THE GLOBAL CO_2 SUPPLY / DEMAND BALANCE

AND

THE GLOBAL CO_2 INVENTORY AND FLOW ANALYSIS

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Chemical CO_2 Equivalents

Ratios

	Product	Chemical CO_2 equivalent
Starch / Glucose /Cellulose	**1**	**1.63**
Vegetable Oil	**1**	**2.81**
Carbon	**1**	**3.67**
Limestone	**1**	**0.44**
Methane	**1**	**2.75**

CO_2 equivalents will allow calculations to be executed among different products

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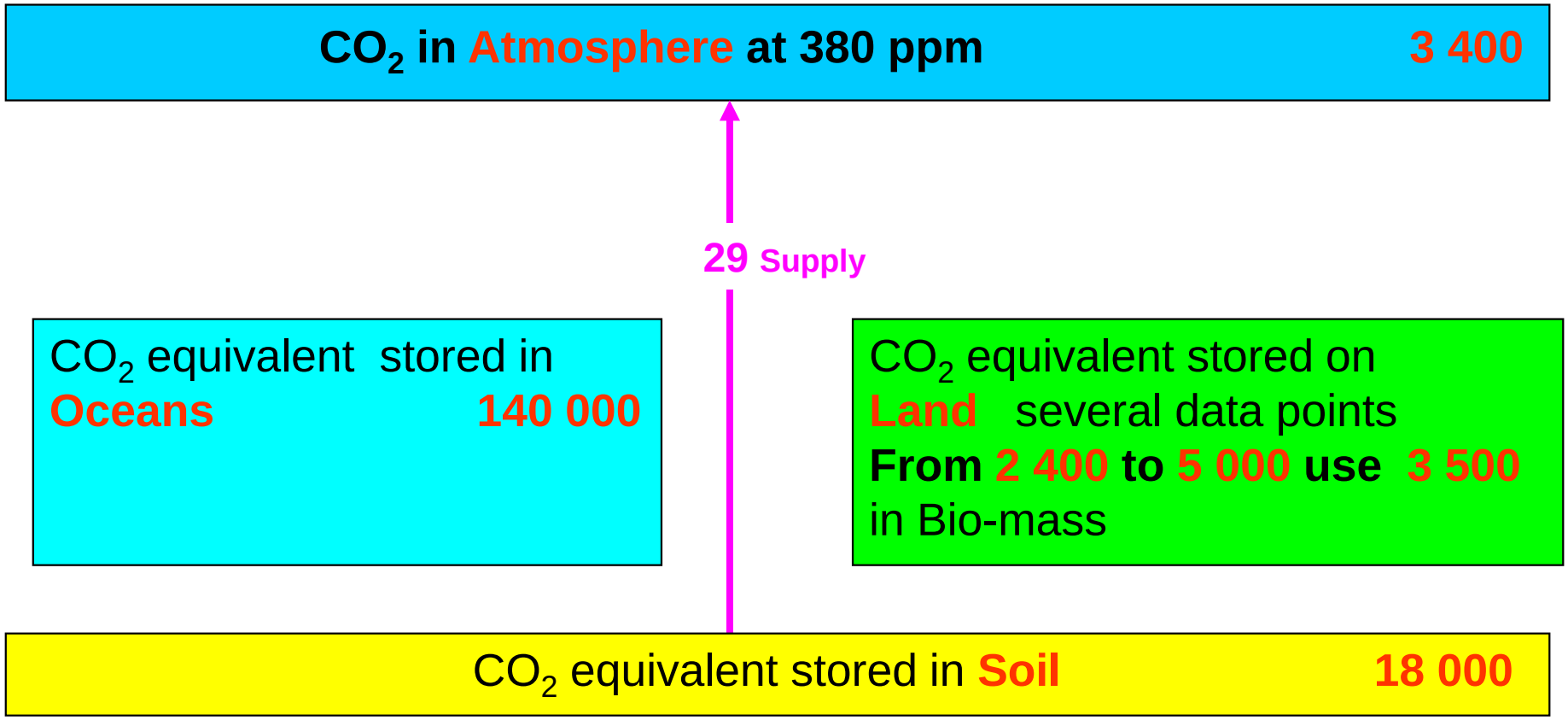
Can we make some estimates about the flows of CO_2 ?

Kyoto Protocol (the IPCC) :
22 Gt CO_2 from fossil fuel flows into the atmosphere based on 1990 data

In 2004 CO_2 fossil fuel equals 29 Gt (used in this presentation)
In 2007 CO_2 fossil fuel equals 32 Gt

CO_2 equivalent flows in Gt /Year and CO_2 stored in Gt



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A part of CO_2 stays in Atmosphere and a part is returned

CO_2 content in the Atmosphere in 1960 300 PPM = 2 690 Gt
CO_2 content in the Atmosphere in 1998 360 PPM = 3 240 Gt
CO_2 content in the Atmosphere in 2008 380 PPM = 3 420 Gt

The difference between 300 and 380 ppm = 730 Gt

Inventory increase in the Atmosphere = 15 Gt CO_2 / Year (1960-2008)

The difference between 360 and 380 ppm = 180 Gt

Inventory increase in the Atmosphere = 18 Gt CO_2 / Year (1998-2008)
(used in this presentation)

Return from Atmosphere (Demand by Ocean) = 11 Gt CO_2 / Year (1998-2008)
(used in this presentation)

