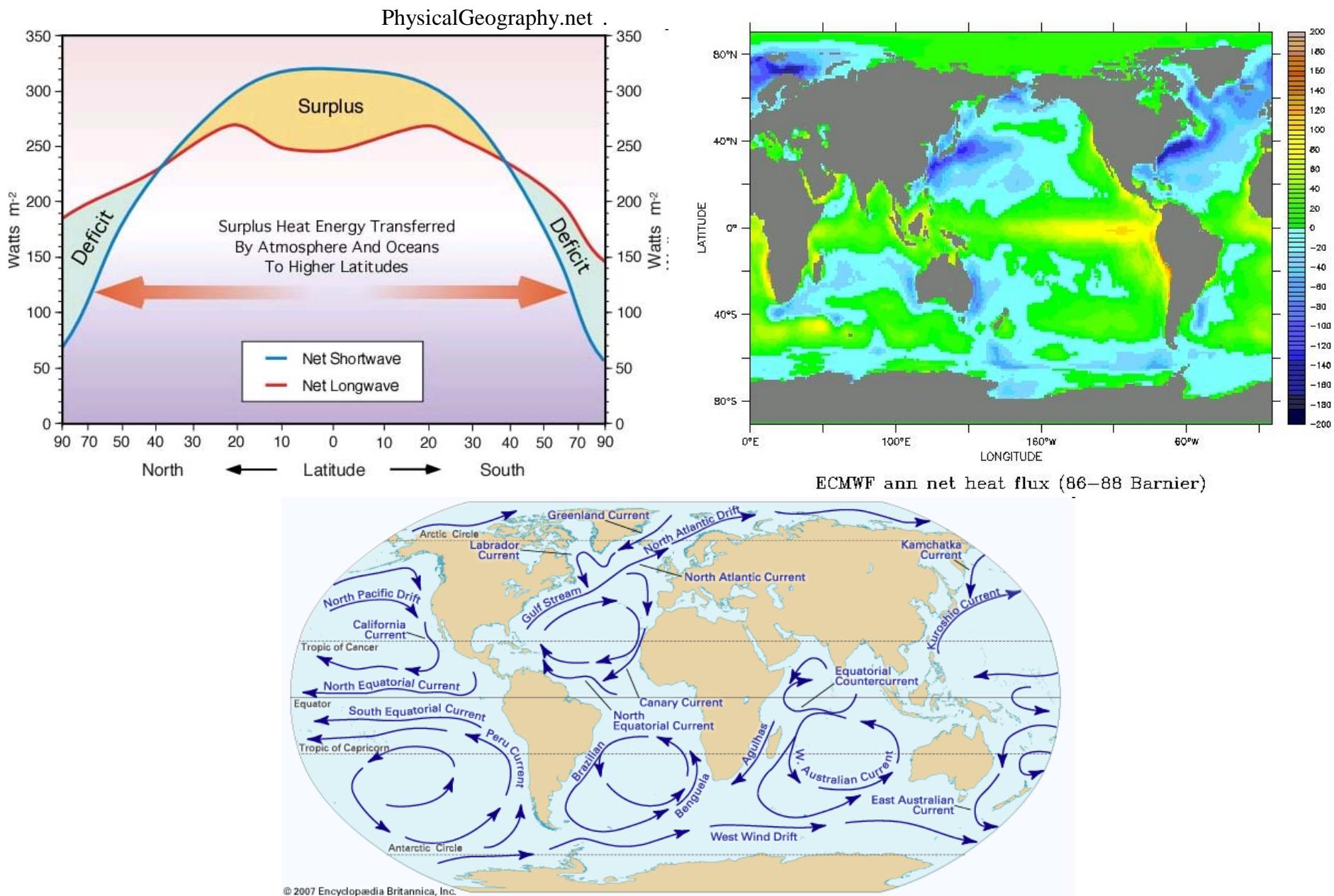




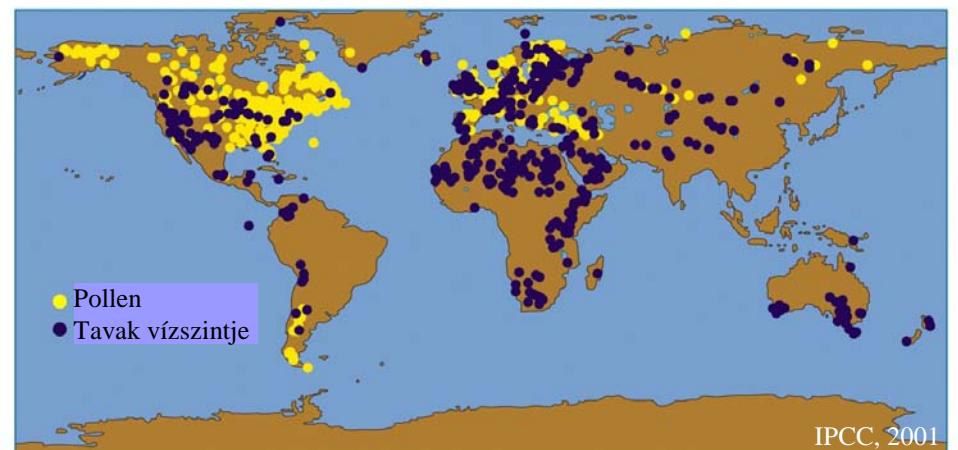
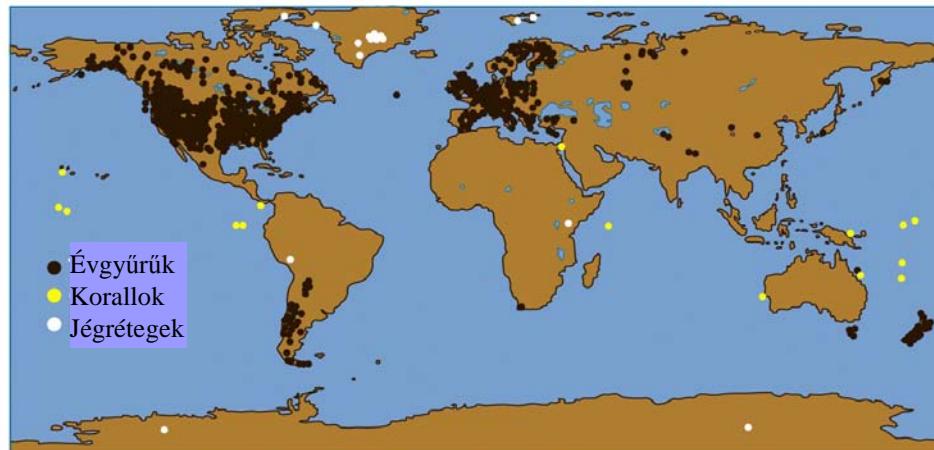
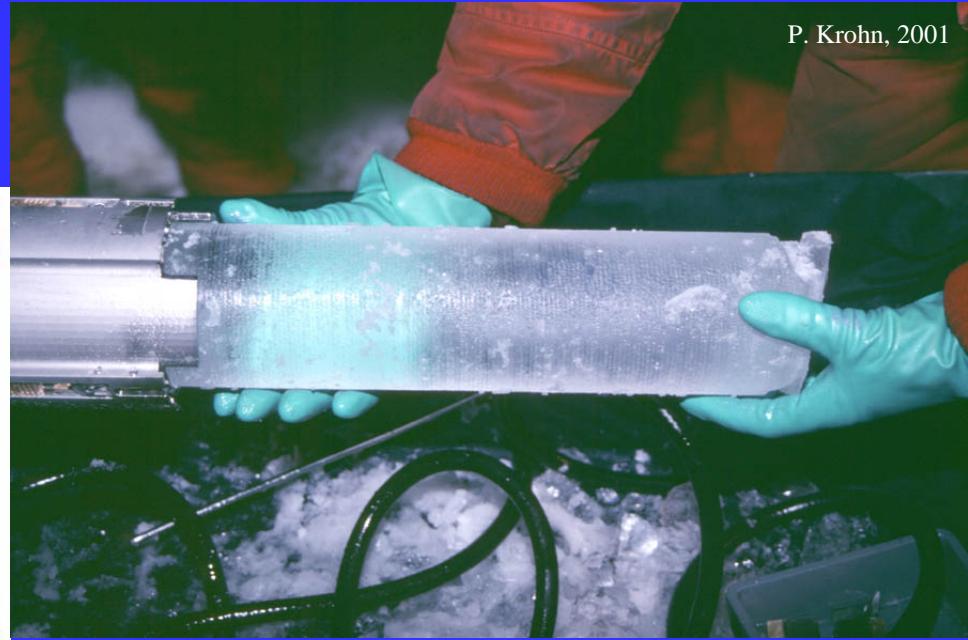
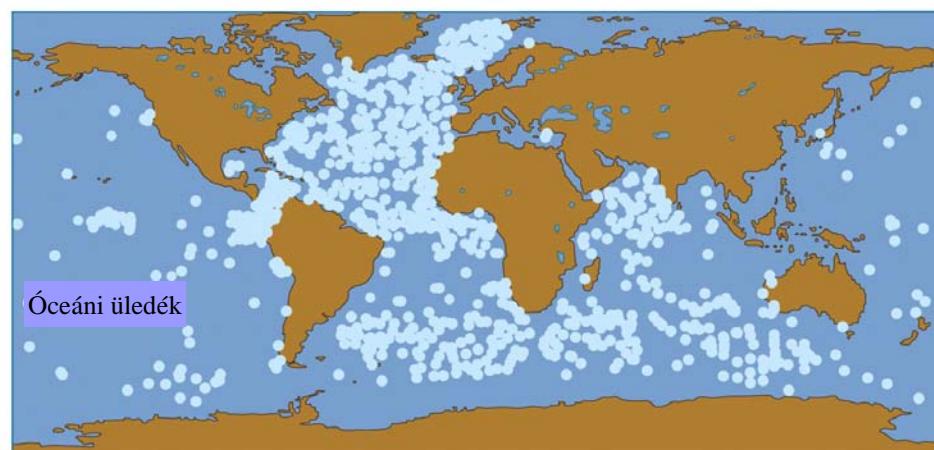
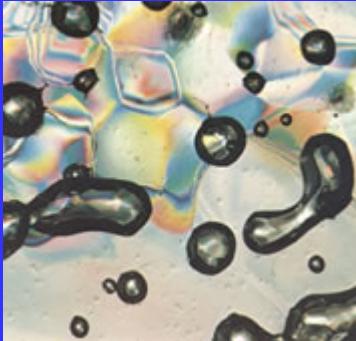
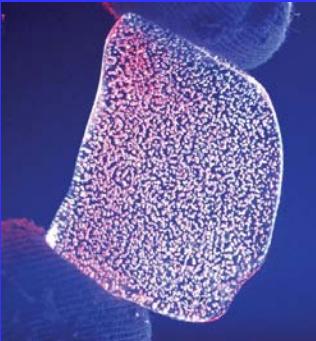
Energiatranszport

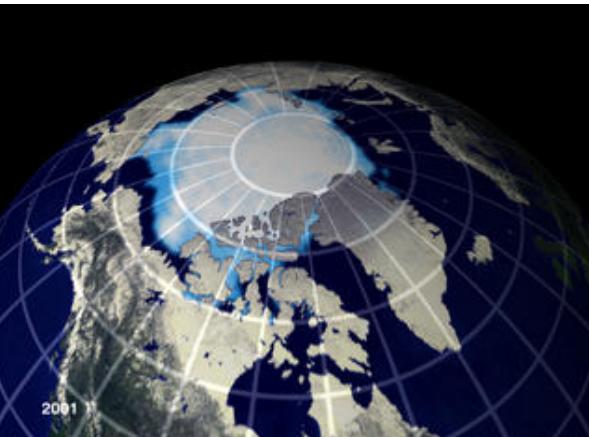
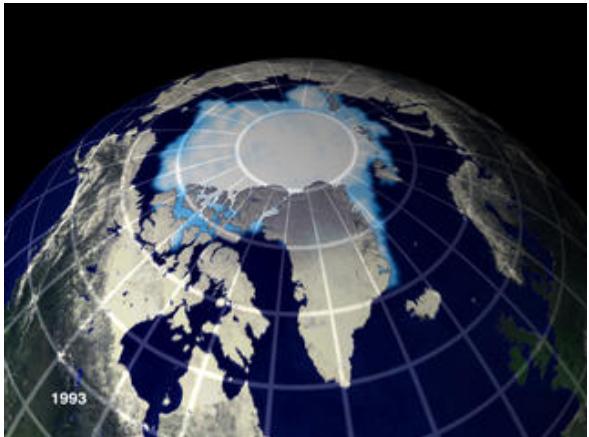


Energiatranszport

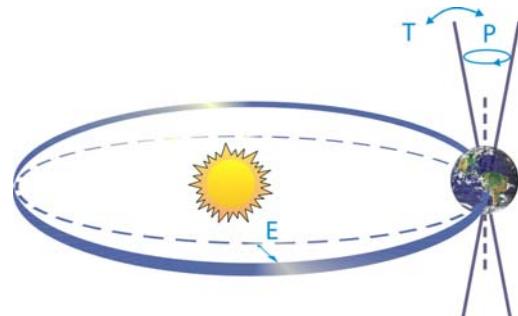
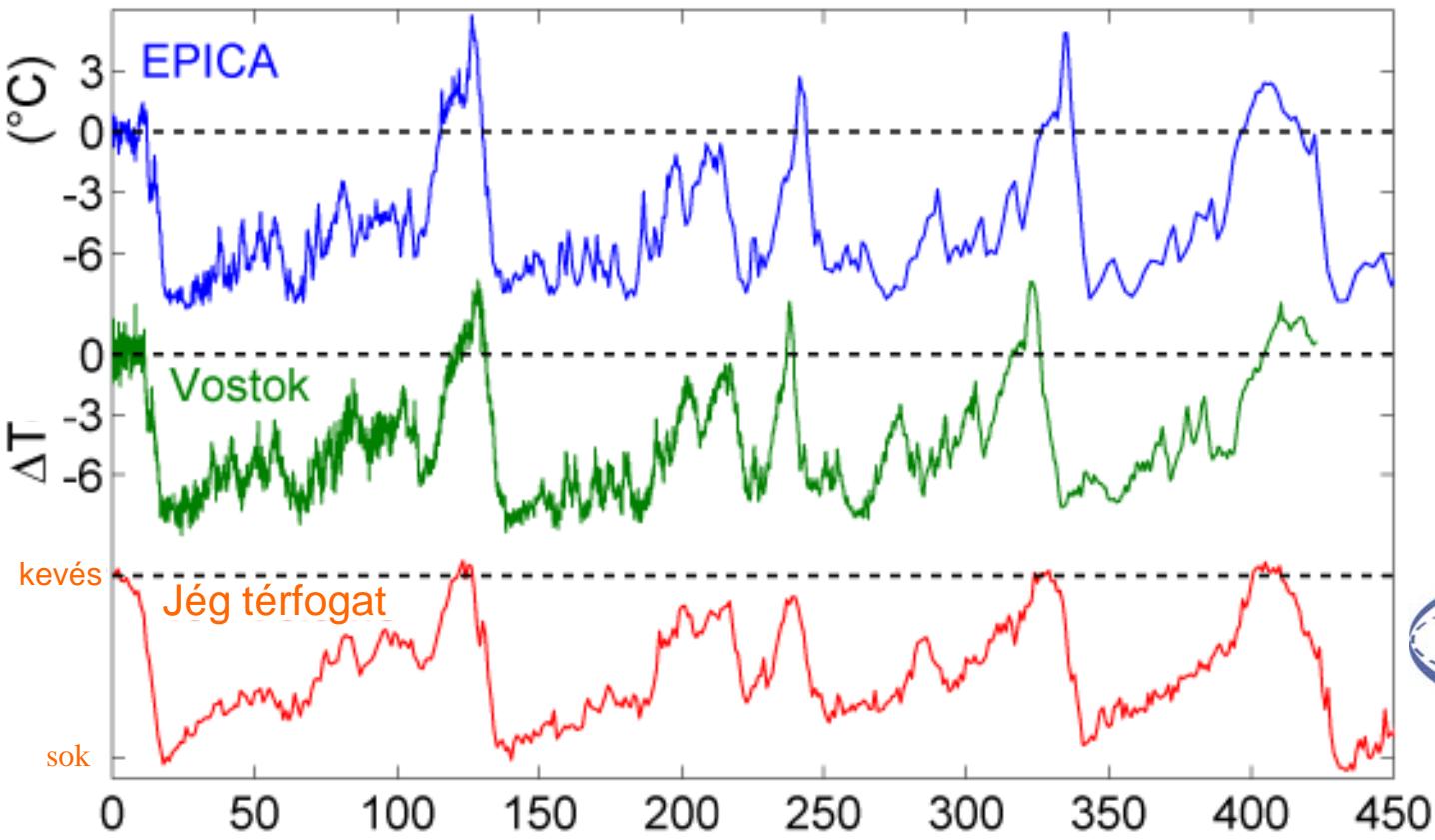


Hosszú távú klíma-rekonstrukció

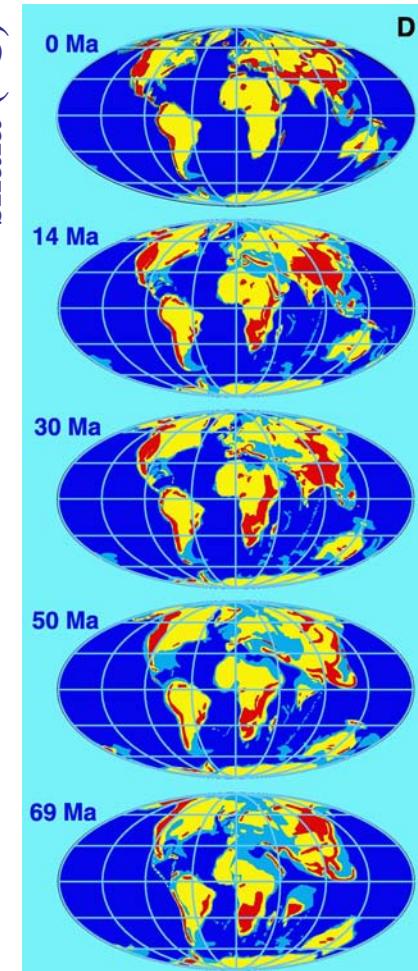
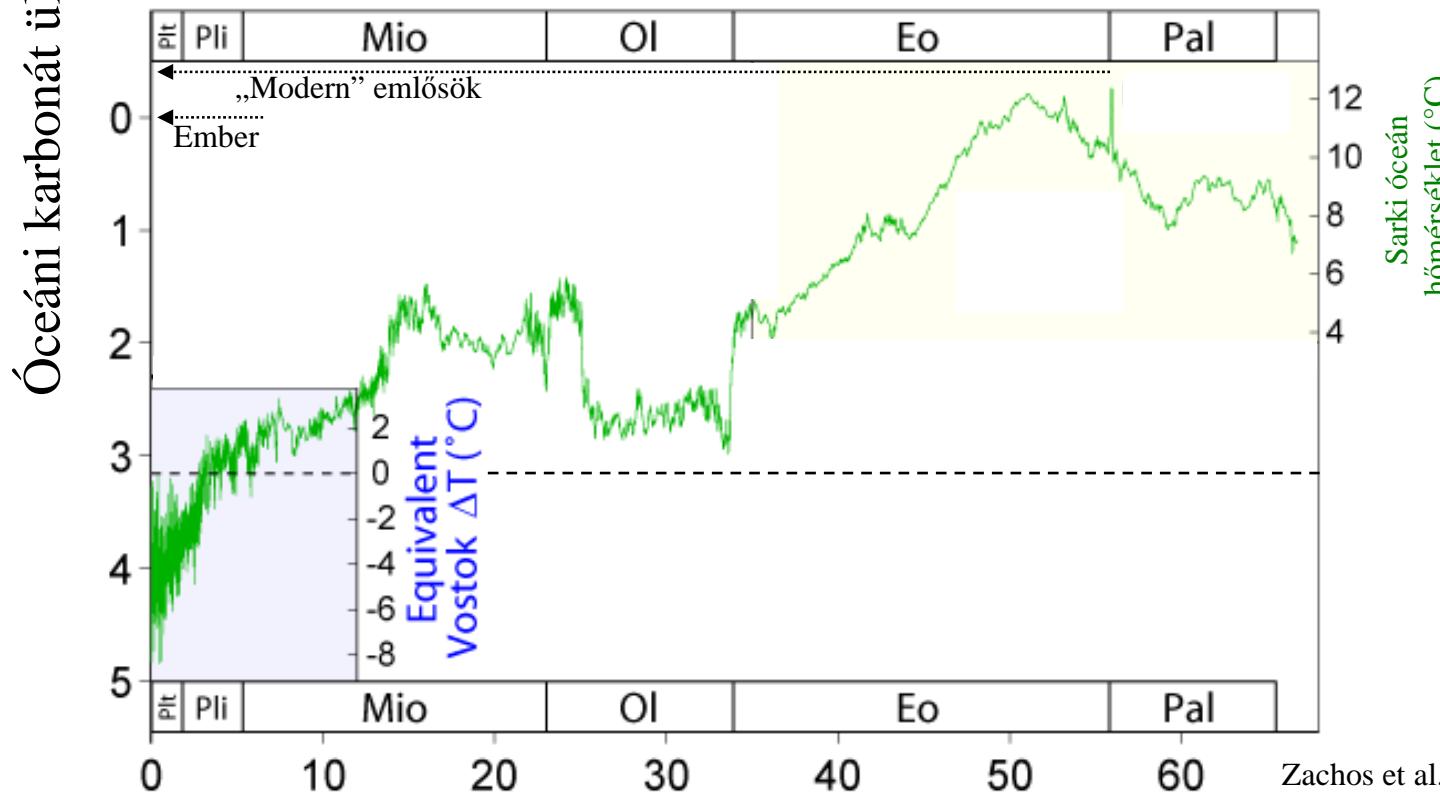
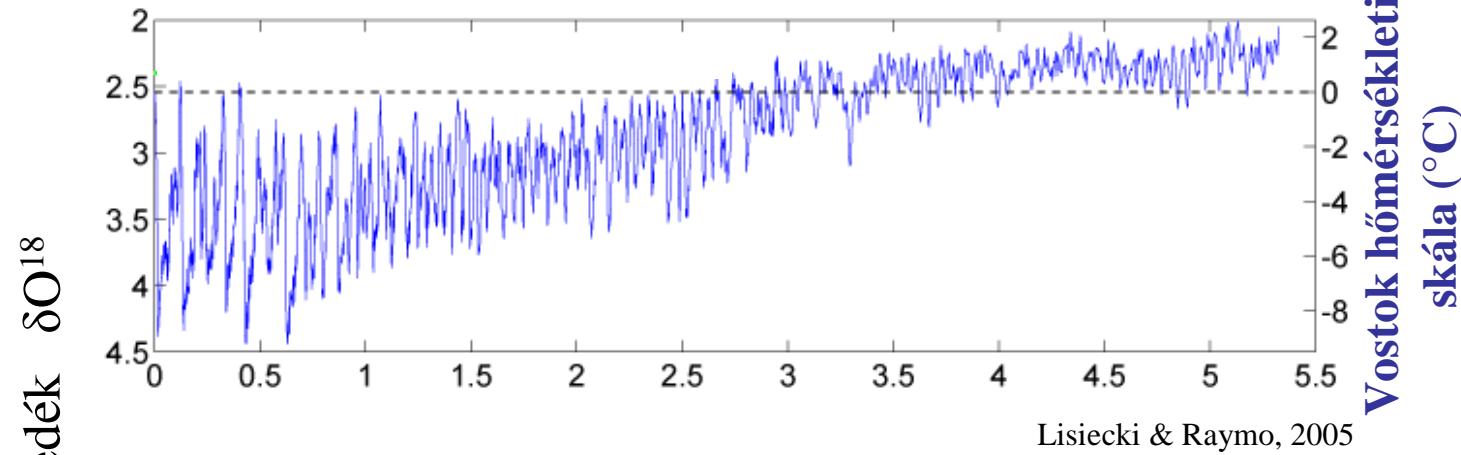




Az utolsó 450 ezer év

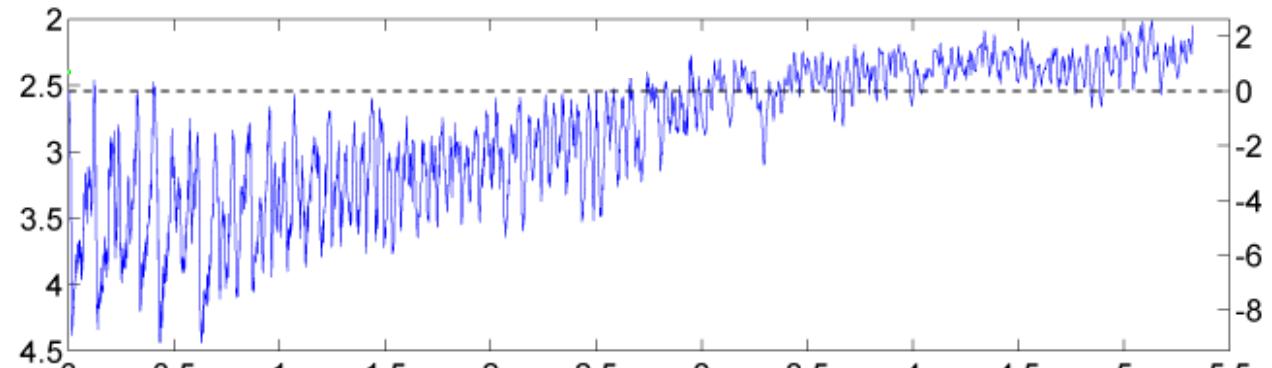


Éghajlatváltozás millió éves időskálán

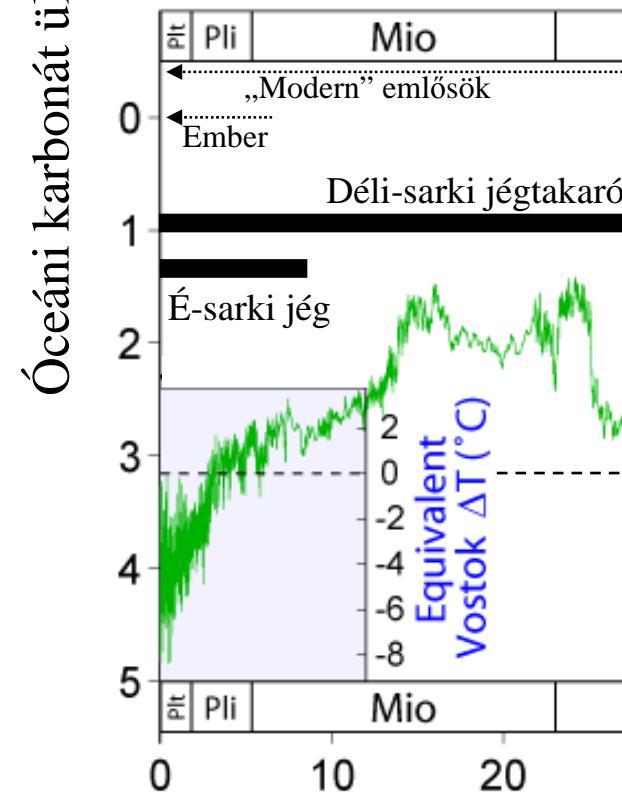
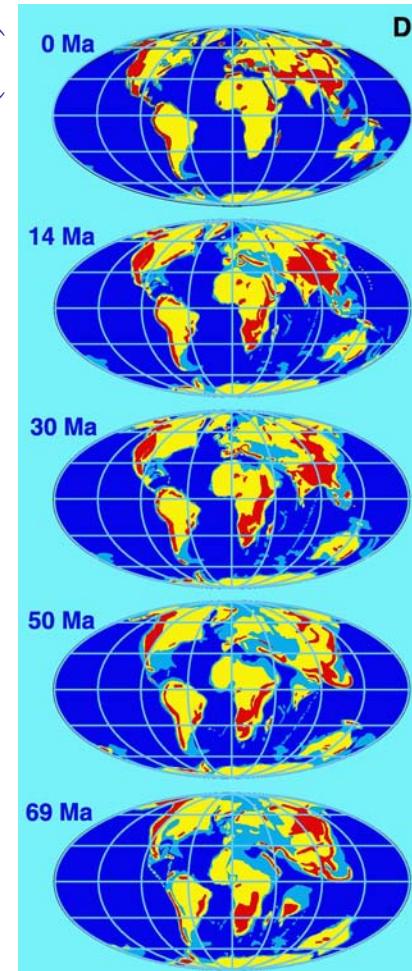


