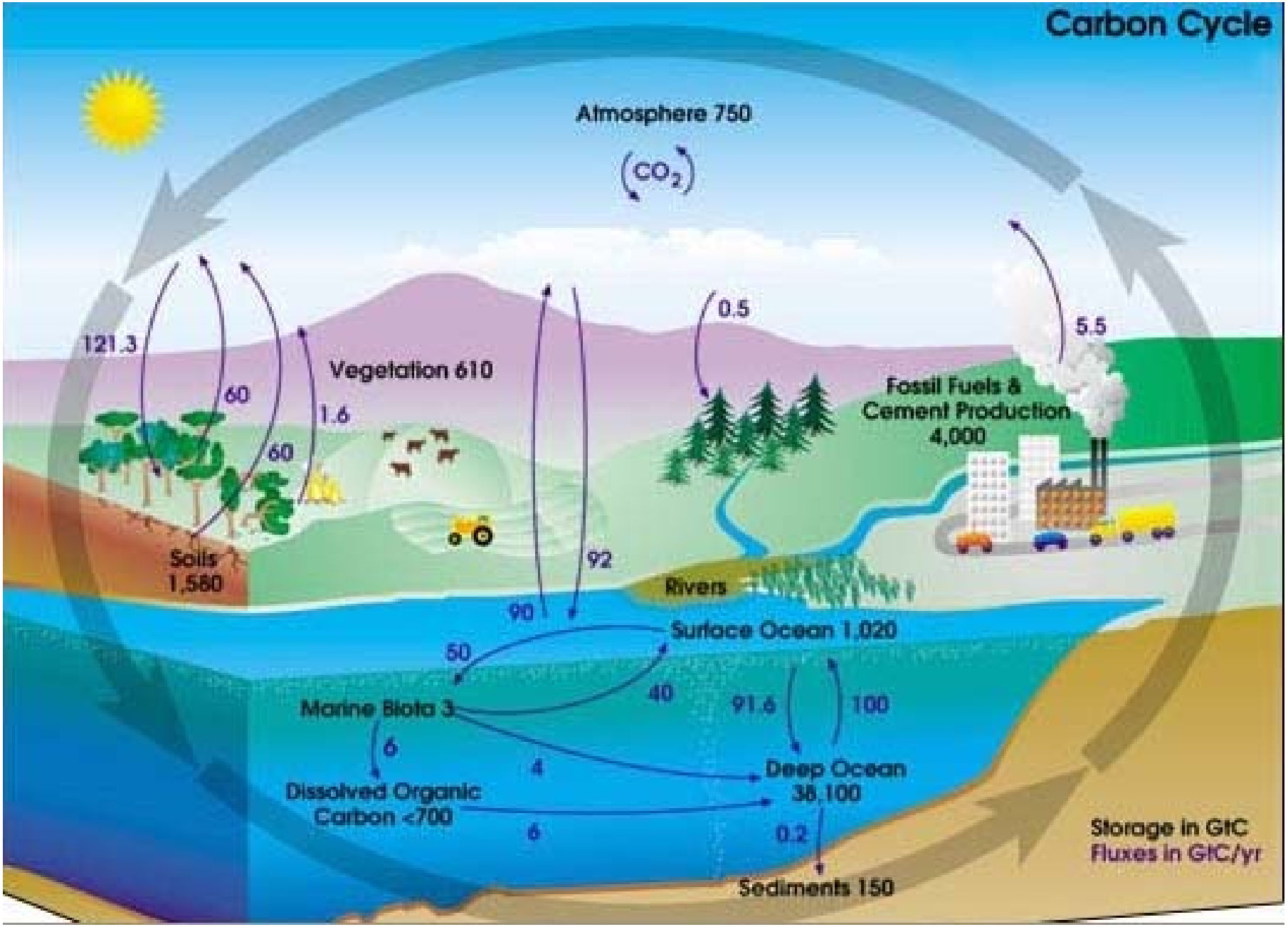
1°) carbon dioxide and climat change

- energy challenge and carbon dioxide production
- earth temperature evolution since thousand years