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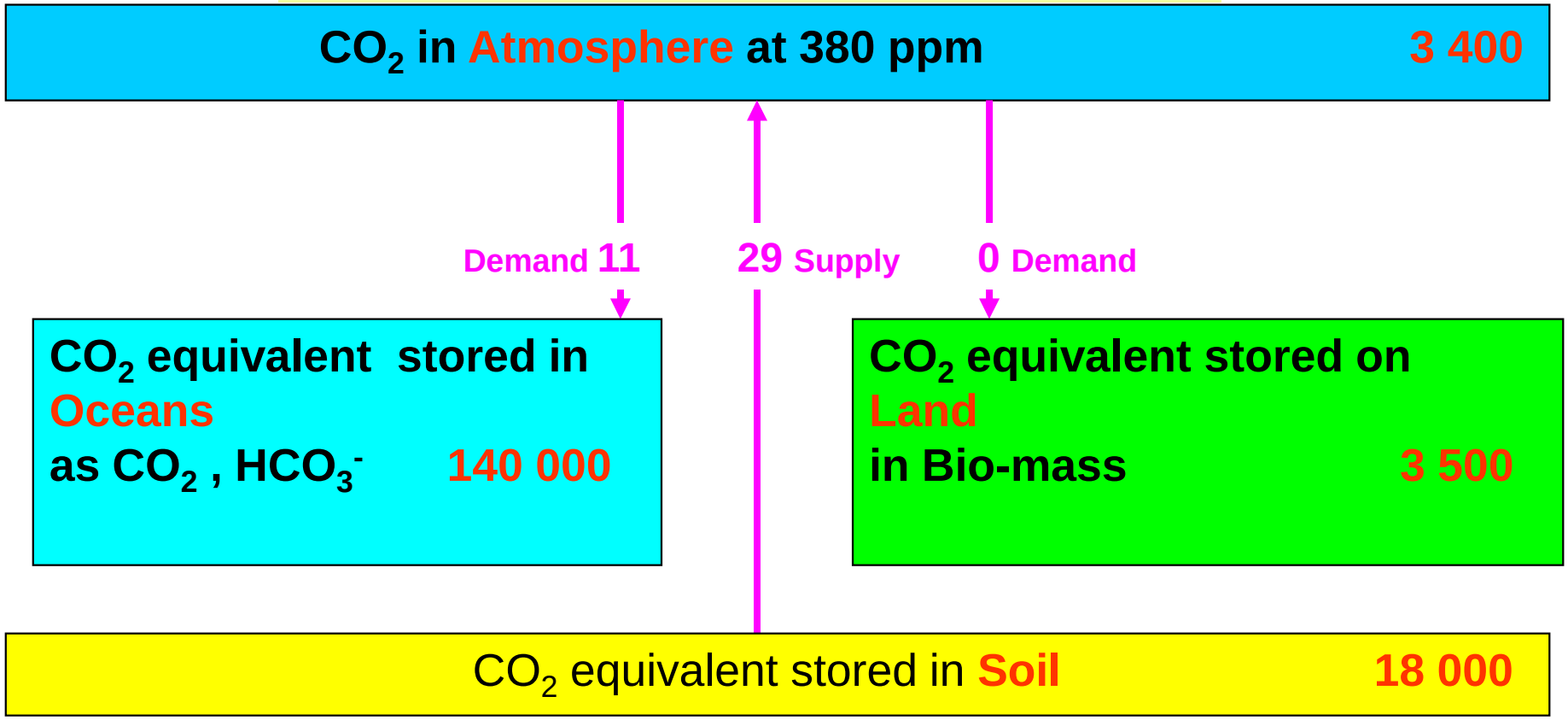
CO_2 equivalent flows in Gt /Year and CO_2 stored in Gt

Inventory build-up is 18 equivalent to 2 ppm



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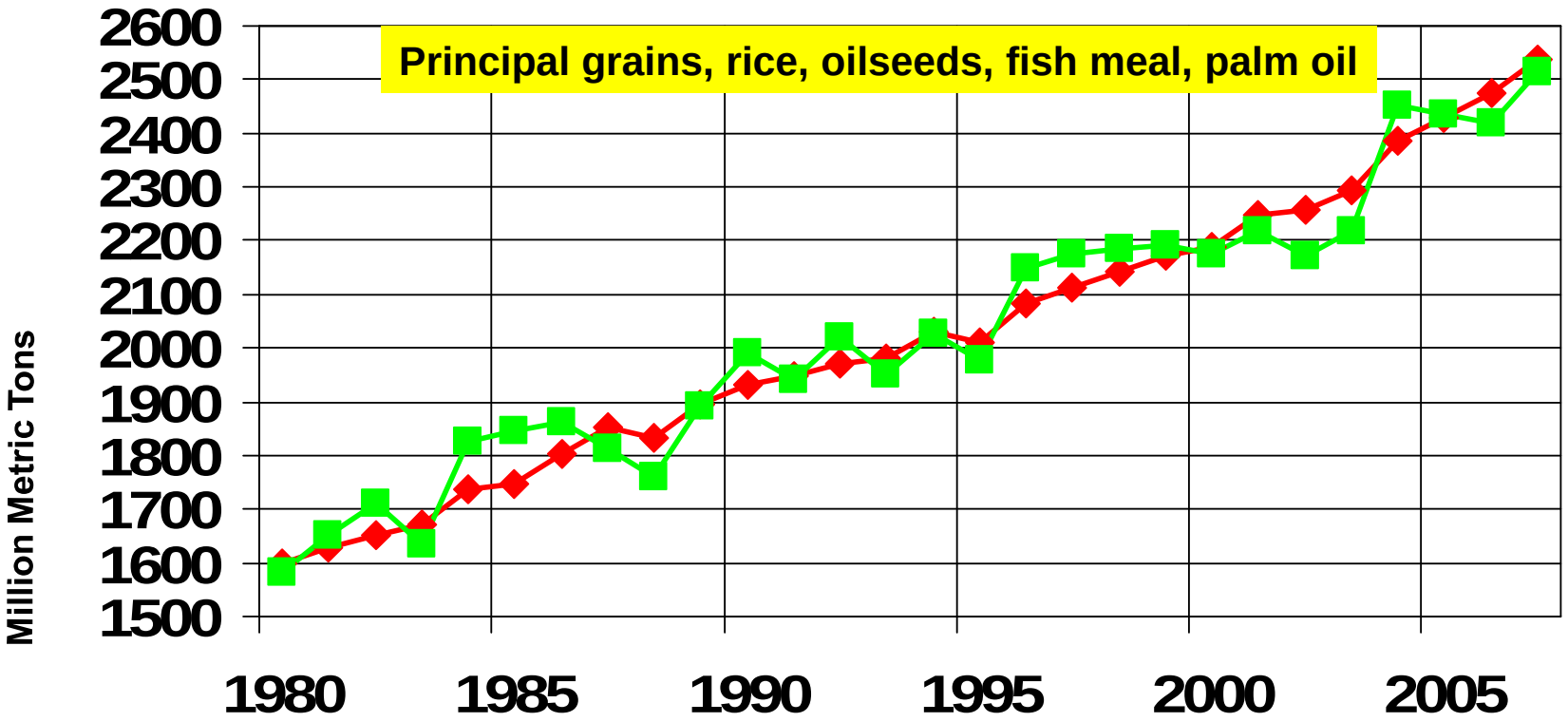
Some agriculture data