Éghajlatváltozás millió éves időskálán

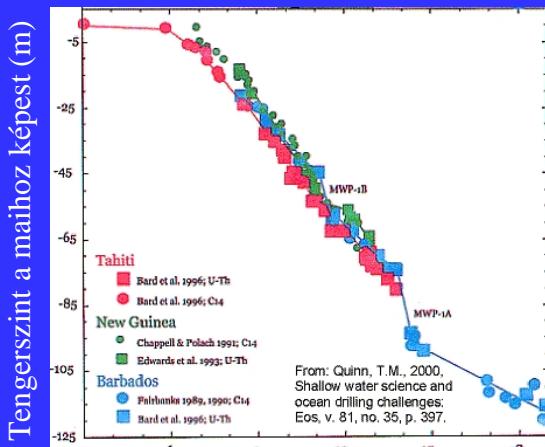
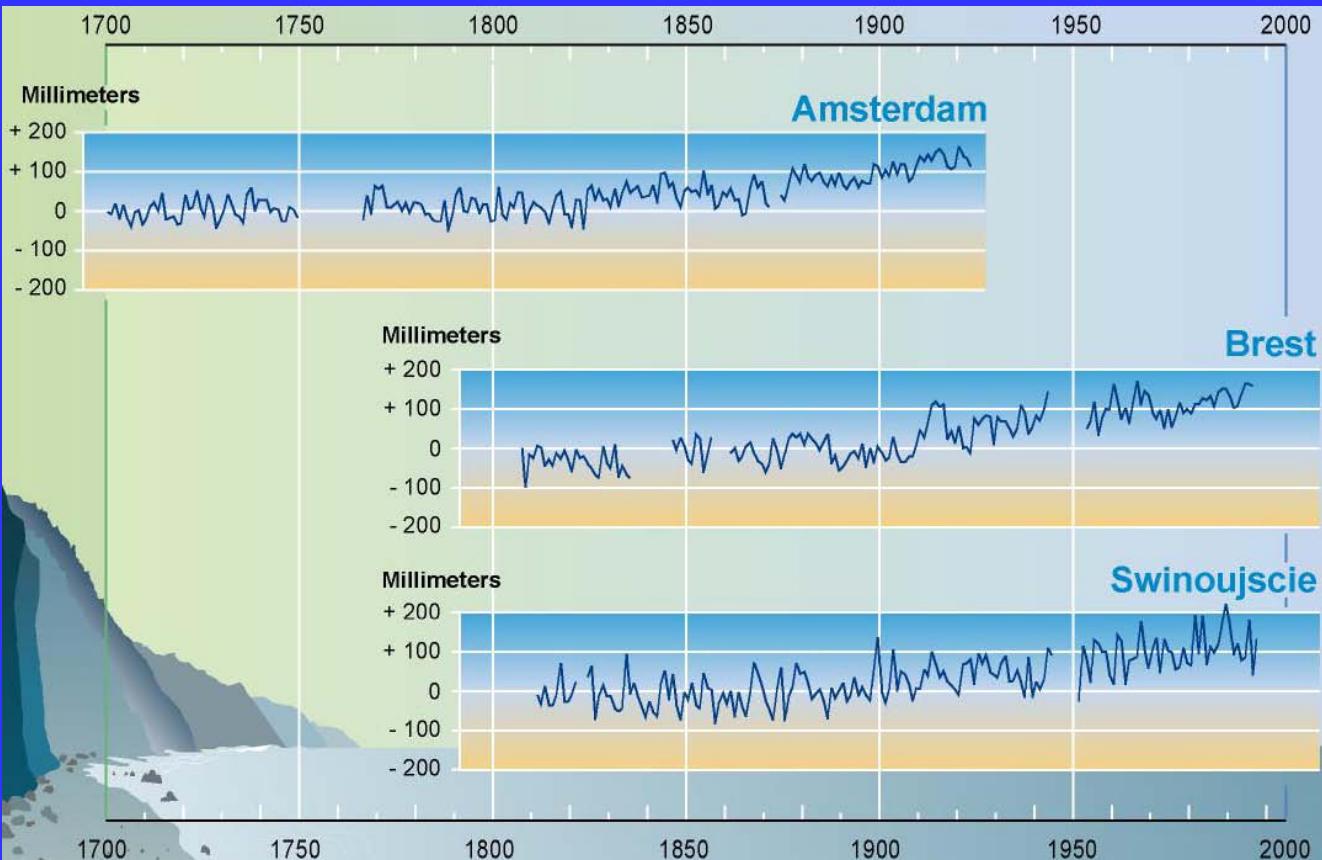
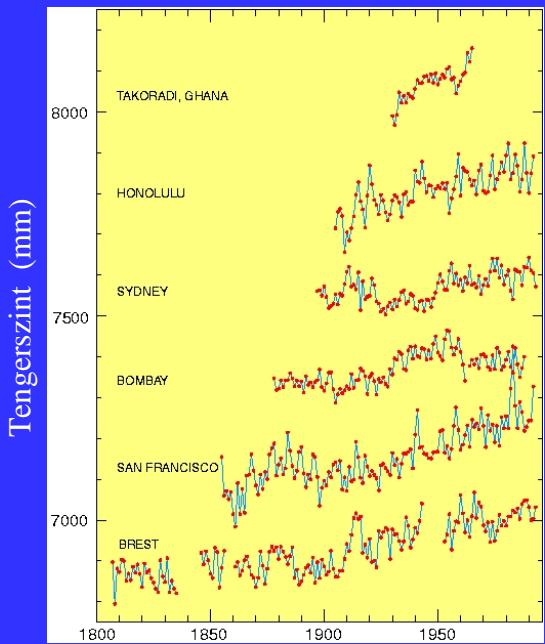
Óceáni karbonát üledék δO^{18}



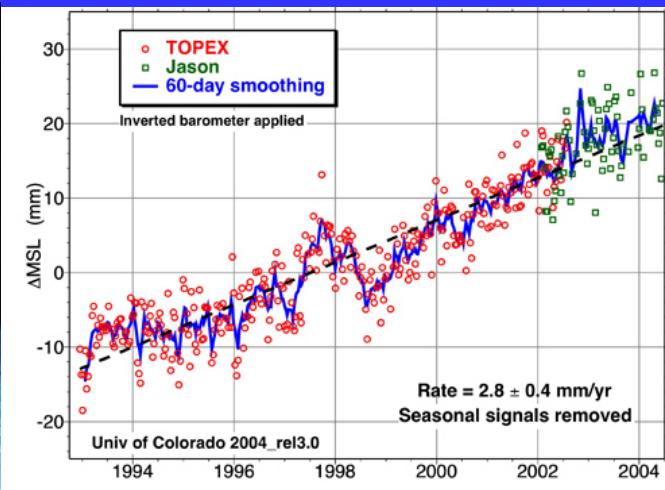
Vostok hőmérsékleti skála ($^{\circ}\text{C}$)

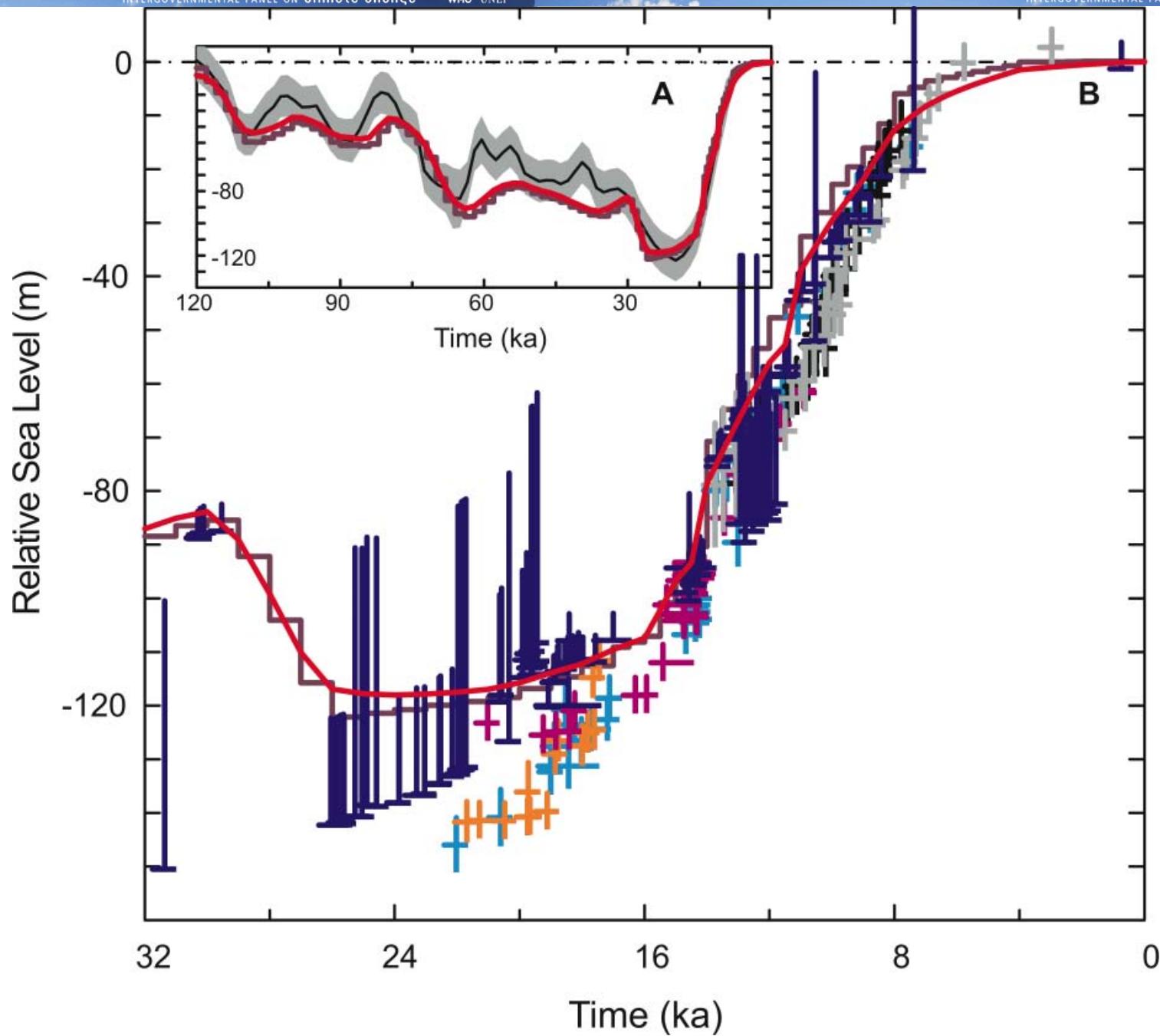


Tengervízsint emelkedik.....

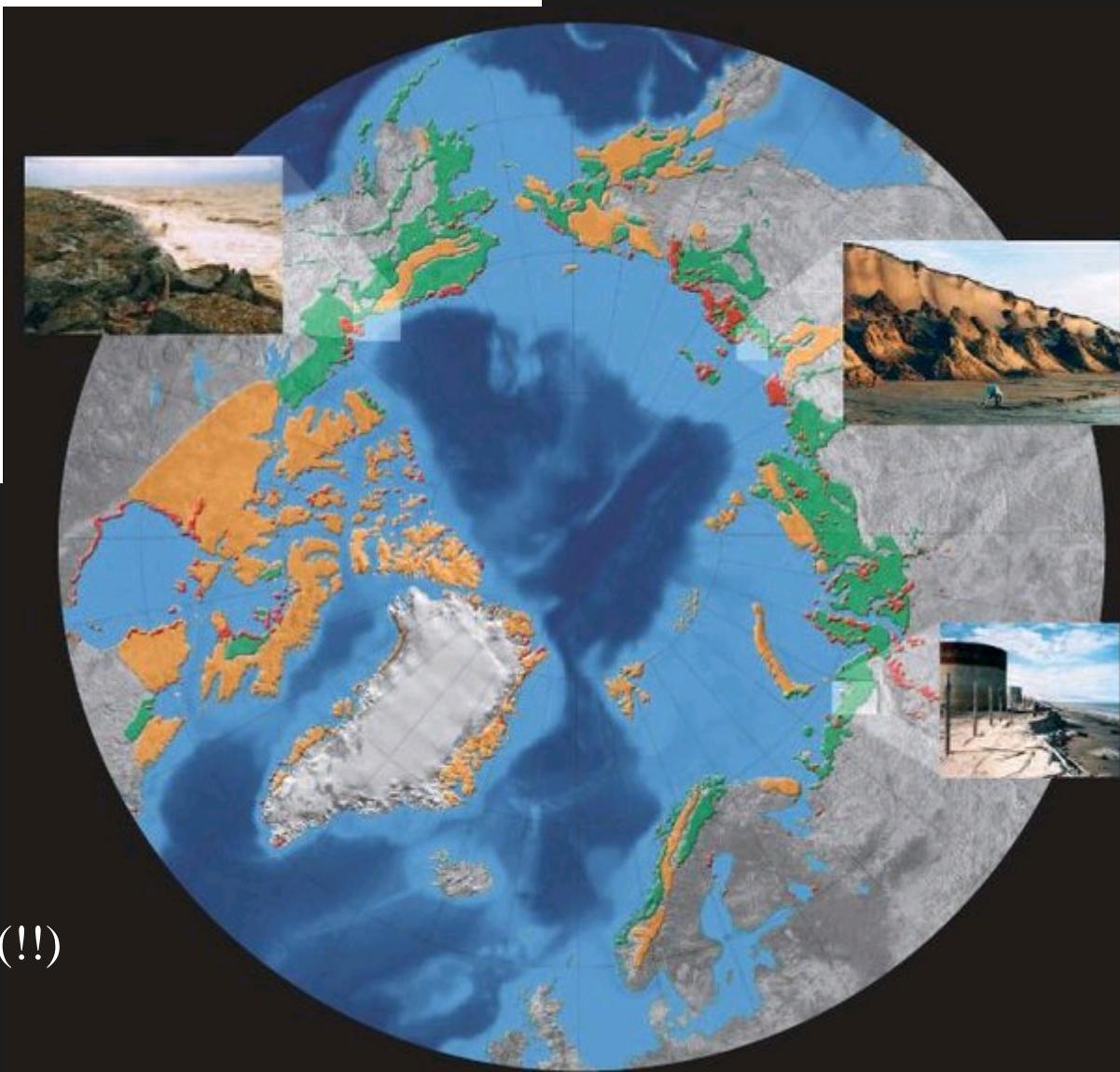
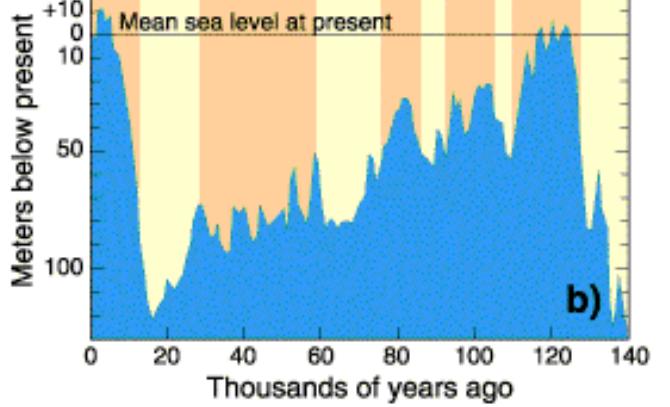
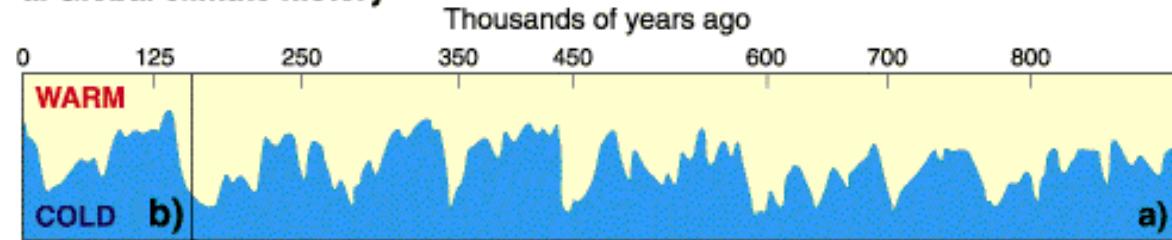


Ezer év visszafelé



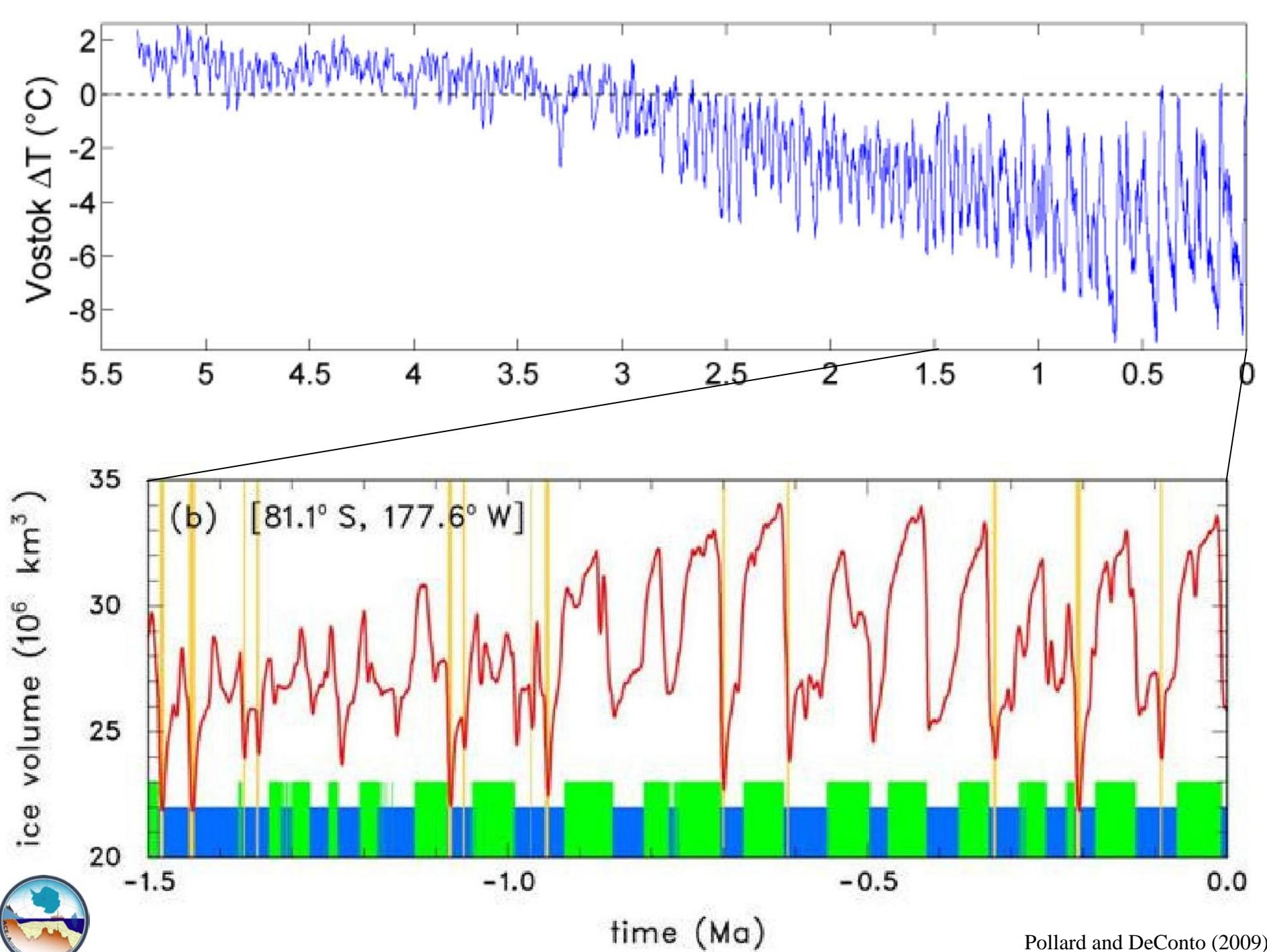


a. Global climate history

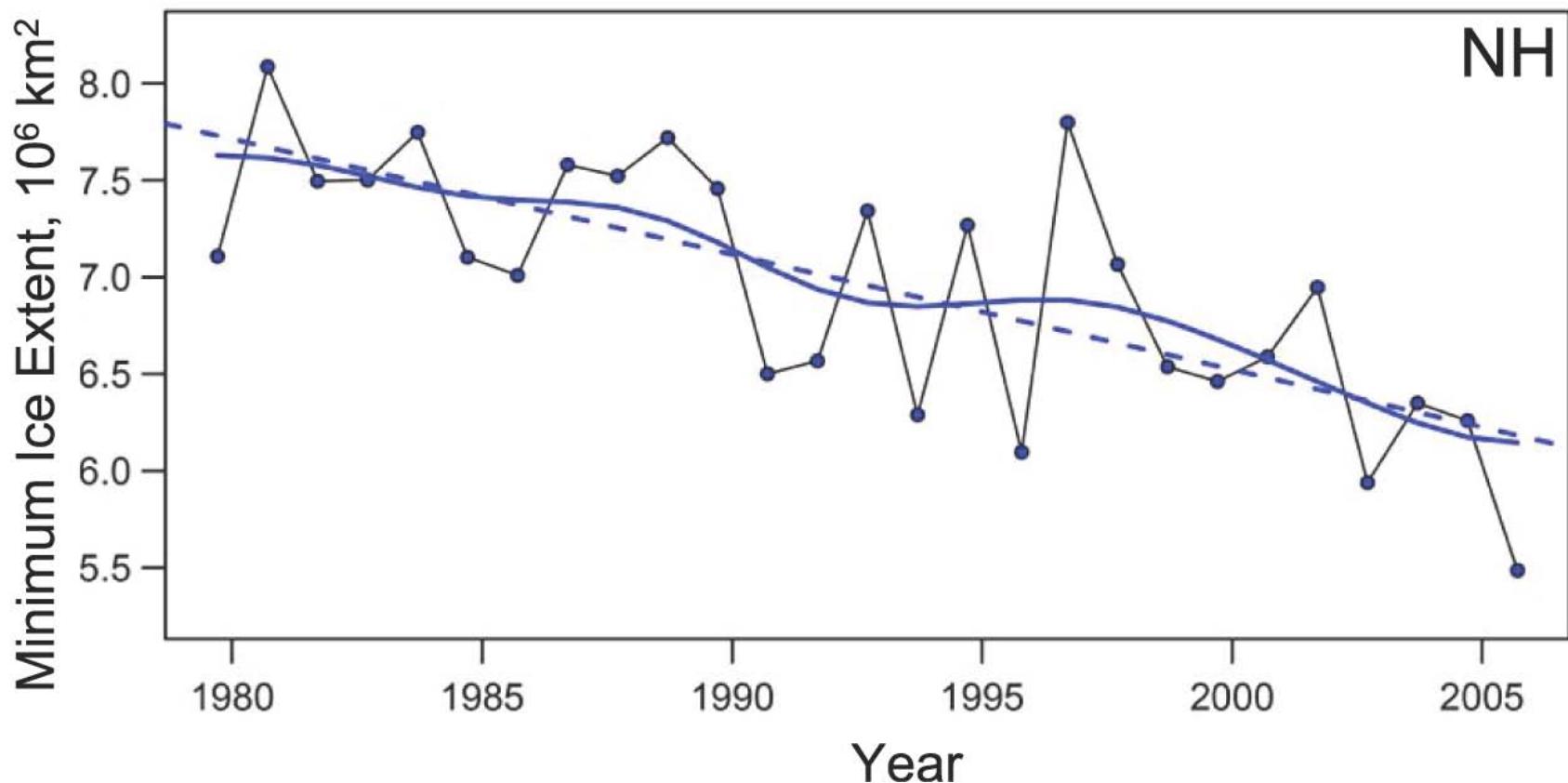
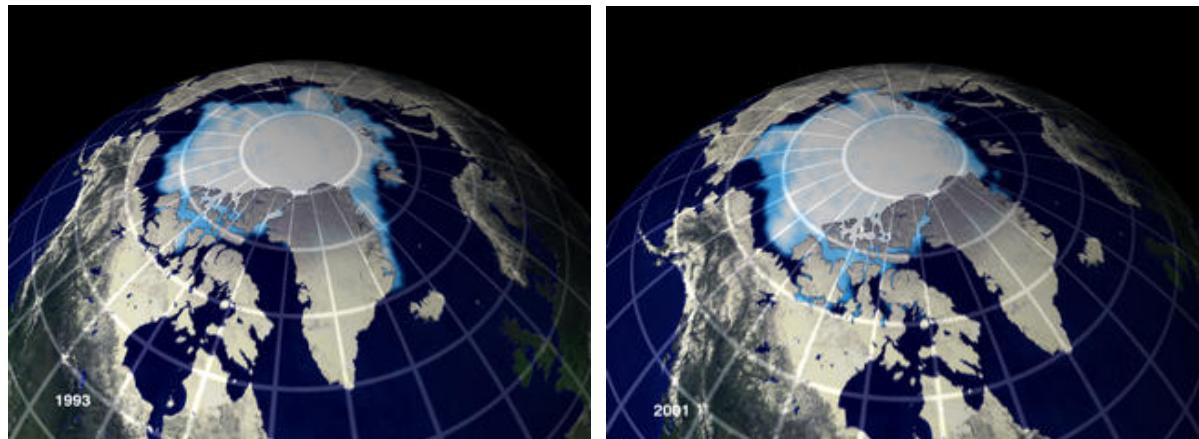