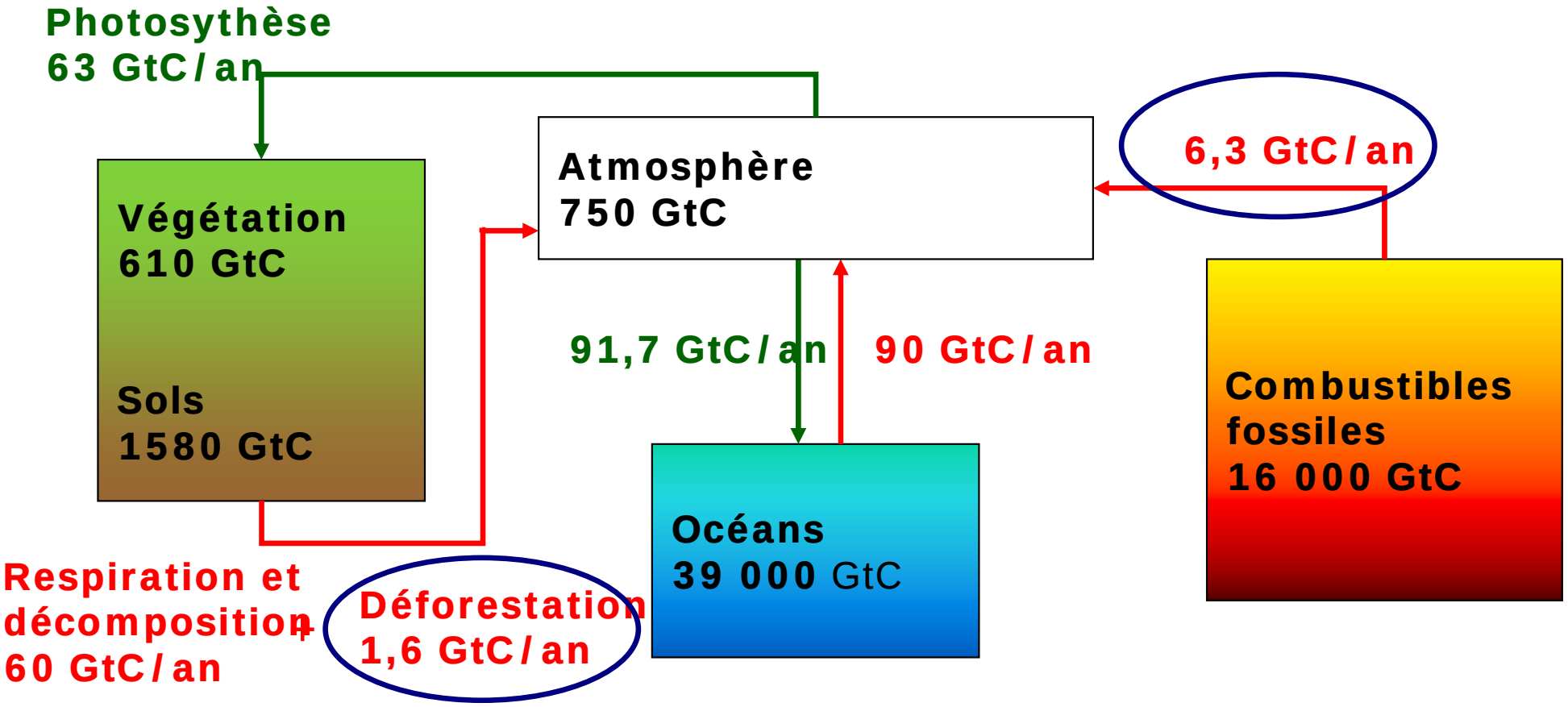


Total amount of carbon around 60000GT

Excess 8.47giga tons per year in the atmosphere

ACS 6 oct 2009

World mass balance of CO2



Þ Excess of 8.47 billions of tons of carbon per year
ACS 6 oct 2009

ain problem:kinetic of enzymatic transformation of CO2/industrial
netic of production

