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Avoiding Dangerous Climate change by Eco-Innovation and Green Purchasing

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(4) President of Sustainable Management Forum
(5) Chair of Eco-efficiency Forum
(6) Chair of the National Committee for Green Procurement
(7) Chair of the National Committee for Ecolabelling ⟨ISO/TC207/ SC3⟩
(8) Honorary chair of Green Purchasing Network (GPN), Japan
(9) Chair of the International Green Purchasing Network (IGPN)
(10) Chair of the Organizing Committee of EcoProducts Exhibition
(11) Guest Professor of 34 Chinese Universities

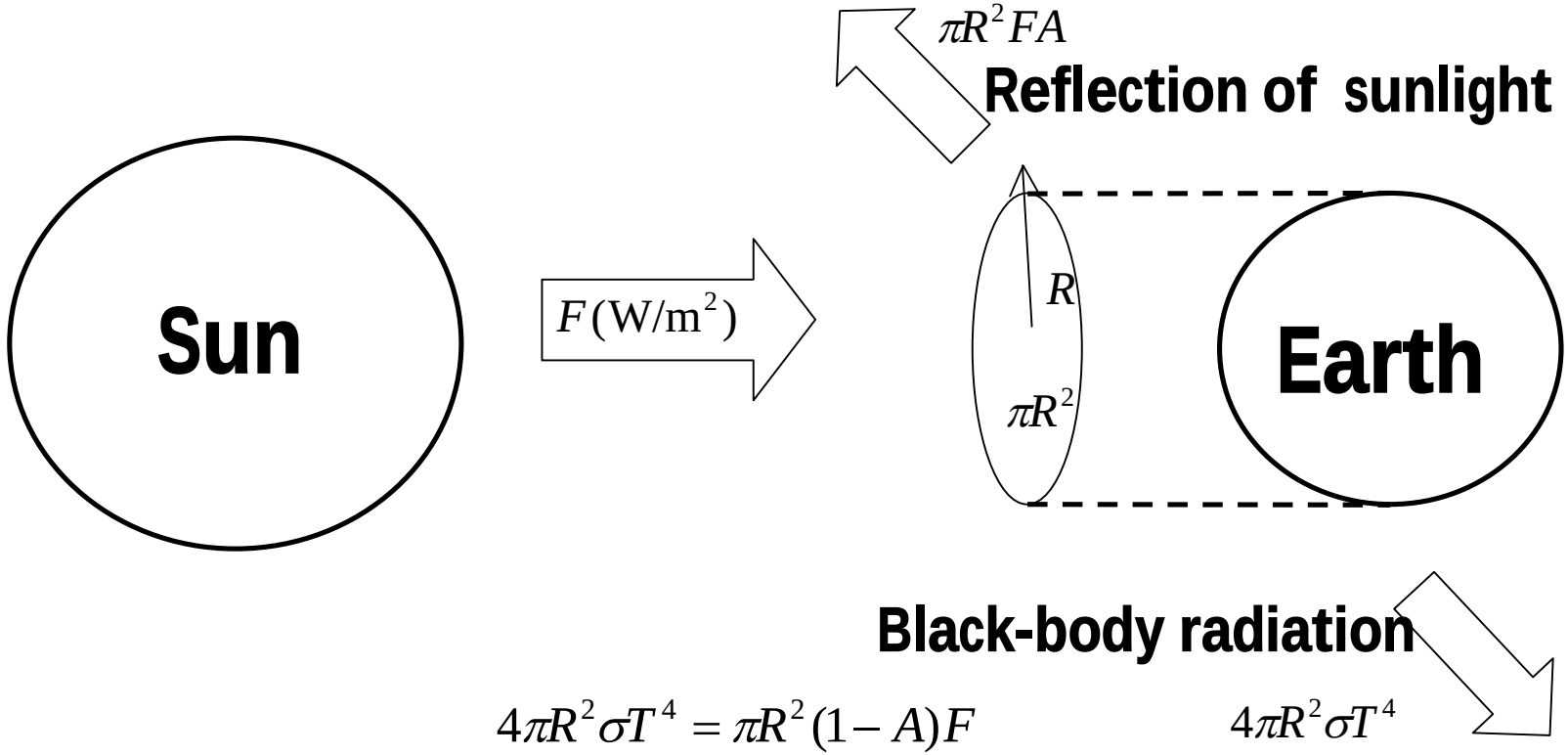
Reality of the World

World GDP	4.8billion US **$** (2006)
	growth rate 4.0%/year
World Population	6.5billion (2006)
	growth rate 1.1%/year
CO_2 Emission	2.64billion ton (2005)
	growth rate 3.3%/year
Extinction of Biospecies	10,000～50,000/year

Big changes in a day

Increase of the World GDP	130 billion US$
CO_2 emission	72 million ton
CO_2 accumulation in air (60% of emission)	43 million ton
CO_2 accumulation in air in a few thousands years (20% of emission)	14 million ton
Number of extinction of Bio-Species	～100
Increase of the world population	～0.2 million

The surface temperature of the Earth without greenhouse gas is -18℃



$$4\pi R^2 \sigma T^4 = \pi R^2 (1-A) F$$

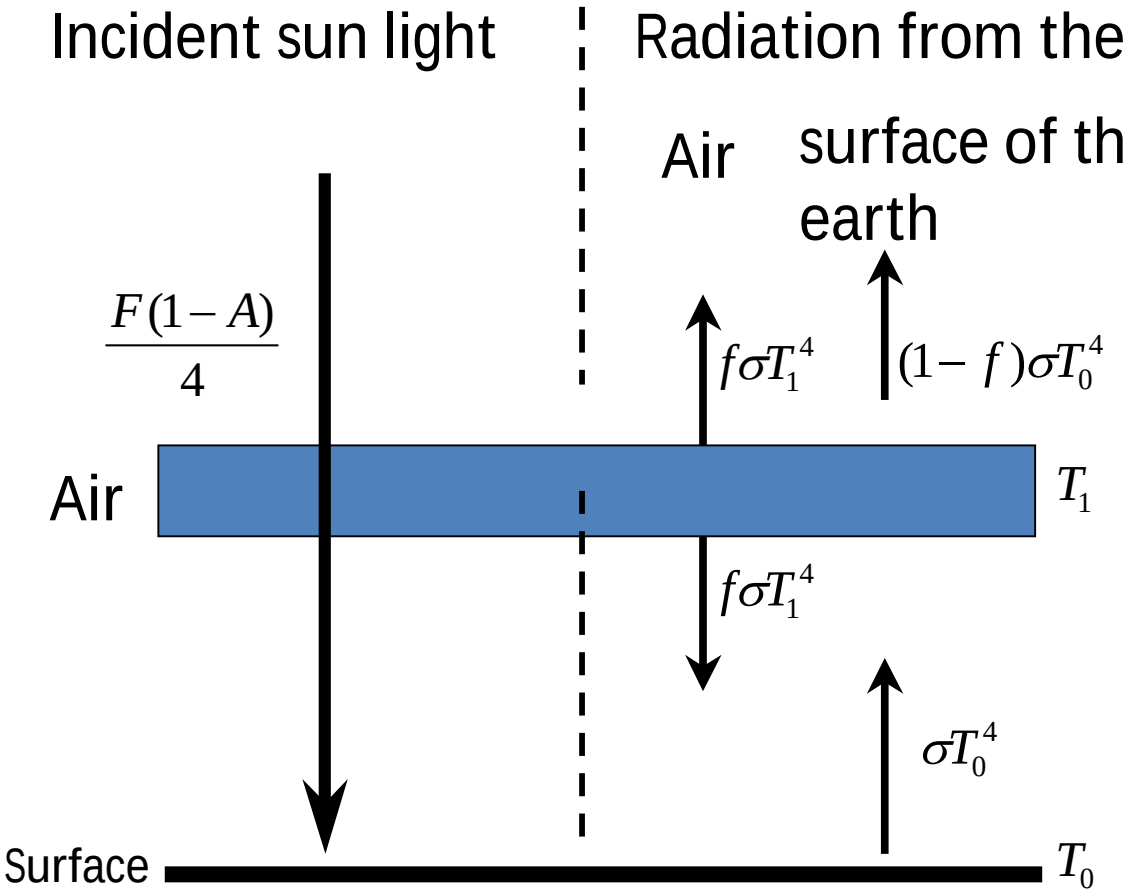
$$T = \left\{ \frac{(1-A)F}{4\sigma} \right\}^{1/4}$$

A (Albedo) $=0.3$ $\quad$ F(solar constant)$=1368\mathrm{W/m^2}$

σ(Stefane- Boltzmann constant) $=5.67\times10^{-8}\mathrm{Wm^{-2}K^{-4}}$

$$\boxed{T = 255\mathrm{K}(-18^\circ\mathrm{C})}$$

The surface temperature of the Earth with greenhouse gas is 15℃



Energy balance

$$\frac{F(1-A)}{4} = (1-f)\sigma T_0^4 + f\sigma T_1^4 \quad (1)$$

$$f\sigma T_0^4 = 2 f\sigma T_1^4 \quad (2)$$

$$T_0 = \left\{ \frac{F(1-A)}{4\sigma(1-\frac{f}{2})} \right\}^{1/4}$$

$A = 0.30,\ f = 0.77$ (Absorption Coeff.)

$T_0 = 288K(15^\circ\mathrm{C})$

Relationship between Radiative forcing and the Earth surface temperature

Radiative forcing= change in the radiation flux of the earth due to the change of the concentration of greenhouse gas

$\Delta F=(1-f/2)\sigma T0^4-(1-(f+\Delta f)/2)\,\sigma T0^4=1/2\Delta f\cdot\sigma T0^4$

$\Delta T0=\lambda\Delta F$

$\lambda=1/4(1-f/2)\,\sigma T0^3=0.3K/(W/m^2)$

- GCM simulations
  λ =0.3 ~ 1.4 K/(W/m²)
- Comparison between Glacier and Int. Glacier periods
  λ =0.75 (J.Hansen, NASA)

The surface temp. change is proportional to the change of Radiative forcing in the first order

Relationship between the Earth surface temperature and CO_2 conc.

Since radiative forcing is proportional to the logarithm of CO_2 conc., surface temperature is proportional to log. CO_2 conc.

T_2=A log[556 (doubling of the CO_2 conc. of the pre-ind. level)]

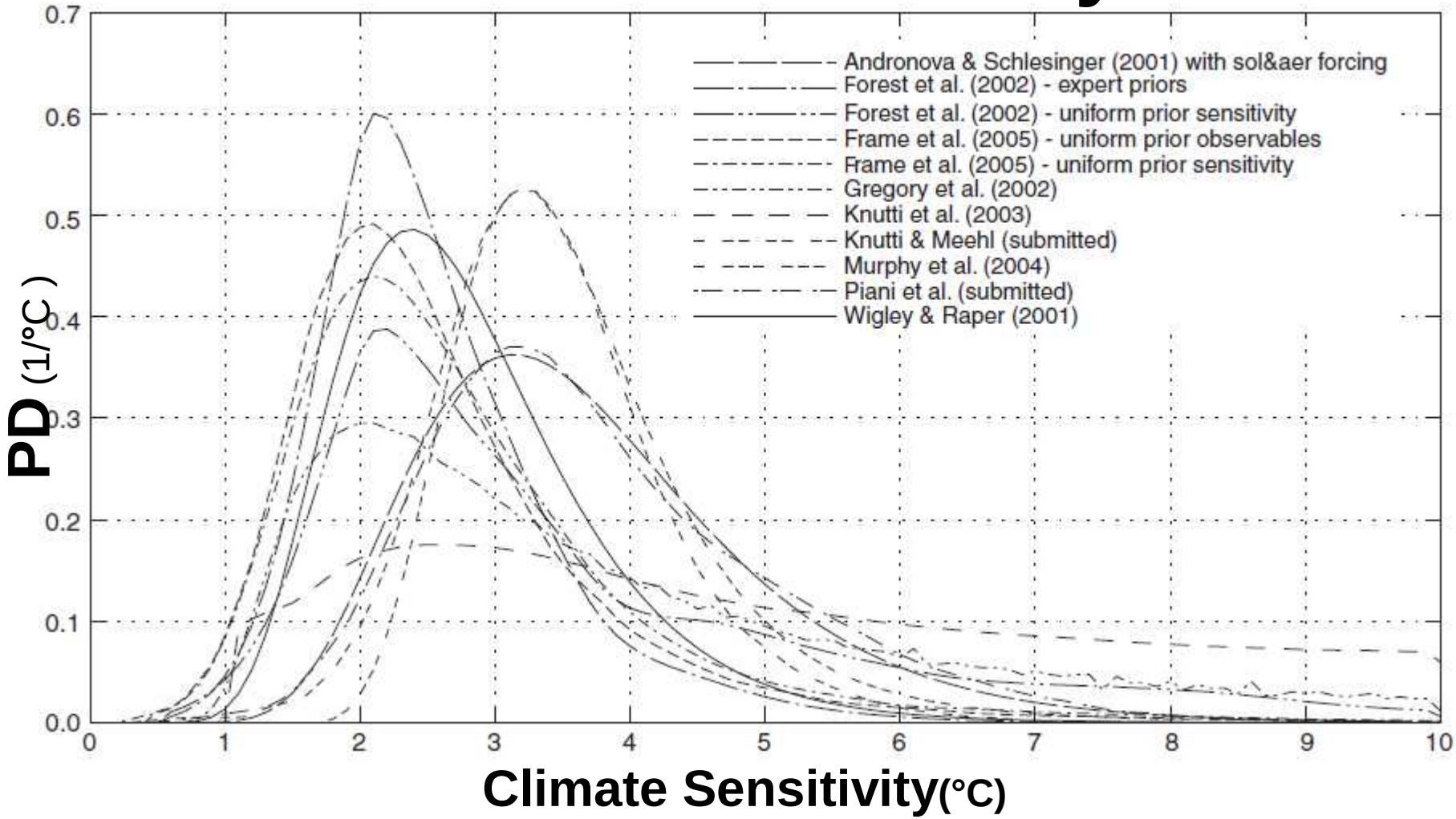
T_1=A log[278 (the CO_2 conc. of the pre-ind. level)]

T_2-T_1 = A log (556)-A log(278)= A log2=CS(Climate Sensitivity)

A=CS/log2(CS=3°C (IPCC-AR4, best estimate))

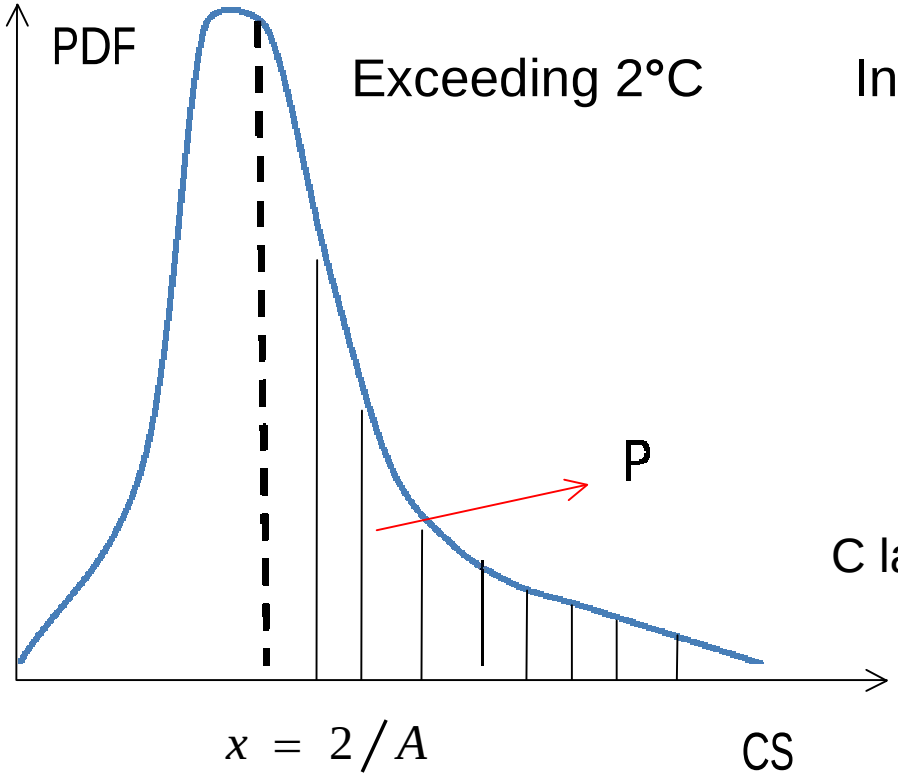
Increase of surface temp. $T - T_1 = (CS/log2)\ log(C/278)$

Probability Distribution Function of Climate Sensitivity



Source: What Does a 2°C Target Mean for Greenhouse Gas Concentrations? (2006) Malte Meinshausen

Probability of the earth surface temperature



Increase of the Earth surface temp.

$$\triangle T = CS \cdot \log[C/278]/\log 2 = A \cdot CS$$

$$A = \log[C/278]/\log 2$$

$$Ax \geq 2^{\circ}C \text{ (Climate Target } 2^{\circ}C)$$

$$P = \int_{2/A}^{\infty} PDF(x)\,dx$$

C large→A large→x small→P becomes near to 1.