Fő tényezők:

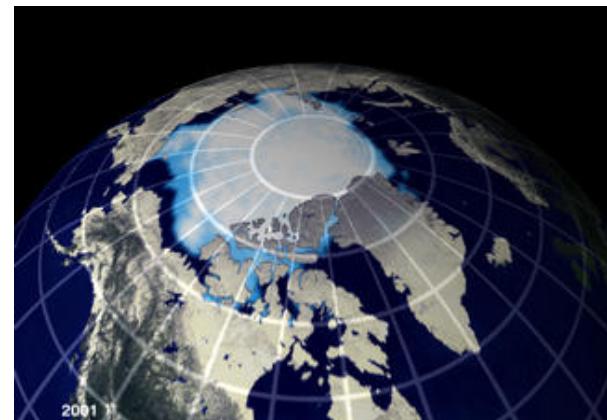
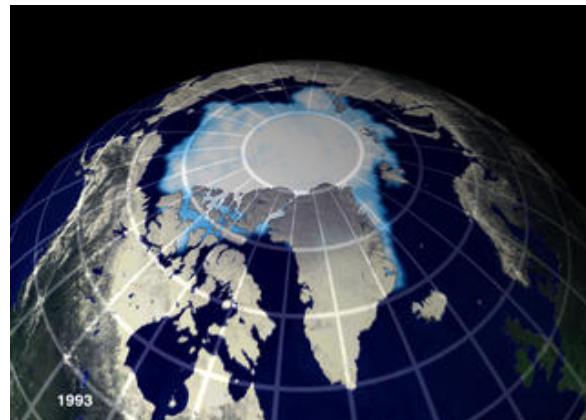
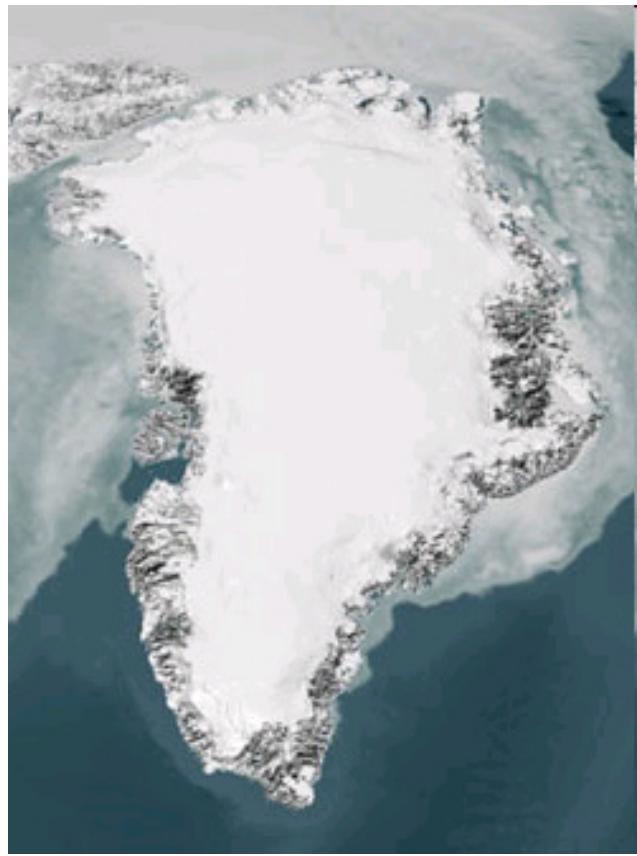
- felszíni jég olvadása
- melegedés (hőtágulás)
- lokális kéregdinamika (!!)



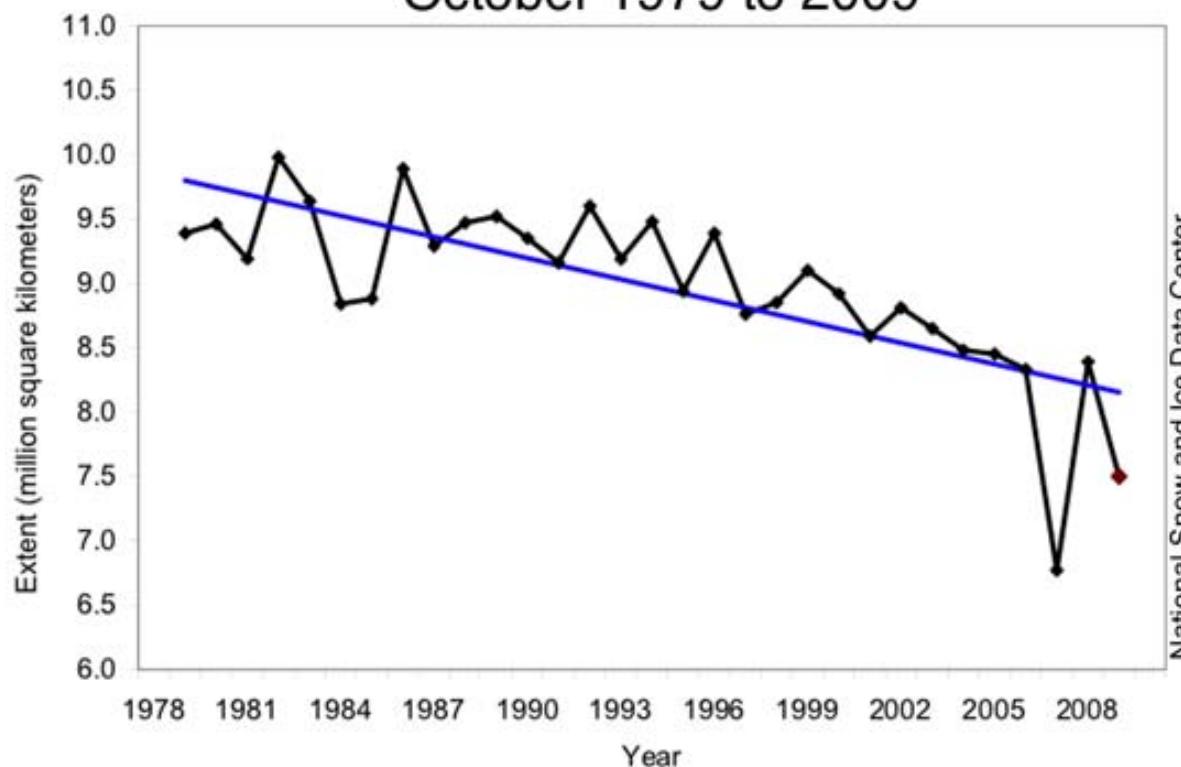
Felszíni jég olvad.....



Felszíni jég olvad.....



Average Monthly Arctic Sea Ice Extent
October 1979 to 2009



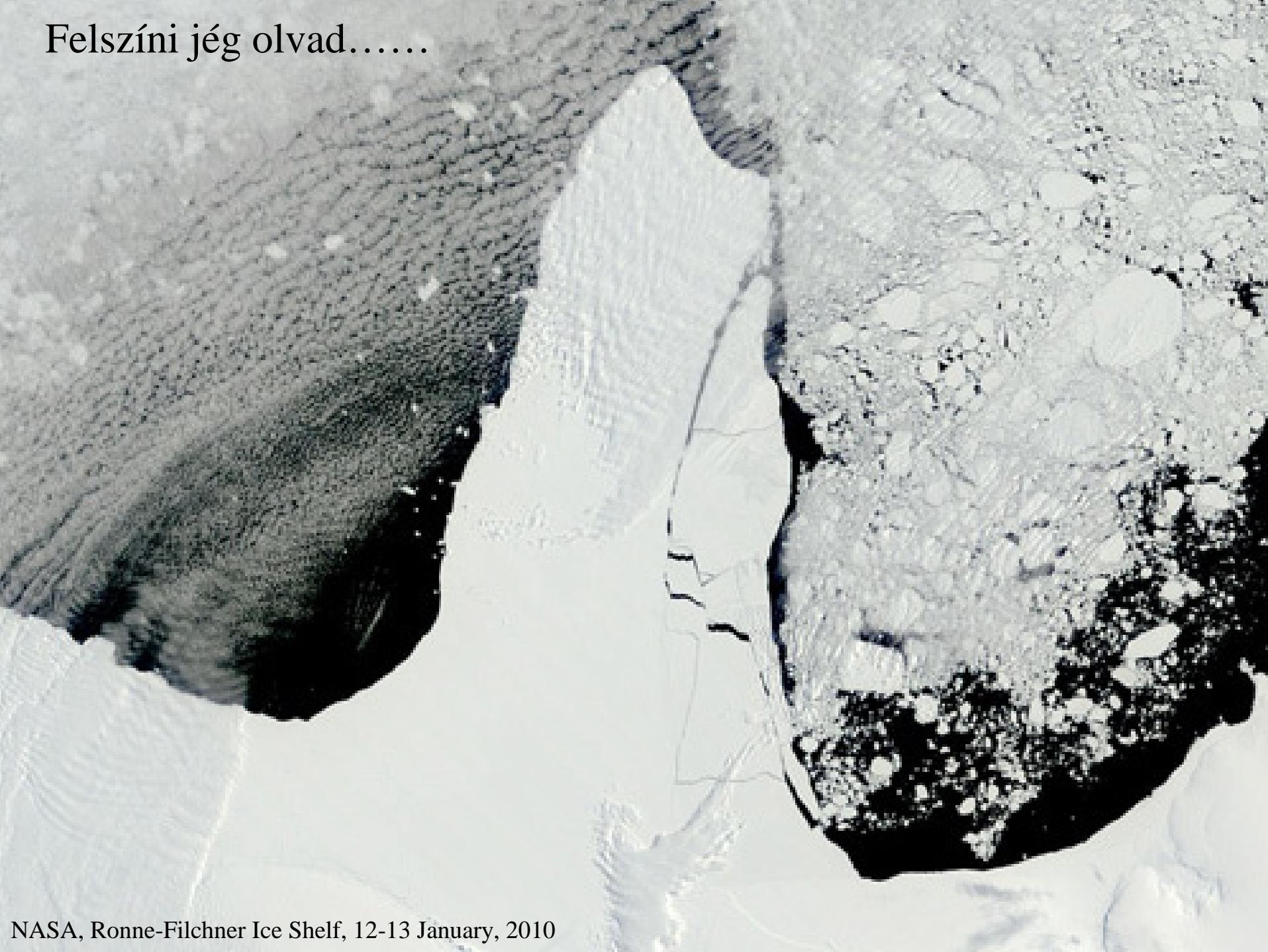
National Snow and Ice Data Center

Felszíni jég olvad.....



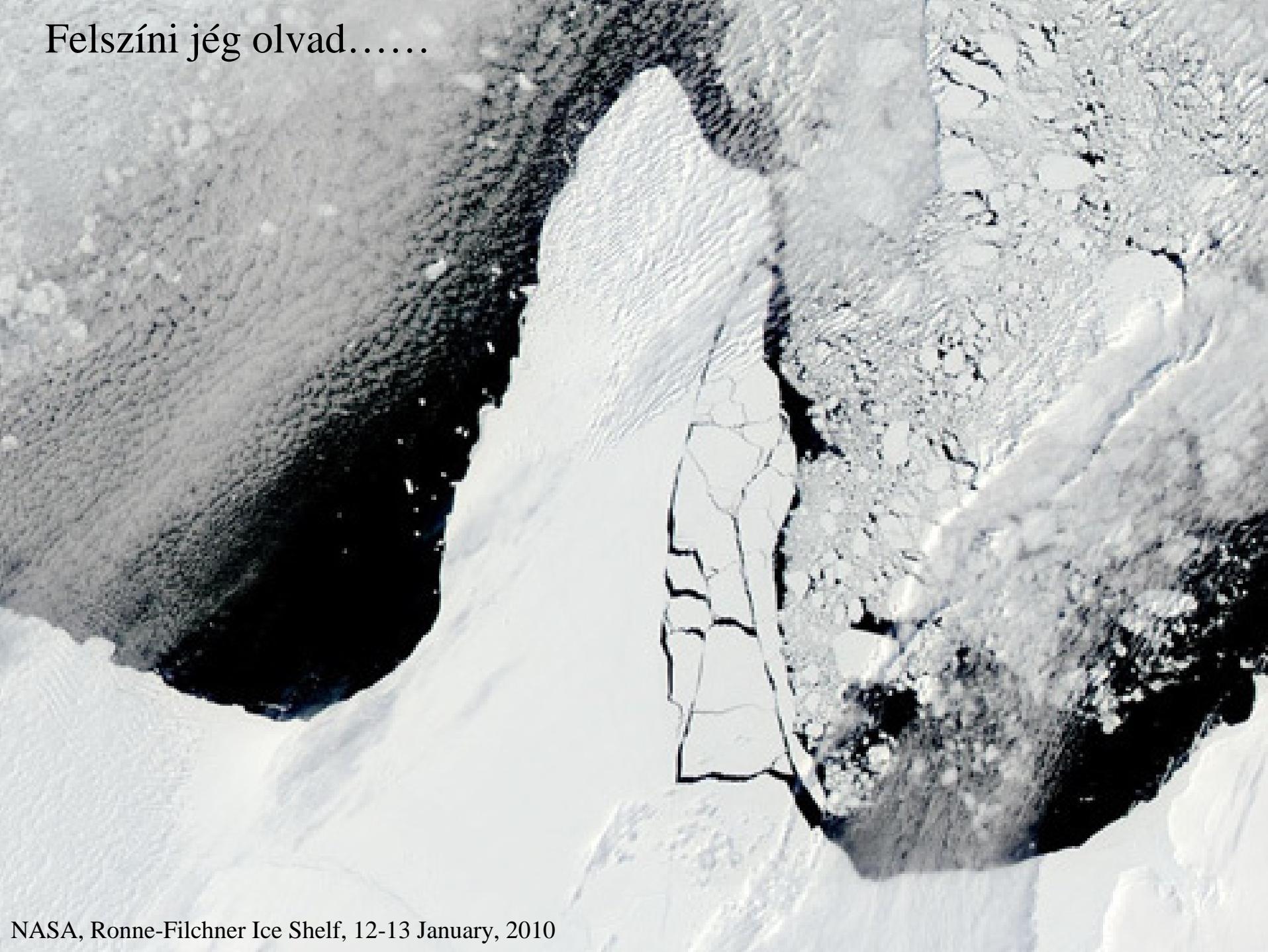
NASA, Ronne-Filchner Ice Shelf, 12-13 January, 2010

Felszíni jég olvad.....



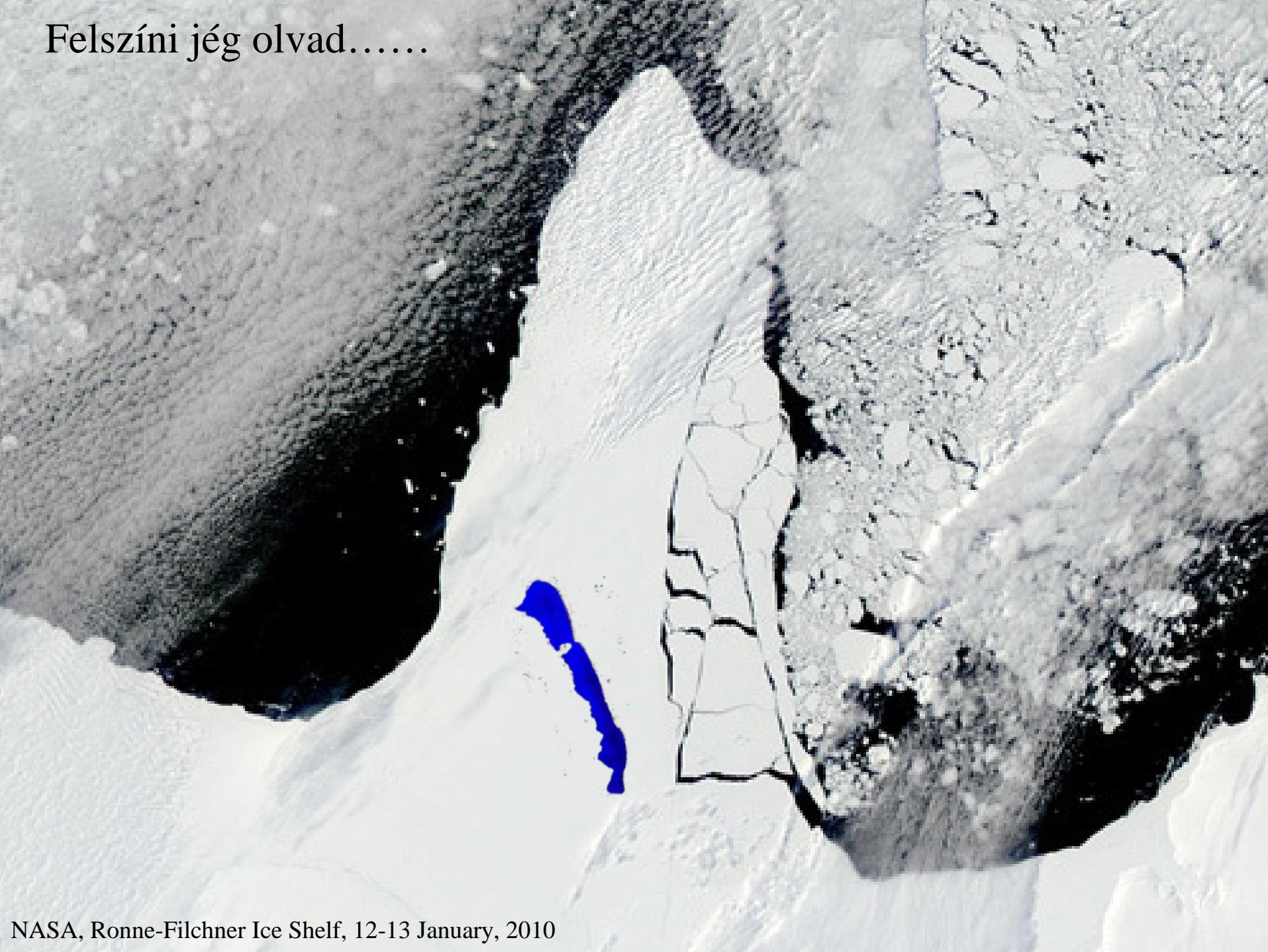
NASA, Ronne-Filchner Ice Shelf, 12-13 January, 2010

Felszíni jég olvad.....



NASA, Ronne-Filchner Ice Shelf, 12-13 January, 2010

Felszíni jég olvad.....



Felszíni jég olvad.....



Photographed in 1928

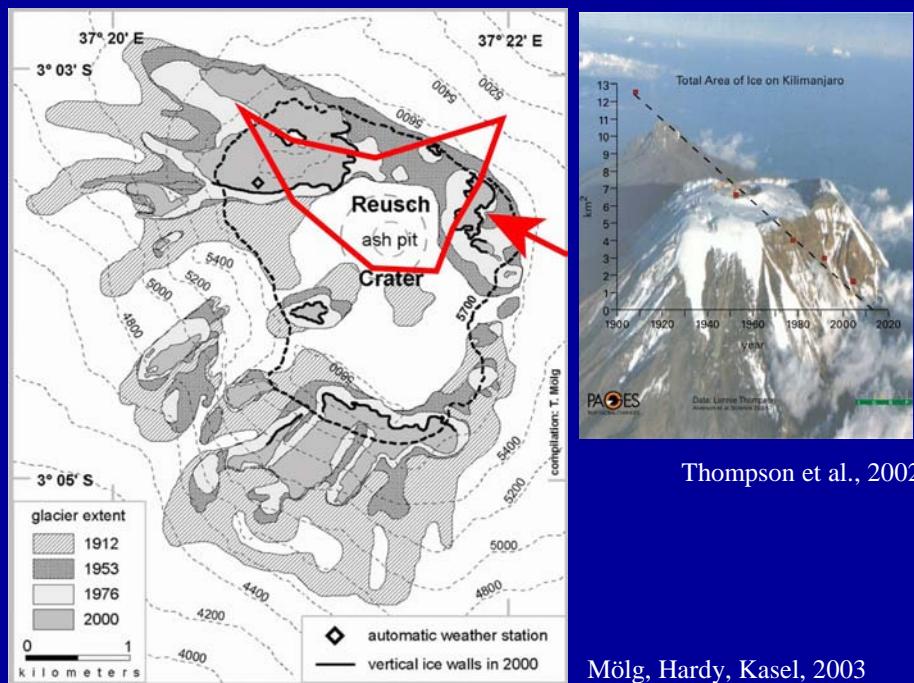
South Cascade glacier, Washington Cascade Mountains



Photographed in 2000



© Jungle Photos Africa 2004



Thompson et al., 2002

Mölg, Hardy, Kasel, 2003

Melting of Himalayan glaciers:

IPCC statement

Issued on 20 January 2010

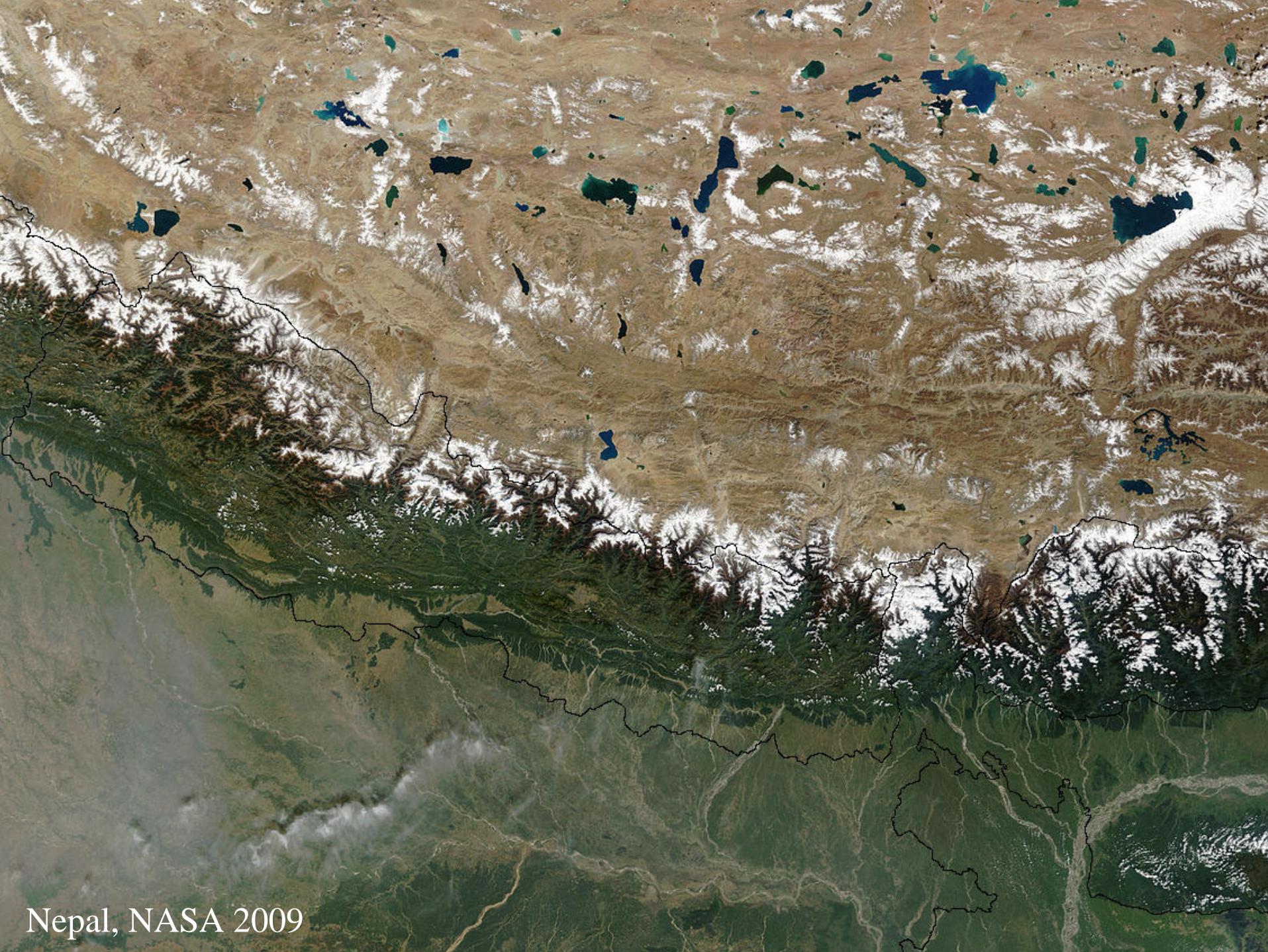
IPCC statement on the melting of Himalayan glaciers¹

The Synthesis Report, the concluding document of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (page 49) stated: "Climate change is expected to exacerbate current stresses on water resources from population growth and economic and land-use change, including urbanisation. On a regional scale, mountain snow pack, glaciers and small ice caps play a crucial role in freshwater availability. Widespread mass losses from glaciers and reductions in snow cover over recent decades are projected to accelerate throughout the 21st century, reducing water availability, hydropower potential, and changing seasonality of flows in regions supplied by meltwater from major mountain ranges (e.g. Hindu-Kush, Himalaya, Andes), where more than one-sixth of the world population currently lives."