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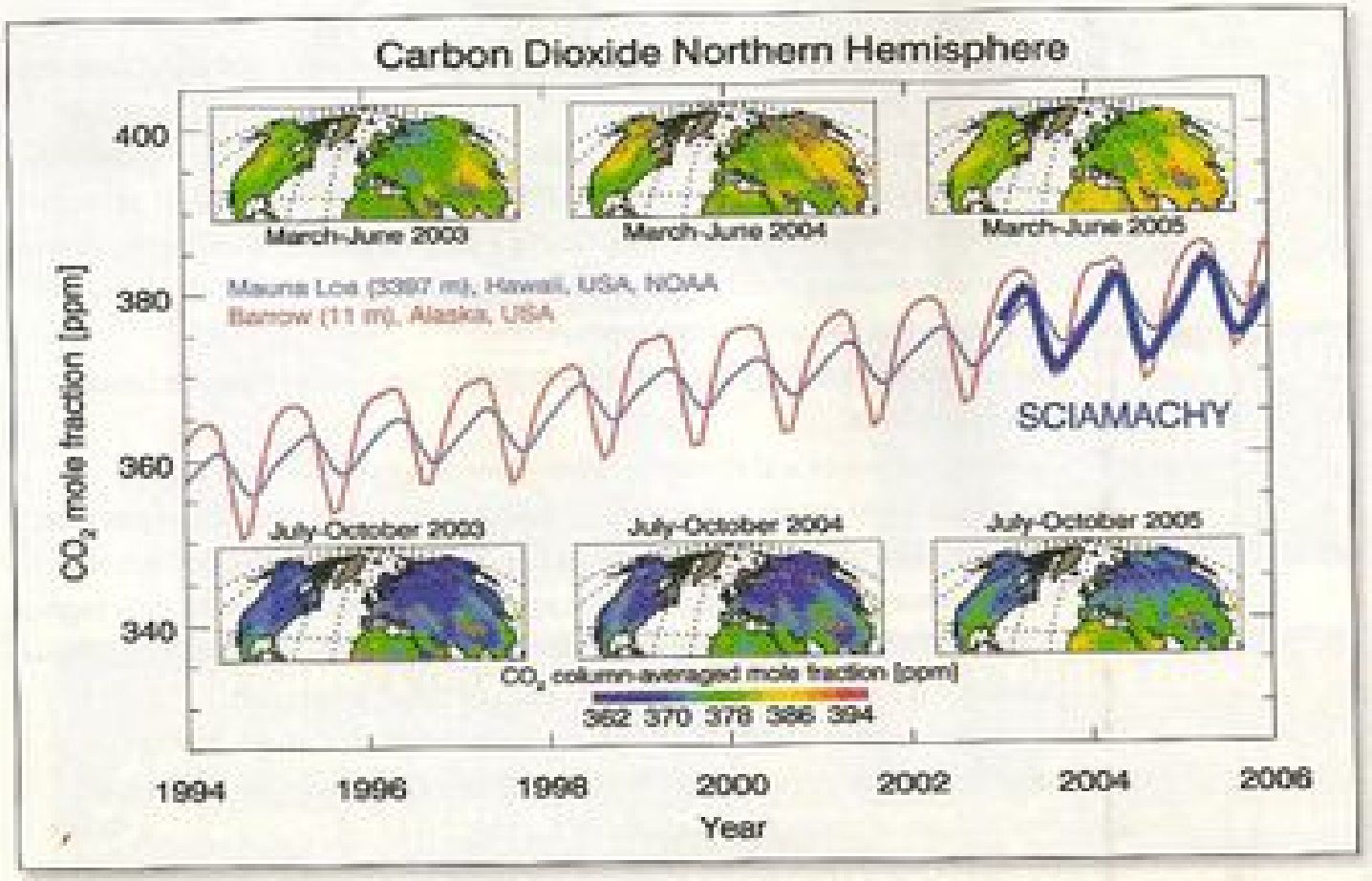
The first Correlation between CO2 and temperature evolution was demonstrated by Claude Laurius (Grenoble) from ice of Antarticle from 1989 to -800.000years (isotopic measurement)



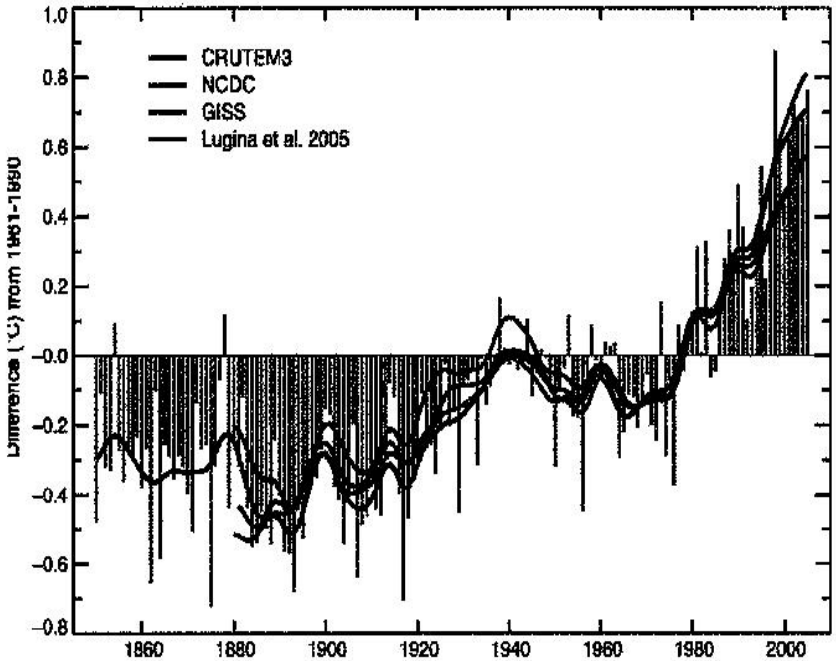
▲ FIG. 1: Seasonal variation of carbon dioxide (total dry column amount) over the Northern hemisphere measured by SCIAMACHY. Comparison with ground-based measurements at Mauna Loa and Barrow shows good agreement. The reflectivity over the oceans is not high enough to produce sufficient signal to noise for the solar photon absorption measurements. Source: Michael Buchwitz, University Bremen, Germany.