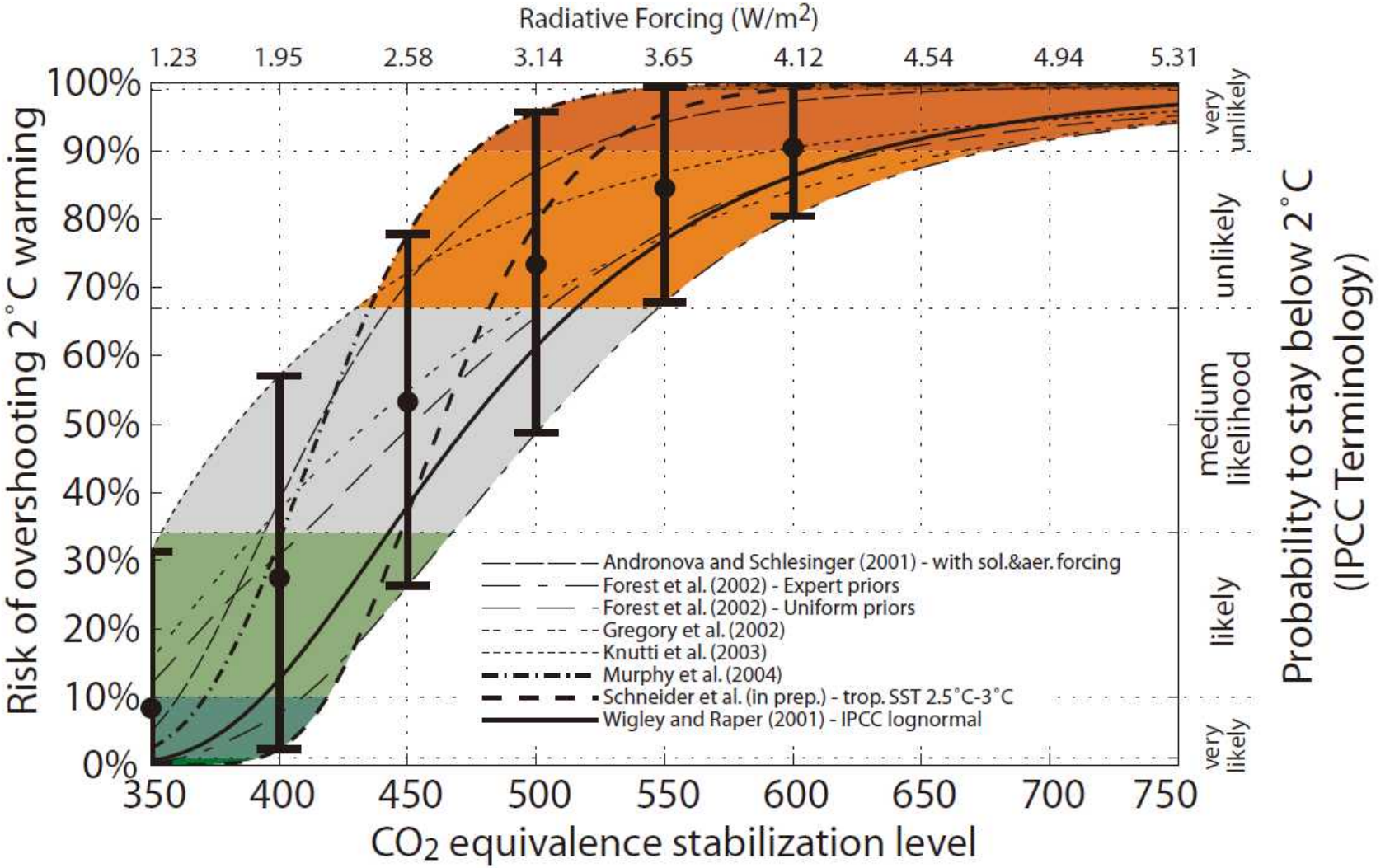
$$\int_0^{\infty} PDF(x)\,dx = 1 \quad \text{(PDF is normalized)}$$

Probability of the Surf.Temp. Increase exceeding 2°C (%)

CO_2 conc. (ppm)	350	400	450	500	550	600	650	700	750
Max.	31	57	78	96	99	100	100	100	100
Medium	7	28	54	71	82	88	92	94	96
Min.	0	8	26	48	63	74	82	87	90

Malte Meinshausen, Avoiding Dangerous Climate Change p265 (2006)

Risk of overshooting 2 degrees mean equililibrium warming for different CO2e stabilization levels



Meinshausen.M., Februrary 2005, "On the risk of overshooting 2 degrees Celsius", www.stabilisation2005.con


気候変動 プラス +2℃
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まさか?
地球の平均気温が
2℃上がると
世界はこう変わる!
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山本良一
Ryoichi Yamamoto
温暖化地獄
脱出のシナリオ
『予測』を超える『現実』
暴走する温暖化
ダイヤモンド社

The Hell Picture Scroll of Global Warming

Yamamoto Laboratory, Institute of Industrial Science, University of Tokyo

Melting Ice at North & South Pole

Falling Ice of South Pole

Heat Wave

Heat Wave in Europe (2003)

Melting Glacier

Falling Glacier from Andes

Victim in India adds up to more than 1200

Increasing Number of Deaths due to Heat Injury

Faint Woman

Urban Heat Island

Rising Temperature in Cities due to Heat Exhaustion

Urban Heat Island of NY

Desertification

Accelerating Desertification in China

Deserted Marsh in Sahel Region

Severe Rain

Flooding Subway Stations

Pregnant Woman on rescue boat and other refugees in Japan

Withered Land

Dying Beech

Dying Corn Farm

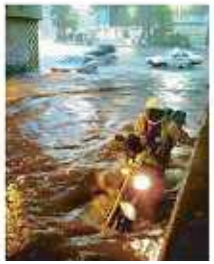
Forest Fire

Firefighters stand without avail in front of burning fire

Spreading Fire in Indonesia (1997)

Flood

Drifting House



Stuck Motorcycle

Cyclone

Gigantic Cyclone above Sea of India

Family in Despair after
Destruction of Cyclone

High Tide

Severe High Tide Hitting Levee

Levee Destroyed and Flooding
Houses Close to Ocean

Tornado

Tornado in Oklahoma

What Tornado left...
House Destroyed, Bicycle blown

Hurricane

Destroyed House in Honduras

Coral Decay

Dying Coral in Okinawa

Major Typhoon

Desperate Mother with a Baby
after Typhoon

Utility Pole Knocked down
by Strong Wind

Bankrupt of Insurance Company

Bankruptcy due to Increasing Number
of Natural Disaster and its Results in
Expanding Insurance Money

The Hell Picture Scroll of Global Warming

Yamamoto Laboratory, Institute of Industrial Science,
University of Tokyo

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Rising Sea Level Lead to Land Loss

Drowning Islands
(Majero & Tsubaru)

Water Shortage

Drained Well in India

Child in Search of Water

Food Shortage

Weakening Girl and Awaiting Scavenger (Sudan)

Children Suffering from Malnutrition

Conflict

Throwing Rocks to a Tank

Frightened Girls

Famine

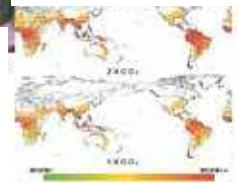
Dying Child in Mother's Hand

Mother lost 3 yrs old son in War

Northward Movement of Malaria

Mother with Malaria Infected Baby

Deceased Patient due to Celebral Malaria



Rising Temperature Increases the Malaria Risk

Refugees Crossing the Border

Fully Loaded Vehicle with Refugees

Flooding Refugees in Republic of Congo

War due to Natural Resource

Soldier Heading toward Oil Well

Cold Temperature

Extreme Temperature as a result of Current Termination in Deep Sea Level

不都合な真実

AN INCONVENIENT TRUTH

The Planetary Emergency of Global Warming and What We Can Do About It

アメリカ元副大統領

アル・ゴア

枝廣淳子＝訳

地球のためにあなたが出来る最初の一歩は、この事実を知ることだ。

映画『不都合な真実』の書籍版！

1月20日（土）TOHOシネマズ六本木ヒルズほかにて全国ロードショー

人類の未来のために、なるべくたくさんの人に、手元においてもらい何度も開いてほしい本です。
——坂本龍一

このままでは人類史上、最悪の被害がやって来るという「不都合な真実」から、あなたは目を反らすのか……一人ひとりに問うている。
——筑紫哲也

とにかくわかりやすい。原因をつくってきた先進国の一員としての僕らの進むべき道しるべになってくれる本だと思う。
——小林武史

地球は人間の体と同じ。温暖化で起こる現象はまさに人の体に起こる病気。その治療には、私たち一人一人のＡＣＴが必要だ。
——横森理香

気がつくというのはいつだって個人的な問題だろう。この本は気づきの扉をノックする。
——須藤元気

ランダムハウス講談社


気候変動 プラス +2℃
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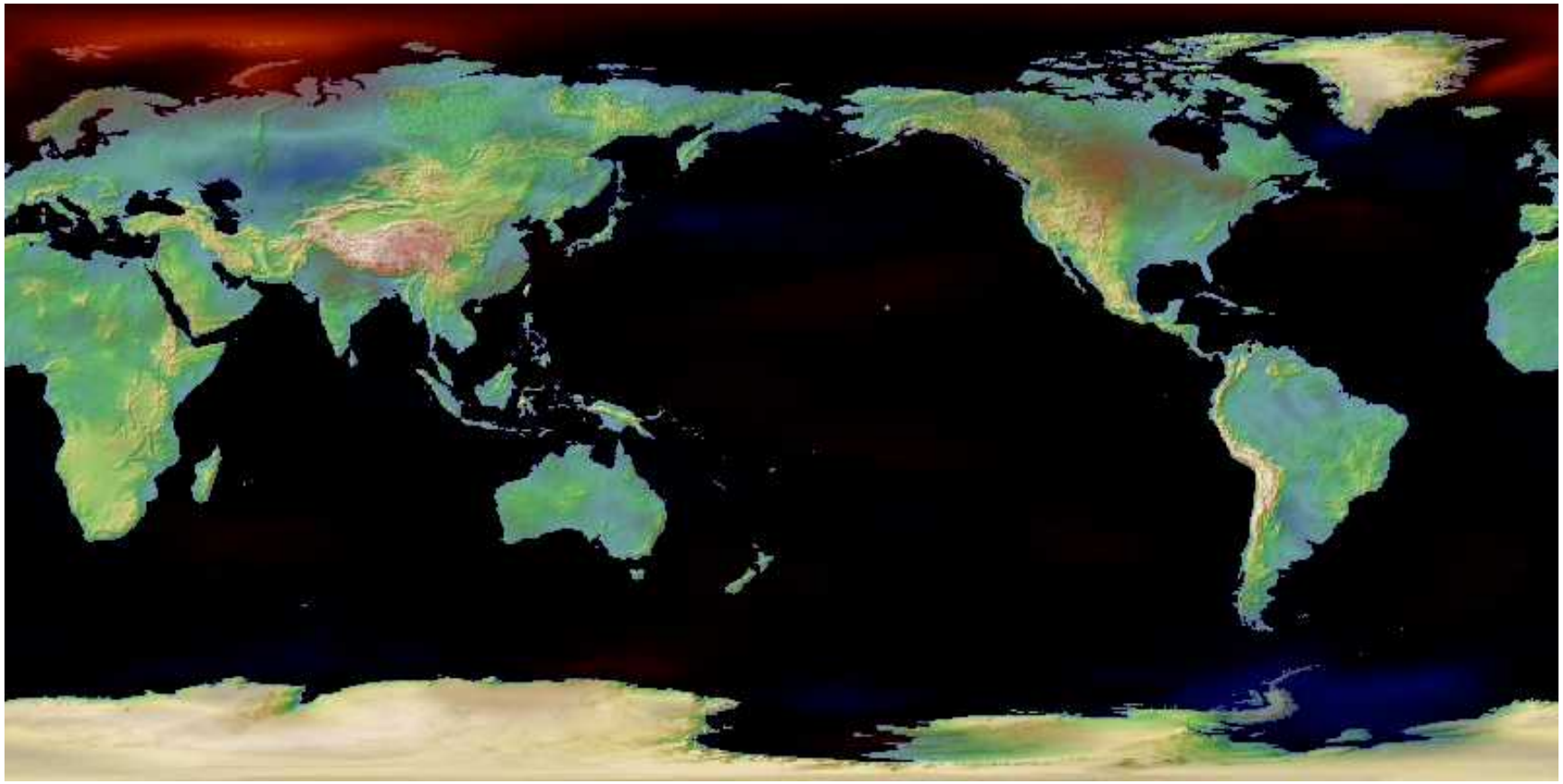
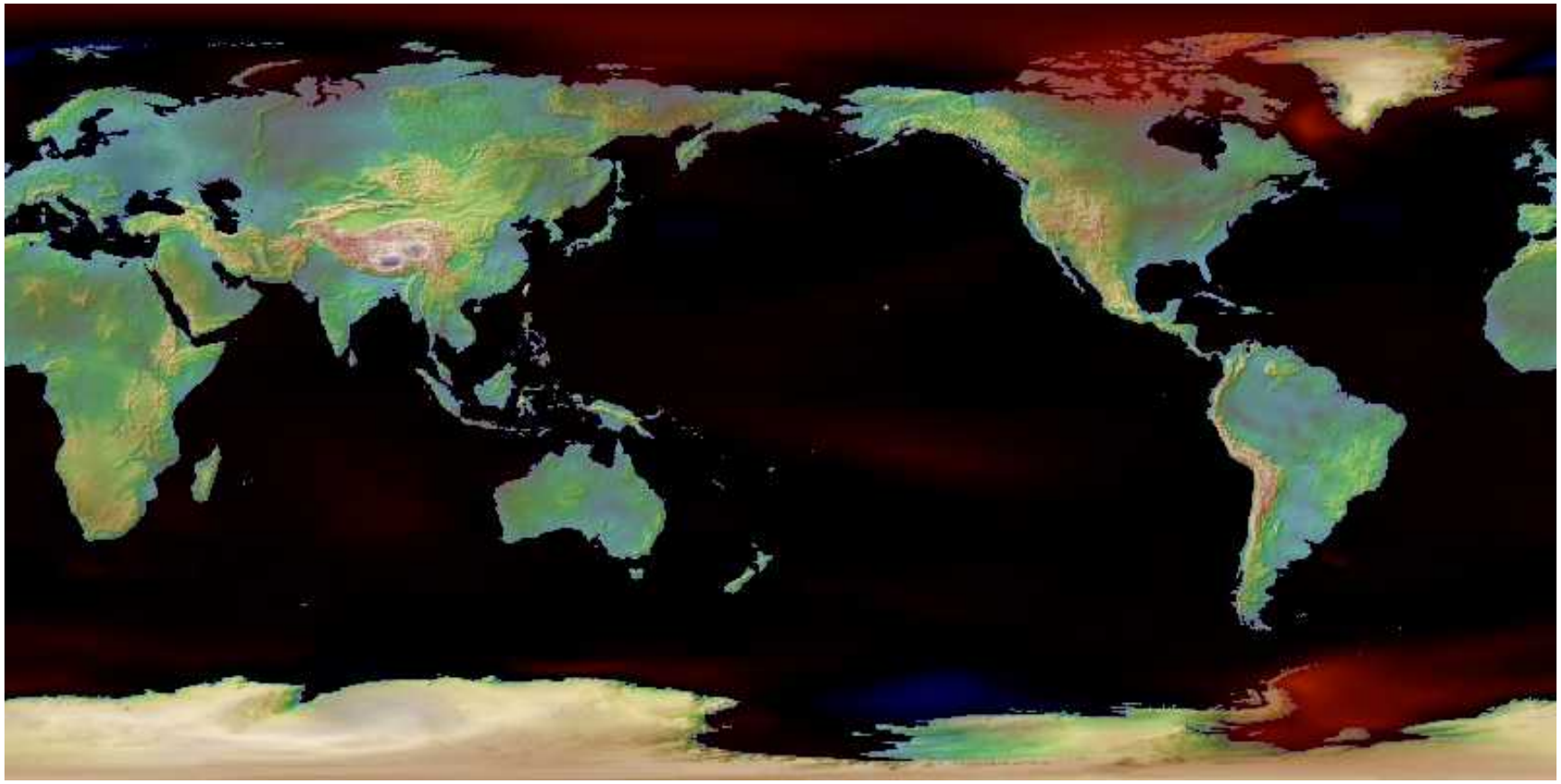
Prediction of Global Warming by the Earth-Simulator

ref. Climate Change +2°C (ed.by R.yamamoto,Diamond Co.,2006)
Avoiding Dangerous Climate Change (2006)