Global supply / demand of raw crop materials



The composition contains 4.8 % vegetable oil, the remainder is considered starch and cellulose. Please note that sugar cane is excluded form this chart.

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CO_2 consumption Raw crops

2.5 Gt / Year of Raw crops require:	**4.5 Gt CO_2 / Year**
4.9 Gt / Year associated Biomass require:	**8.0 Gt CO_2 / Year**
Total	**12.5 Gt CO_2 / Year**

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CO_2 consumption on Land

CO_2 demand for cropland	13	Gt / Year
CO_2 demand for non-cropland	88	Gt / Year
CO_2 demand from Atmosphere by Land	101	Gt / Year

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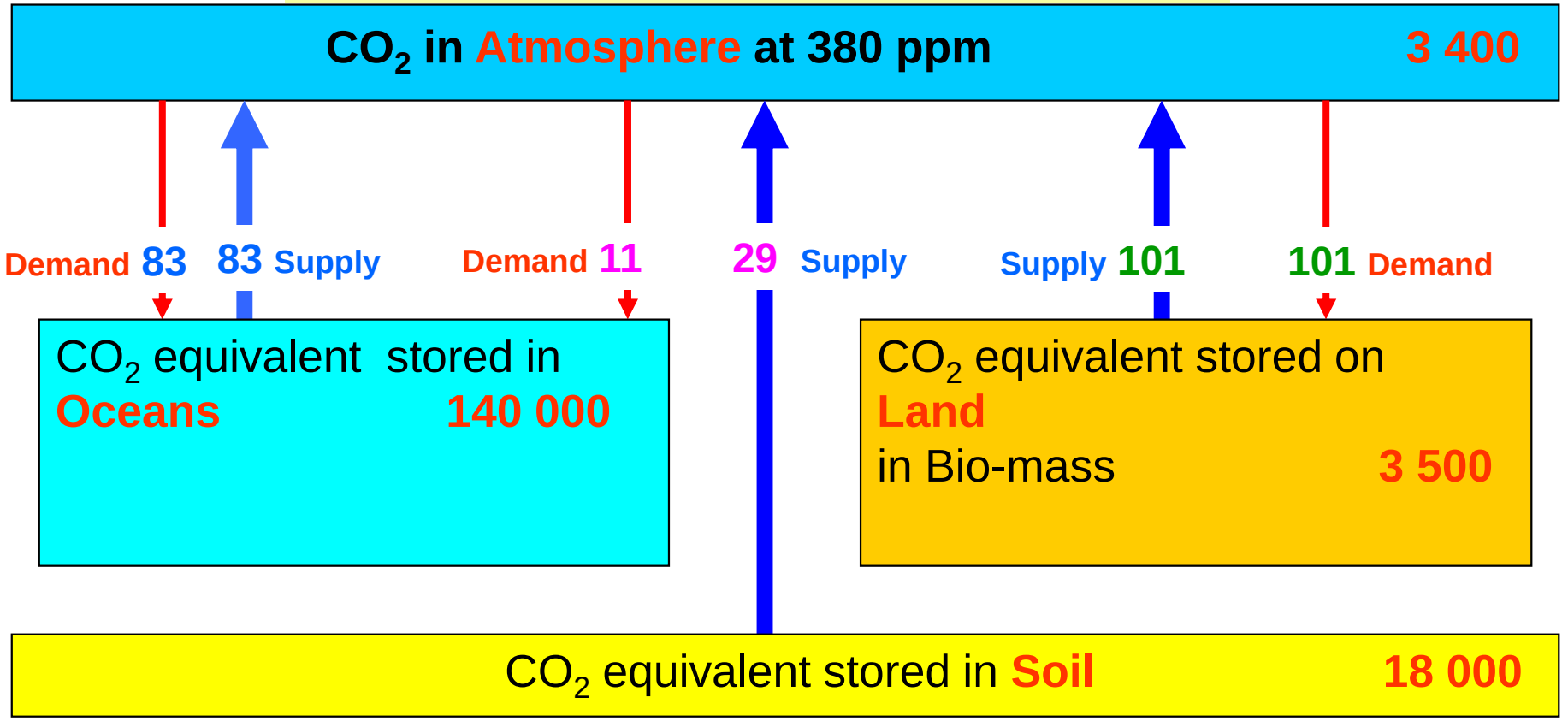
CO_2 equivalent flows in Gt /Year and CO_2 stored in Gt