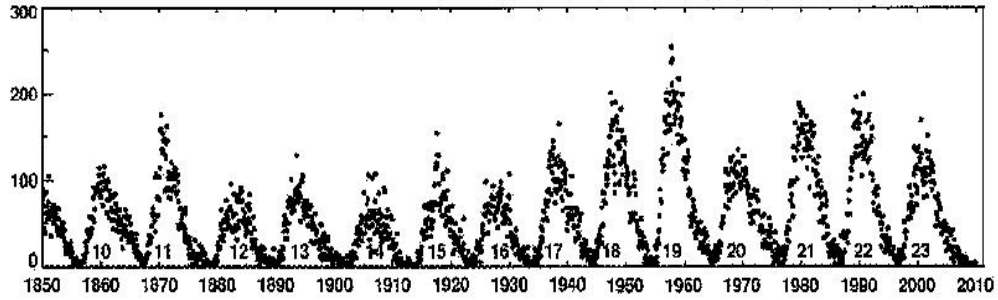
University Bremen germany

average temperature on earth since 1850

2. Improved solar variability models will allow us to accurately determine the Sun's contribution to our climate and in turn anticipate the impact of this contribution to global warming in the longer term.

experimental conditions as the spectrum under consideration).





Document 1 : Évolution du nombre de taches solaires depuis 1850.
Sunspot numbers since 1850.
Source: http://solarscience.msfc.nasa.gov/SunspotCycle.shtml

Document 2 : Évolution de la température moyenne de la Terre depuis 1850.
Average temperature on Earth since 1850.
Source: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/figure-3-1.html

Remarque : Les différentes courbes correspondent à différentes techniques d'obtention des mesures de température.
Note: The different curves represent the different techniques used to measure temperature.