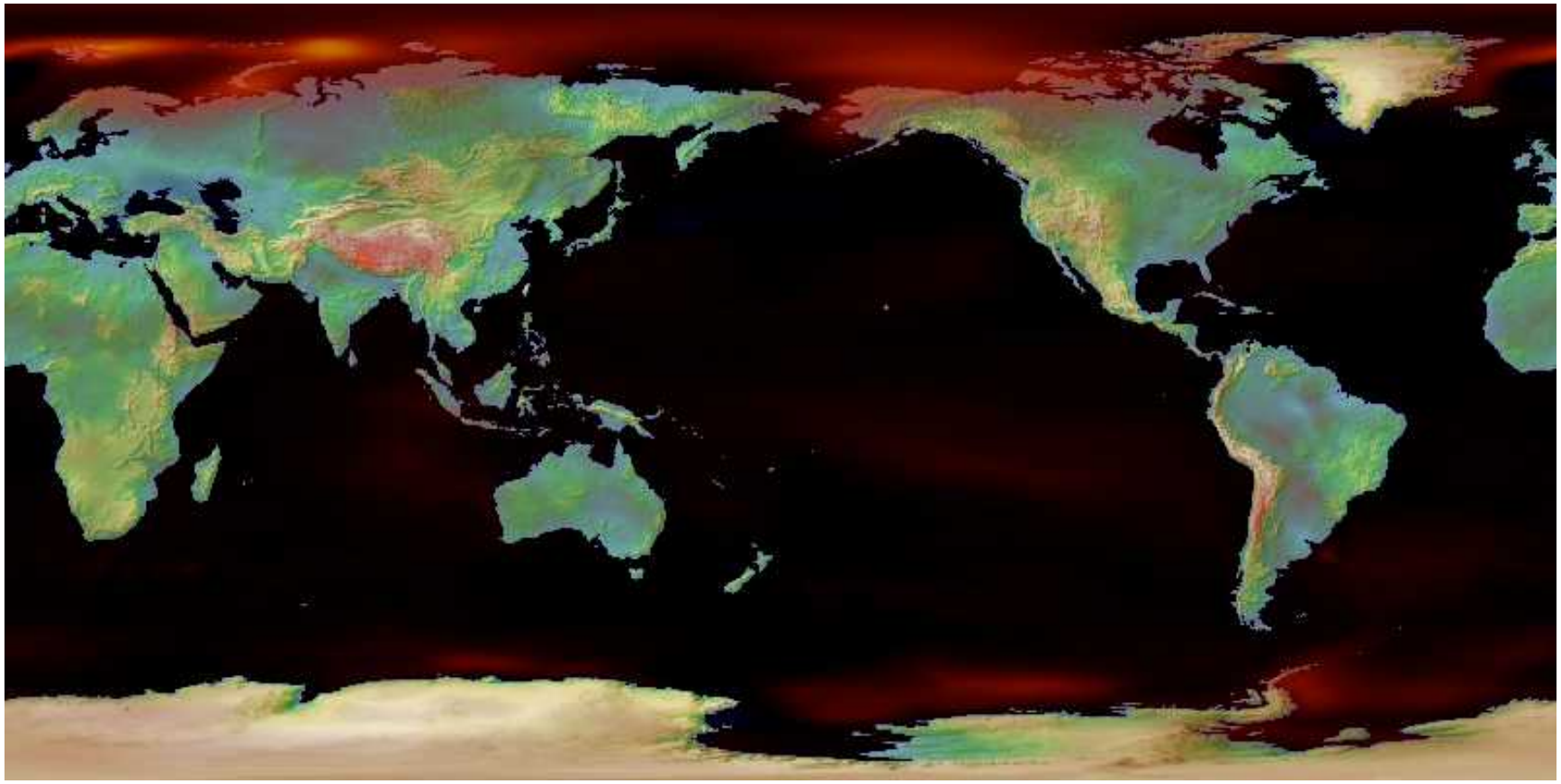
Temperature increase compared to pre-industrial level	Year predicted	Environmental impacts to be expected
1.5°C	**2016**	Triggers the melting of Greenland ice sheet, etc
2°C	**2028**	1.0 - 2.8 billion people will suffer from water shortage etc.
3°C	**2052**	Collapse of climate, such as instabillization of West Antarctic ice sheet, etc
4°C	**2070**	Collapse of Australian agriculture, etc