Inventory build-up is 18 equivalent to 2 ppm



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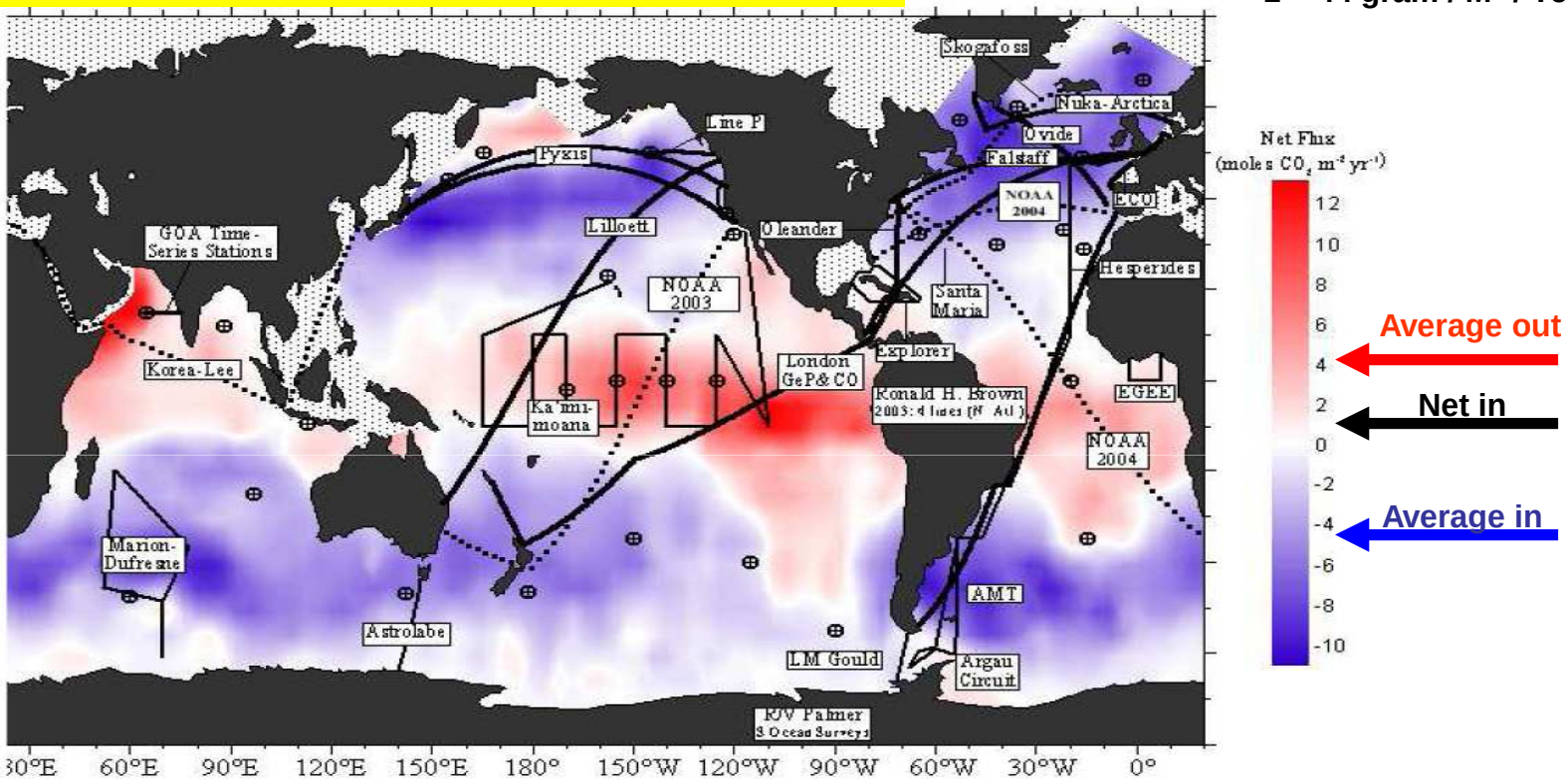
Net CO_2 Flux from Ocean to Atmosphere