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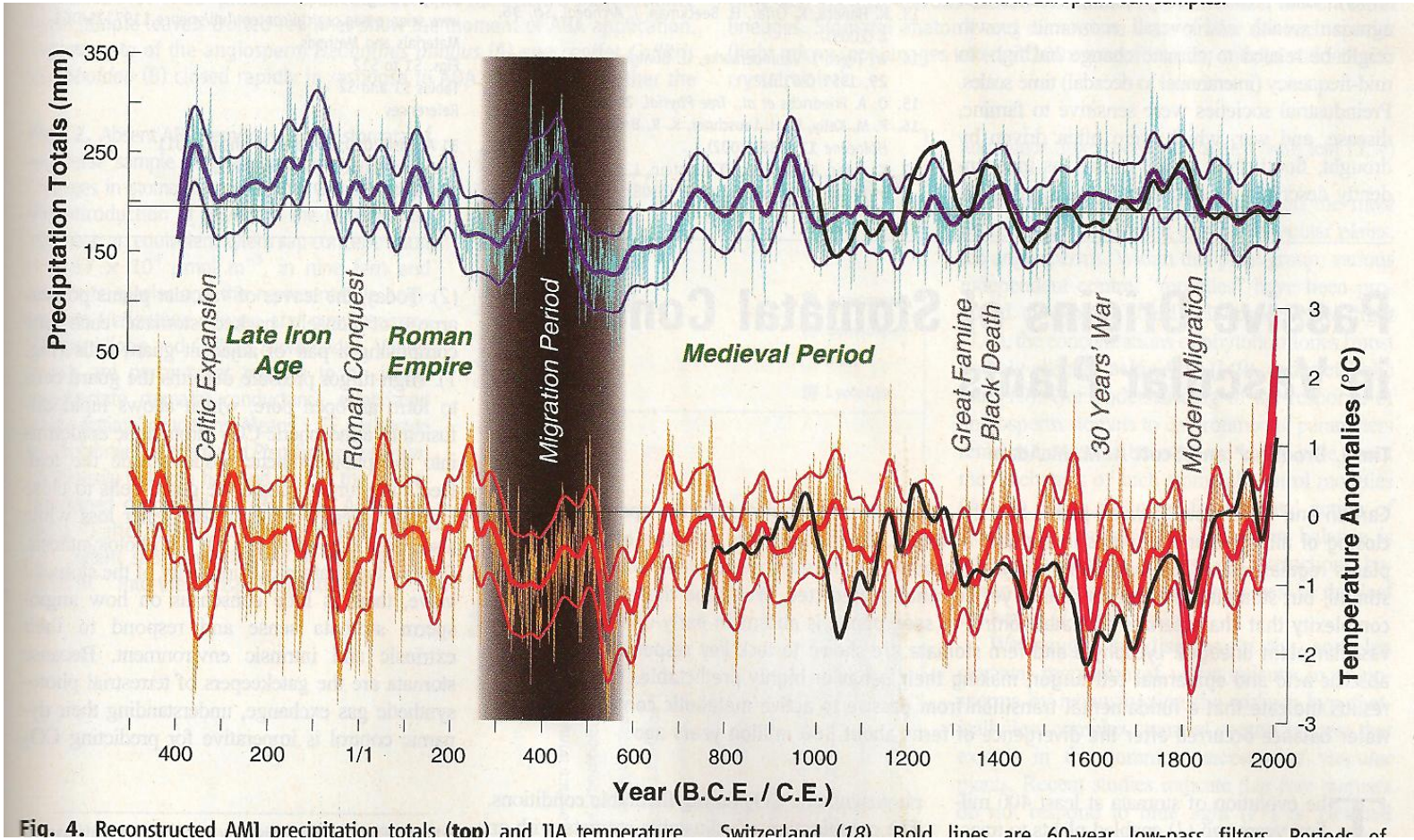
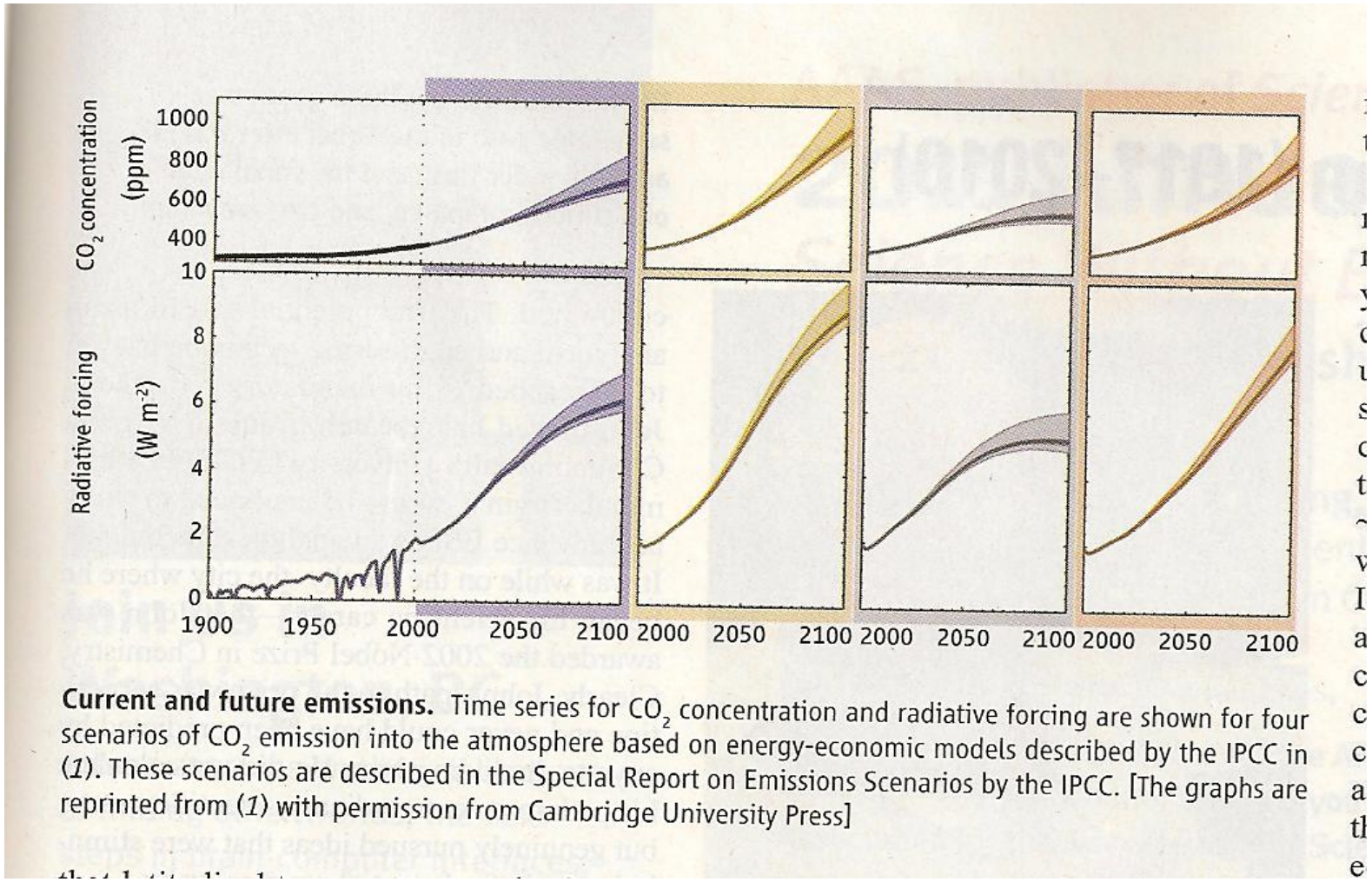