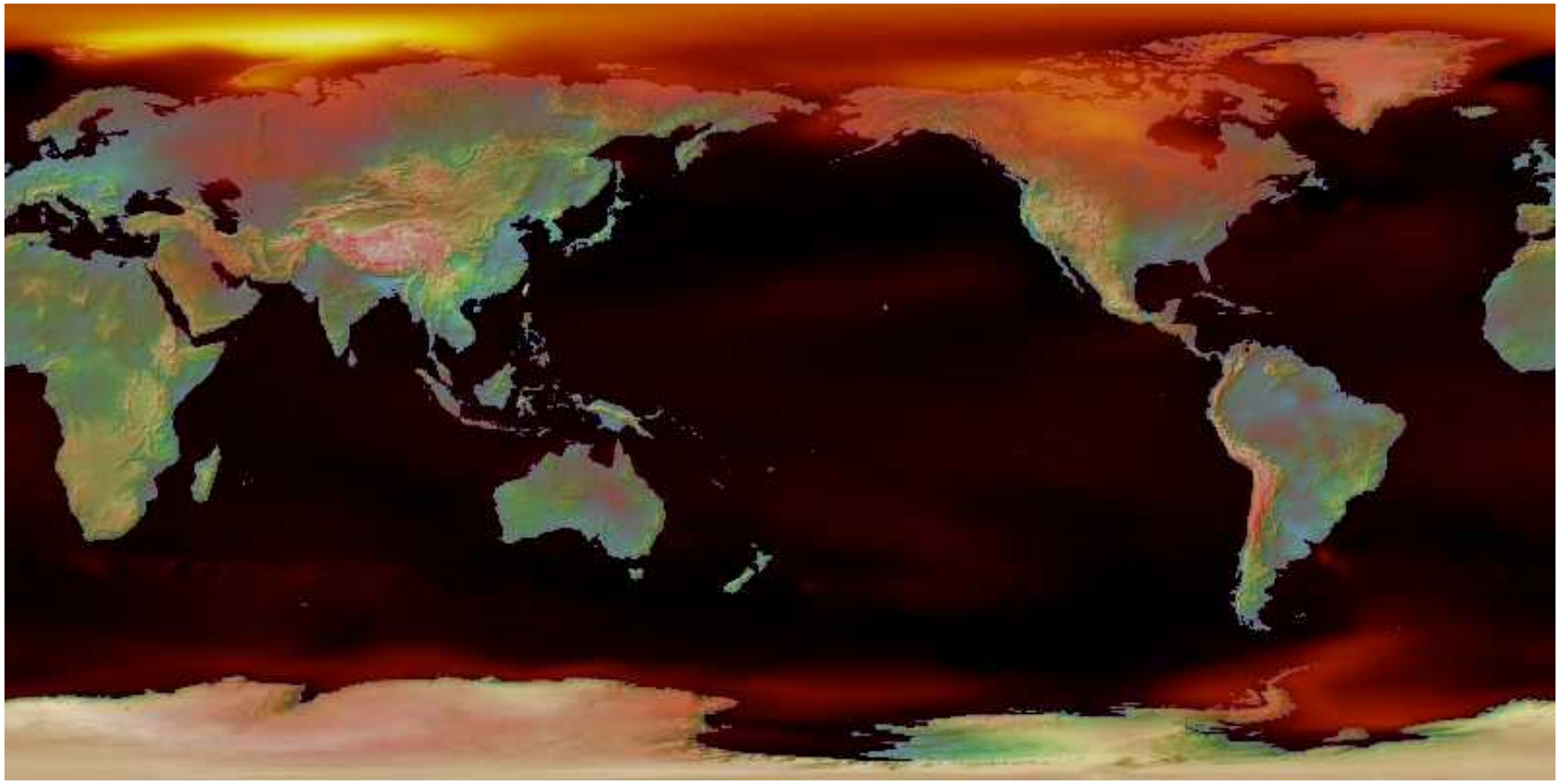
1950



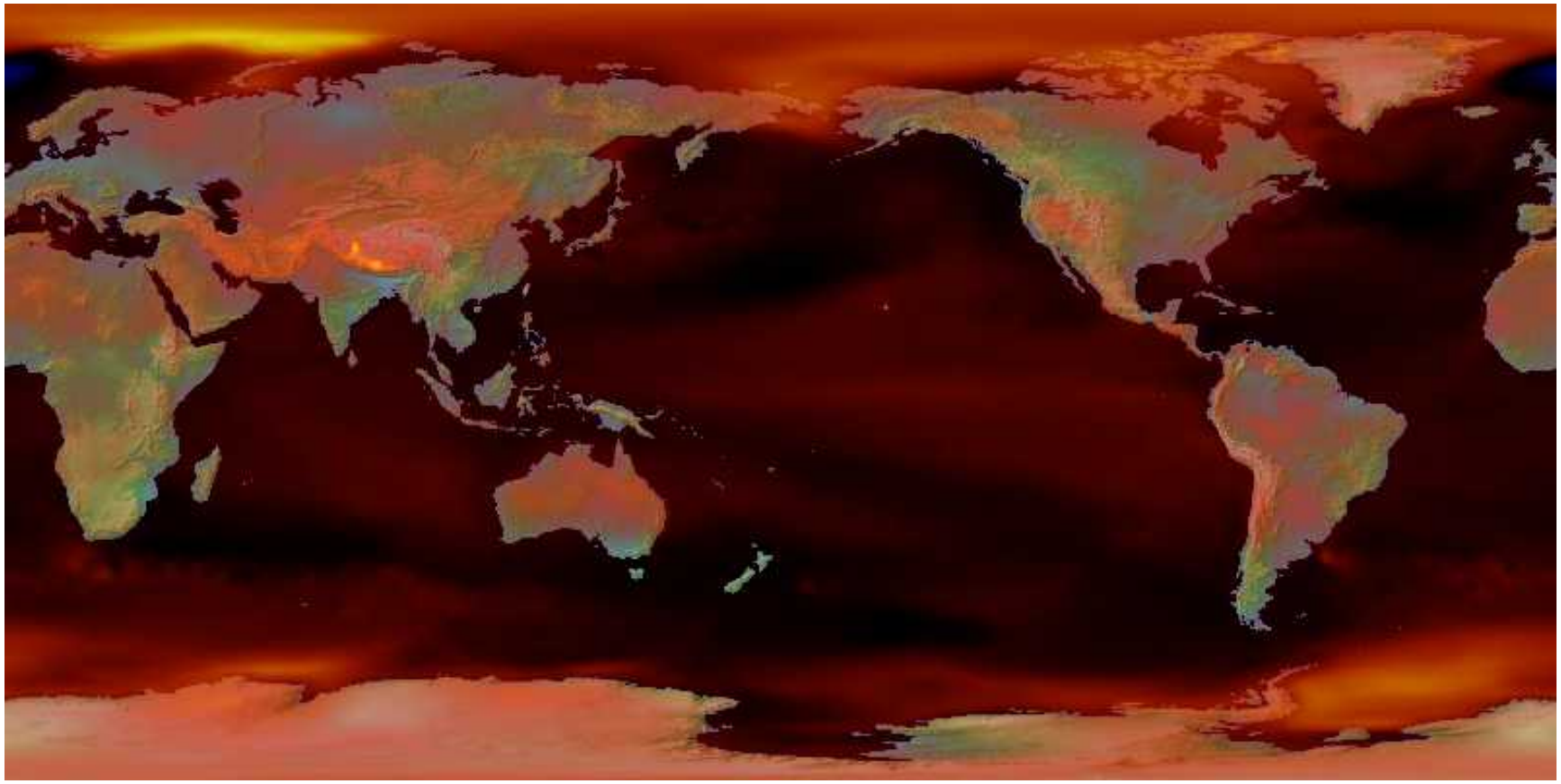
1989



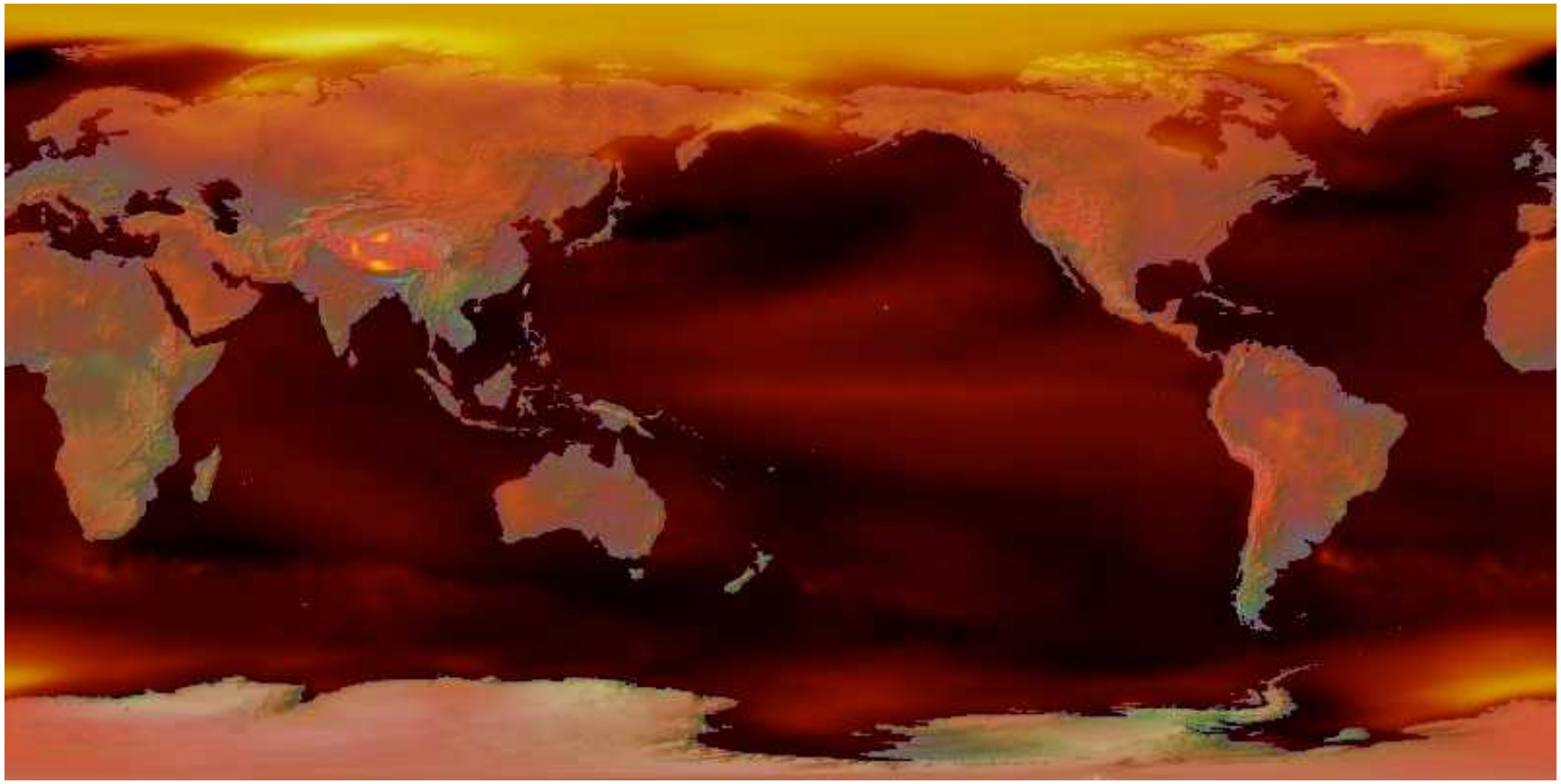
1998



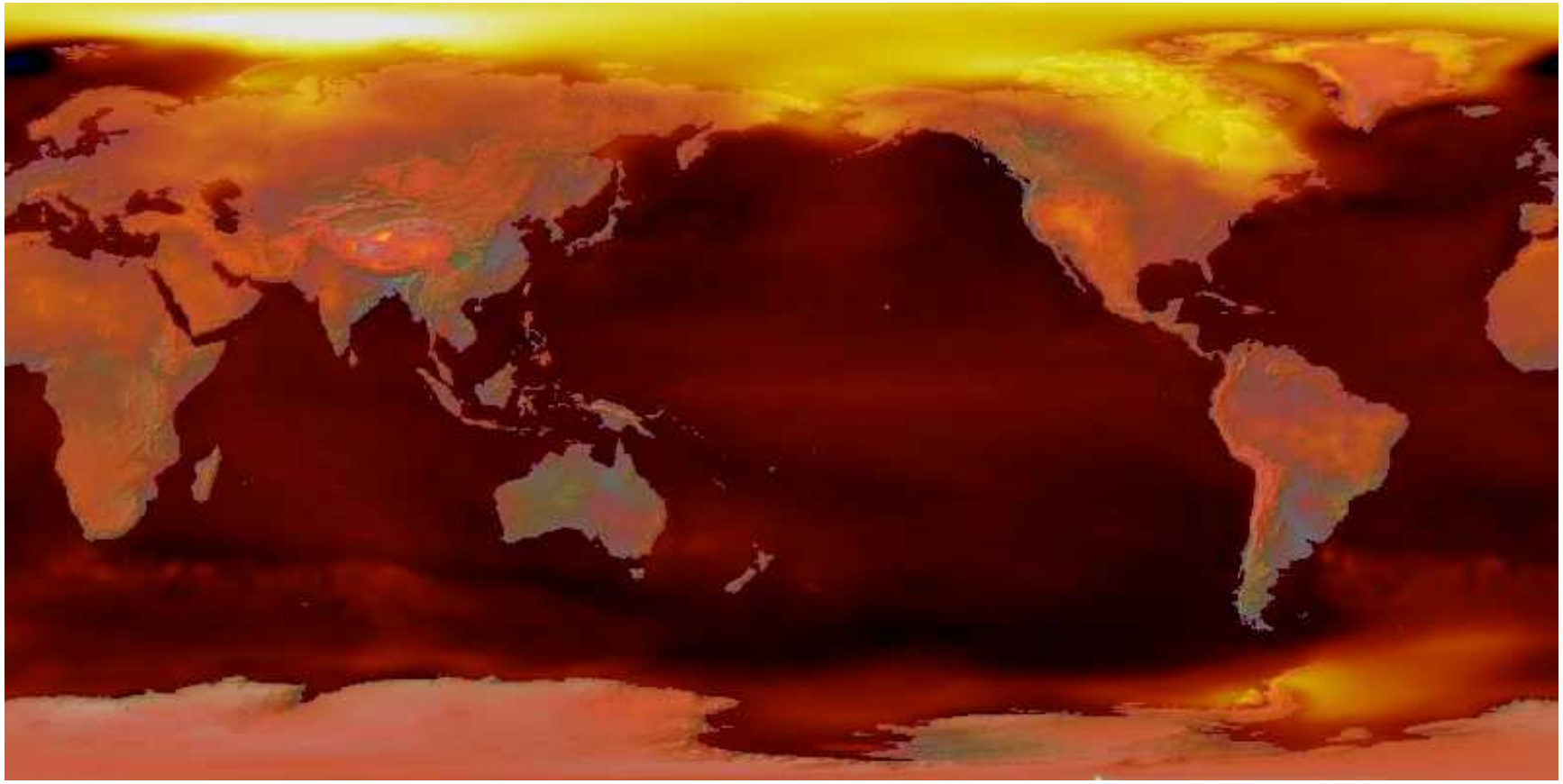
2016



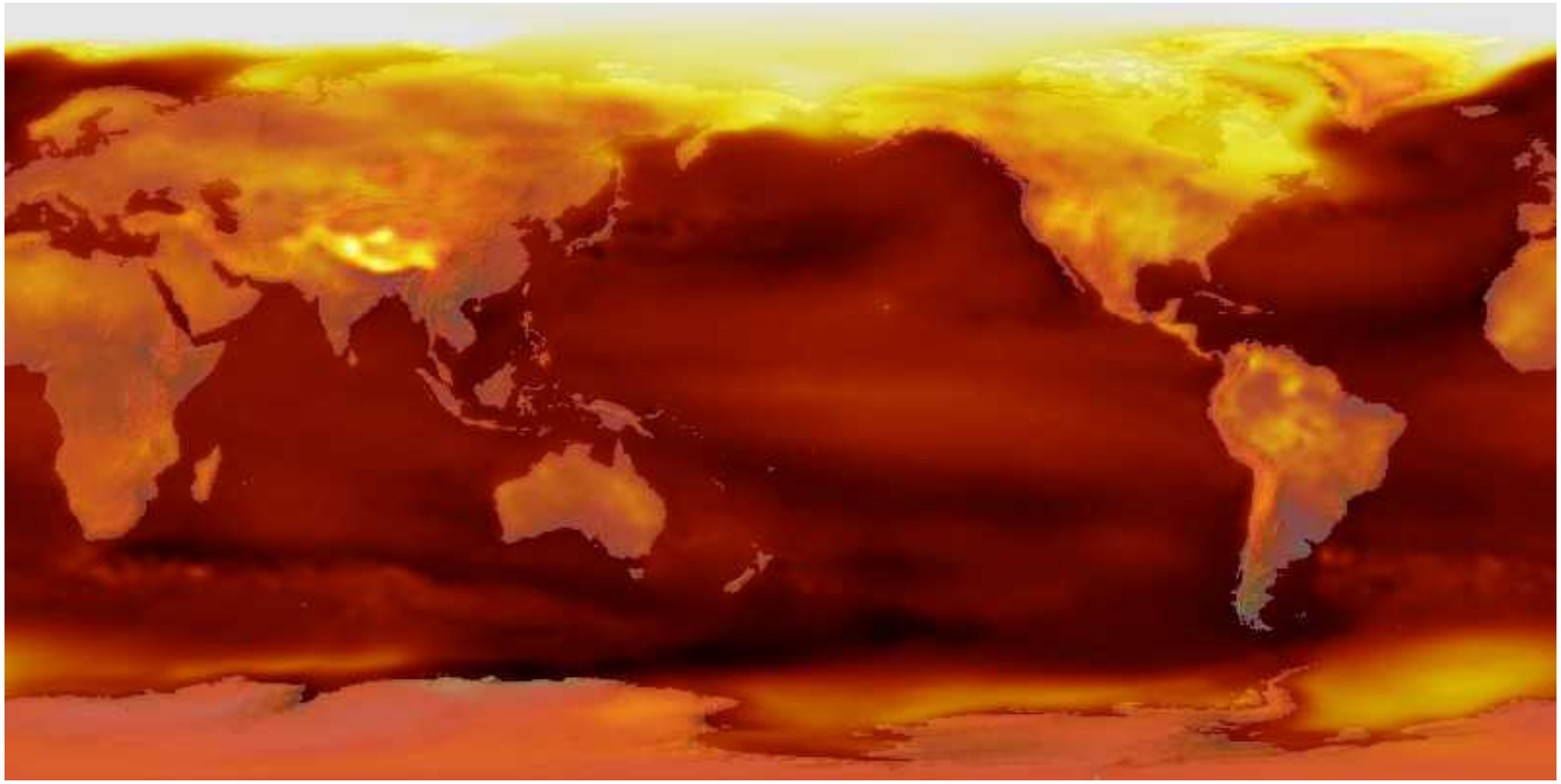
2028



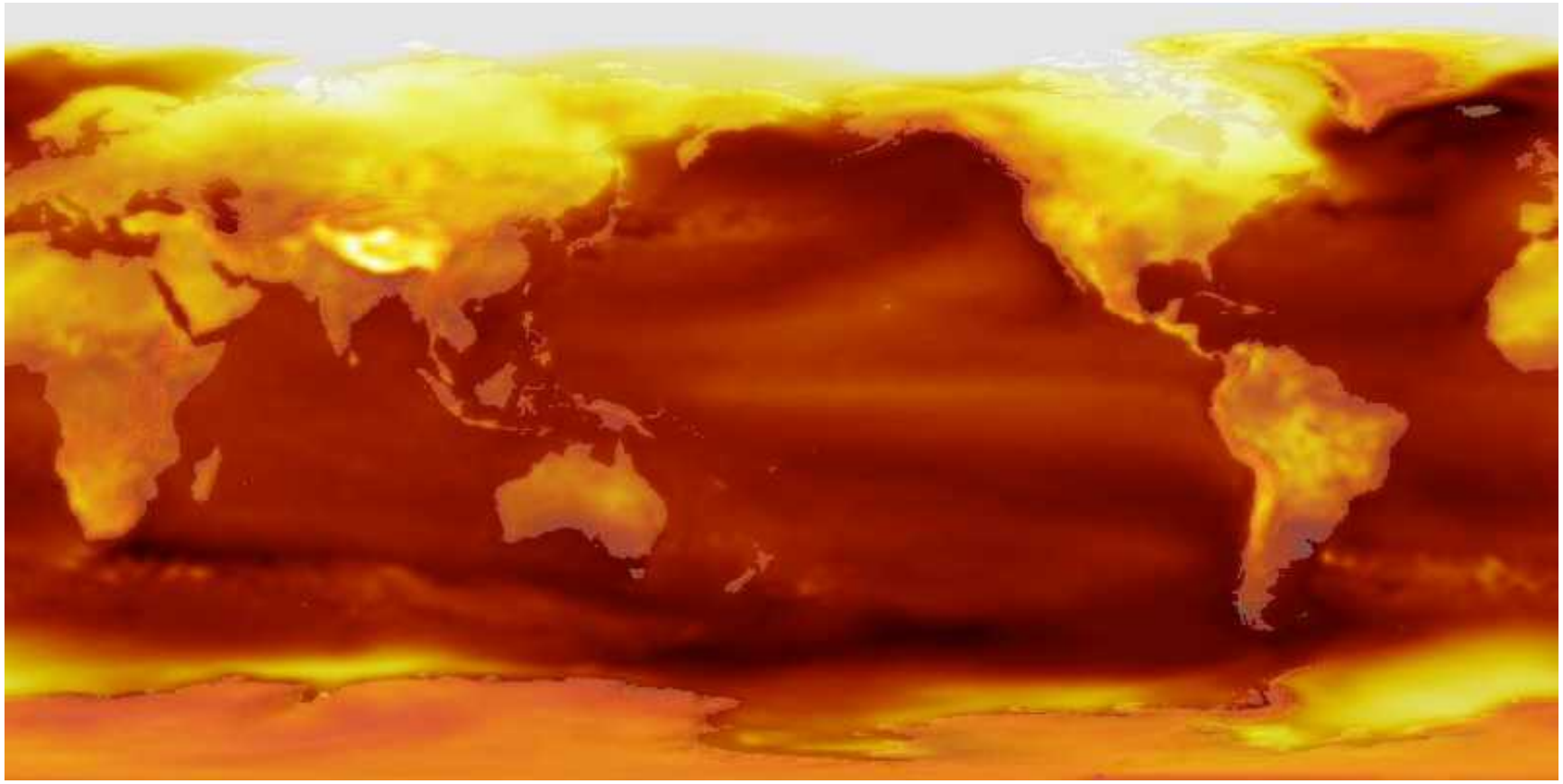
2040



2052



2070



2100

Six Degrees-Mark Lynas

Our Would Plus 1°C

- Severe droughts in the western United States could cause shortages in global grain and meat markets.
- Arid regions of the western United States could revert to desert-like environments.
- New deserts could emerge in the western half of the United States, from Texas all the way up to the Canadian border.
- The Arctic could be ice free for half the year, opening the legendary. Northwest Passage for ships.
- Rising tides could submerge thousands of homes around the Bay of Bangal.
- An increase of 1 degree Celsius may inspire an agricultural makeover in England, as crops previously unable to survive in the United Kingdom begin to thrive. The United Kingdom now has more then 400 Vineyards, growing grapes that have typically been grown in France.

Six Degrees-Mark Lynas

Our Would Plus 2°C

- Insects may migrate in strange new directions. For example, as a temperate climate moves north in the United States, pine beetles could kill off the great white bark forests.

- Greenland's glaciers continue melting at a faster rate. In fact, Greenland's Jakohshavn Gacier is already the fastest- moving ice field on the planet, the amount of ice breaking off the glacier every few days contains enough water to supply New York City for one year.

- Because of a decrease in sea ice, polar bears make the endangered species list.

- Forests begin to take root in Canada's melting tundra.

- The Pacific islands of Tuvalu could sink beneath the rising ocean tides.

- At 2 degrees of warming, the impact on the marine ecosystem is likely to be severe, and it is possible that the vast majority of the world's tropical coral reefs will die off.

Six Degrees-Mark Lynas

Our Would Plus 3°C

- Many scientists focus on 3 degrees of warming as the tipping point that will fundamentally change how we live on this planet.

- The Amazon rain forest could experience repeated cycles of draught and fire. If we lose much of the Amazon, it could cause the re-release of hundreds of millions of tons of stored carbon, perhaps intensifying global warming another degree all by itself.

- The snowcaps on the Alps to all but disappear.

- The Mediterranean and Parts of Europe wither in searing summer heat.

- As the oceans get hotter and hotter, a new global climate pattern emerges that is unstable in the extreme, perhaps mirroring the weather anomaly we call El Niño.

- The World could see the next generation of super storms, the first category 6 hurricanes.

- Thousands of species worldwide would face extinction.

Six Degrees-Mark Lynas

Our Would Plus 4°C

- An increase of 4 degrees Celsius causes the oceans to continue to rise, overtaking heavily populated deltas. Countries like Bangladesh and Egypt could be devastated, and cities like Venice could be totally submerged.

- The Ganges river is the wellspring of like for over a billion people in China, Nepal and India. At first, the melting of Himalayan glaciers that fees the Ganges might unleash unprecedented floods. But then, extreme water scarcity and famine could strike if the glaciers vanish completely.

- There will be no more glaciers in the Himalayas by the year 2035.

- Northern Canada may become one the planet's most beautiful agricultural zones.

- The entire West Antarctic Ice Sheet could collapse, sending sea levels rising even further.

- Sea levels could be rising by more than 1 meter, as the world's great coastal cities prepare for catastrophe.

Six Degrees-Mark Lynas

Our Would Plus 5°C

- Two massive uninhabitable zones could spread into once-temperate regions of the Northern and Southern Hemispheres.
- Snow pack and aquifers that fed some of the world's great cities - Los Angeles, Cairo, Lima, Bombay - are drying out.
- Climate refugees would likely number in the ten of millions and the potential for conflict over scarce resources rises, including in the United States (e.g., water disputes in the Southwest, refugees from hurricanes like Katrina). But, poorer countries would be affected disproportionately.

Our World Plus 6°C

- The world could resemble the Cretaceons Era, 144 to 65 millions years ago, when global temperatures were much higher than today.
- Depleted of nutrients, the oceans could appear bright blue.
- Deserts march across continents like conquering armies.
- Natural disasters become common events, and some of the world's great cities could be flooded or abandoned.

From Acceleration to Runaway Global Warming?

Increase of the Earth's Surface Temperature compared to the Pre-industrial level.

0.8°C → 1.5°C → 2°C → 3°C

(20$_C$) (~2016) (~2028) (~2052)

Our worst fears are exceeded by reality

(1) Arctic sea ice is rapidly decreasing.

(2) Methane bubbling from Siberian thaw lakes as a positive feedback to climate warming.

(3) Carbon losses from all soils across England and Wales 1978-2003.

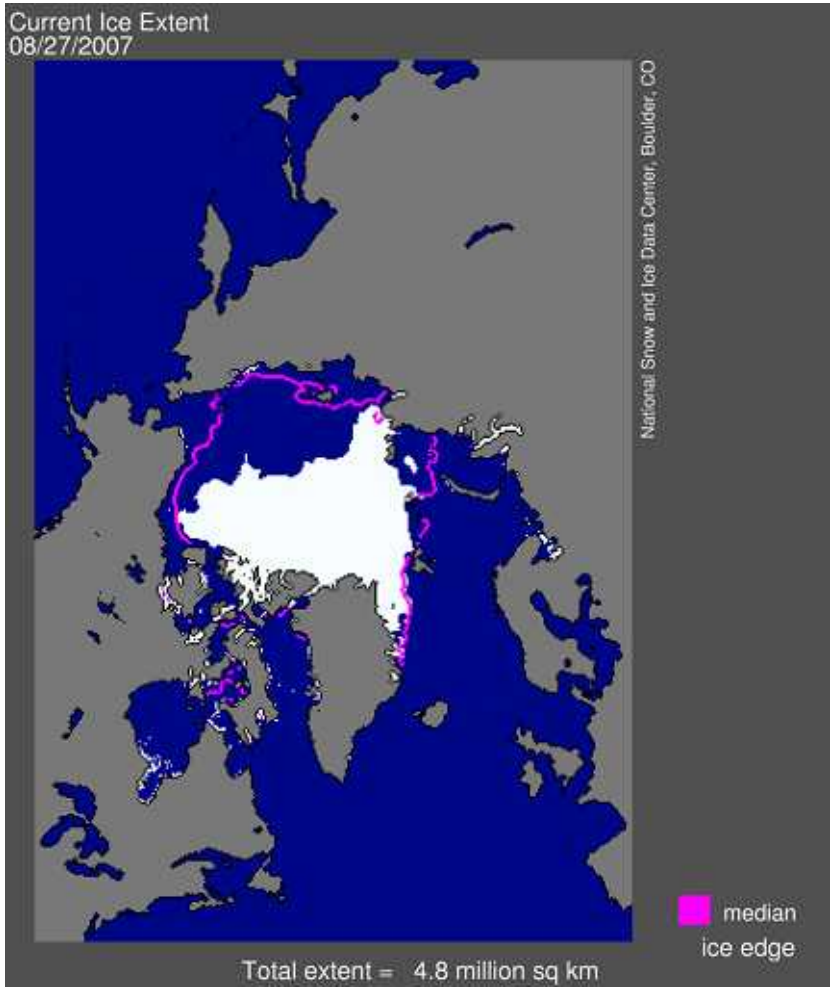
(4) The intermediate water temperature in the western part of the Sea of Okhotsk increased 0.68°C/50yr. (which may instabillize Methane hydrates)

(5) Acidification of sea water proceeds. (pH will decrease 0.14 ~ 0.35 within this century)

Since the climate system has a thermal inertia, ten years are left to the point of no return for runaway global warming??

Dramatically Diminishing of Arctic Sea Ice

Maximum extent of sea ice is 14 million km^2 (1971-2000 mean).
Arctic sea ice is an air-conditioner of the Earths Climate System.



Sea ice extent

Historical smallest record since 1979

5.32 million km^2 (Sep. 20 2005.)

Now

4.13 million km^2 (Sep. 16 2007.)

Diminishing Speed of sea ice

~ 200,000km^2/day (Jun. 30 2007.)

80,000km^2/day (Aug. 15 2007.)