This conclusion is robust, appropriate, and entirely consistent with the underlying science and the broader IPCC assessment.

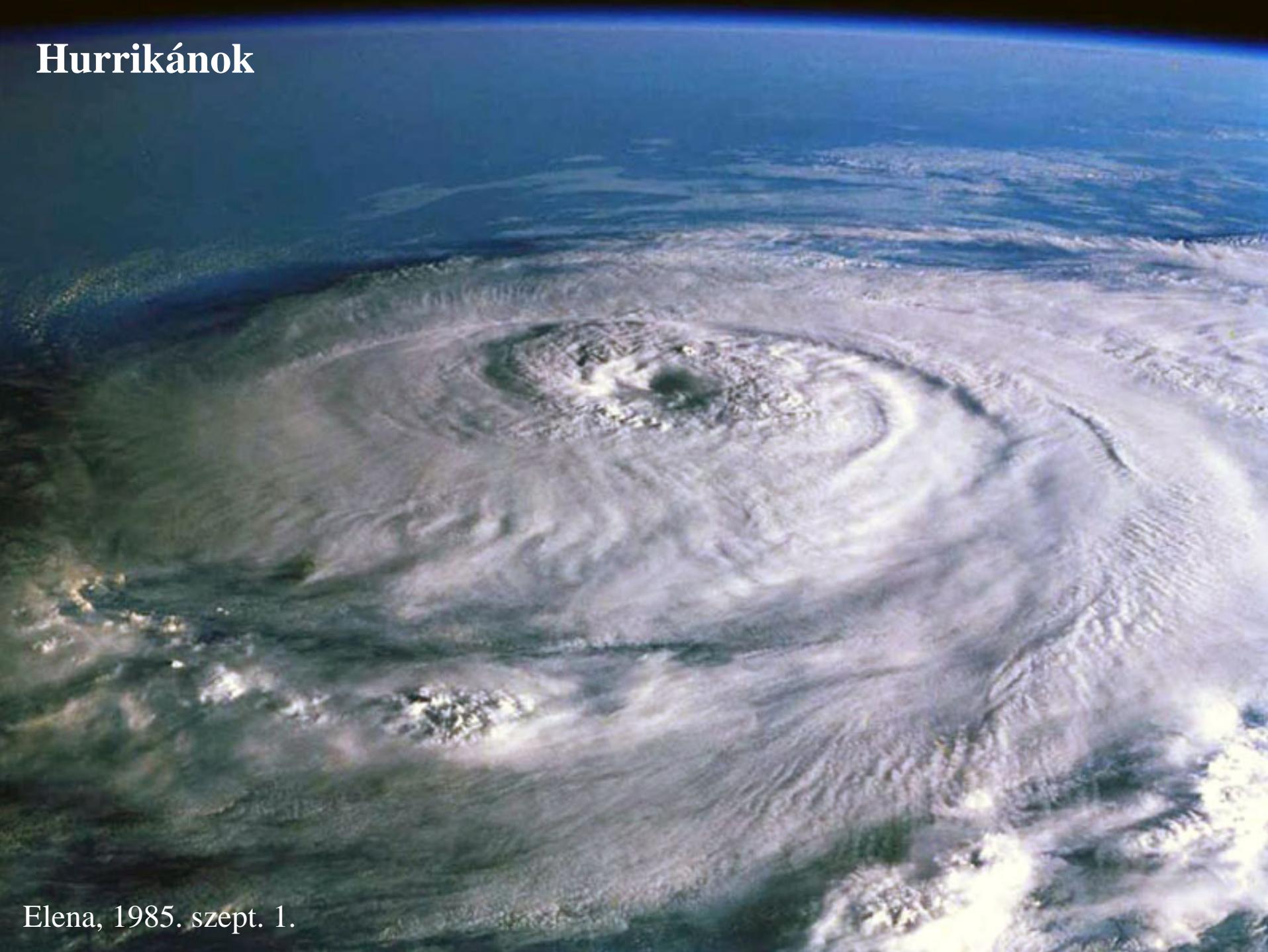
It has, however, recently come to our attention that a paragraph in the 938-page Working Group II contribution to the underlying assessment² refers to poorly substantiated estimates of rate of recession and date for the disappearance of Himalayan glaciers. In drafting the paragraph in question, the clear and well-established standards of evidence, required by the IPCC procedures, were not applied properly.

The Chair, Vice-Chairs, and Co-chairs of the IPCC regret the poor application of well-established IPCC procedures in this instance. This episode demonstrates that the quality of the assessment depends on absolute adherence to the IPCC standards, including thorough review of "the quality and validity of each source before incorporating results from the source into an IPCC Report"³. We reaffirm our strong commitment to ensuring this level of performance.



Nepal, NASA 2009

Hurrikánok



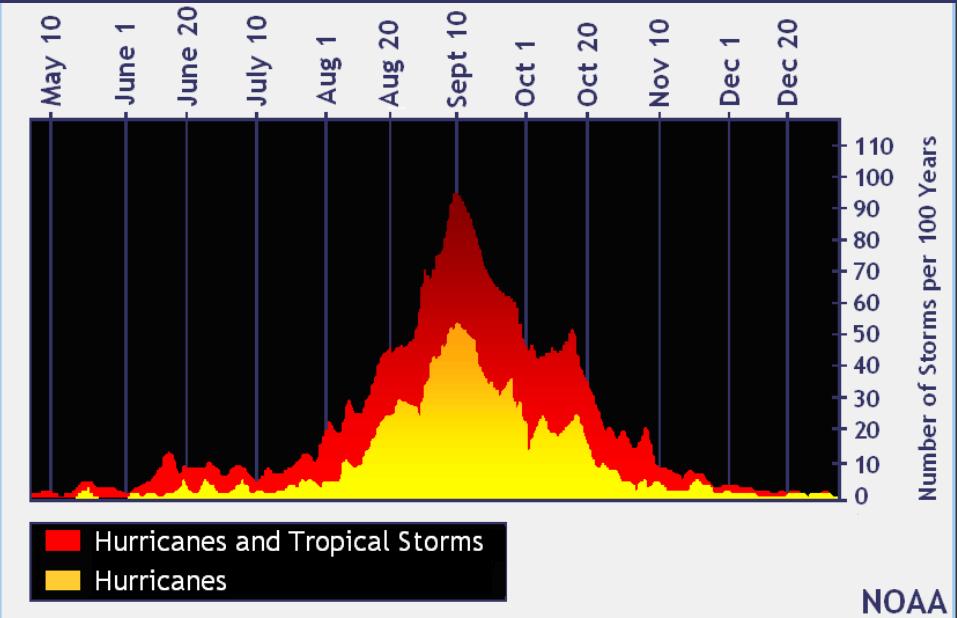
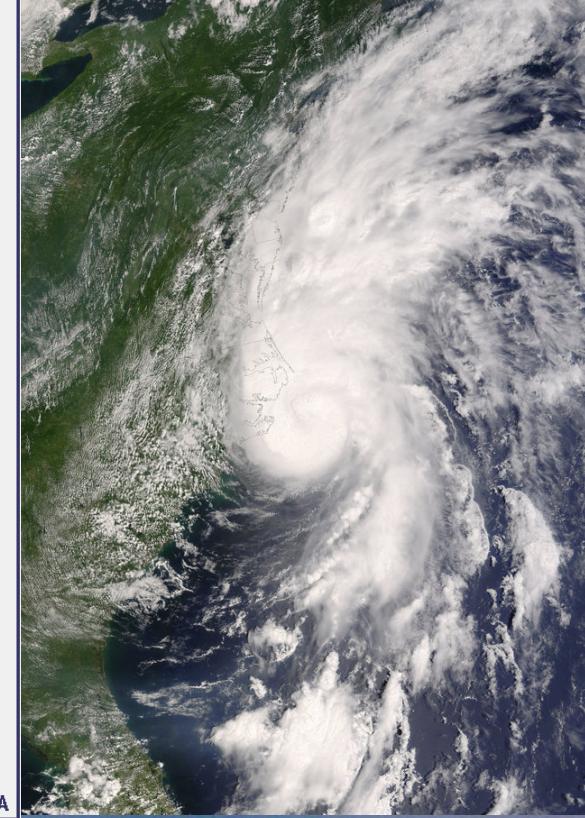
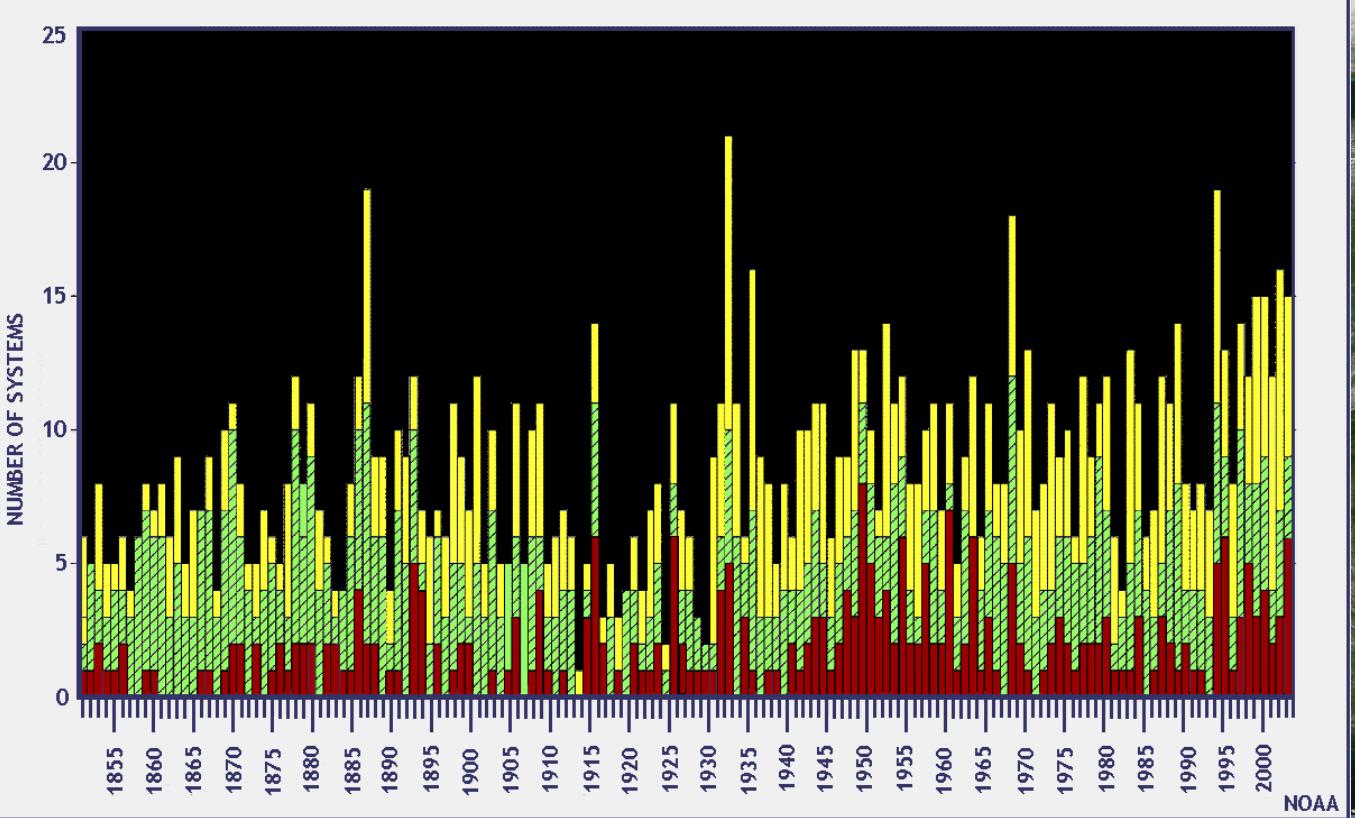
Elena, 1985. szept. 1.



Isabelle, 2003. szept. 16.



1980-2005.

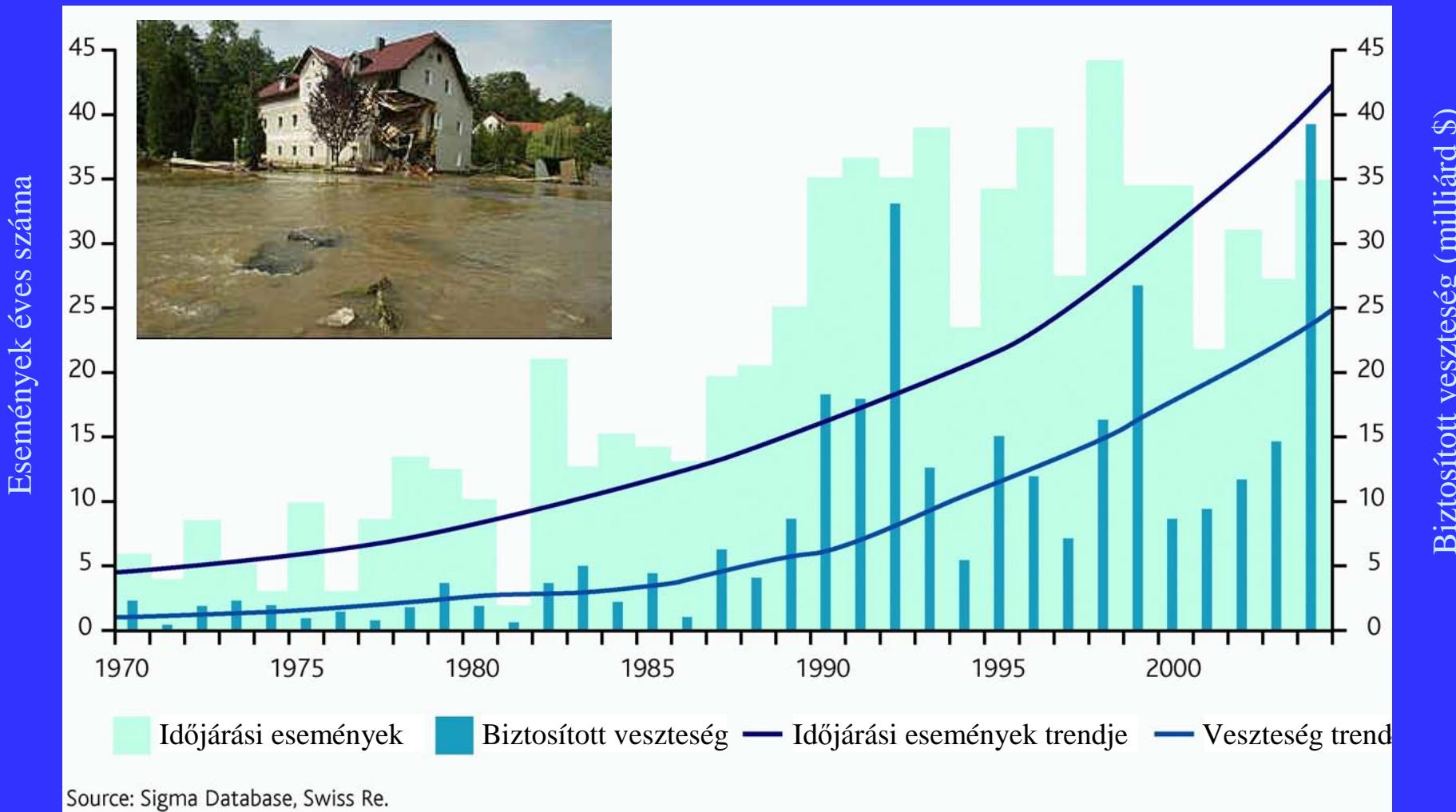




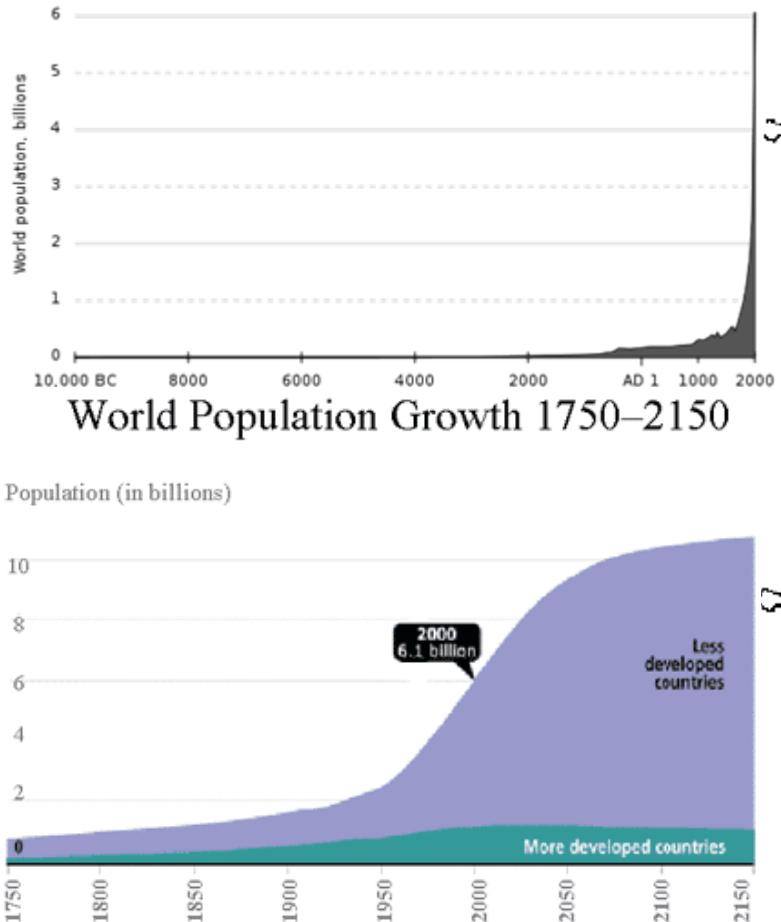
Adapted from 'Scotland on Sunday'

Extrém klimatikus események, katasztrófák

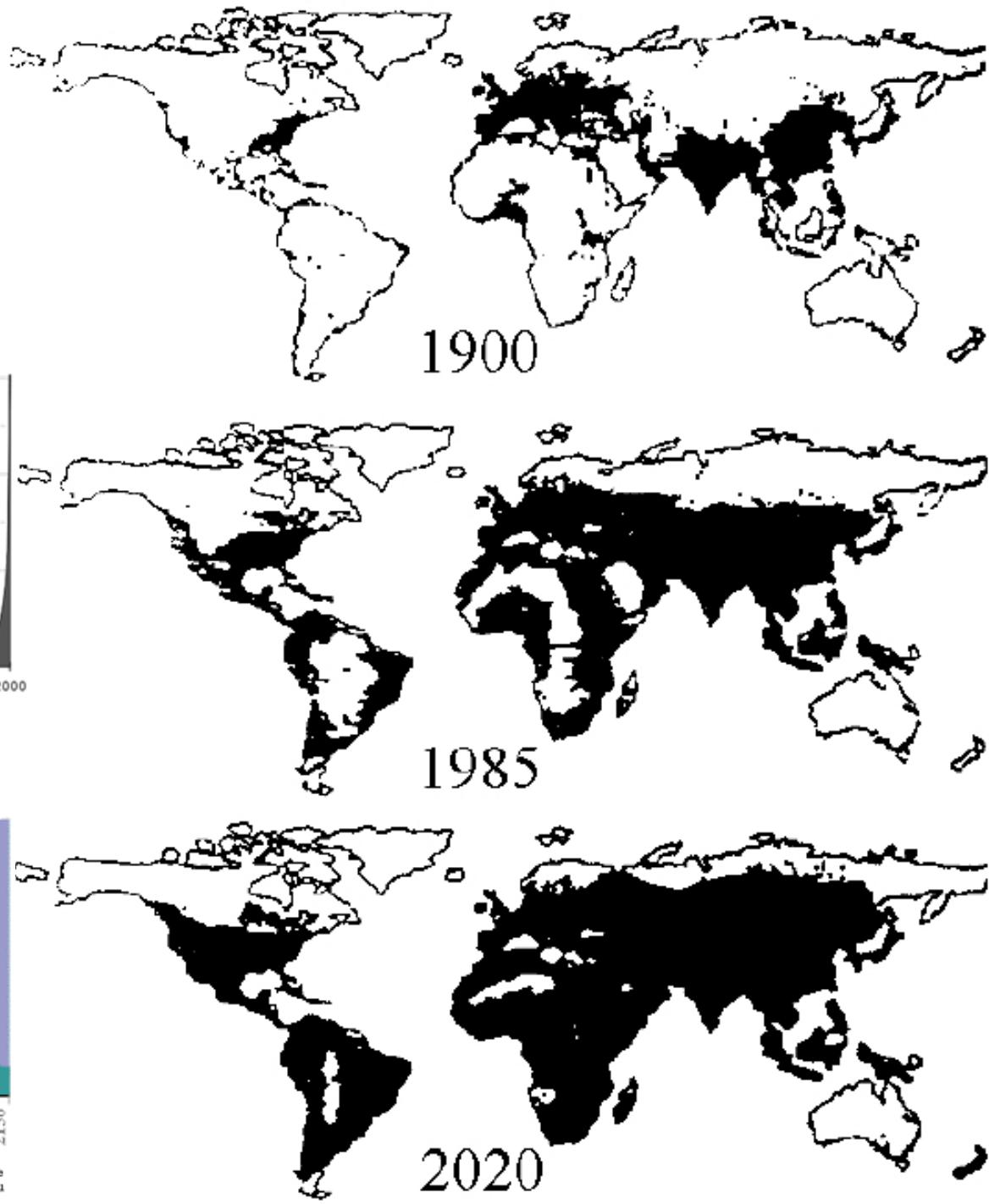
Időjárási katasztrófák száma és biztosított anyagi veszteség (2004-es dollár árfolyamon)



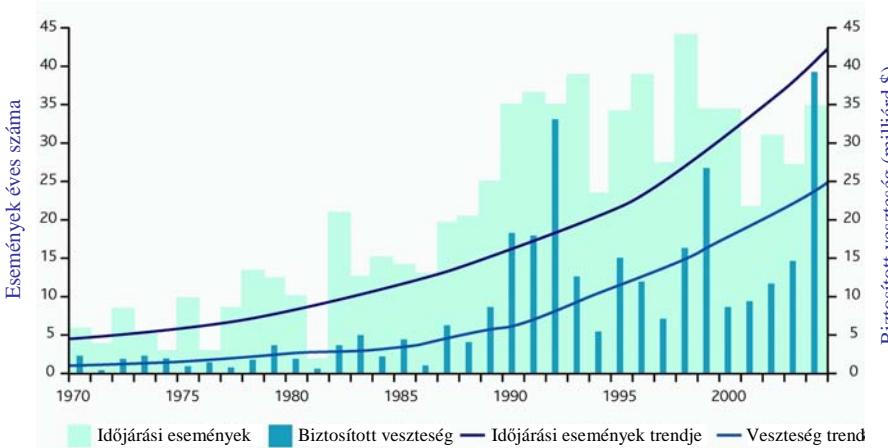
Mindemellett....



Source : United Nations, *World Population Prospects, The 1998 Revision*; and estimates by the Population Reference Bureau

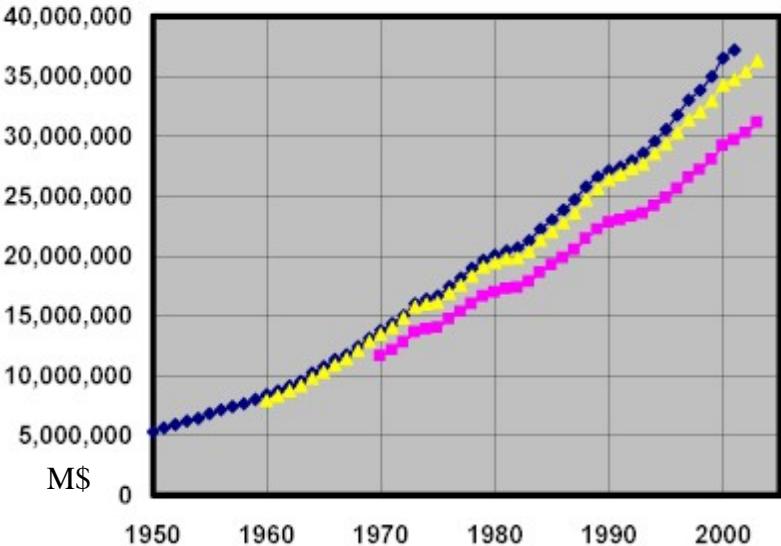


Katasztrófák?

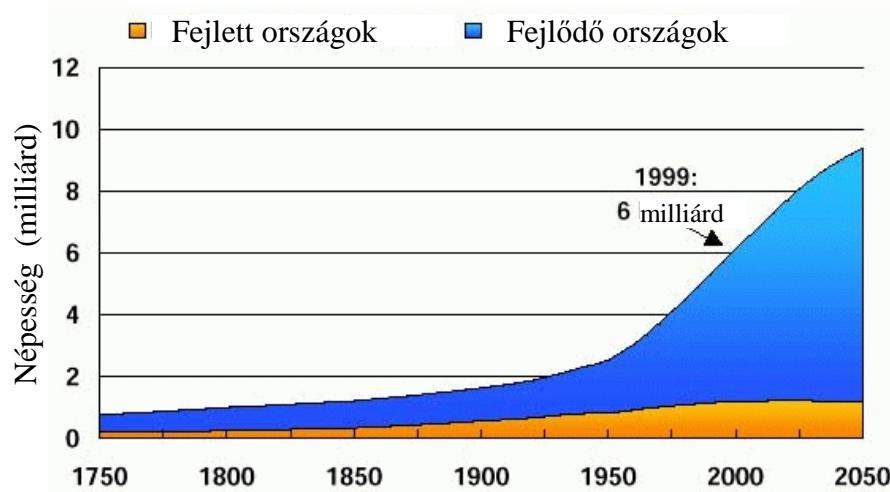


Source: Sigma Database, Swiss Re.