Fig. 4. Reconstructed AM1 precipitation totals (**top**) and 11A temperature ... Switzerland (*18*). Bold lines are 60-year low-pass filters. Periods of

Prospectives of climat changes



Current and future emissions. Time series for CO_2 concentration and radiative forcing are shown for four scenarios of CO_2 emission into the atmosphere based on energy-economic models described by the IPCC in (*1*). These scenarios are described in the Special Report on Emissions Scenarios by the IPCC. [The graphs are reprinted from (*1*) with permission from Cambridge University Press]

GREENHOUSE GASES: U.S. STARTS COUNTING

From emissions estimates to related financial risks and opportunities, the CPI are going to add it up

As 2009 came to a close, the U.S. crossed a key milestone in the path toward regulating greenhouse gas (GHG) emissions. Nearly 10,000 facilities (Figures 1 and 2) — a significant portion of them in the chemical process industries (CPI) — became subject to the U.S. Environmental Protection Agency's (EPA; www.epa.gov; Washington D.C.) Final Mandatory Greenhouse Gases Reporting Rule. The rule requires that applicable facili-

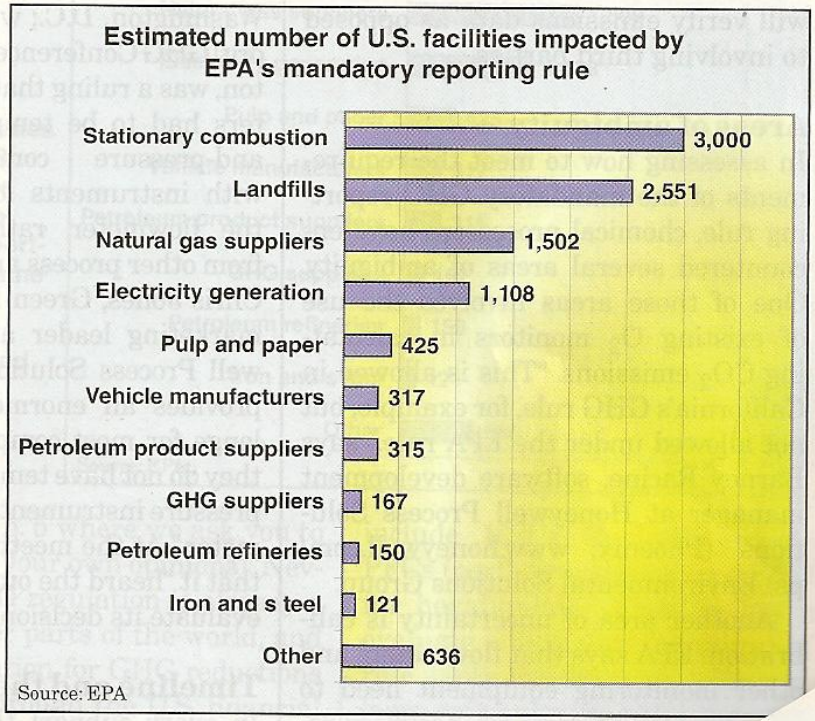
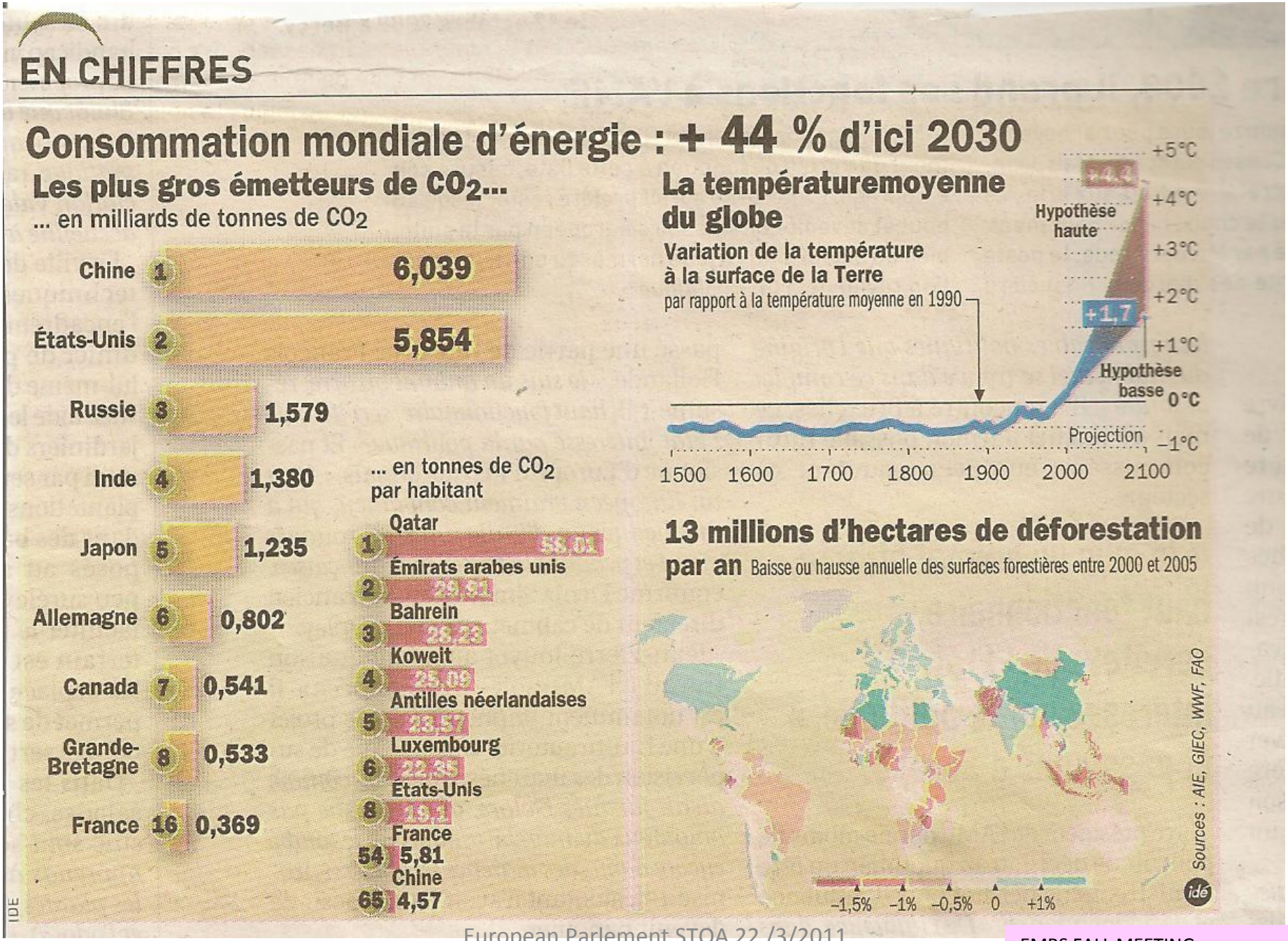