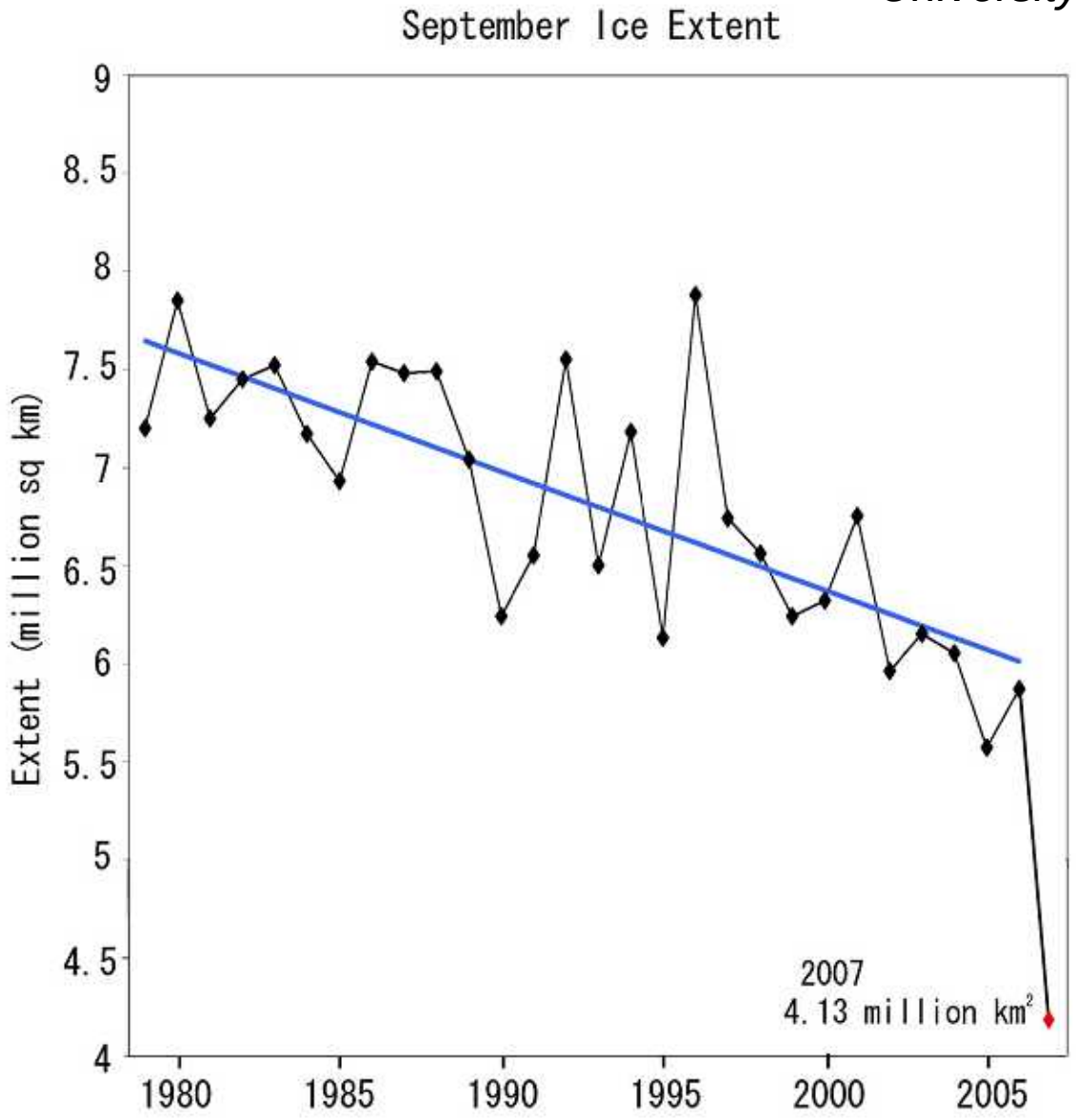
28,000km^2/day (Aug. 22 2007.)

Arctic sea ice will extinct in the summer season by 2030

(Dr. Serreze, USA).

Yearly Change of Arctic Sea Ice Extent in September

University of Colorado, NSIDC, NASA (USA)



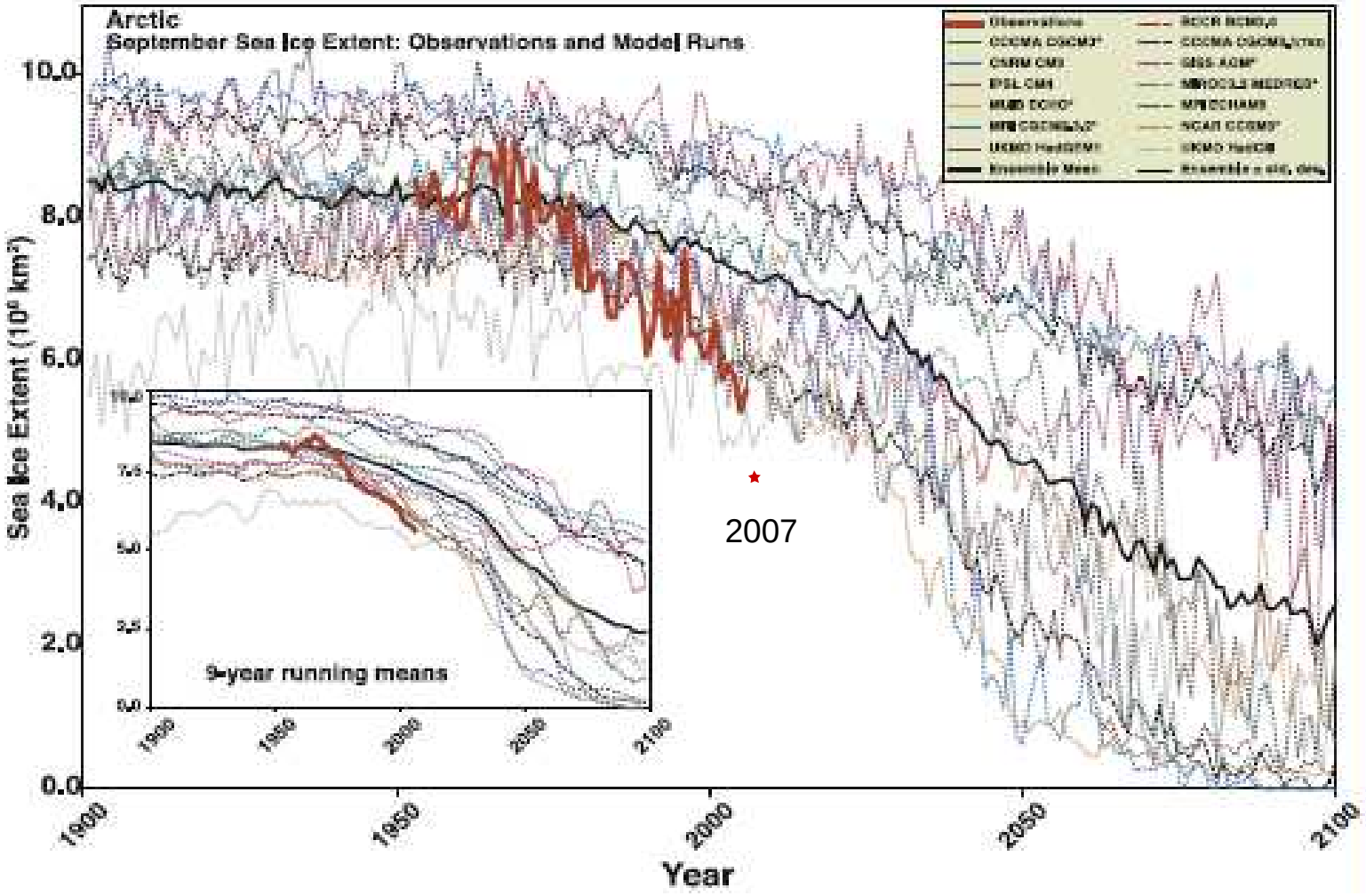
4.13 million km^2 was recorded on September 16,2007, and the past minimum record was updated.
Arctic Sea Ice is tipped already and will continue runaway melting. Arctic Sea Ice will be extinct by summer 2030 according to Mark Serreze.

Source:
National Snow and Ice Data Center (USA)

Arctic Sea Ice Decline: Faster Than Forecast

Julienne Stroeve et al

Geophysical Research Letters 34. L09501(2007)



Arctic September sea ice extent from observations (red line) is lower than that estimated by 13 IPCC AR4 climate models ensemble mean (solid black line). The models underestimate the GHG response, the externally forced component may be larger.

Tipping Elements in the Earth System

Source: Potential Anthropogenic Tipping Elements in the Earth System, Schellnhuber, The Potsdam Institute for Climate Impact Research

- tipped already
- in limbo
- still stable

1 Arctic Sea Ice Loss
2 Melting of Greenland Ice Sheet
3 Methane Escape from Thawing Permafrost Regions and Continental Shelves
4 Boreal Forest Dieback
5 Suppression of Atlantic Deep Water Formation
6 Climatic Change-Induced Ozone Hole over Northern Europe
7 Darkening of the Tibetan Plateau
8 Disruption of Indian Monsoon
9 Re-Greening of the Sahara and Sealing of Dust Sources
10 West African Monsoon Shift
11 Dieback of Amazon Rainforest
12 Change in Southern Pacific Climate Oscillation
13 Disruption of Marine Carbon Pump
14 Suppression of Antarctic Deep Water Formation and Nutrients Upwelling
15 Collapse of the West Antarctic Ice Sheet
16 Antarctic Ozone Hole

Assessment of Target CO_2

Phenomenon	Target CO_2 (ppm)
1. Arctic Sea Ice	300-325
2. Ice Sheets/Sea Level	300-350
3. Shifting Climatic Zones	300-350
4. Alpine Water Supplies	300-350
5. Avoid Ocean Acidification	300-350

→ Initial Target CO_2 = 350* ppm

***assumes CH_4, O_3, Black Soot decrease**

(ref.J.Hansen.NASA.USA)

Three Scenarios for Climate Stabilization

(1) 3°C /550ppm

Stern report (2006)	450 ~ 550ppmCO_{2e}
RITE (2007)	550ppmCO_2
IPCC-AR4 (2007)	535 ~ 710ppmCO_2

(2) 2°C/450ppm

Baer-Mastrandrea (2006)	70 ~ 80% CO_2 reduction until 2050
Mainshausen (2006)	50%CO_{2e} reduction until 2050
Rive,Torvager et al (2007)	80%CO_{2e} reduction until 2050
UNFCC report (2007)	445 ~ 490ppmCO_{2e}

(3) 0.5°C/320ppm

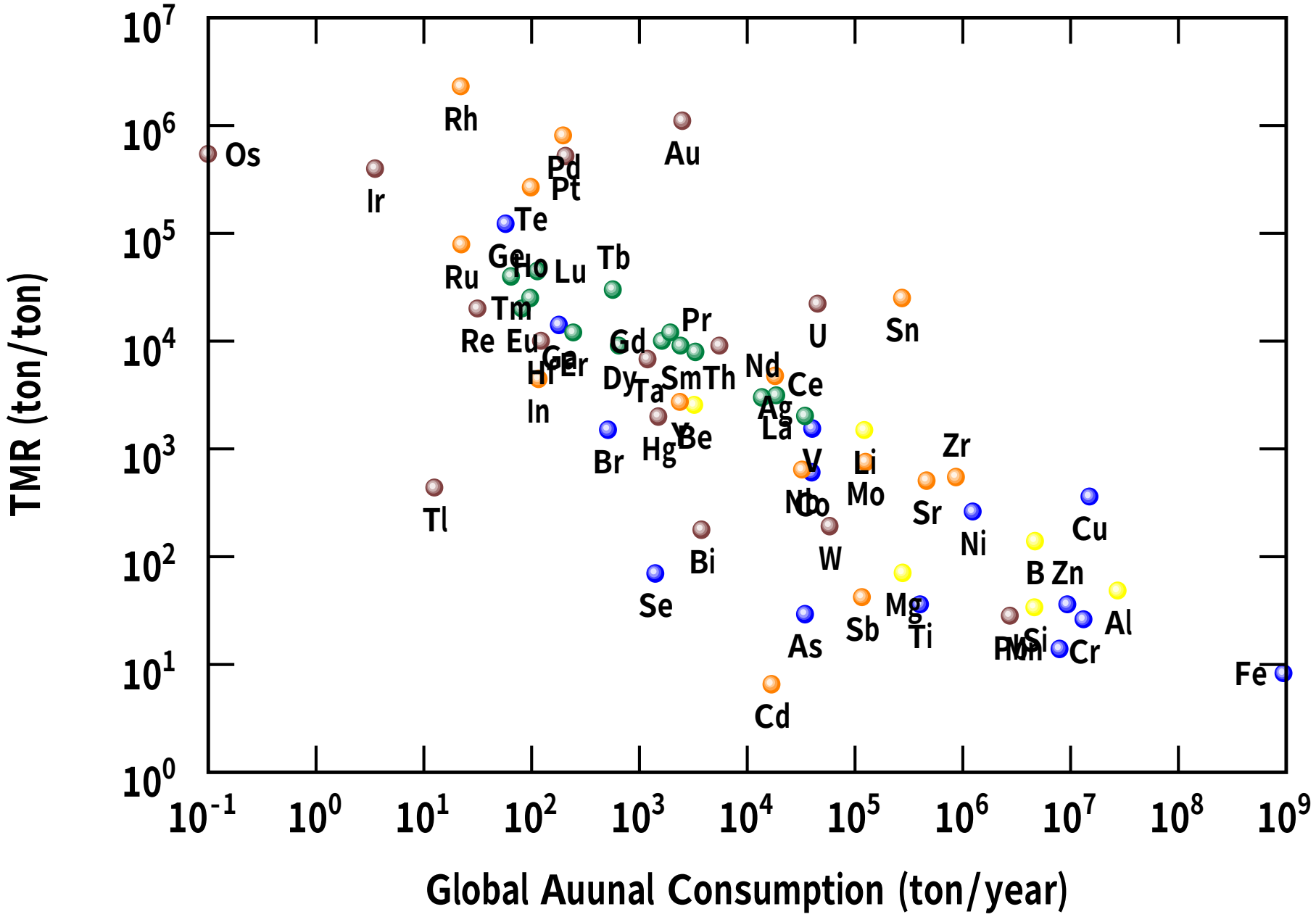
Spratt-sutton (2007)	320ppmCO_{2e}
Hansen (2007)	350ppmCO_2

CO2e=CO_2 equivalent of GHG

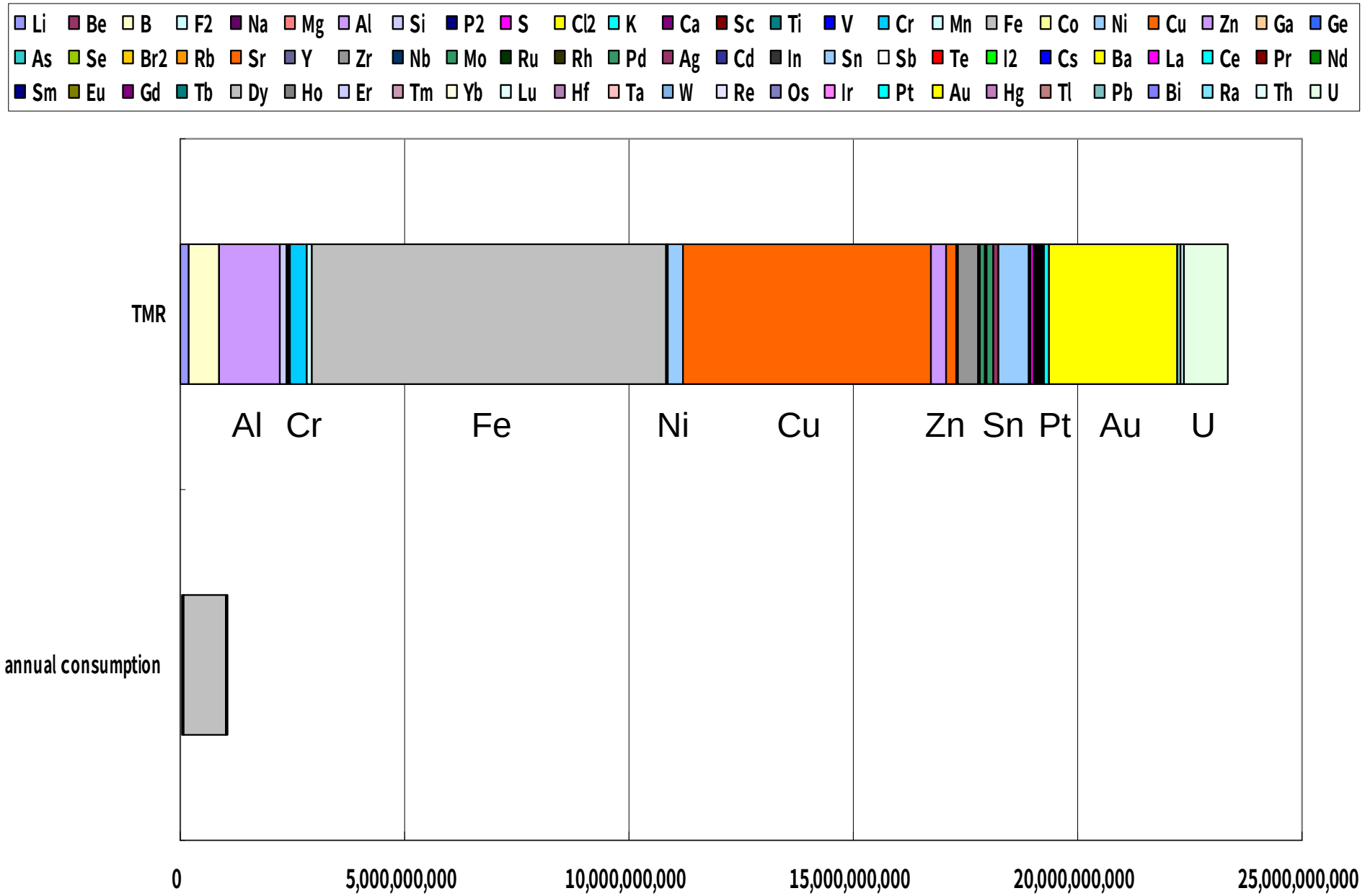
Summary of physical measures for resource depletion

- Primary productions of mineral commodities *increase over time;* (except lead and tin as negative growth),
- *Reserves increase* as mineral commodities' market price rising.
- Advancement of mining technologies can *increase reserves.*
- Life expectancies *vary greatly*.
- *Ultimate resource is not a very useful indicator* in the long run as energy resource may become a limiting factor.