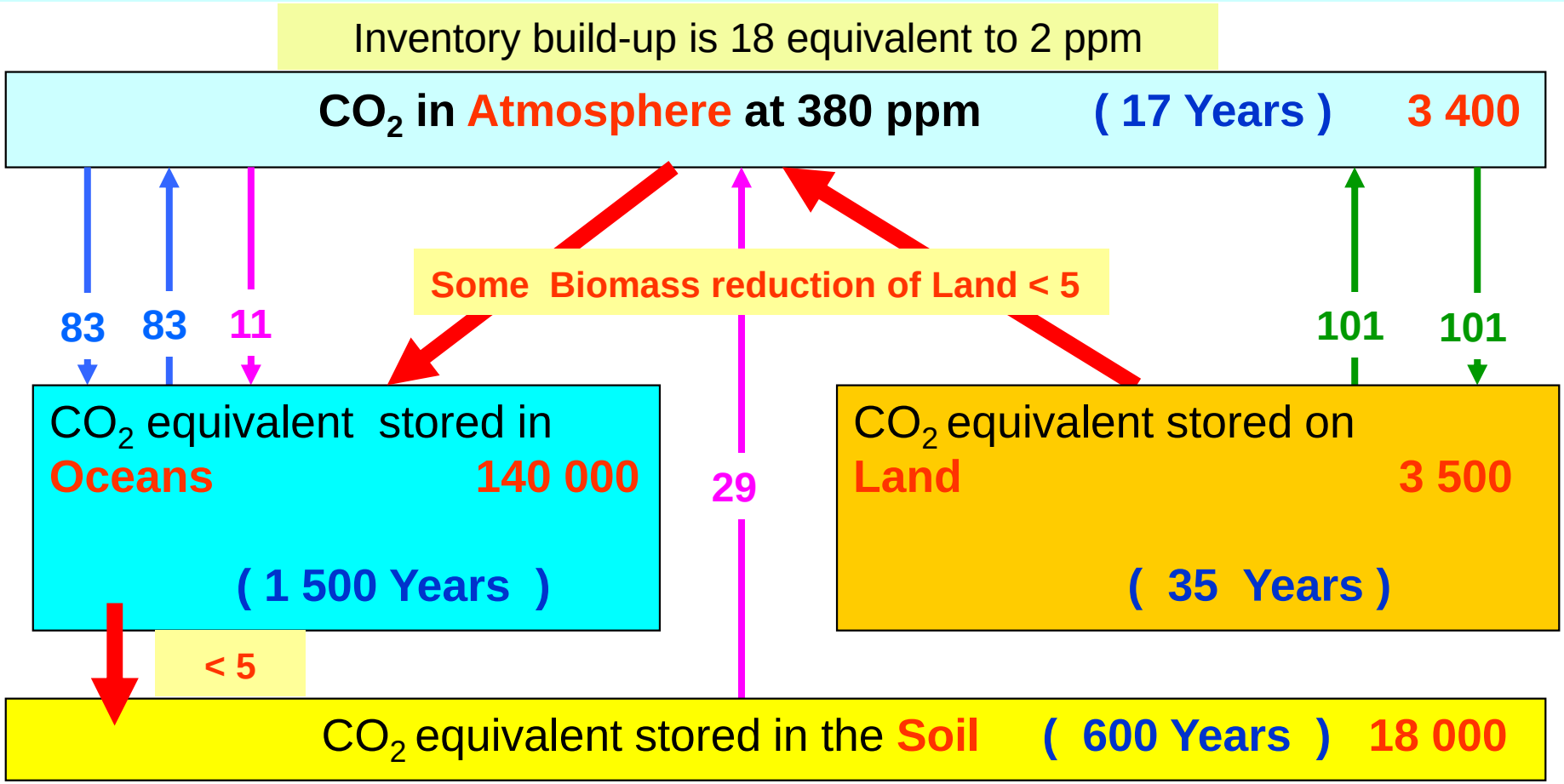
1 = 44 gram / M^2 / Year



The Oceans have a high Net Flux CO_2 from Ocean to Atmosphere near the Equator and negative Net Flux away from equator.

Source: Integrated Global Carbon Observation (IGCO)

Global CO2 Inventory and Flow Diagram in Gt



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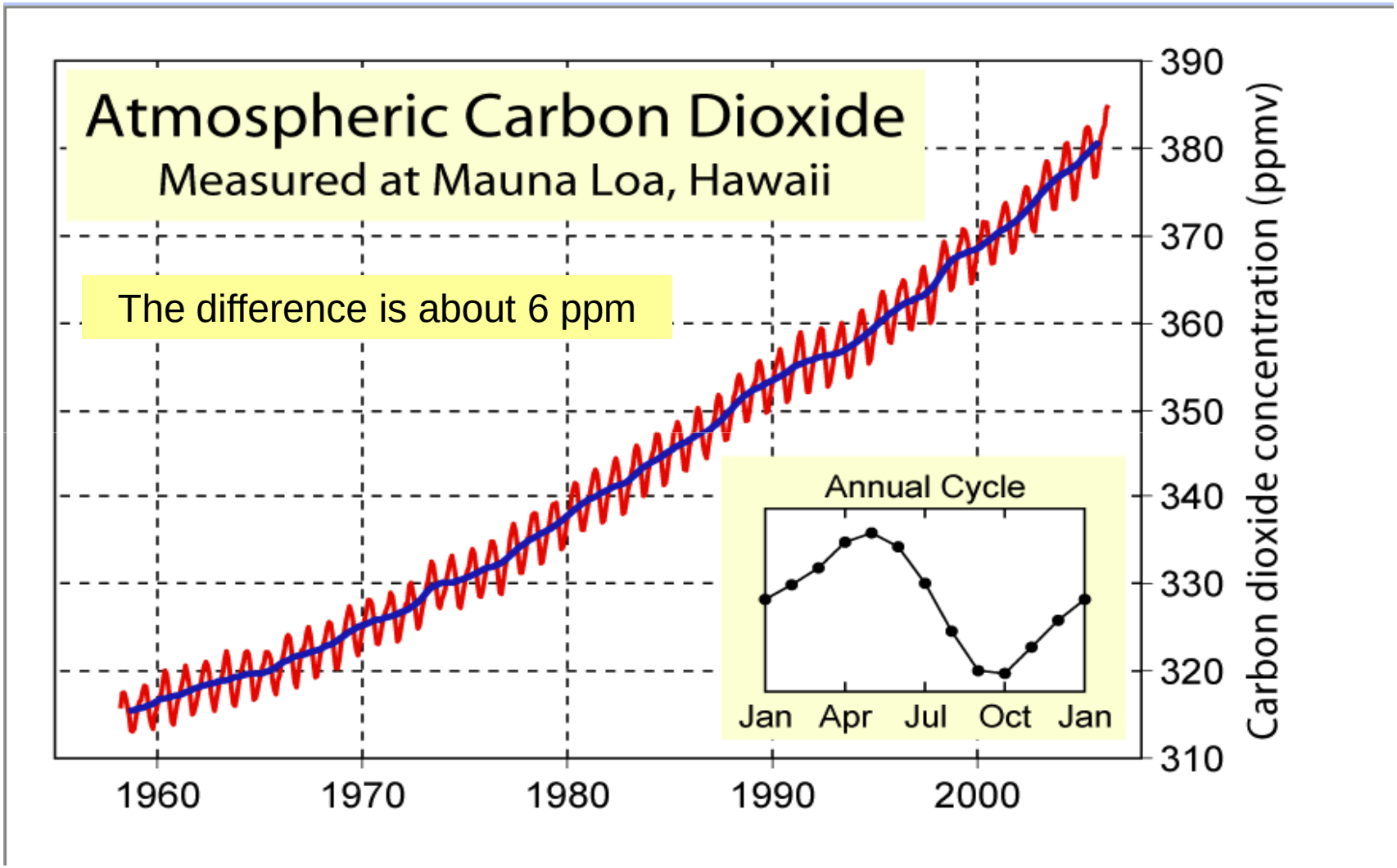