FIGURE 1. The EPA estimates that 10,000 U.S. facilities will be covered by the mandatory reporting rule that came into effect on January 1. The category defined as "Other" is detailed in Figure 2

world energy consumption since 2030:**+44%**



sources:AIE ,GIEC

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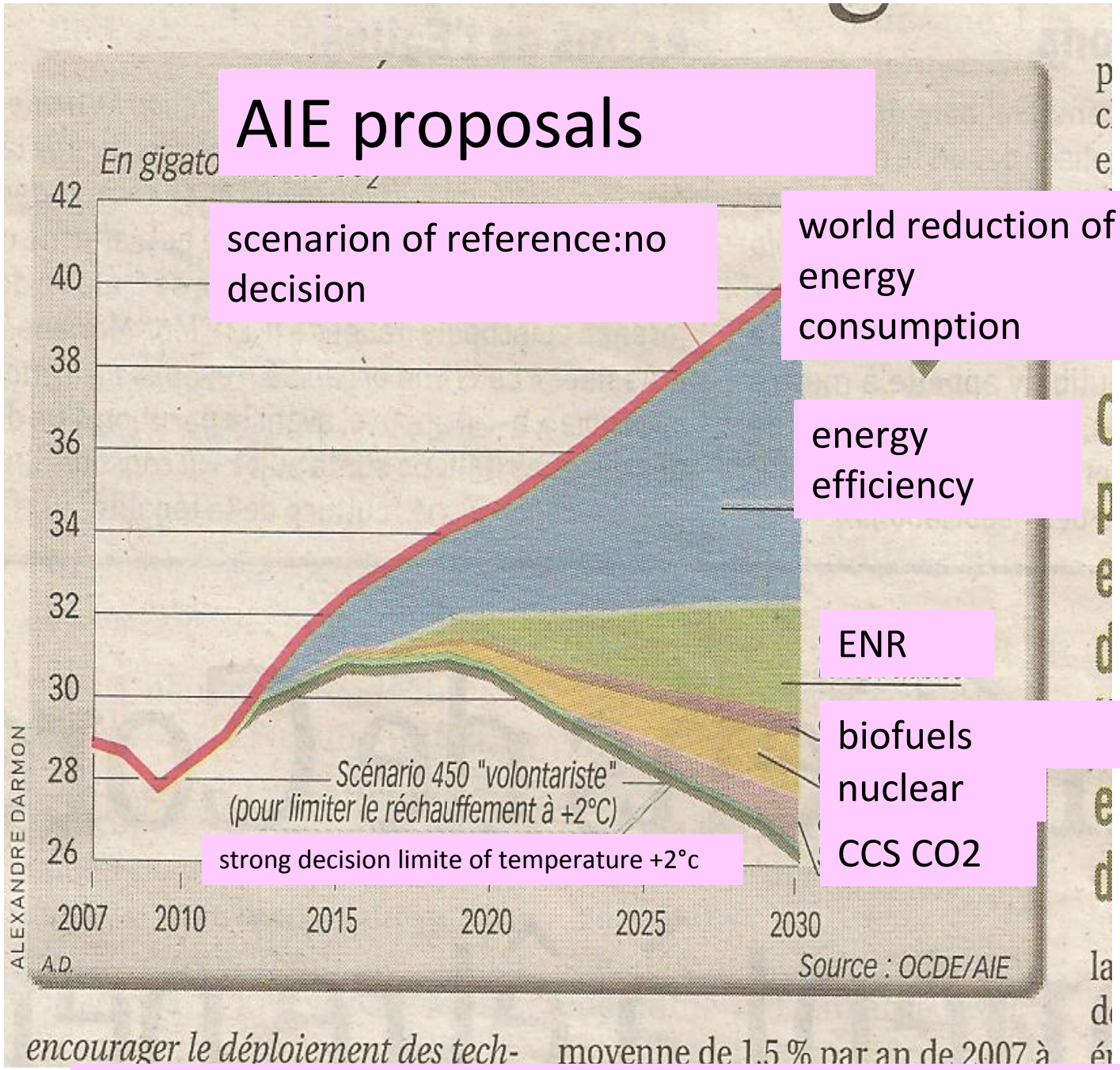
AIE proposals



scenarion of reference:no decision

world reduction of energy consumption

energy efficiency

ENR

biofuels

nuclear

CCS CO2

strong decision limite of temperature +2°c

encourager le déploiement des tech- moyenne de 1,5 % par an de 2007 à

CO_2 A raw material for industry

total mondial emission in 2009

CO_2 from combustion of fossil fuel and cement factory have reached

8.47 gigatons of carbon

(ACS 6 Oct. 2009)

Or 31 gigatons of CO2

Market place for CO2 emission trading organization:

ETS- 15$/T emission cost (march 2011)

(152 millions Ton / 2010 to 132 millions Ton in 2020)

European Emission Trading Scheme –85 billions$