TMRS of Common Metals are smaller than those of Rare Metals



Total TMR of Metals

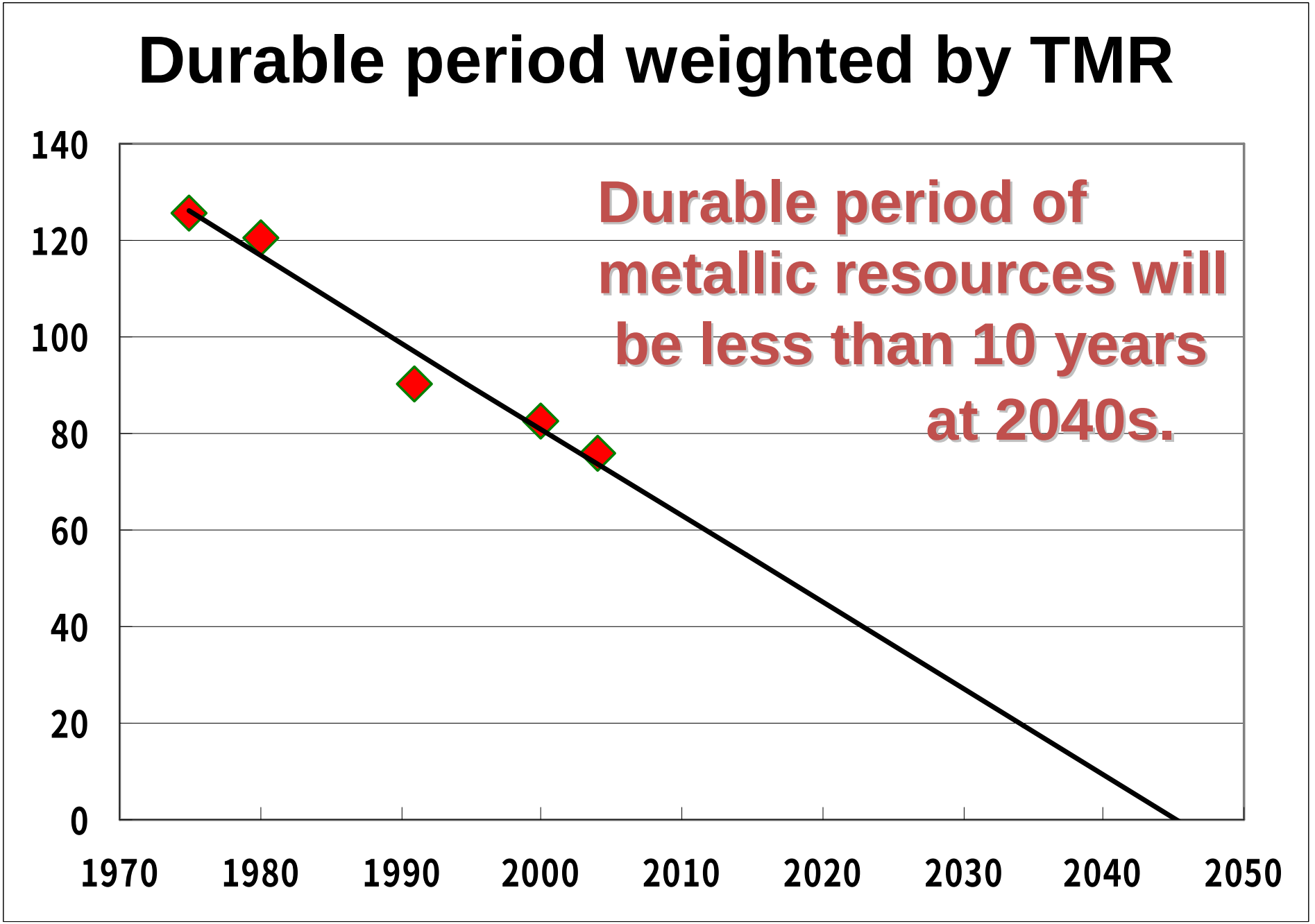


$$\textbf{Durable Period of Metals} = \frac{\sum_i \textbf{TMR}_i \times \textbf{Reserve}_i}{\sum_i \textbf{TMR}_i \times \textbf{Consumption}_i}$$

Unit:
Durable period of Metals: years
Consumption or annual consumption: tons/year
Reserve: tons
Total Material Requirement: kg/kg

by K. Halada, 2006

Durable period weighted by TMR



Decoupling Status of Metal Consumption from Economic Growth

Kohmei Halada, Masanori Shimada and Kiyoshi Ijima

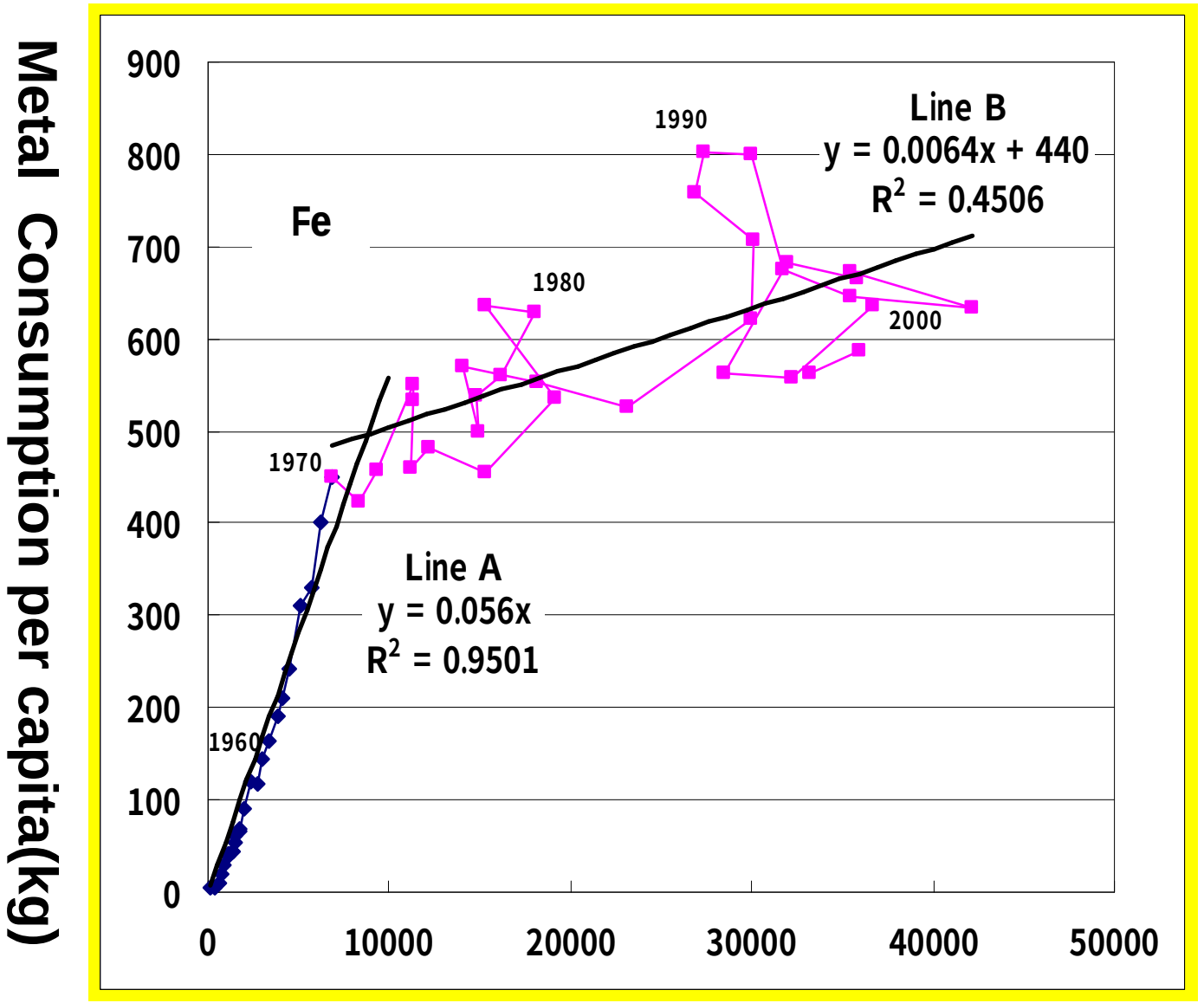
National Institute of materials Science, Tsukuba, JAPAN

World will need a few times more metallic resources at 2050 than present.

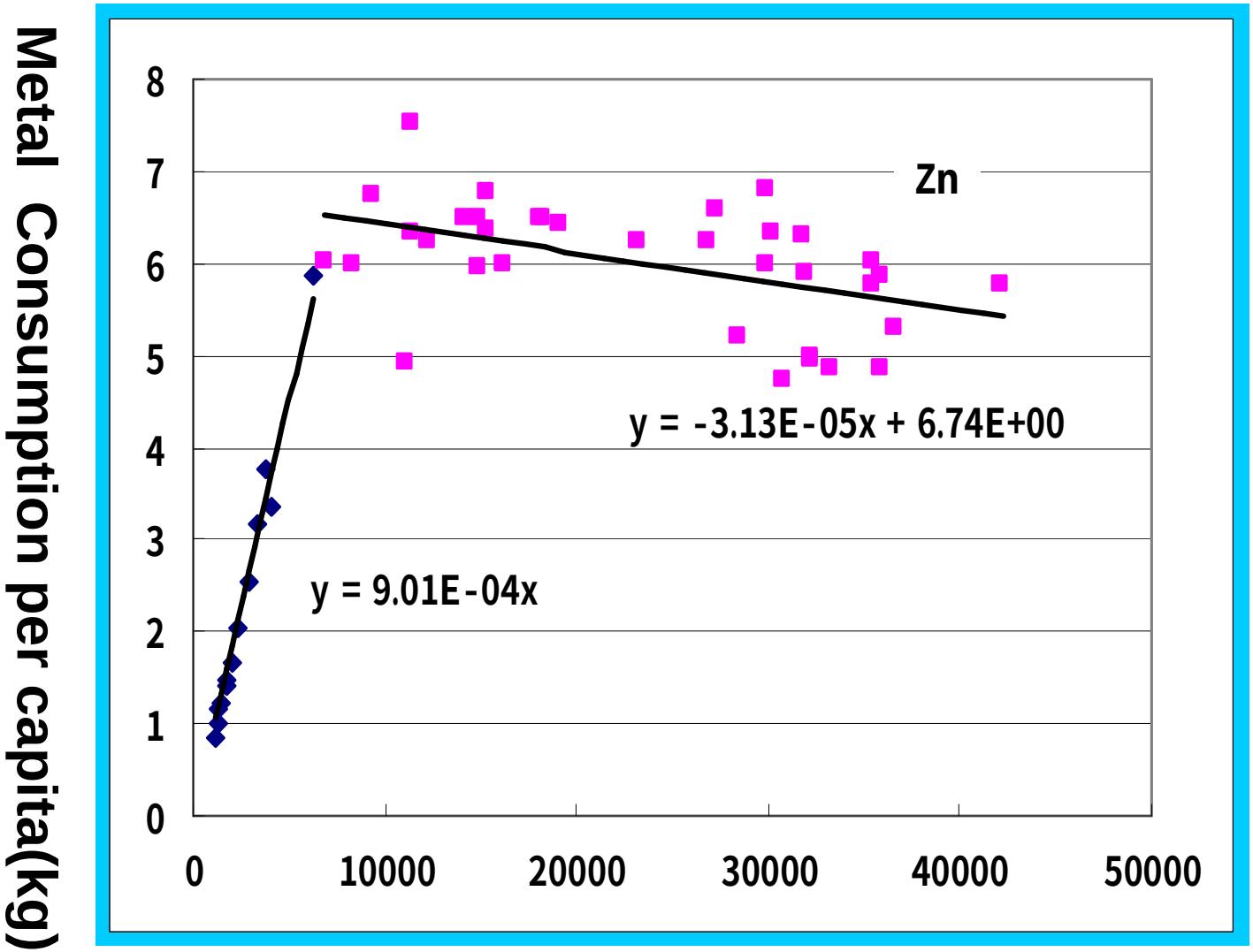
Forecasting of the consumption of metals at 2050

Fe, Mo, W, Co, Pt, Pd	**Present resources will be exhausted completely.**
Ni, Mn, Li, In, Ga	**The consumption will increase more than double.**
Cu, Pb, Zn, Au, Ag, Sn	**The consumption will exceed even its resource base.**