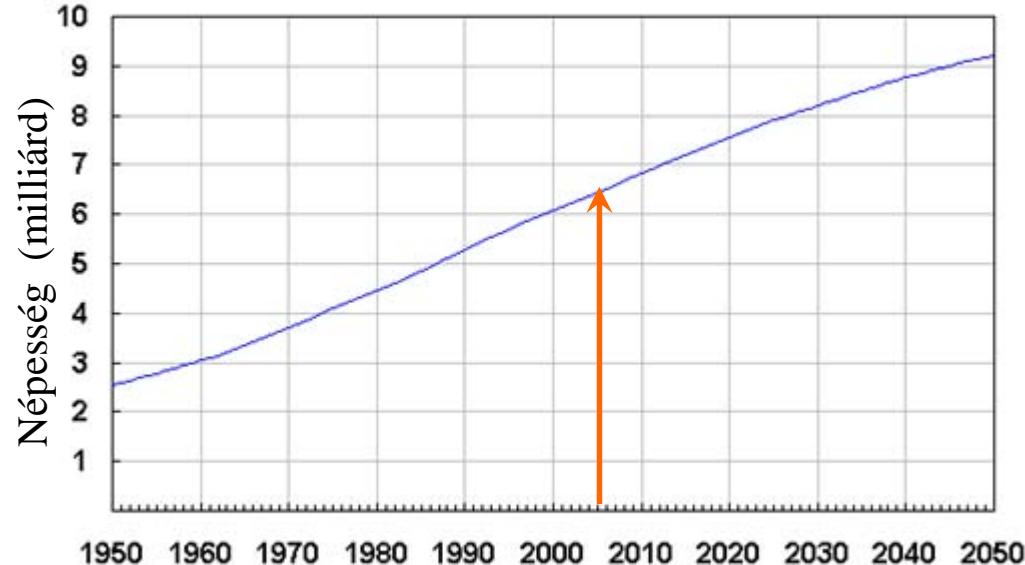
A világ GDP növekedése



Source: EWI, World Bank, UN

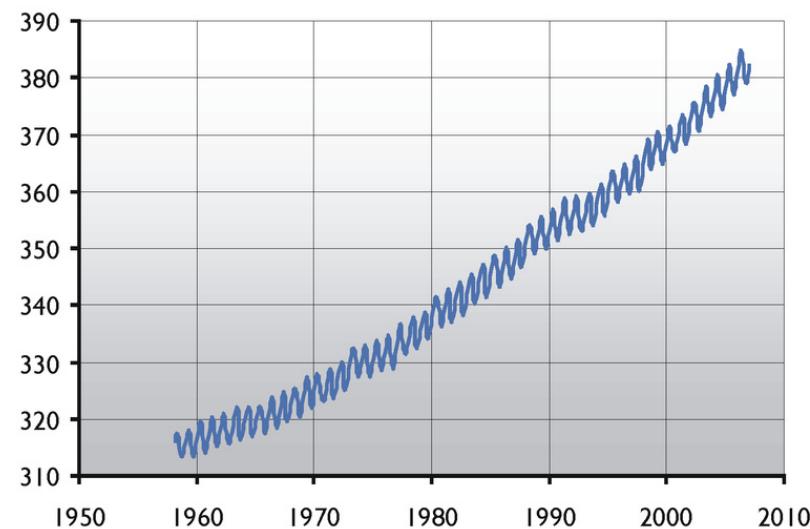
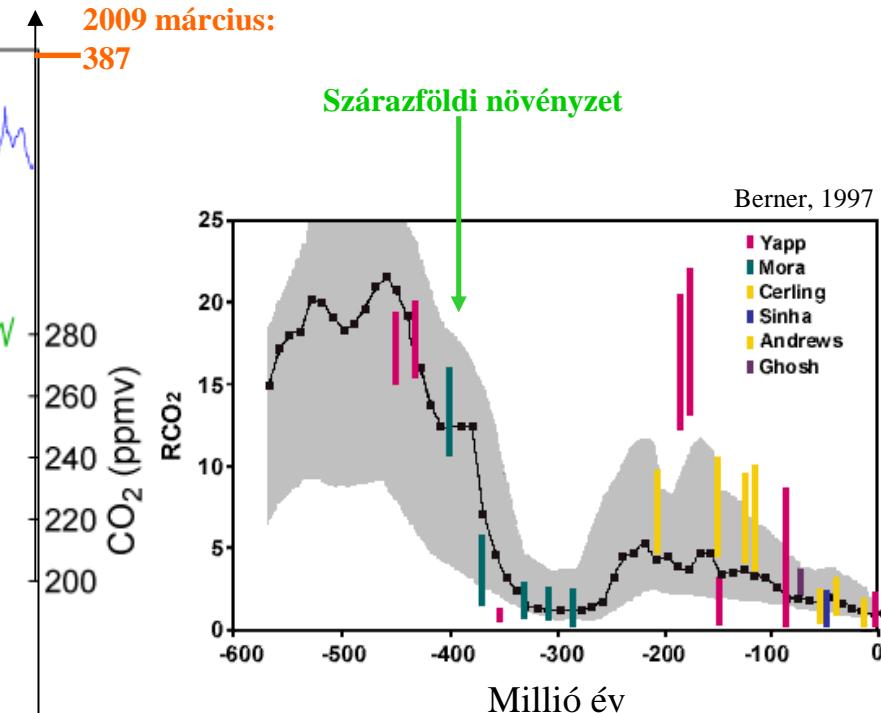
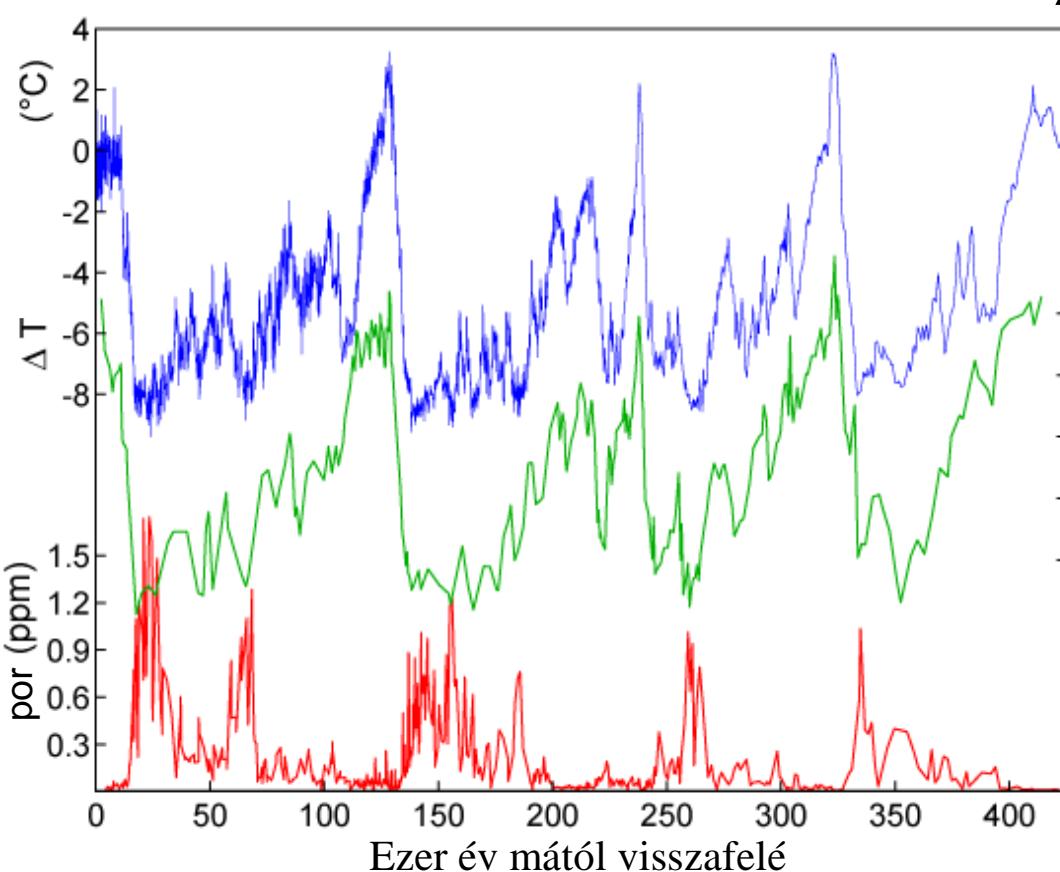


A világ népessége 1950-2050



Source: U.S. Census Bureau, International Data Base, April 2005 version.

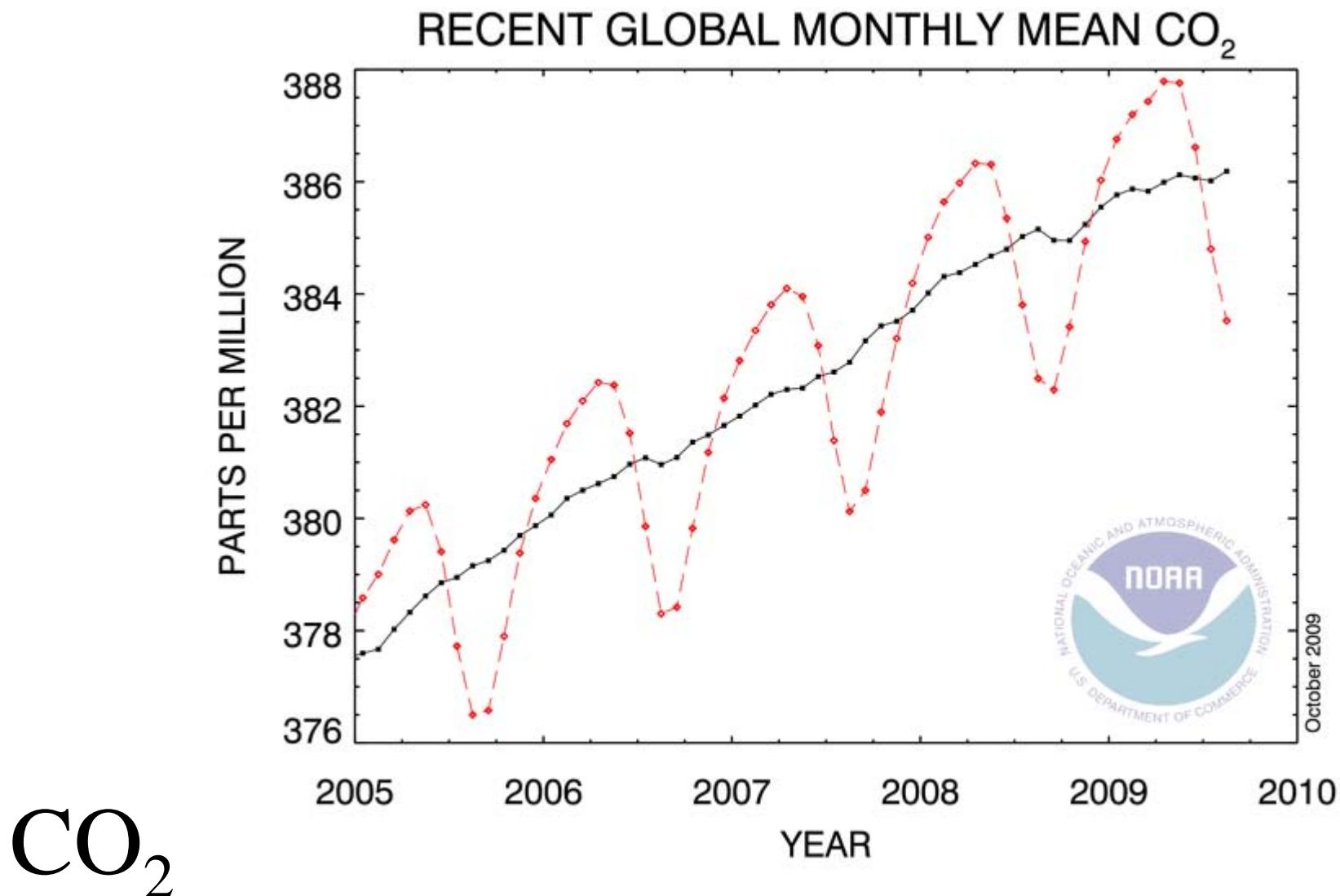
Klímaváltozás és levegőszennyezés

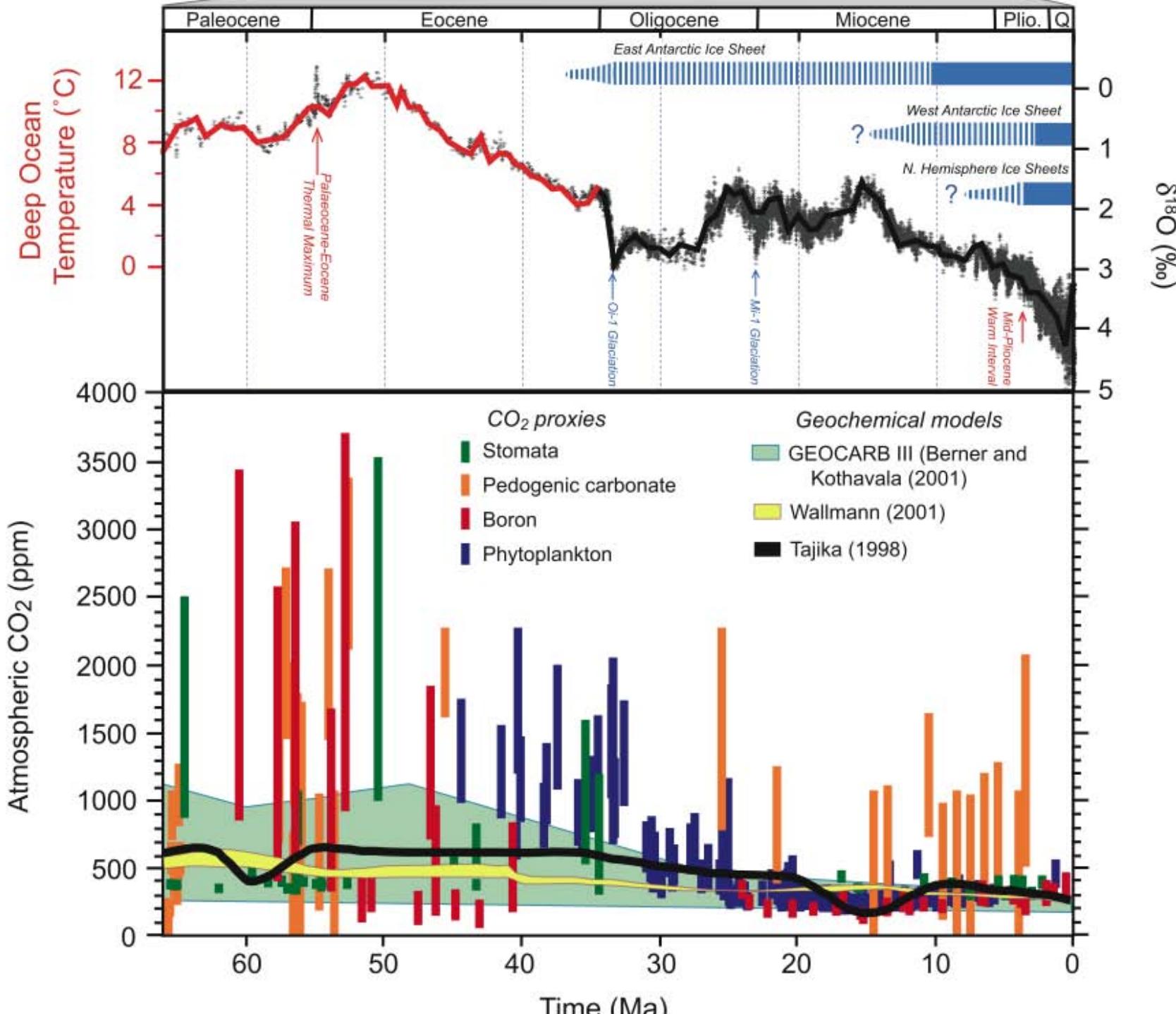


CO₂



Klímaváltozás és levegőszennyezés



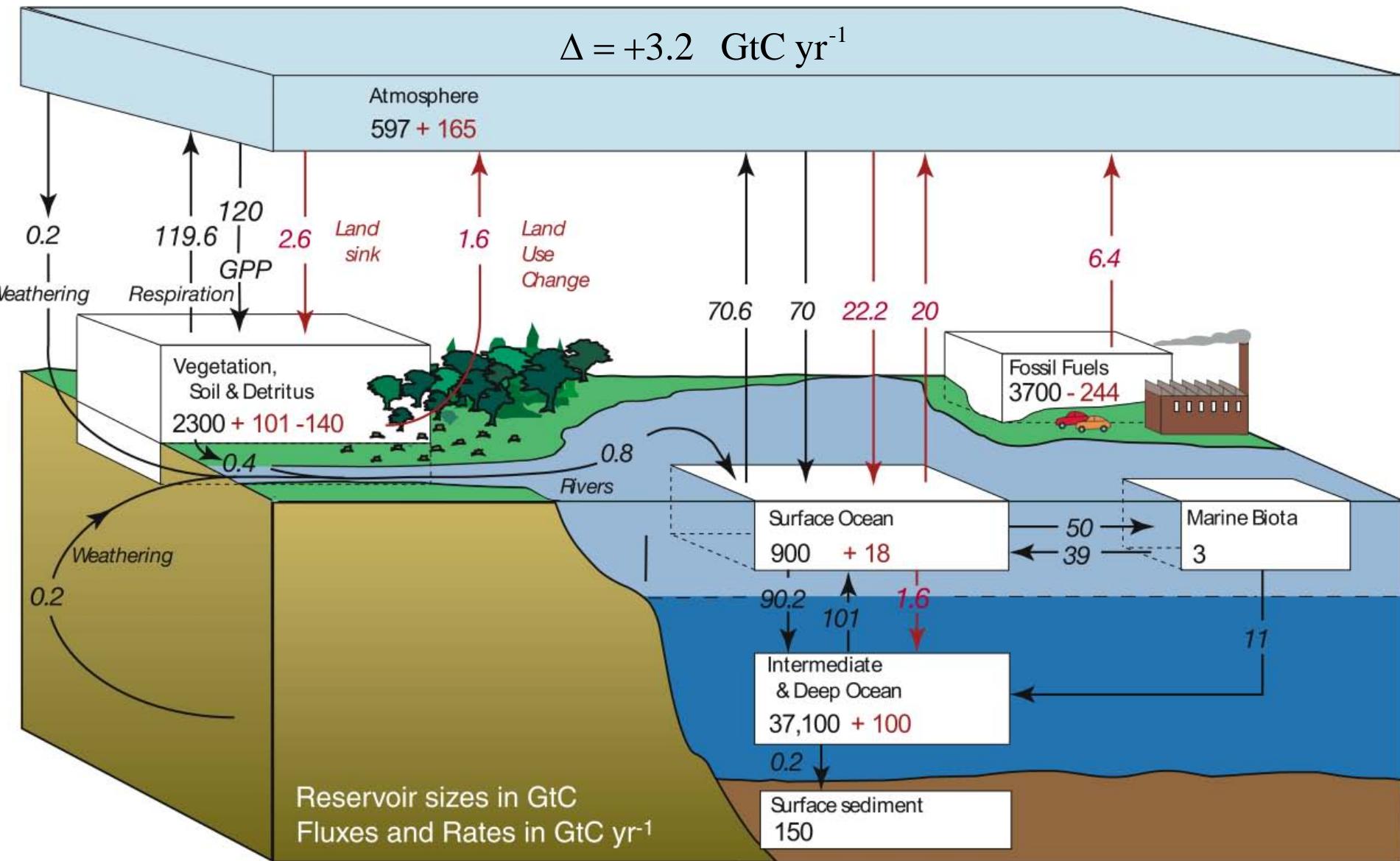


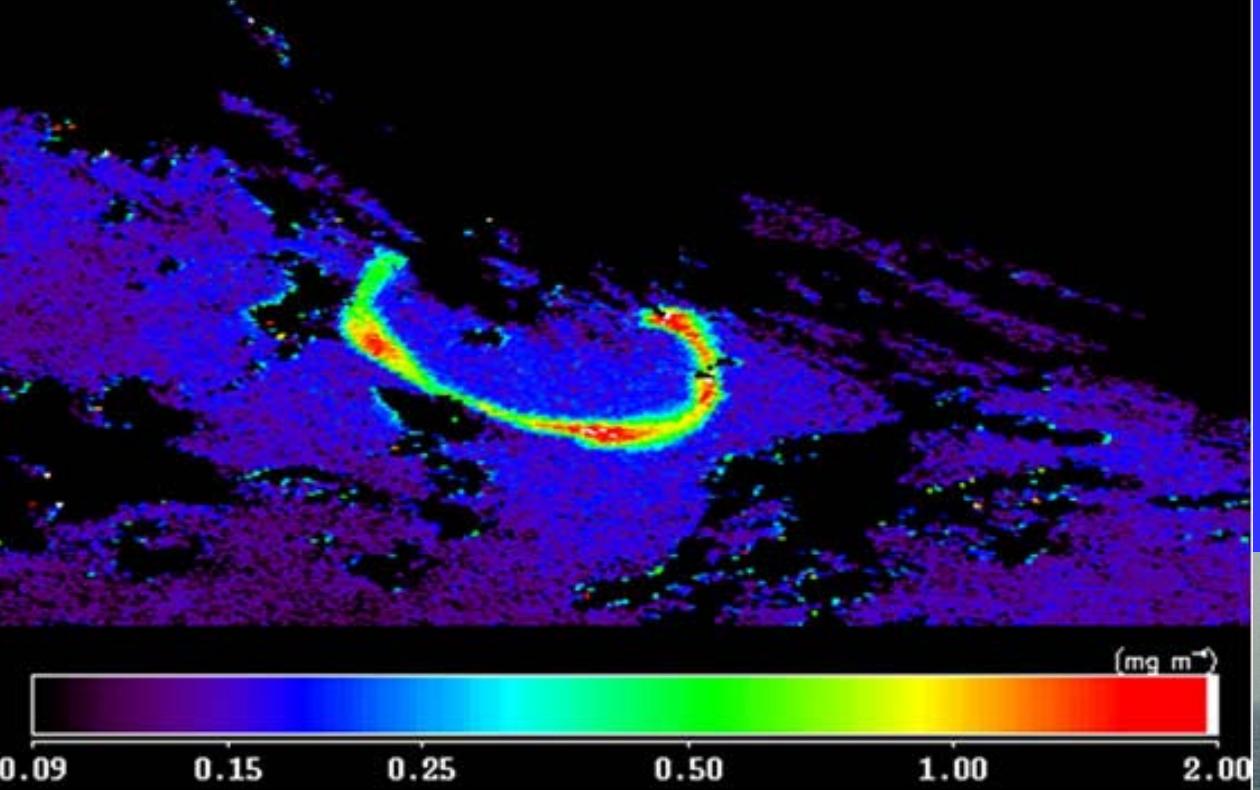
Klímaváltozás és levegőszennyezés

GPP: gross primary production (per year)