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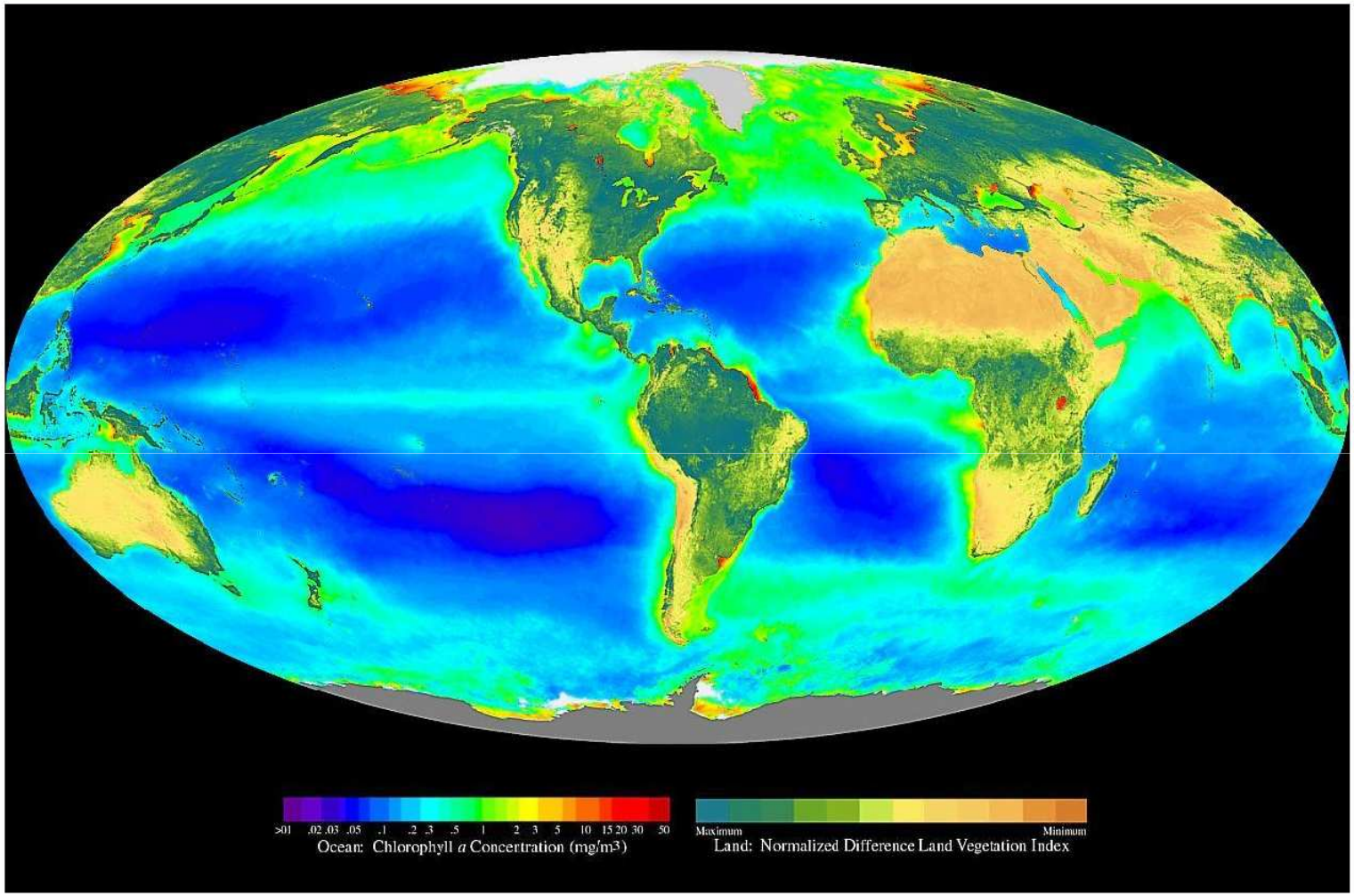
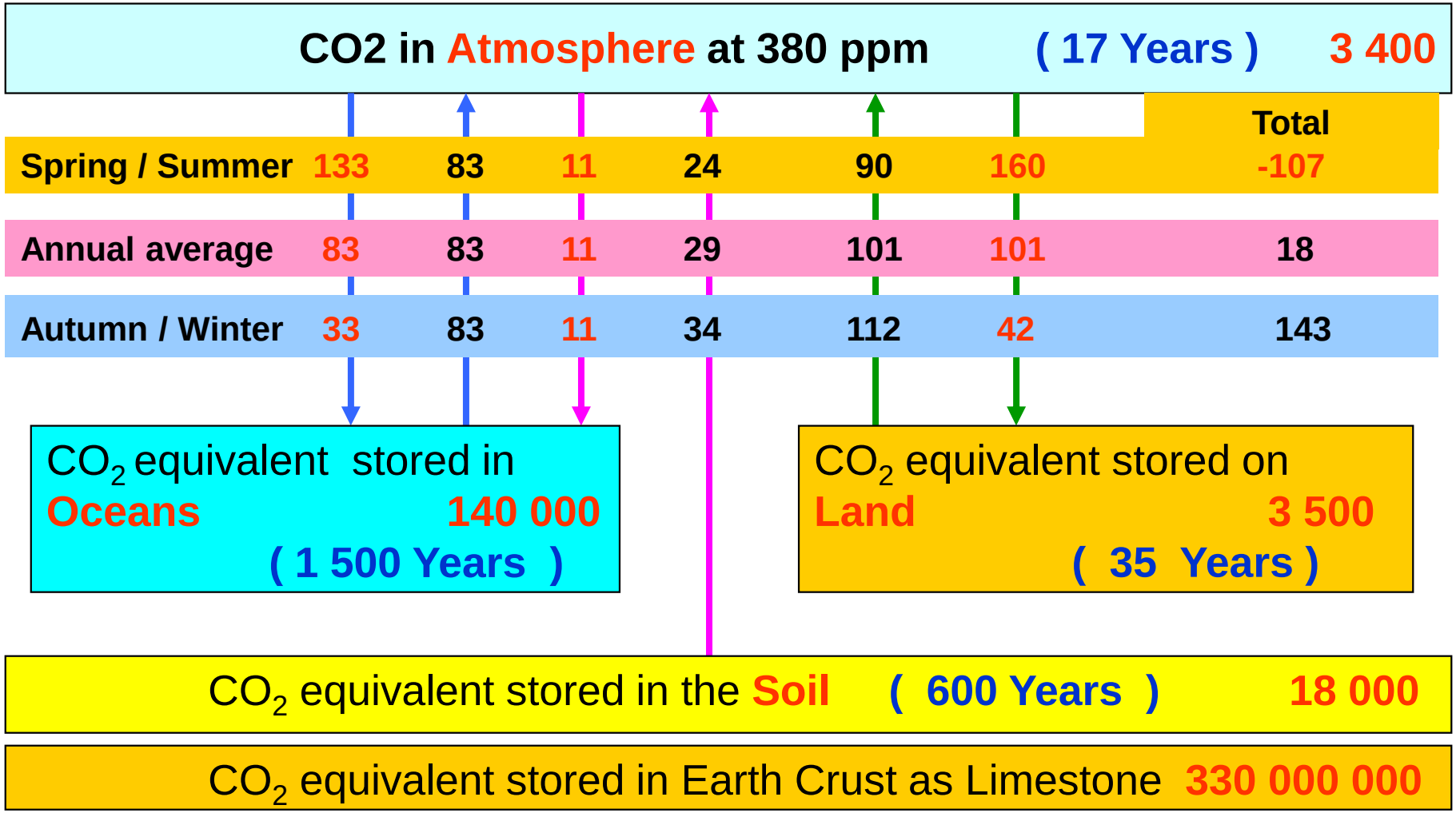