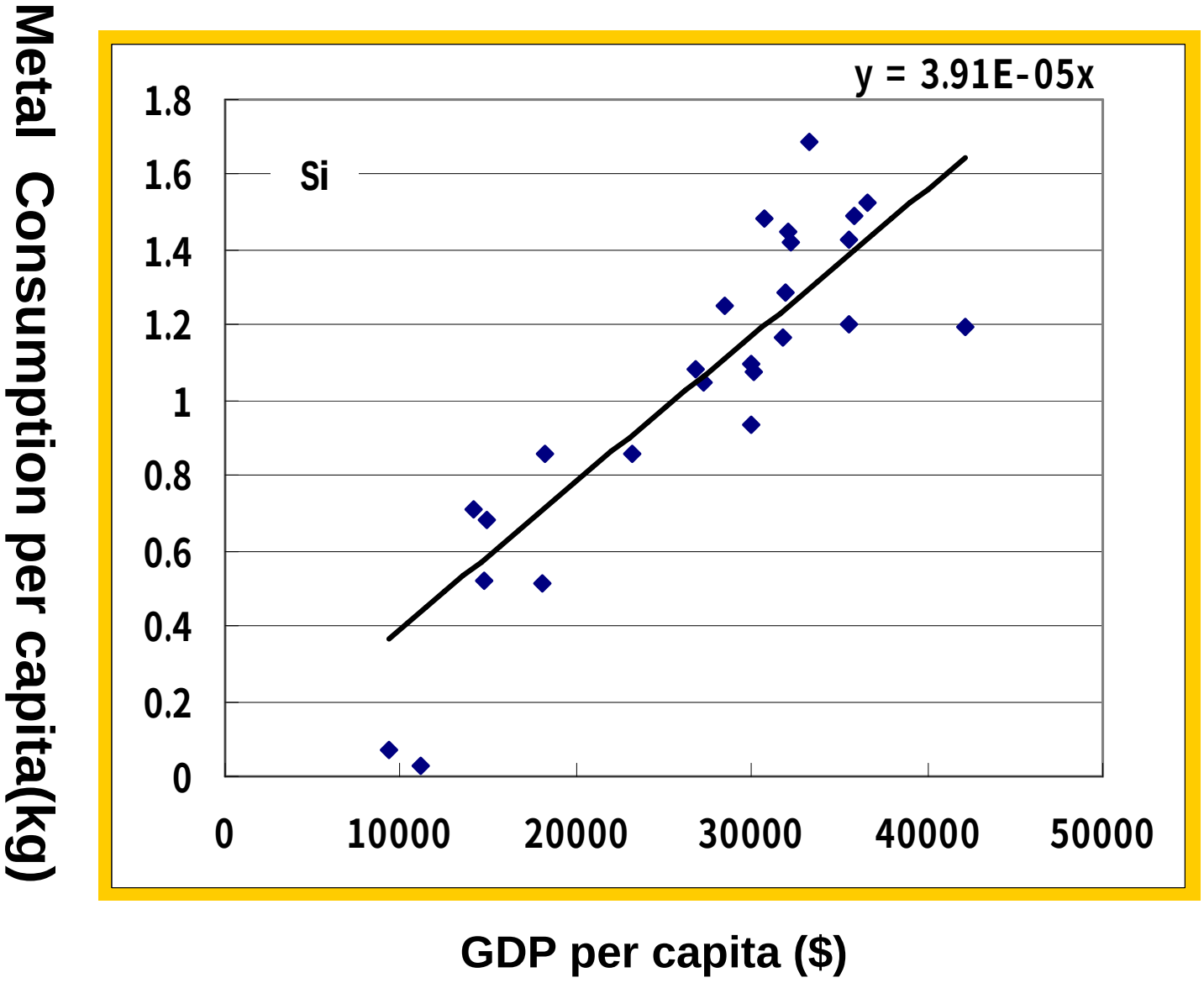
(1) Fe, Al, Ni, Mo, Ag, Sb



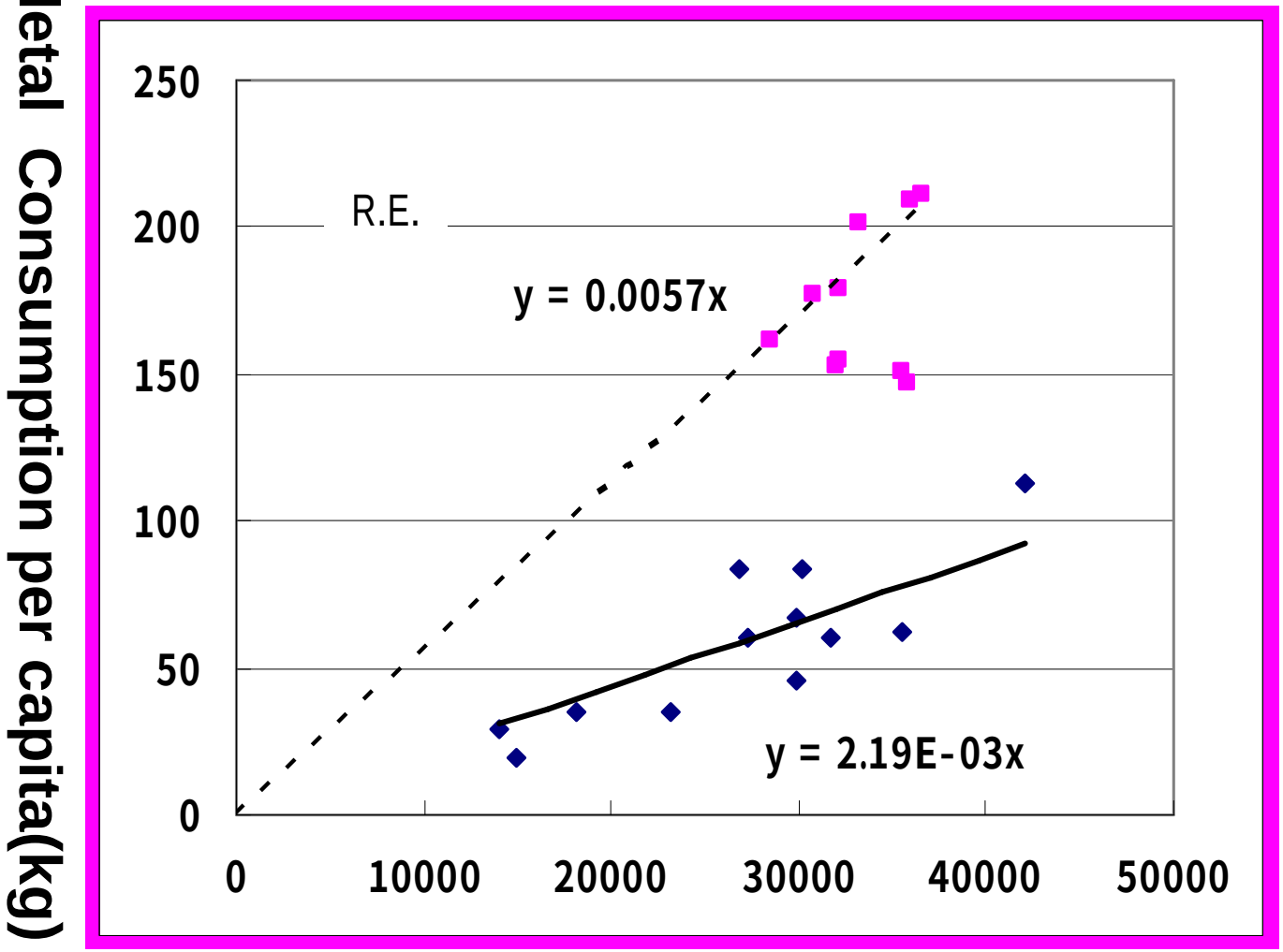
(2) Zn, Cu, Sn, Pb, W, Cr, Mn, Au



(3) Si, Pt, Co


y = 3.91E-05x
Si
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
10000
20000
30000
40000
50000
Metal Consumption per capita(kg)
GDP per capita ($)

(4) R.E., Li, In, Ga


Metal Consumption per capita(kg)
250
200
150
100
50
0
R.E.
y = 0.0057x
y = 2.19E-03x
0
10000
20000
30000
40000
50000
GDP per capita ($)

Comparing Climate Risk with Material Risk

	Climate Risk	Material Risk
Impact	dangerous climate change	resource depletion, environmental pollutions
Origin of Risk	greenhouse gas emission, deforestation, etc.	giant material production and consumption
Science	Climate Science	Materials Science
Monitoring	CO_2, SO_2, CFC-11, ice, etc.	No
Simulation	many computer simulations of climate change	partly material flow
Policy Target	2°C target by EU (550ppm CO_2-eq.)	No for resource consumption Yes for some toxic materials
Solution	improve resource productivity (energy efficiency and decarbonization of energy)	improve resource productivity (material efficiency)
International Panel	IPCC	No big one
International Treaty	Kyoto Protocol, etc.	Montreal Protocol, Basel Treaty, etc.

Absolute targets

3M	Reduce GHG emissions by 30% from 2002 levels by 2007
Alcoa	Reduce GHG emissions by 25% from 1990 levels by 2010
Allianz	Reduce GHG emissions by 20% from 2000 levels by 2012
Bank of America	Reduce total U.S. GHG emissions by 9% 2004-2009
British Telecom	Reduce total GHG emissions by 25% below 1996 levels by 2010
DuPont	Reduce GHG emissions by at least 15% from base year of 2004 by 2015
Eastman Kodak	Reduce total global GHG emissions by 10% from 2002 to 2008
Entergy	Reduce total U.S. GHG emissions by 20% from 2000 to 2010
Goldman Sachs	Reduce GHG emissions by 7% by 2012 from 2005 levels
International Paper	Reduce total U.S. GHG emissions by 15% from 2000 to 2010
JP Morgan Chase	Reduce GHG emissions by 5-7% by 2012 from 2005 levels
Johnson & Johnson	Reduce GHG emissions by 14% from 2001 to 2010
Swiss Re	Reduce GHGs by 15% below 2002 levels by 2013
Wal-Mart	Reduce global GHG emissions by 20% from 2006 to 2013
Weyerhaeuser	Reduce GHG emissions by 40% from 2000 levels by 2020
Xerox	Reduce total global GHG emissions by 10% from 2002 to 2012

Intensity targets

Ball Corp.	Reduce U.S. GHG emissions by 16% per production index from 2002 levels by 2012
Caterpillar	Reduce CO2 emissions per million dollars of revenue by 20% between 2002 and 2010
Intel Corp	Reduce global GHG emissions by 30% per production unit from 2004 to 2010
Interface	Reduce U.S. GHG emissions by 15% per production unit from 2004 to 2010
Lockheed Martin	Reduce U.S GHG emissions by 30% per dollar revenue from 2001 to 2010

ref. Climatic Consequences Citigroup 2007

Characteristic Features of the Activities of Japanese Corporations Combating for Climate Change

(1) Promotion of Environmental Management

(2) Promotion of Eco・Innovation

(3) 3R and Eco・design

(4) Reducing GHGs through Voluntary Programs of the Industrial Sectors

(5) Greening of the Supply Chain

(6) Promotion of the Eco Products Exhibition

(7) Various types of Environmental Communication

(8) Tackling the Conservation of Biodiversity

Actions of Japanese companies to prevent the global warming

TOYOTA	CO_2 emissions: 1.6 million ton (2006) / Emissions per sales 1.38t/billion yen • Achieve the Europe JAMA voluntary agreement ($CO_2$140g/km by 2009) <The target by 2010> Manufacturing: Reduce emissions per sales in the world 20% compared to 2001 Distribution: Reduce emissions 10% in Japan compared to 1990 (Totally, emissions are decreasing, though, emissions from non-manufacturing part such as distribution are increasing)
MITSUBISHI HEAVY INDUSTRIES	CO_2 emissions: 0.527 million ton (2006) Try to reduce CO_2 emissions from factories and achieve 6% reduction compared to1990 by 2010 Emissions: 0.472 million ton-CO_2 (1990) 0.443 million ton-CO_2 (2010)
NIPPON STEEL	CO_2 emissions: 67 million ton (2006) Target: Reduce energy consumptions 10% compared to 1990 by 2010 Emissions: 74 million ton-CO_2 (1990) 66.6 million ton-CO_2 (2010)
THE TOKYO ELECTRIC POWER COMPANY	CO_2 emissions: 97.6 million ton (2006) Emission Intensity: 0.380kg-CO_2/kwh(1990) 0.339kg-CO_2/kwh(2006) Reduce the average CO_2 emission intensity from 2008 to 2012 20% compared to 1990

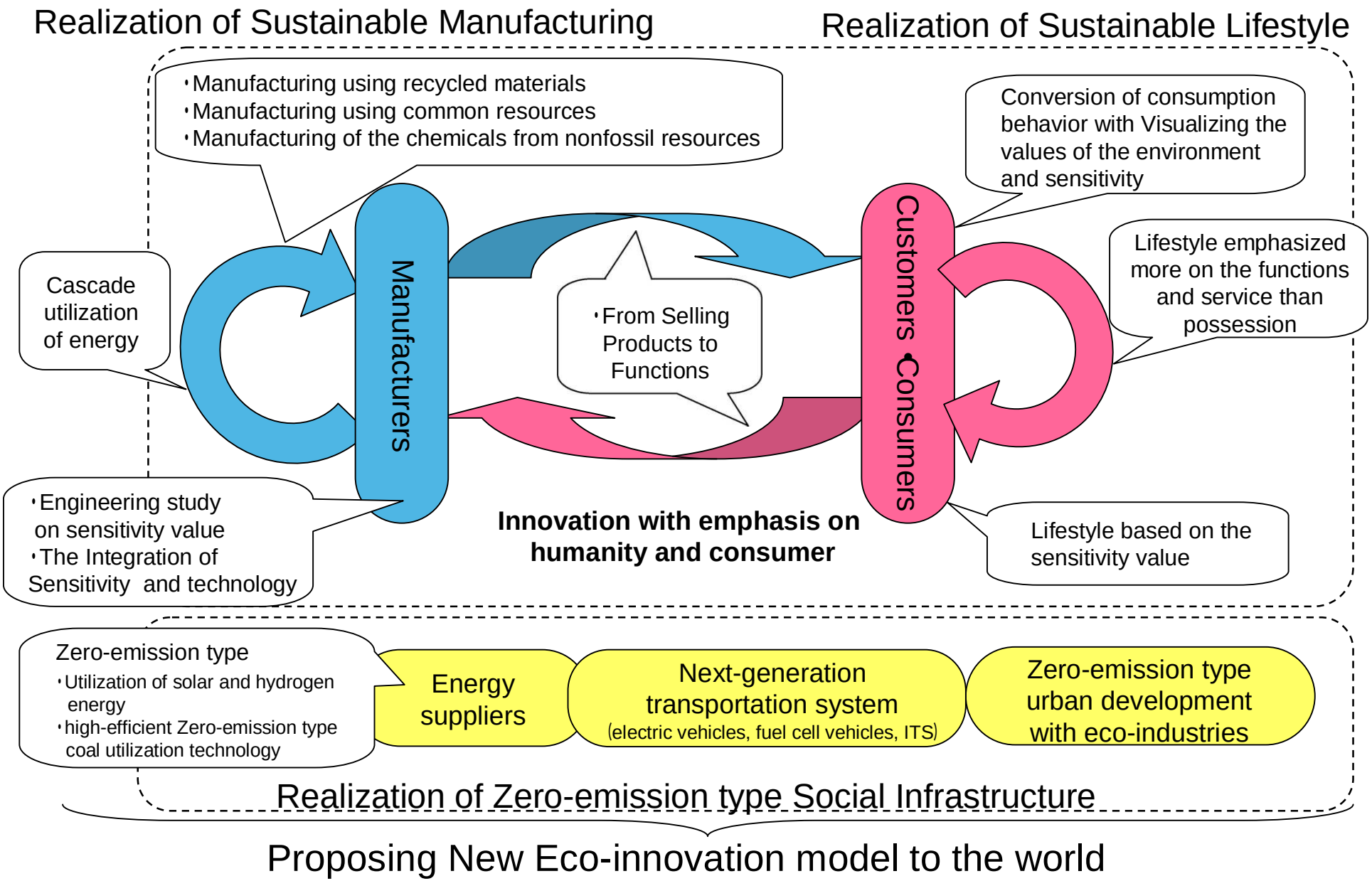
TOKYO GAS	This Company's CO_2 emissions: 0.91 million ton (2006) Client's CO_2 emissions: 25.4 million ton (2006) Reduction of CO_2 emissions: 6.61 million ton (compared to 1990) - Promotion of development and diffusion of high efficiency instruments: 0.62 million ton - Change from fossil fuels to natural gas: 3.84 million ton - Natural gas co-generation system: 2.15 million ton Targeted CO_2 emissions reduction: 8 million ton (2010)
HITACHI, LTD	CO_2 emissions: 2.8 million ton (2006) Reduction of CO_2 emissions: 14% (compared to 1991) Improvement of global warming prevention factor: 60%(compared to 2000) Target: Reduction of CO_2 emissions: 7% (compared to 1990) Improvement of global warming prevention factor: 50%(compared to 2000)
SHARP	CO_2 emissions: 1.73 million ton (2006) Emission Intensity (CO_2 emissions (tons)/ production sales (yen)) -Reduced 12% compared to previous year -Reduce 28% by 2010
MATSUSHITA ELECTRIC INDUSTRIAL	CO_2 emissions: 4.13 million ton (2006) (4% less than previous year) Target (2010): - Global warming prevention factor 5 (compared to 1990) - Resources factor 3 (compared to 1990), - Green products development rate over 90%, Green factory rate over 90%, - Reduce CO_2 emission intensity of factory 10%

NEC	CO_2 emissions: 1.29 million ton (2006) Reduce CO_2 emissions to zero practically by 2010 Contribution to CO_2 reduction by saving energy products: 50% up (compared to 2005) Resource productivity: 2 times (compared to 2000) Use renewable resource and energy more than 10%
CANON	CO_2 emissions: 6.85 million ton (2006) Maximize resource productivity Factor (compared to 2000): 1.38 (2006), target-2 (2010)
RICOH	CO_2 emissions: 0.17 million ton (2006) Reduce environmental impact: 15% (2007), 20% (2010)
SONY	CO_2 emissions: 20.5 million ton (2006) Reduce CO_2 emissions 7% by 2010 compared to 2000
TOSHIBA	CO_2 emissions: 2.44 million ton (2006) Eco-efficiency (compared to 2000): 2 times (2010), 1.59 times (2006) CO_2 emissions per productivity sales: 28% down (2010)
FUJITSU	CO_2 emissions: 1.15 million ton (2006) CO_2 emissions per sales: 28% down (2010) Energy consumption: less than 1990 (2010) Eco efficiency factor (compared to 2005): 2 (2009)

Eco-innovation related Activities in Japan

(1) Survey of “Innovation”
by the Science Council of Japan
(2) “Innovation 2025” Report
by the Government
(3) Eco-innovation Strategy by METI
(4) Strategy-Map of
Technology Development by NEDO

Innovation of technologies and society from the viewpoints of the environment and humanity (Eco-Innovation) / METI, JAPAN



To Overcome the Obstacle of Dematerialization with Eco-Design

- Many industrial products are manufactured for direct use by human being or in relation to the size of man, and the size of such products can not be down sized arbitrarily. (eg. Notebook, desk, chairs, PC, PDA, keyboard, cellular phone, houses, automobiles, trains, TV sets, roads, traffic signal) *Source; Industrial Ecology by Gradel & Allenby (translated by Goto; Toppan)*
- To provide affluent services to the World's population of 9 billion people in 2050, there is no way other than to thoroughly develop the eco-design
- Eco design maximizes the environment efficiency (energy efficiency, resource efficiency) in the whole life cycle of products
  - Resources saving, energy saving, longer life, easy repair, easy expansion of functions, reuse of parts (remanufacturing), recycle, recovery of thermo energy, timeless design
- Substitution by services of products (rental, common sharing, etc.)
- Zero emission in various scales

Four Types of Ecodesign Innovation

by H.Brezet

Type 1 Product Improvement (~Factor 2)

organization of a take-back system
changing raw materials
changing the type of coolant used etc.

Type 2 Product Redesign (~Factor 5)

increased use of non-toxic materials
increased recycling and easy disassembly etc.

Type 3 Product Concept Innovation (~Factor 10)

a change from paper-based information
exchange to e-mail etc.

Type 4 System Innovation (~Factor 20)

a change over in agriculture to industry-based
food production etc.