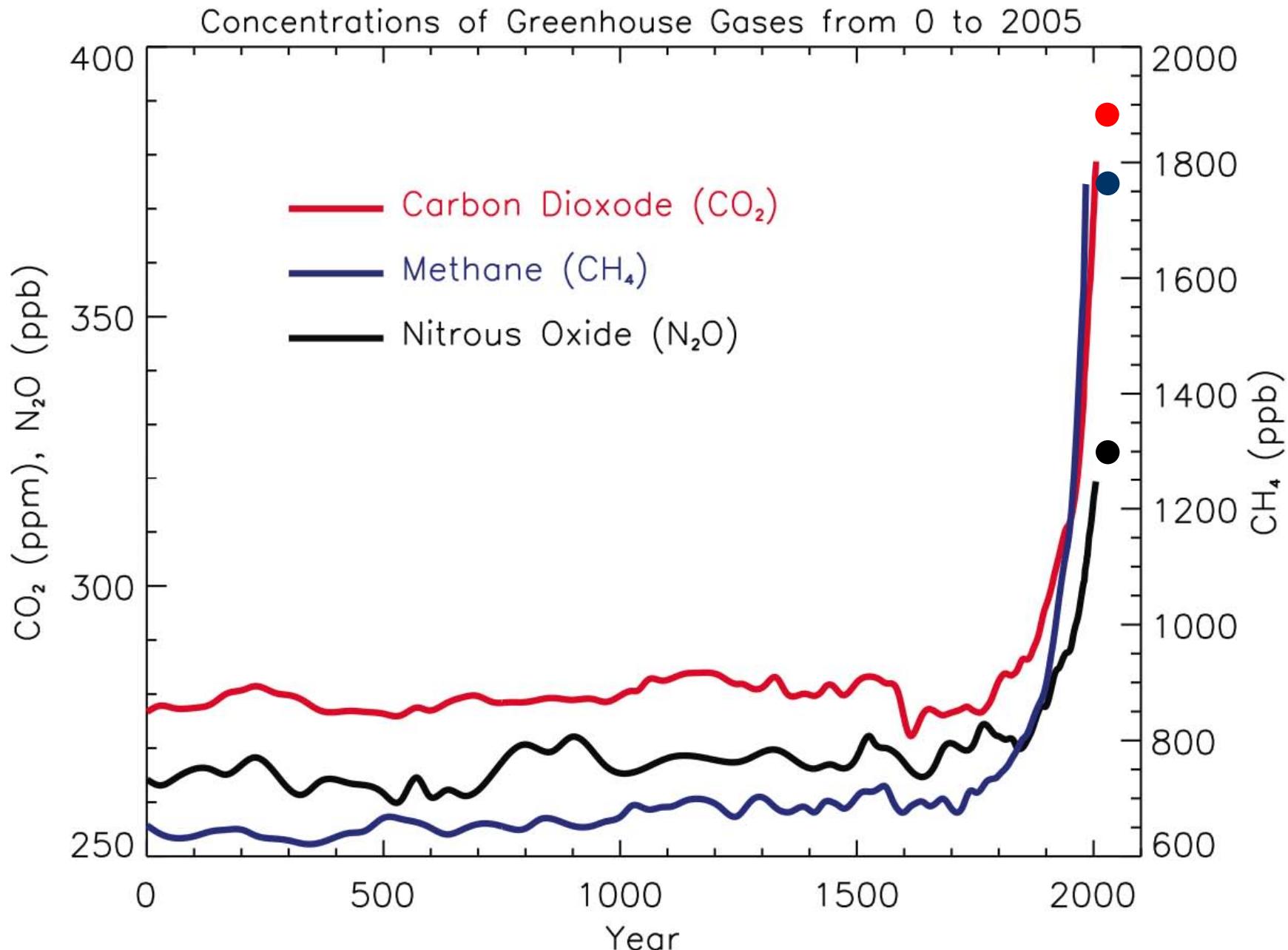
—: „natural” flux

—: „anthropogenic” flux

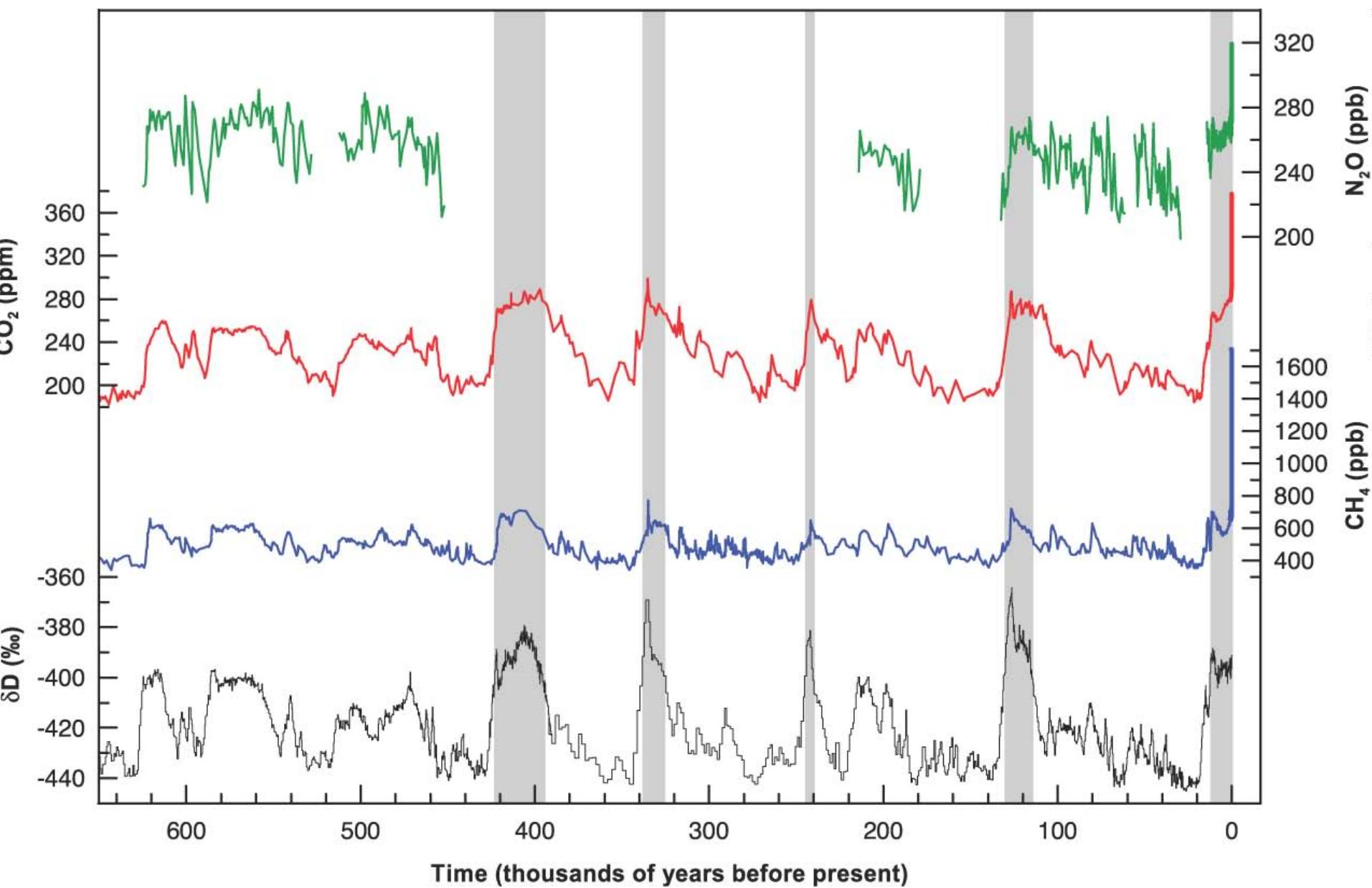




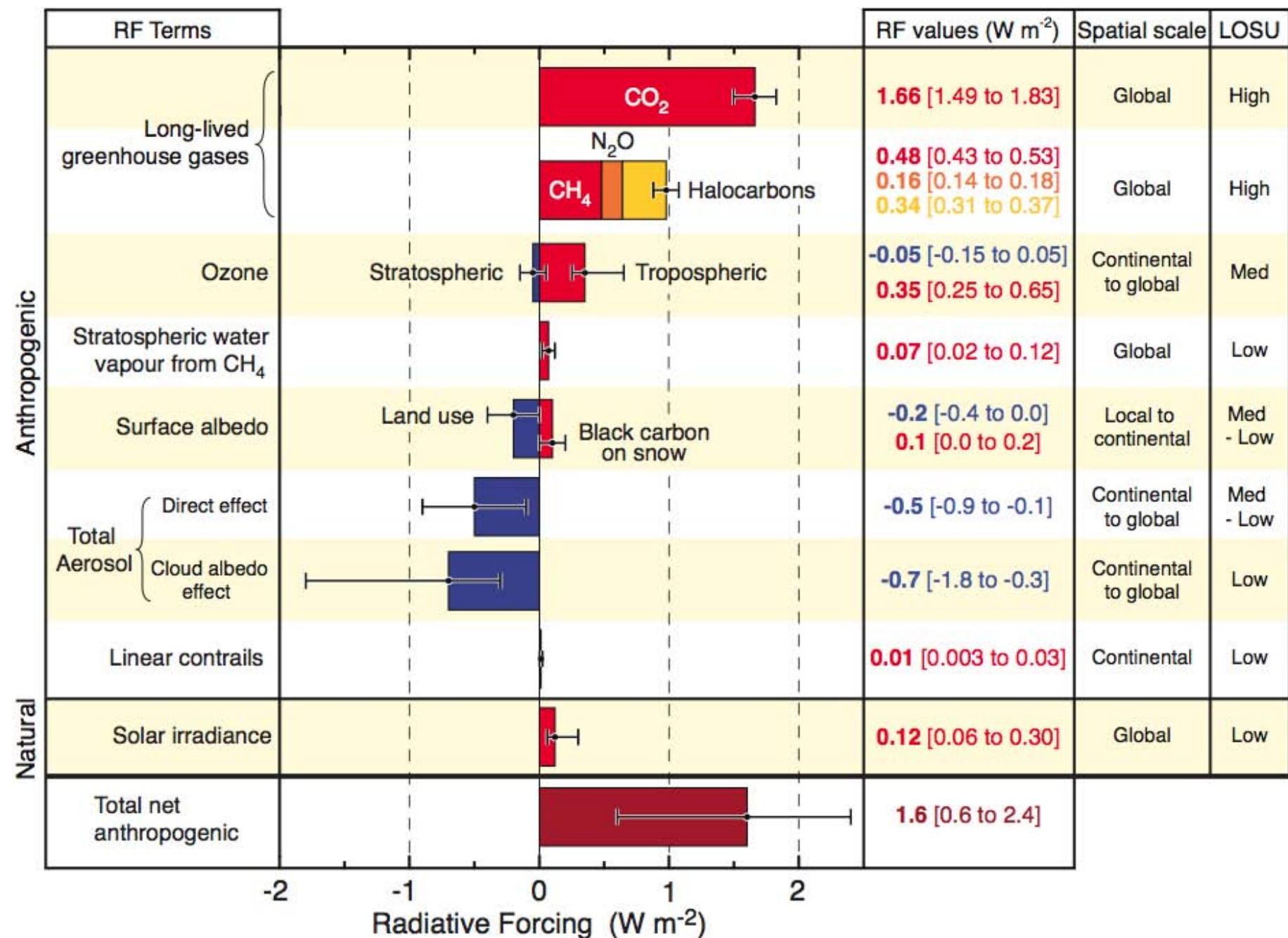
Klímaváltozás és levegőszennyezés



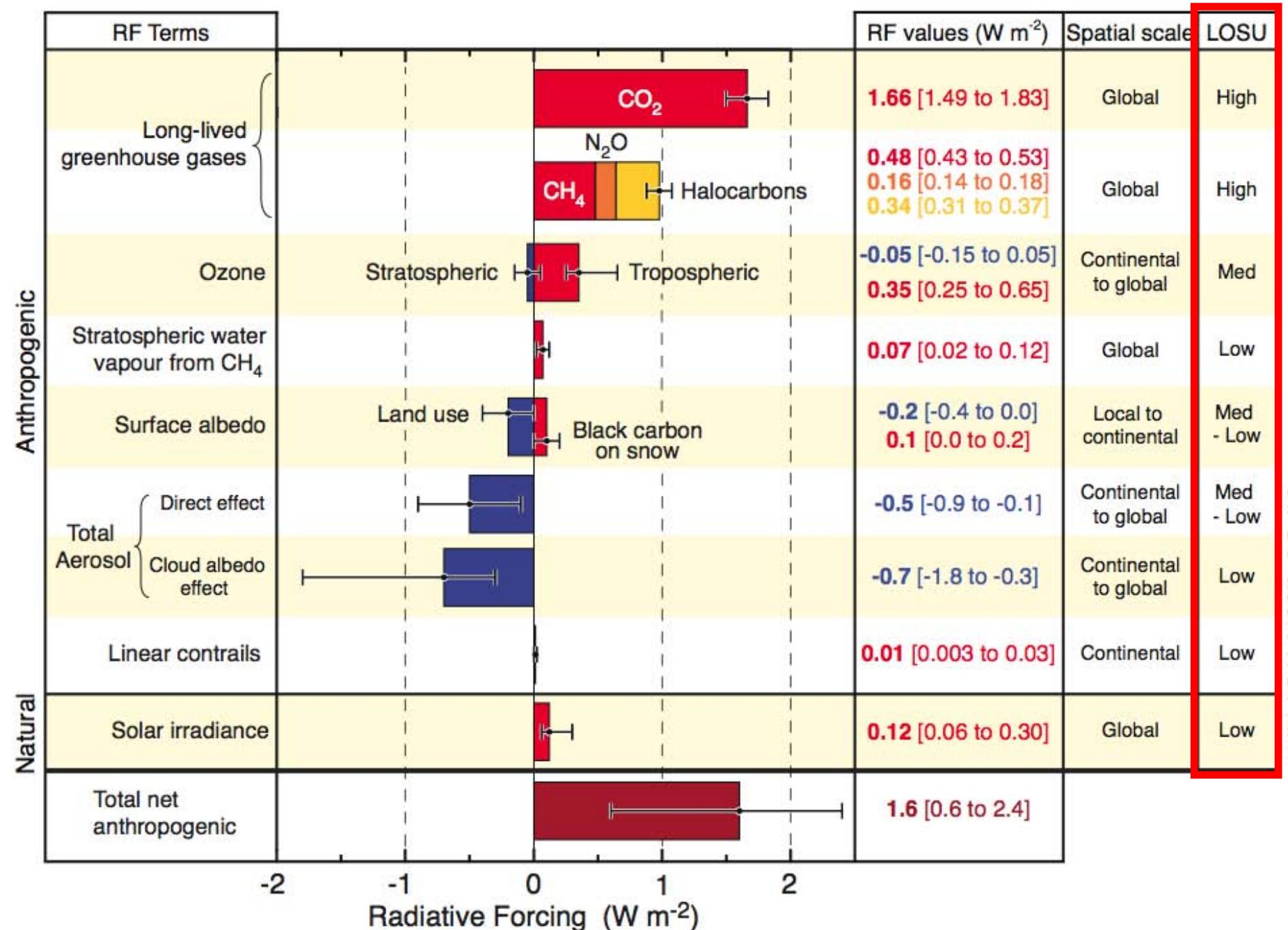
Klímaváltozás és levegőszennyezés



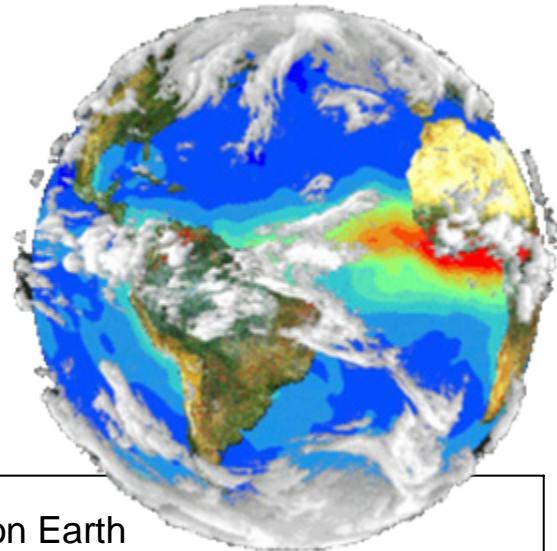
Radiative Forcing Components



Radiative Forcing Components

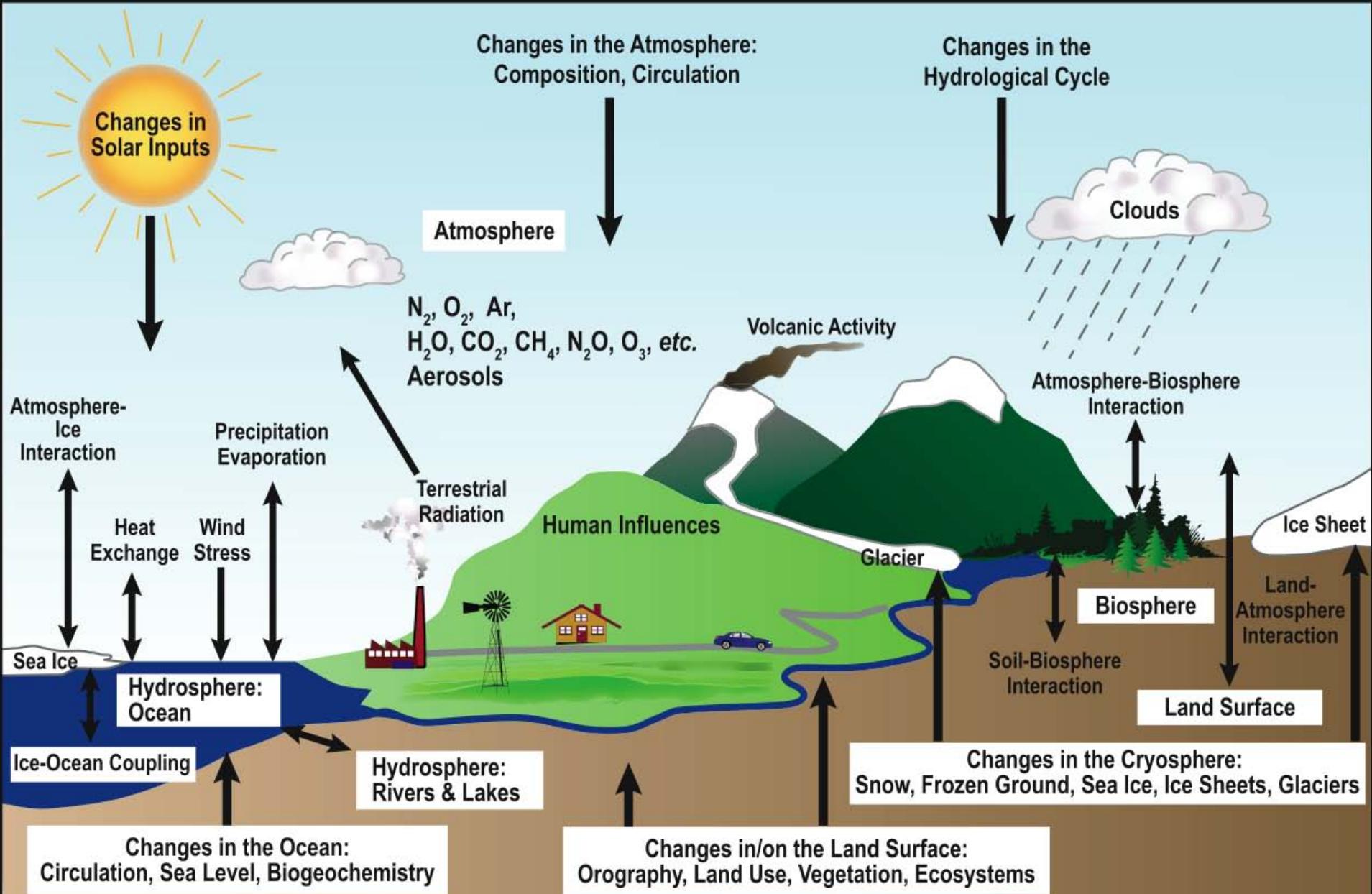


Klímaváltozás és levegőszennyezés



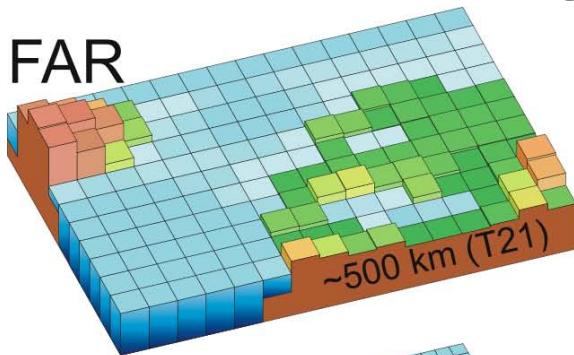
| Gas | Venus | Earth | Mars | Source or sink of gas on Earth |
|---------------|-------|---------|-------|--|
| CO_2 | 96.5% | 0.04% | 95% | Reduced to organic compounds (especially glucose) by photosynthesis; organisms use it to produce calcium carbonate (CaCO_3) for skeletal elements |
| O_2 | Trace | 21% | 0.13% | Released via photosynthesis by cyanobacteria, algae and plants |
| N_2 | 3.5% | 79% | 2.7% | Produced via bacterial conversion of nitrates (NO_3) in soil. |
| CH_4 | 0 ppm | 1.7 ppm | 0 ppm | Produced by fermenting bacteria, especially in the rumen of bovines. |

Klímaváltozás és levegőszennyezés: mi a bizonyíték?

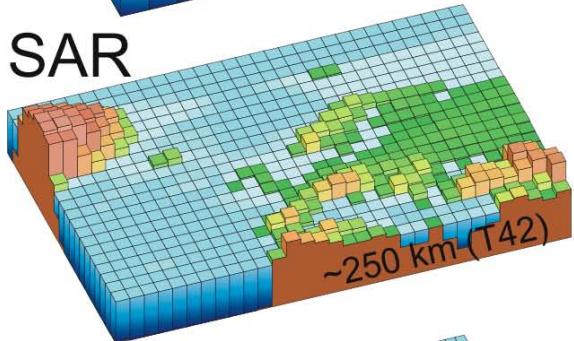


Klímaváltozás és levegőszennyezés: mi a bizonyíték?

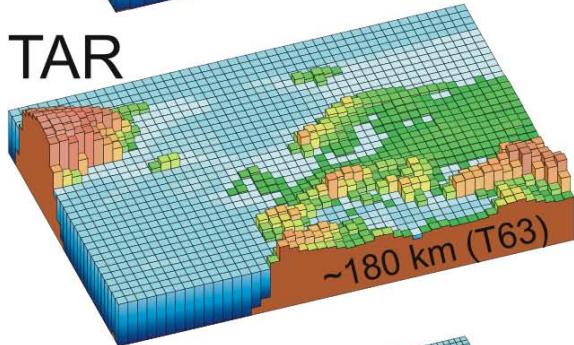
FAR



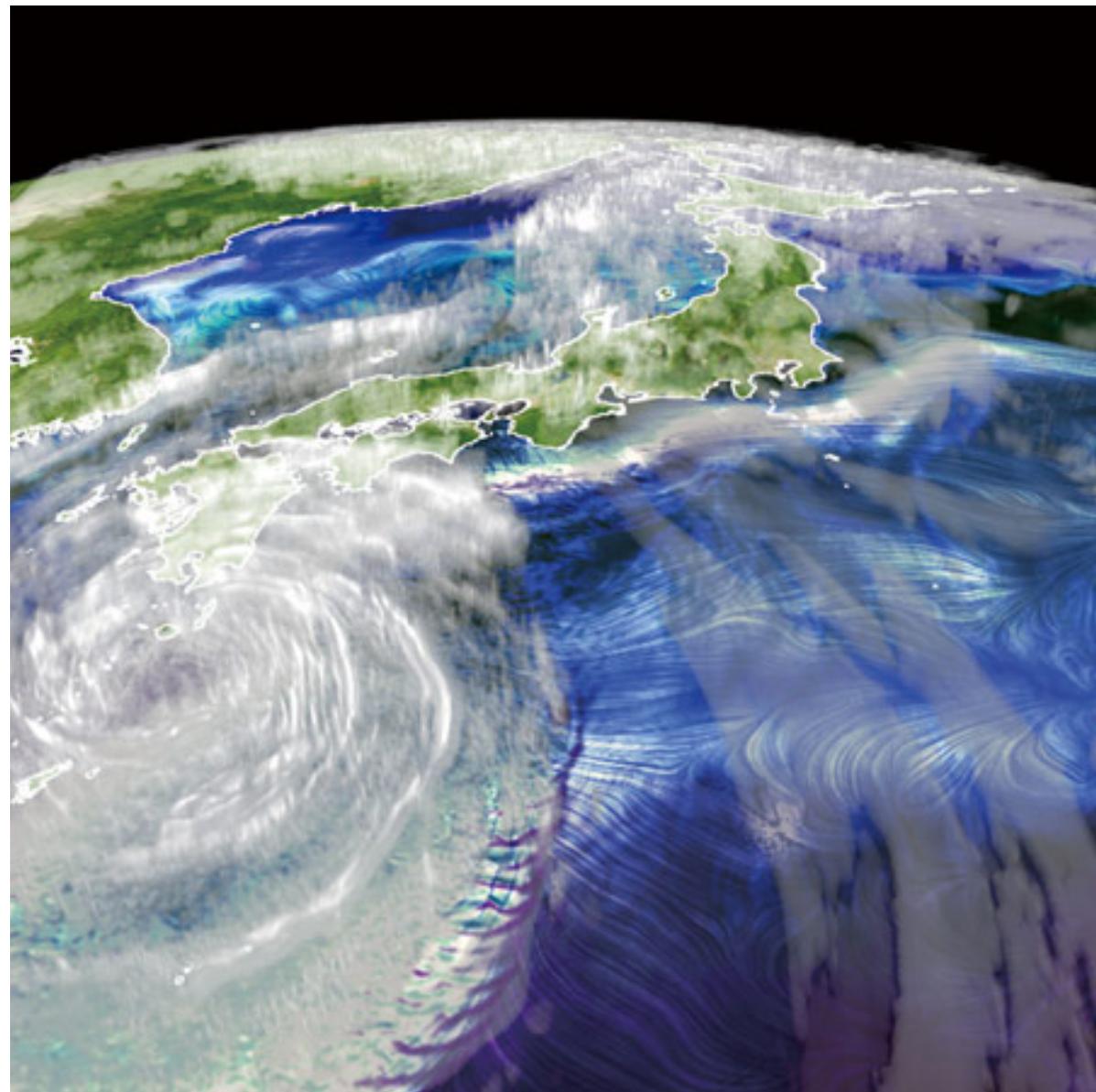
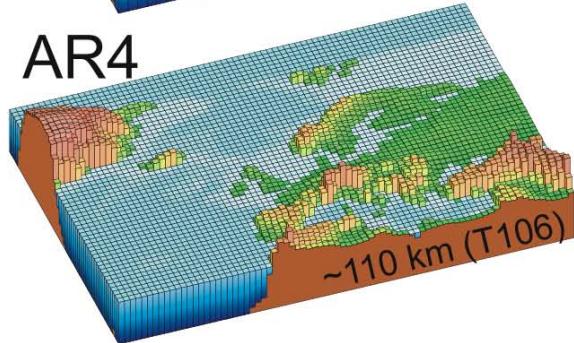
SAR