Like Agriculture on Land ……stimulate Photosynthesis where it naturally occurs

Seasonal Flow rates based on seasonal CO_2 concentration changes



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How to relocate CO_2 from the Atmosphere ?

Reduce CO_2 supply from Fossil and Bio Mass to Atmosphere !

Increase CO_2 demand for Bio Mass from Atmosphere !

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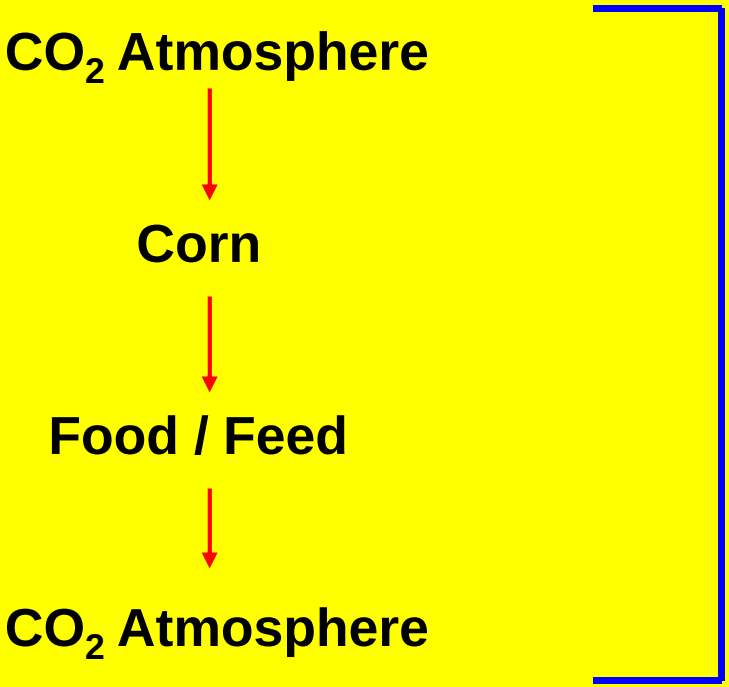
Increase the CO_2 Biomass inventory on Land. Focus should be on Biomass with a long lifecycle