エコプロダクツ2007
Eco Style Fair
12/13 Thu 14 Fri 15 Sat
Green Power
BIOMASS


地球と私のためのエコスタイルフェア
エコプロダクツ2007
Eco Style Fair
12/13 Thu 14 Fri 15 Sat
Green Power
BIOMASS
Eco Life
My Style
イエット!
CO2
http://eco-pro.com


電気自動車
EV
Switch!
Battery Unit
Battery Unit
Battery Unit


TOYOTA
Plug-in
HYBRID


枝廣 淳子 氏
京都精華大学
服部 静枝 氏
アルピニスト
野口 健 氏
イオン株式会社
上山 静一 氏
東京大学
山本 良一 氏


SHARP
NEC
FUJITSU
環境配慮型製品と環境技術
電気自動車用リチウムイオン二次電池
15.7kℓ


brother
ROYAL


Eco-Products 2003
地域食と
ものづくり総合展
環境コミュニケーション
ステージ
全国牛乳容器
牛乳パック
リサイクル
"リサイクル"
ありがとう
宝酒造
Takara


HONDA
TOYOTA


東4
三菱地所グループ
NTT


AEON
AEON
Eco-Products2007
進化する
エコストア
TOYO SEI
世界の人々に「良
おかげさまで90周年。東洋製
身近な容器の進化
分別しやすい
2006


PLUS
ECO
ゼロにしま
環境商品が「当たり前」の
メーカーになるために
2010年中に環境配慮商品100%を
目指します。
52%
SUNTORY

Eco-Products International Fair 2008 (EPIF2008)

Hanoi, Vietnam, March 1-4 2008

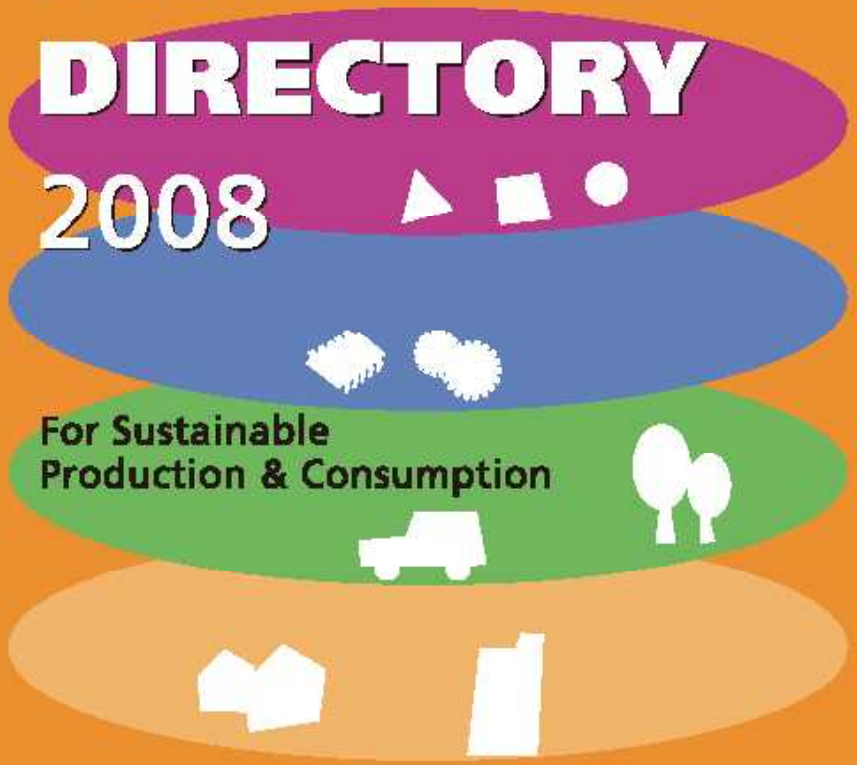
Organizers	Vietnam Productivity Centre
	Vietnam Association for Conservation of Nature and Environment
	Global EXPO and Event JSC
	Vietnam Environment Protection Agency
Supported by	Ministry of Science and Technology
	Ministry of Natural Resources and Environment
	Ministry of Industry
	Vietnam Chamber of Commerce and Industry.
	Asian Productivity Organization(APO)
Venue	Giang Vo Exhibition Fair Centre

ASIAN PRODUCTIVITY ORGANIZATION
1-2-10, Hirakawa-cho, Chiyoda-ku,
Tokyo 102-0093, Japan
Tel: (81-3)5226-3920 Fax: (81-3)5226-3950
e-Mail: apo@apo-tokyo.org
URL: www.apo-tokyo.org

ECO-PRODUCTS DIRECTORY 2008
For Sustainable Production & Consumption

ECO-PRODUCTS DIRECTORY 2008

For Sustainable Production & Consumption



APO
ASIAN PRODUCTIVITY ORGANIZATION

ECO-PRODUCTS DIRECTORY 2008


LỄ KHAI MẠC - OPENING CEREMONY
HỘI CHỢ TRIỂN LÃM QUỐC TẾ VỀ SẢN PHẨM SINH THÁI 2008
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INTERNATIONAL FAIR 2008
01 - 04 / 03 / 2008
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"For Sustainable Development and B
Tổng cục Tiêu chuẩn Đo lường Chất lượng
Directorate for Standards and Quality
Hội Bảo vệ Thiên nhiên và Môi trường Việt Nam
Vietnam Association for Conservation of Nature and Environment
VINASTAS


Cơ quan tổ chức / Organizers:
Tổ chức Năng suất Châu Á
Asian Productivity Organization
Tổng cục Tiêu chuẩn Đo lường Chất lượng
Directorate for Standards and Quality
Trung tâm Năng suất Việt Nam
Vietnam Productivity Centre
Đơn vị thực hiện / In
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Công ty CP Tổ chức Sự kiện và Hội chợ Toàn Cầu
Global Expo and Event JSC.
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"For Sustai


Cơ quan tổ chức / Organizers:
Tổ chức Năng suất Châu Á
Asian Productivity Organization
Tổng cục Tiêu chuẩn Đo lường Chất lượng
Directorate for Standards and Quality
Trung tâm Năng suất Việt Nam
Vietnam Productivity Centre
Hội Bảo vệ Thiên nhiên và Môi trường Việt Nam
Vietnam Association for Conservation of Nature and Environment
Đơn vị thực hiện / Implementing Agencies:
FIRST
ECO-PRODUCTS
INTERNATIONAL FAIR 2008
01 - 04 / 03 / 2008
Trung tâm Hội nghị Quốc gia / National Conv
LỄ KHAI MẠC - OPENING CEREMON
Hà Nội, 01/03/2008
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ECO-PRODUCTS INTERNATIONAL FAIR
"VÌ SỰ PHÁT TRIỂN BỀN VỮNG VÀ CUỘC SỐNG TỐT ĐẸP
"For Sustainable Deve ment and Bet ife"


UPC
Centre
NCE ON
COMPETITIVE
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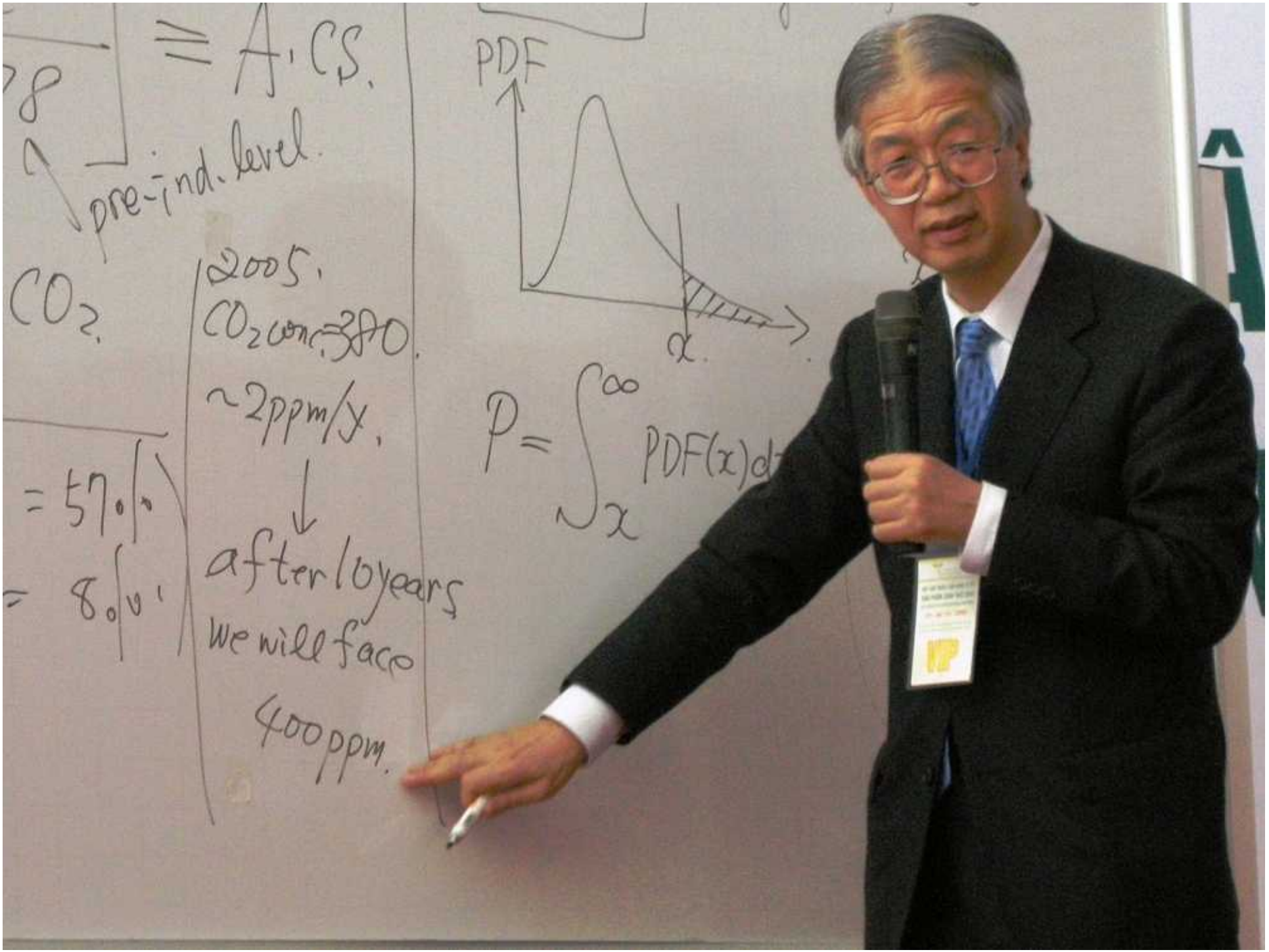
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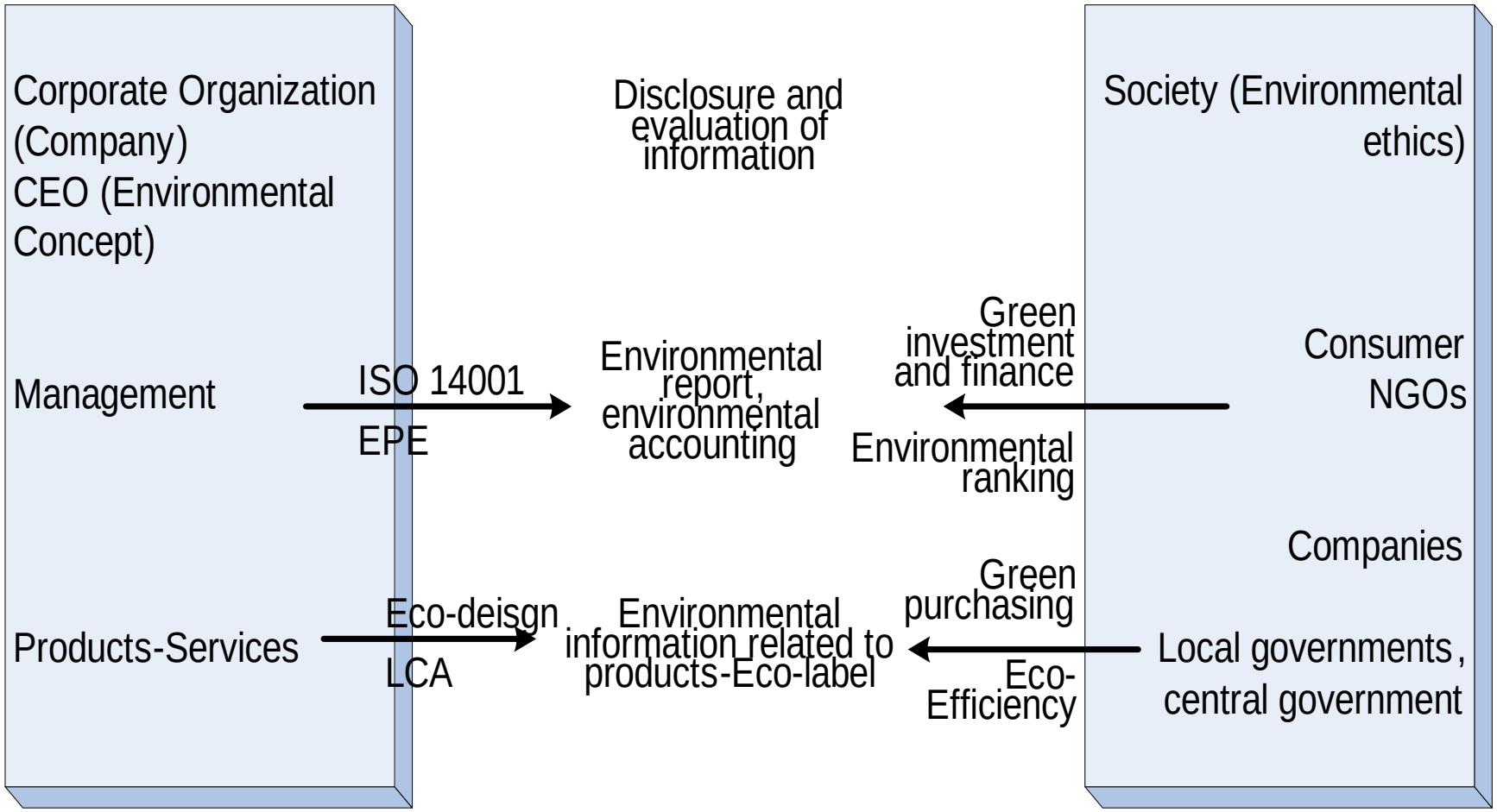
pre-ind. level
CO2.
2005.
CO2 conc. 380.
~2ppm/y.
after 10years
we will face
400ppm.
PDF
α.
P = ∫ PDF(x)dx
= 57.0%
= 8.0%.


HONDA
The Power of Dreams
HONDA
Honda Việt Nam - Môi trường và Phát triển bền vững
HONDA
The Power of Dreams


TOYOTA
ECO

Greening our Industrial-Economic System by expanding the Environmental Management System (ISO14000 Series)



Introduction to IGPN

- **Launched in April 2005**
- **Based on Sendai Declaration in October 2004**

Missions

- **To promote the development of environmentally friendly products and services and Green Purchasing activities around the world**
- **To collect and share information on global Green Purchasing activities, the best examples, know-how, products information, purchasing policies and recent trends**
- **To harmonise the efforts of Green Purchasing and the development of environmentally friendly products and services from the global viewpoint**

It is estimated that there will be 400 million New Middle-Class in Asia-Pacific Region, except Japan, by 2009

- 1.2 trillion dollar (US) market will appear if they consume 3,000 dollars per year.
- If they purchase non-environmentally preferable goods and services, the additional environmental burden will be enormous.
- Promotion of Eco-products Exhibitions and Green Purchasing are urgent in Asia Pacific region.

Missions of IGPN

- To promote the development of environmentally friendly products and services and Green Purchasing activities around the world
- To collect and share information on global Green Purchasing activities, the best examples, know-how, products information, purchasing policies and recent trends
- To harmonize the efforts of Green Purchasing and the development of environmentally friendly products and services from the global viewpoint

Green Purchasing Targets for Each Country

1. To have in-place an organization to promote Green Purchasing
2. To enact Green Purchasing Law
3. To establish database of environmentally friendly products
4. To regularly open an Eco-Products exhibition

COMPARISONS OF GREEN PURCHASING ACTIVITIES IN ASIA PACIFIC REGION & BRICs

COMPARISONS OF GREEN PURCHASING ACTIVITIES IN ASIA PACIFIC REGION & BRICs

(as of 19.09.2007)

	Green Purchasing Promoting Organisations	Green Purchasing Law (or equivalent)	Eco Products Exhibitions	Government Green Purchasing	Green Purchasing related Database
Japan	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Korea	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
China	☆☆☆	☆☆☆	☆☆	☆☆	☆☆☆
Taiwan, China	☆☆☆	☆☆☆	☆☆☆	☆☆☆	-
Philippines	☆☆	☆	not planned	☆	☆
Vietnam	☆	-	☆	-	-
Thailand	☆☆	☆☆	☆☆☆	☆	☆☆
Malaysia	☆☆☆	-	☆☆	-	-
Indonesia	☆☆	-	-	-	-
Singapore	☆☆	-	☆☆☆	-	☆☆☆
India	☆☆☆	☆	☆	☆	☆☆
Sri Lanka	-	-	-	-	-
Australia	-	-	-	-	-
New Zealand	-	☆☆	-	-	-
Brazil	☆	☆☆	-	-	-
Russia	-	-	-	-	-
Definitions of ☆					
☆☆☆	In operation	Enacted	Held regularly	Widely implemented	Developed
☆☆	Established	Under discussion	Held in the past	Implementation began	Being developed
☆	In preparation	Under study	Under study	Planning stage	Under study

Conclusion

- Earth is at the tipping point. We are approaching the point of no-return of global warming.
- Eco-innovation and spreading eco-technology are essentially important to achieve the goals of the Kyoto Protocol and the Asia-Pacific Partnership.
- A number of eco-materials are developed and sold in the market.
- Governments across the World already started Green Purchasing and have made considerable successes.
- Legal framework securing Green Purchasing is necessary.
- Businesses are expected to practice Green Purchasing as well as to supply eco-products.
- International sharing of good experiences, information and know-how will contribute to dissemination of Green Purchasing.