TAR



AR4



Globális csatolt atmoszféra modellek

$$\frac{\partial \theta_v}{\partial t} + (\vec{v} \cdot \nabla) \theta_v = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) \theta_v + \frac{\theta_v}{c_{p,d} T_v} \sum_{n=1}^{N_{e,h}} \frac{dQ_n}{dt}$$

$$\frac{\partial q_v}{\partial t} + (\vec{v} \cdot \nabla) q_v = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) q_v + R_{emis} + R_{dep} + R_{chem} + R_{nuc} + R_{c/e} + R_{dp/s}$$

$$\frac{\partial q_{w,i}}{\partial t} + (\vec{v} \cdot \nabla) q_{w,i} = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) q_{w,i} + R_{emis} + R_{dep} + R_{sed} + R_{nuc} + R_{coag} + R_{c/e} + R_{f/m}$$

$$\frac{\partial q_{I,i}}{\partial t} + (\vec{v} \cdot \nabla) q_{I,i} = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) q_{I,i} + R_{dep} + R_{sed} + R_{nuc} + R_{coag} + R_{f/m} + R_{dp/s}$$

$$\frac{\partial u}{\partial t} + (\vec{v} \cdot \nabla) u = f_v - \frac{1}{\rho} \frac{\partial p}{\partial x} + \frac{1}{\rho} \left[\frac{\partial}{\partial x} \left(\rho K_{m,xx} \frac{\partial u}{\partial x} \right) + \frac{\partial}{\partial y} \left(\rho K_{m,yx} \frac{\partial u}{\partial y} \right) + \frac{\partial}{\partial z} \left(\rho K_{m,zx} \frac{\partial u}{\partial z} \right) \right]$$

$$\frac{\partial v}{\partial t} + (\vec{v} \cdot \nabla) v = -fu - \frac{1}{\rho} \frac{\partial p}{\partial y} + \frac{1}{\rho} \left[\frac{\partial}{\partial x} \left(\rho K_{m,xy} \frac{\partial v}{\partial x} \right) + \frac{\partial}{\partial y} \left(\rho K_{m,yy} \frac{\partial v}{\partial y} \right) + \frac{\partial}{\partial z} \left(\rho K_{m,zy} \frac{\partial v}{\partial z} \right) \right]$$

$$\frac{\partial p}{\partial z} = -\rho q$$

$$\theta_v = T(1 + 0.608q_v) \left(\frac{1000 \text{ mb}}{p} \right)^\kappa = T_v \left(\frac{1000 \text{ mb}}{p} \right)^\kappa$$

$$\rho = \frac{p}{R_m T}$$

$$\frac{\partial \rho}{\partial t} + \nabla \cdot (\vec{v} \rho) = 0$$

Globális csatolt atmoszféra modellek

$$\frac{\partial \theta_v}{\partial t} + (\vec{v} \cdot \nabla) \theta_v = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) \theta_v + \frac{\theta_v}{c_{p,d} T_v} \sum_{n=1}^{N_{e,h}} \frac{dQ_n}{dt}$$

$$\frac{\partial q_v}{\partial t} + (\vec{v} \cdot \nabla) q_v = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) q_v + R_{emis} + R_{dep} + R_{chem} + R_{nuc} + R_{c/e} + R_{dp/s}$$

$$\frac{\partial q_{w,i}}{\partial t} + (\vec{v} \cdot \nabla) q_{w,i} = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) q_{w,i} + R_{emis} + R_{dep} + R_{sed} + R_{nuc} + R_{coag} + R_{c/e} + R_{f/m}$$

$$\frac{\partial q_{I,i}}{\partial t} + (\vec{v} \cdot \nabla) q_{I,i} = \frac{1}{\rho} (\nabla \cdot \rho \vec{K}_h \nabla) q_{I,i} + R_{dep} + R_{sed} + R_{nuc} + R_{coag} + R_{f/m} + R_{dp/s}$$

$$\frac{\partial u}{\partial t} + (\vec{v} \cdot \nabla) u = fv - \frac{1}{\rho} \frac{\partial p}{\partial x} + \frac{1}{\rho} \left[\frac{\partial}{\partial x} \left(\rho K_{m,xx} \frac{\partial u}{\partial x} \right) + \frac{\partial}{\partial y} \left(\rho K_{m,yx} \frac{\partial u}{\partial y} \right) + \frac{\partial}{\partial z} \left(\rho K_{m,zx} \frac{\partial u}{\partial z} \right) \right]$$

$$\frac{\partial v}{\partial t} + (\vec{v} \cdot \nabla) v = -fu - \frac{1}{\rho} \frac{\partial p}{\partial y} + \frac{1}{\rho} \left[\frac{\partial}{\partial x} \left(\rho K_{m,xy} \frac{\partial v}{\partial x} \right) + \frac{\partial}{\partial y} \left(\rho K_{m,yy} \frac{\partial v}{\partial y} \right) + \frac{\partial}{\partial z} \left(\rho K_{m,zy} \frac{\partial v}{\partial z} \right) \right]$$

$$\frac{\partial p}{\partial z} = -\rho q$$

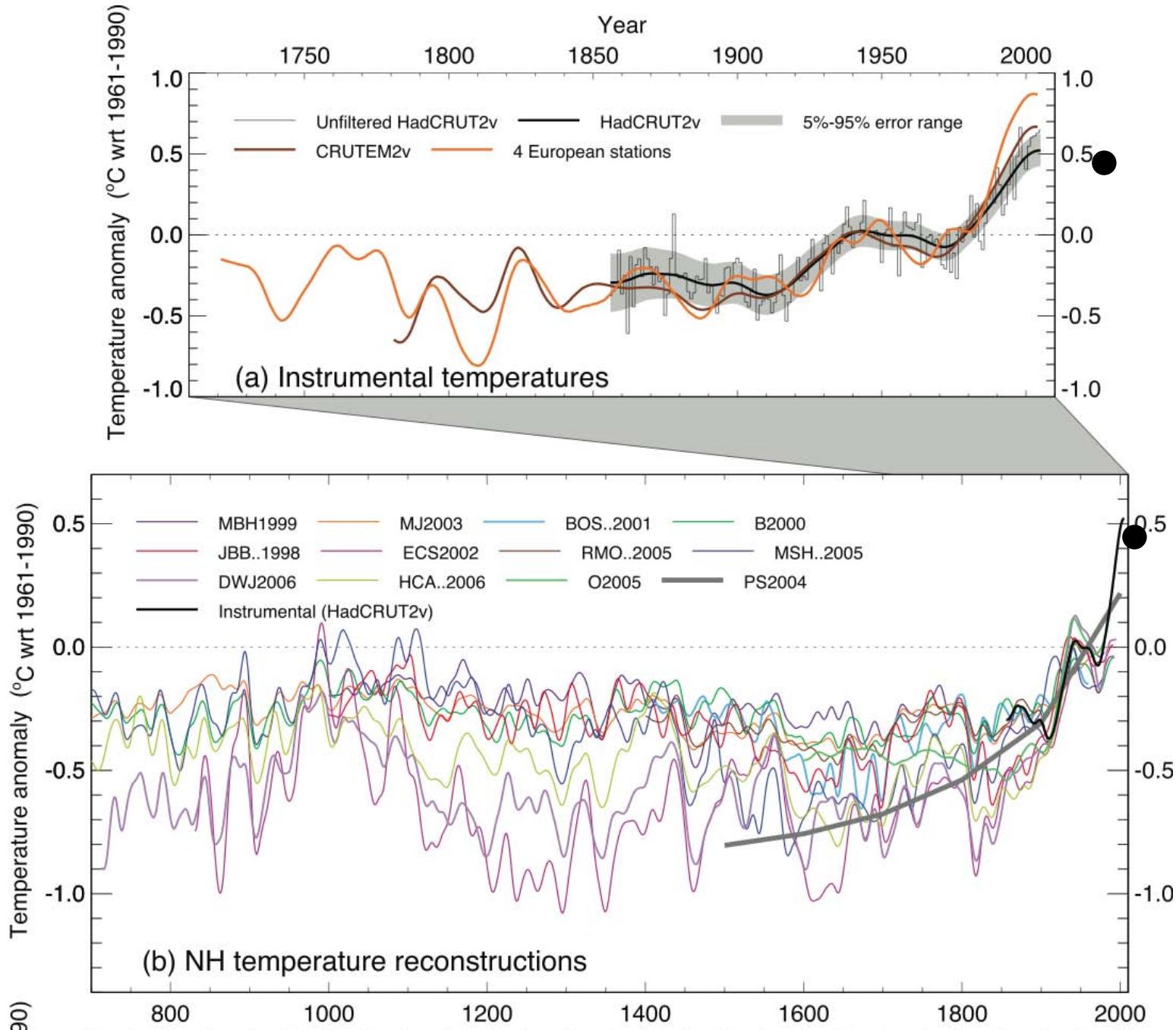
$$\theta_v = T(1 + 0.608q_v) \left(\frac{1000 \text{ mb}}{p} \right)^\kappa = T_v \left(\frac{1000 \text{ mb}}{p} \right)^\kappa$$

$$\rho = \frac{p}{R_m T}$$

$$\frac{\partial \rho}{\partial t} + \nabla \cdot (\vec{v} \rho) = 0$$

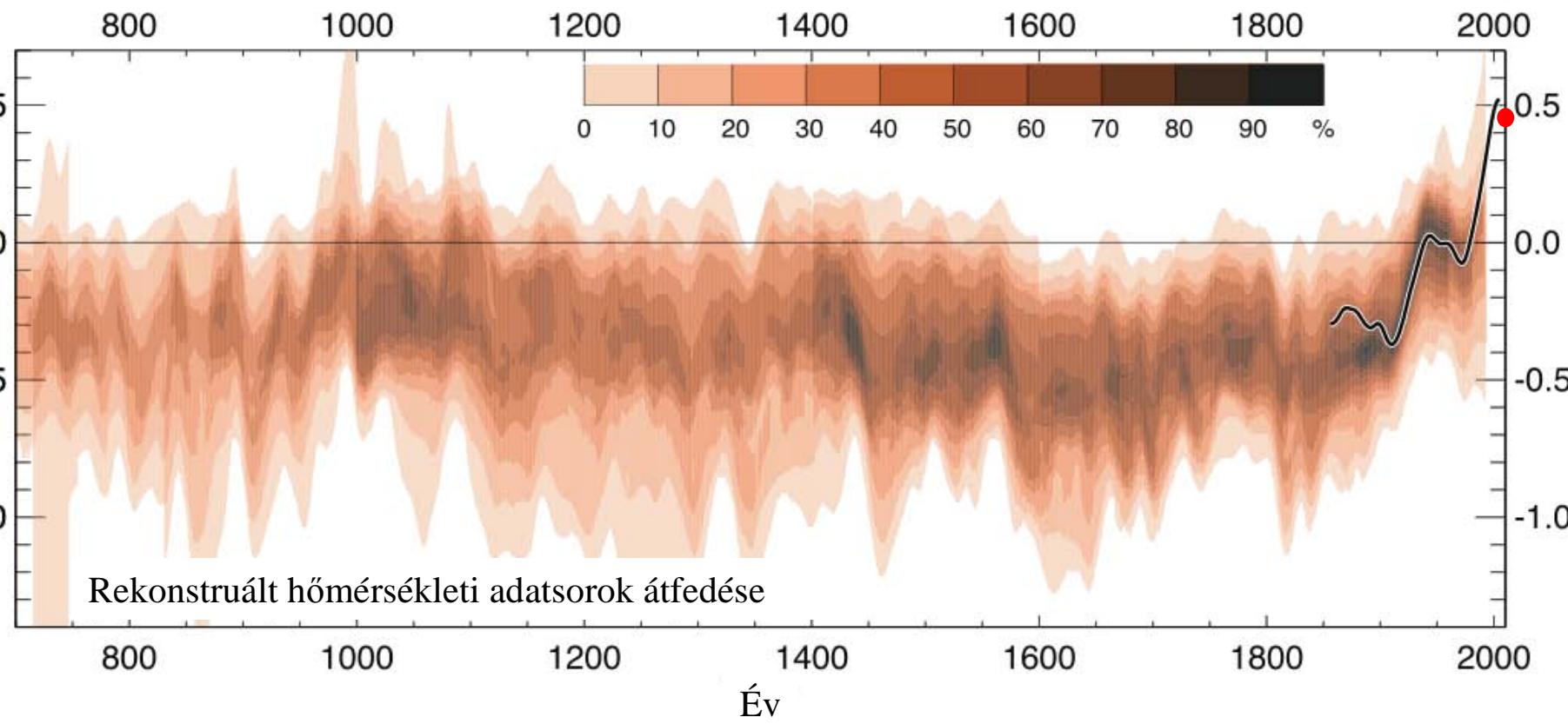
+ további parametrizáció: talaj (20-50), felhők (35-45), ...

Rekonstrukció



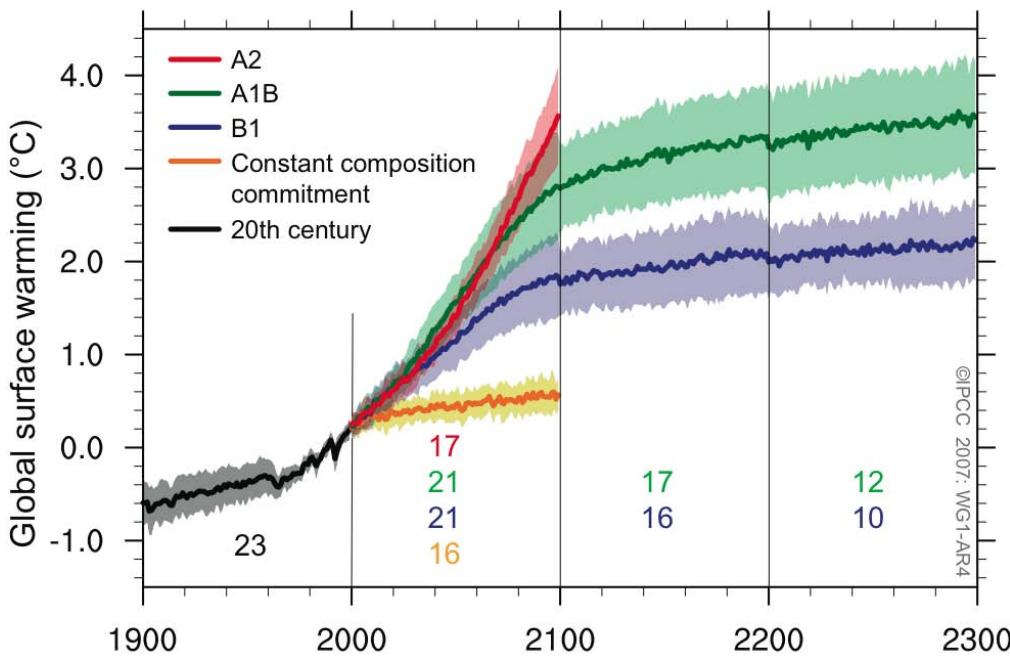
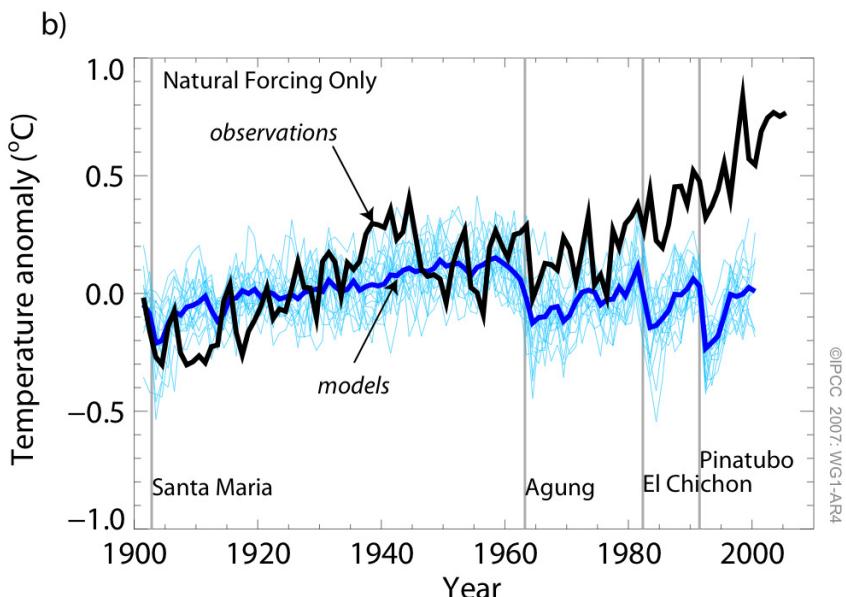
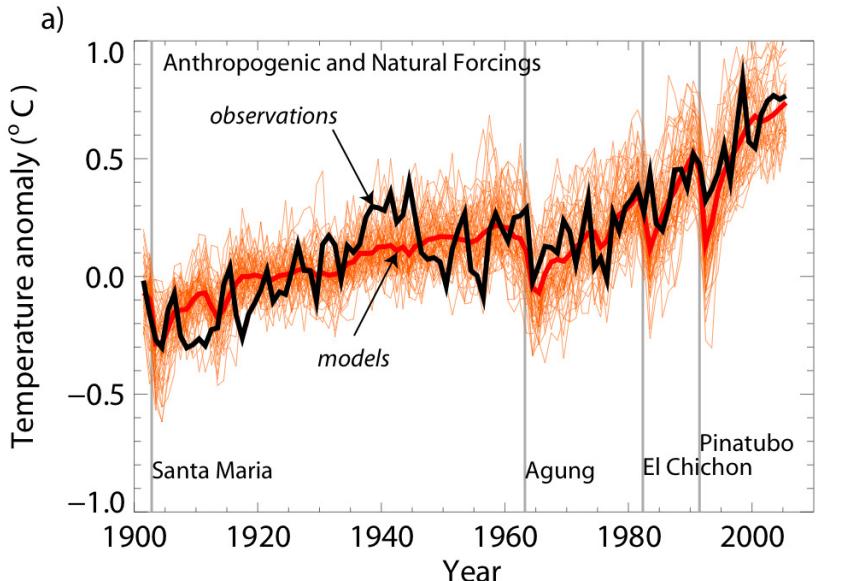
Rekonstrukció

Hőmérsékleti anomália (1961-1990 időszakhoz képest) °C

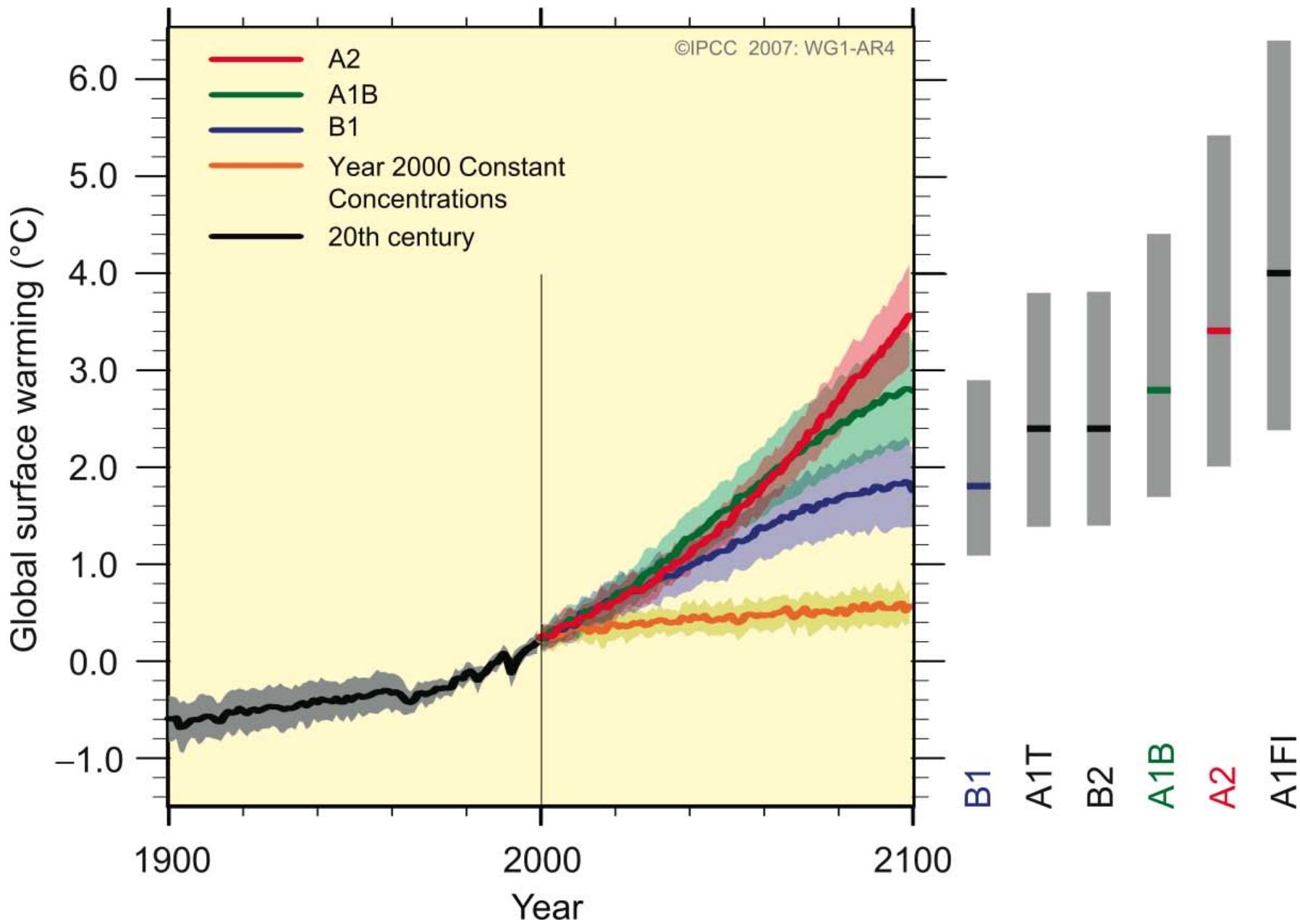


Klímaváltozás és levegőszennyezés: mi a bizonyíték?

Global Mean Surface Temperature Anomalies

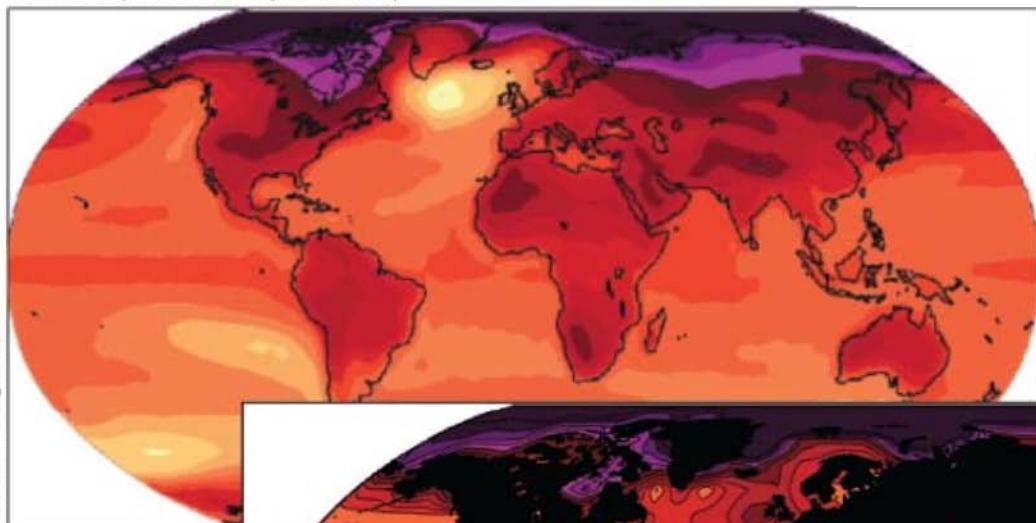


Klímaváltozás és levegőszennyezés: mi a bizonyíték?

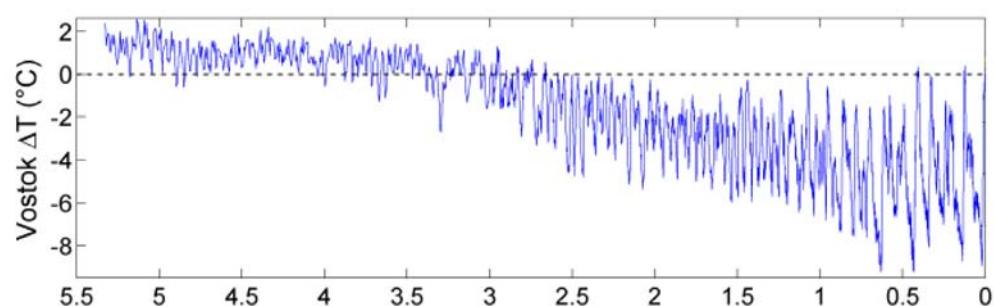


Mindemellett....

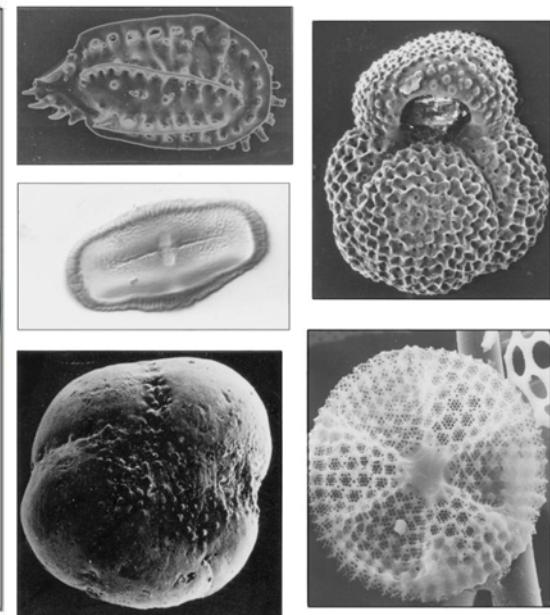
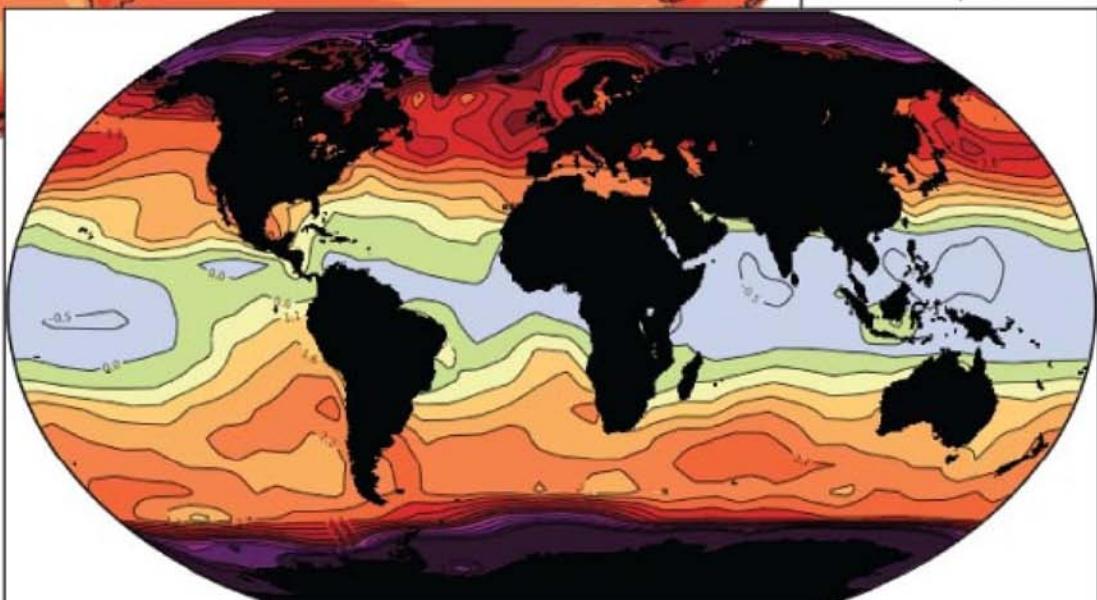
IPCC AR4, A2 Scenario (2090-2099)



IPCC WG1-AR4, Figure 10.8



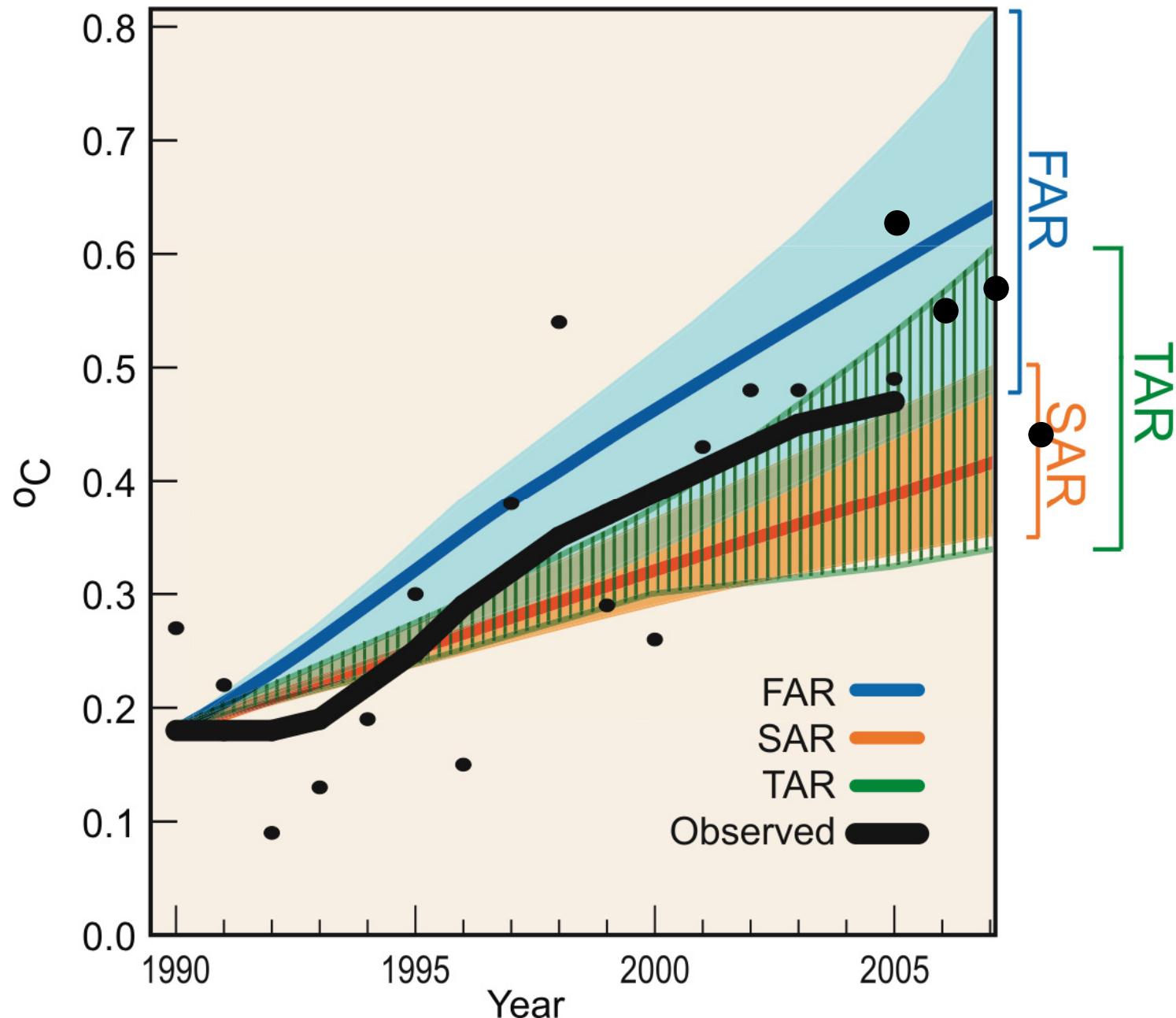
mid-Pliocene, PRISM2 SST

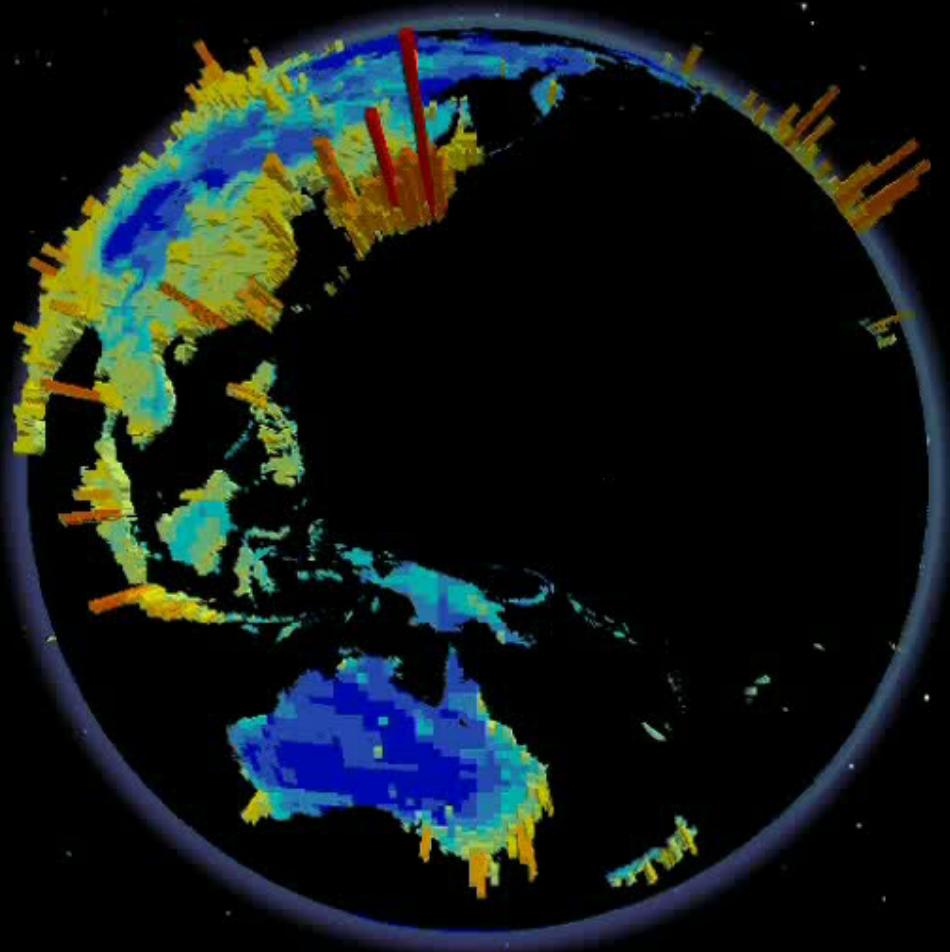


Degrees C

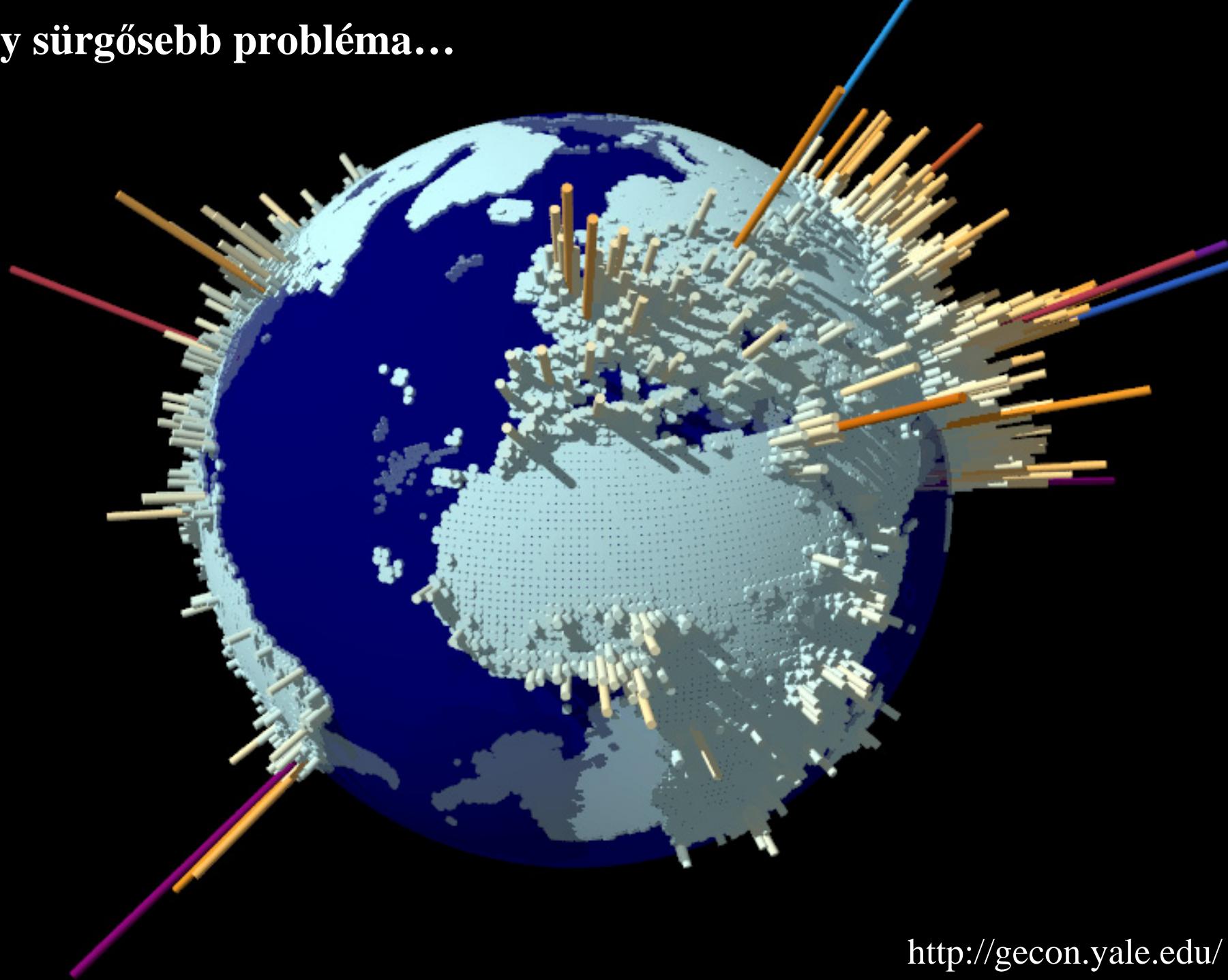
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5

Klímaváltozás és levegőszennyezés: mi a bizonyíték?



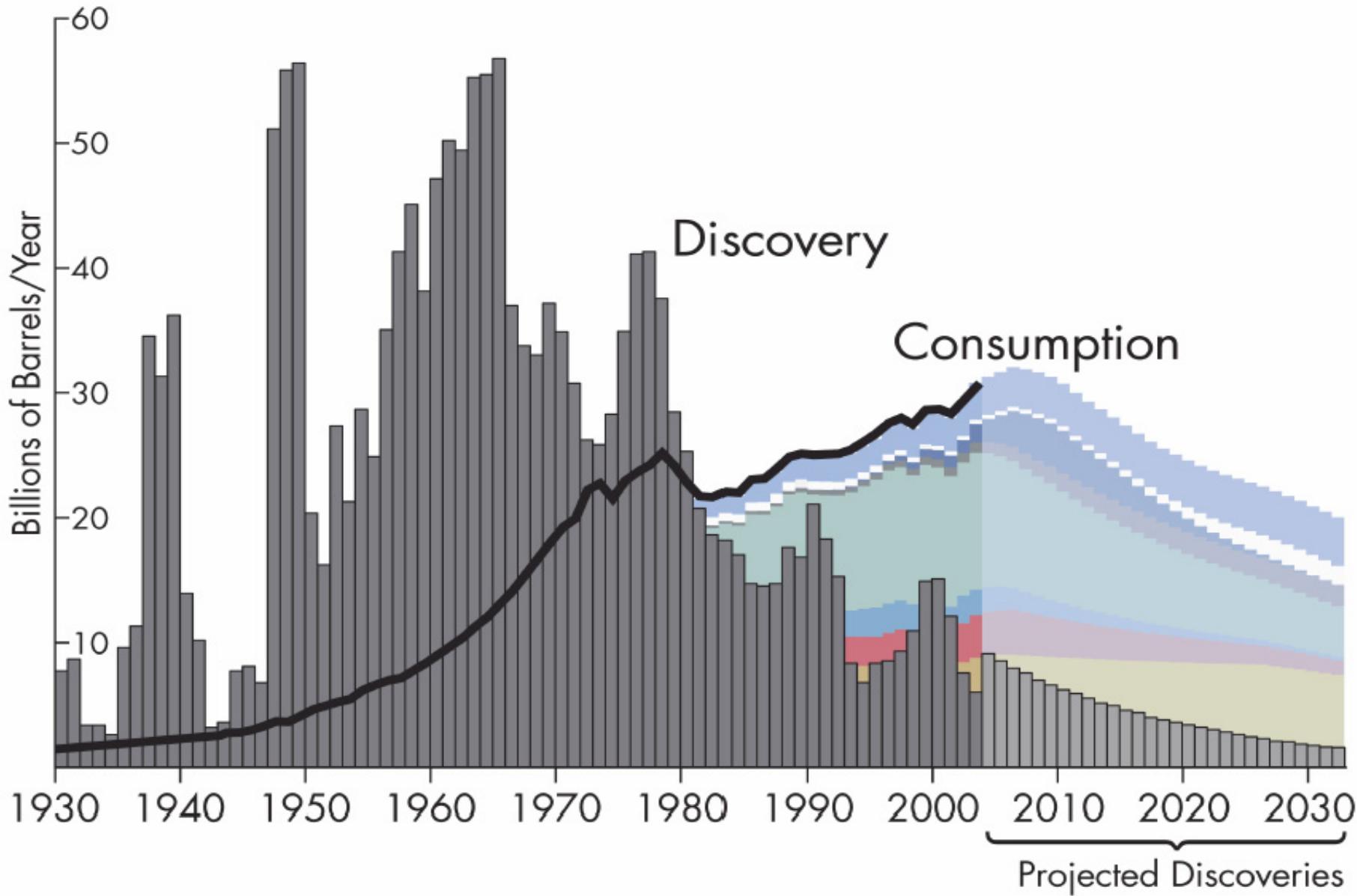


Egy sürgősebb probléma...

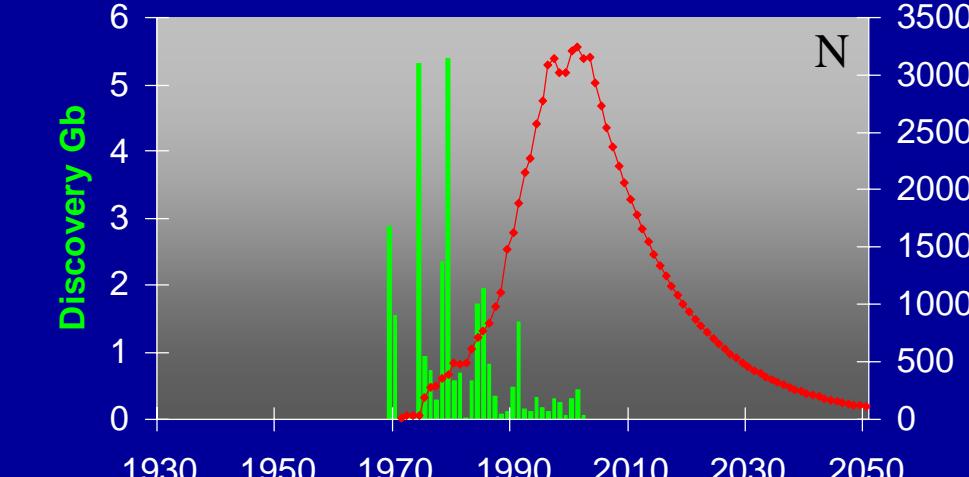
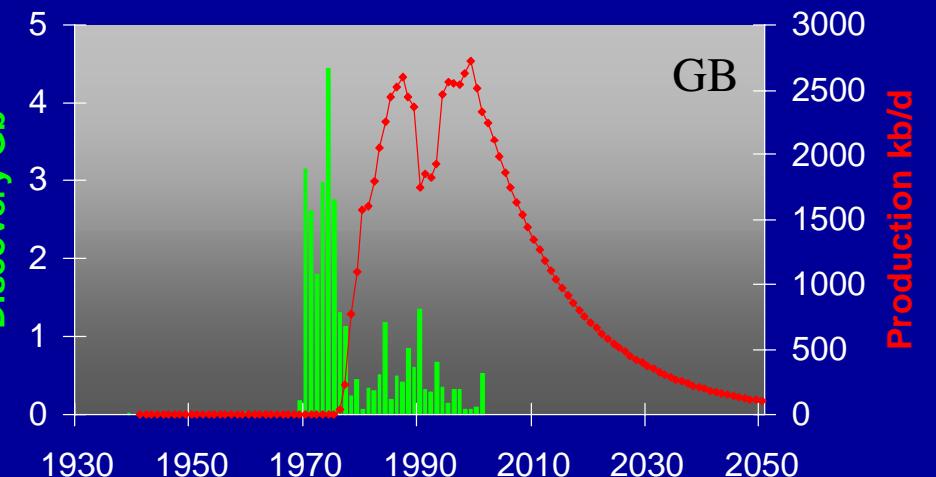
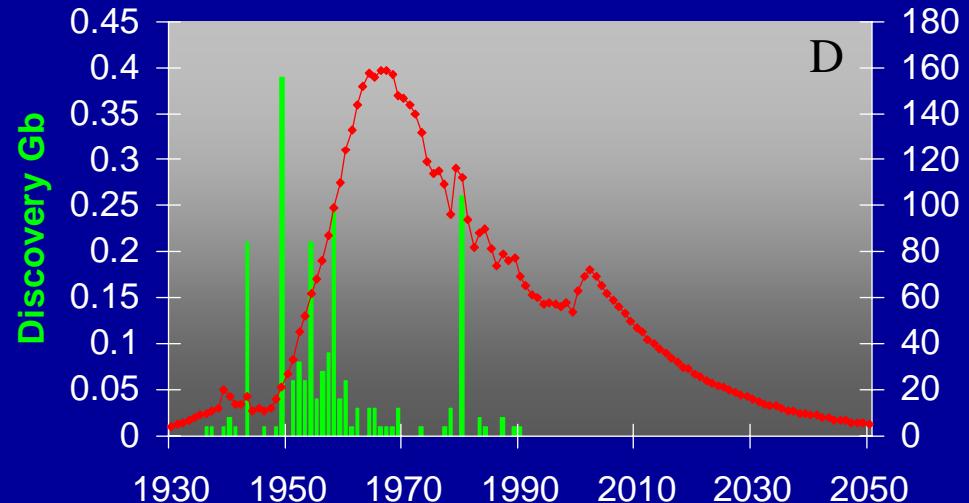
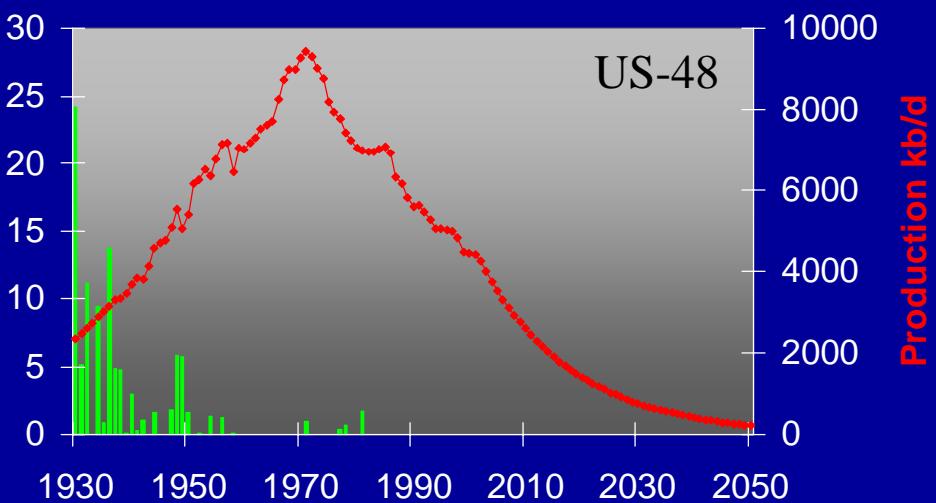


Egy sürgősebb probléma...

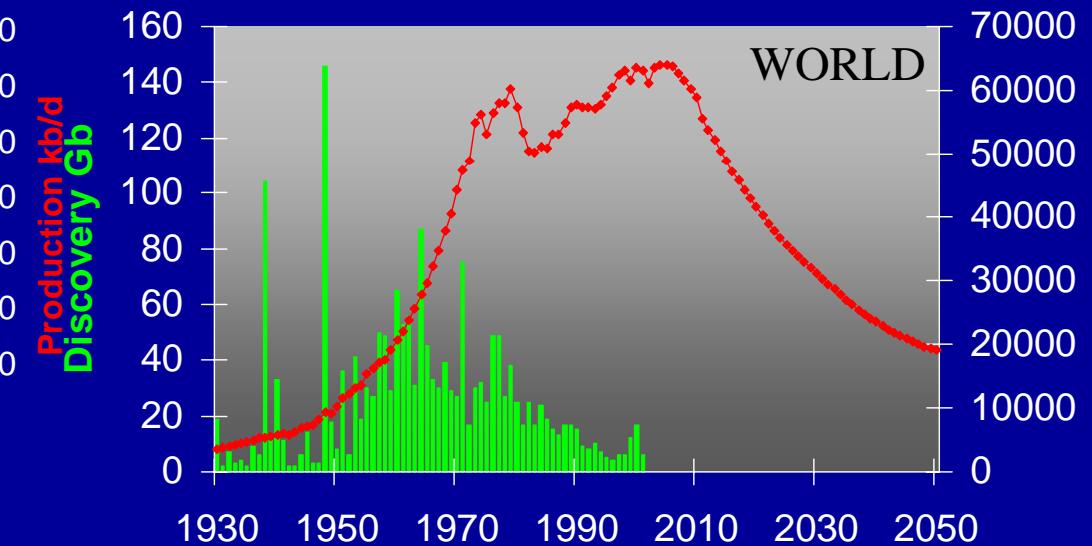
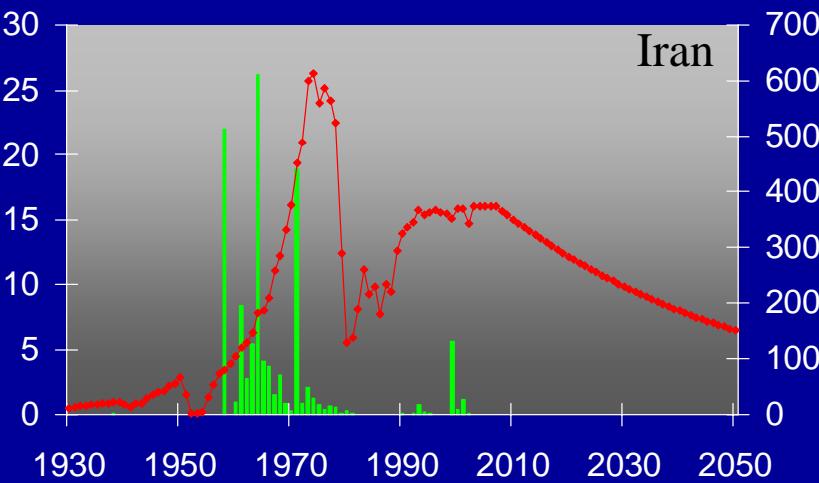
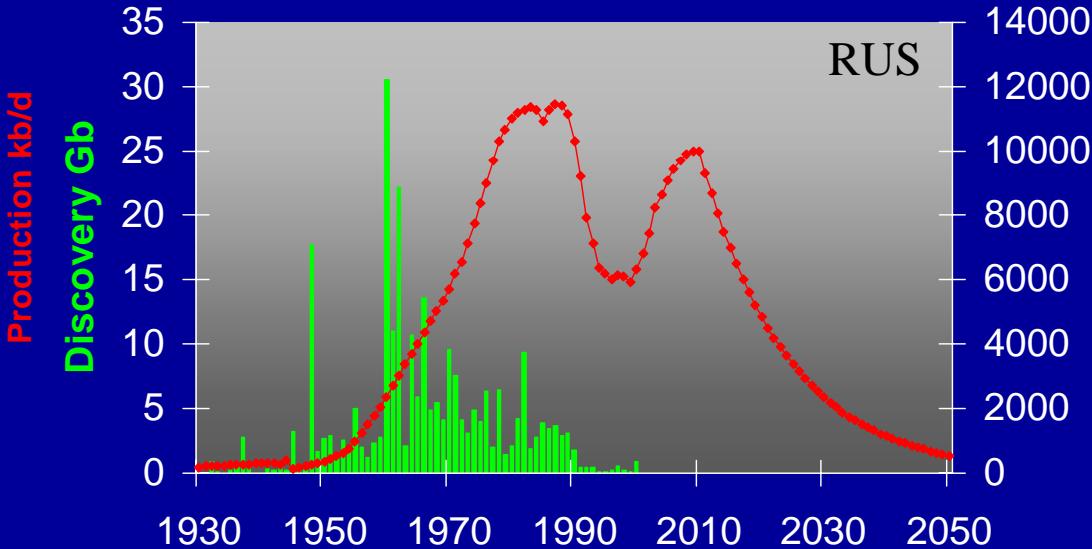
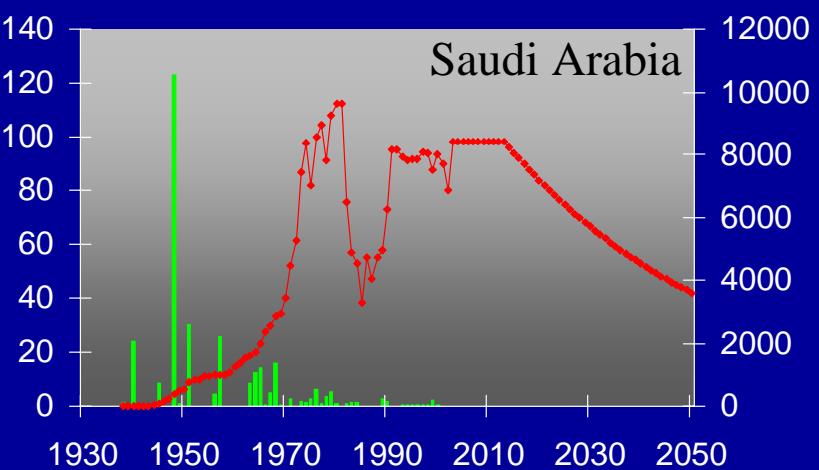
Peak Oil – The Growing Gap



Egy sürgősebb probléma...



Egy sürgősebb probléma...



Összegzés

- Globális felmelegedés: mérhető trend
- Példátlan? (nem)
- Környezetszennyezés: tény
- Csatolás a kettő között? (nem tudjuk)
- Katasztrófák? (nem tudjuk)
- Akad sürgősebb probléma? (úgy tűnik)