The total cycle is about 2-3 years

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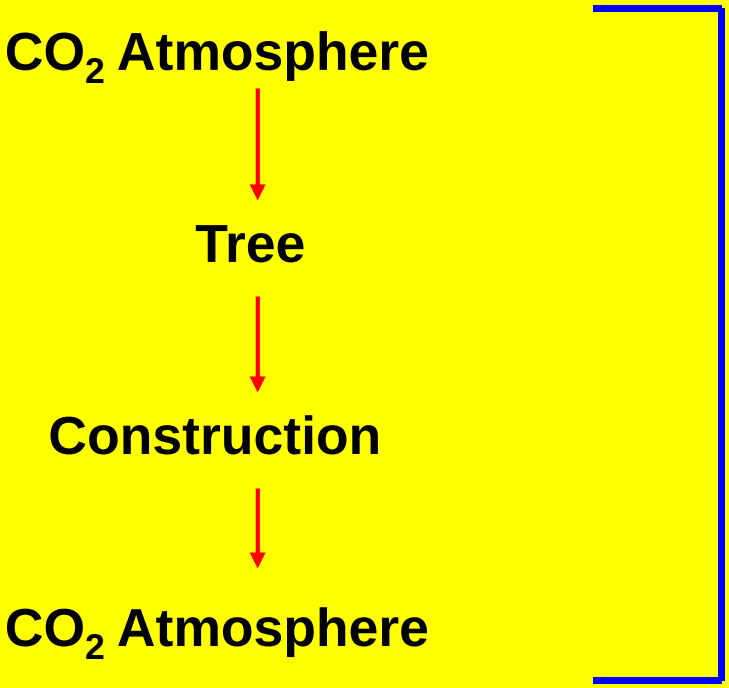
Increase the CO_2 Biomass inventory on Land. Focus should be on Biomass with a long lifecycle



The total cycle is about 50 - 100 years

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Summary for policy makers: CO_2 = "Growth Gas"

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1. Understand Inventory-and-Flow data + adopt the thinking process.

2. Extend the average Bio-mass lifetime on Land with one year. This amounts to 100 Gt CO_2 (11 ppm reduction in Atmosphere)

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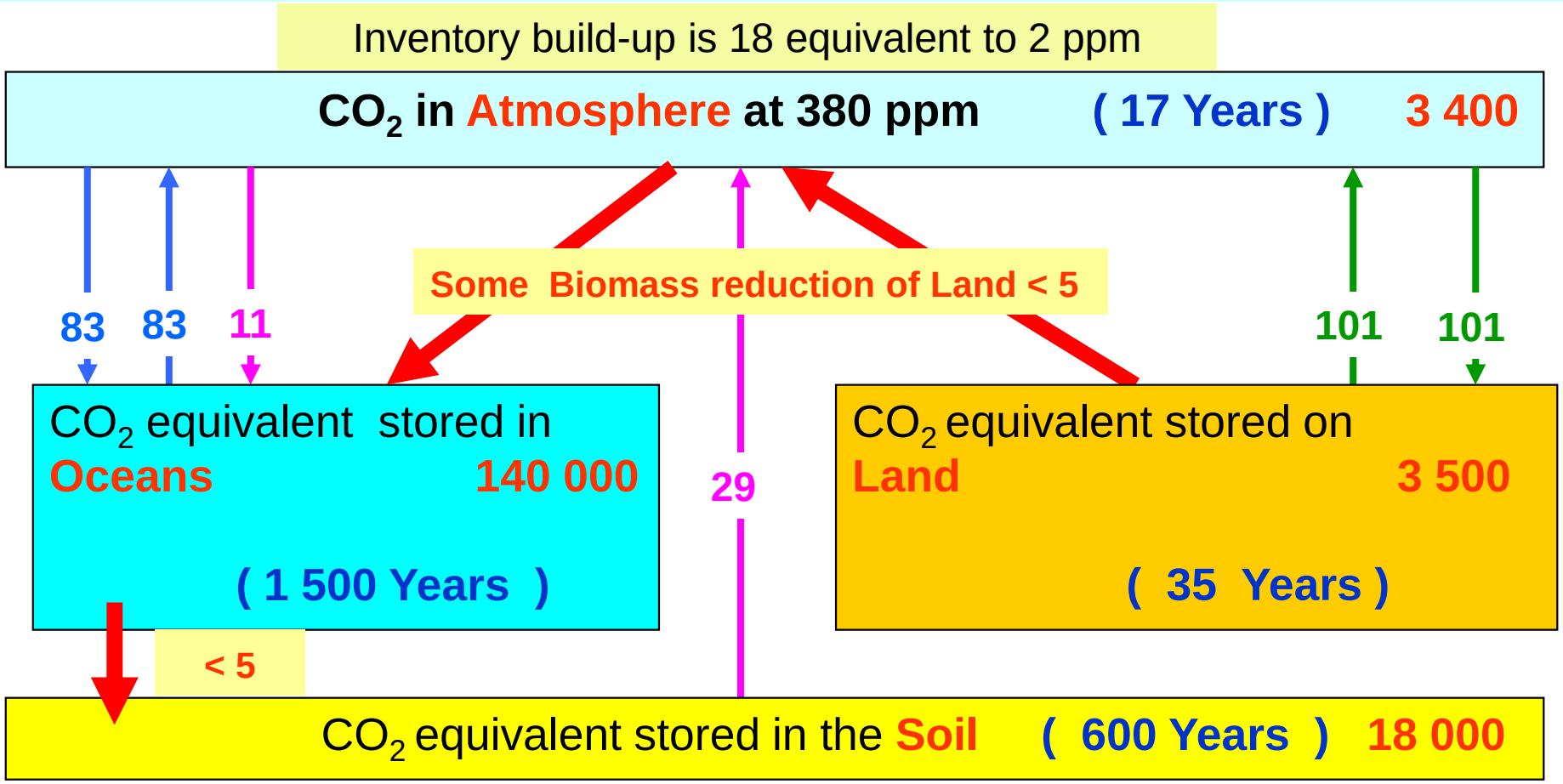
Global CO2 Inventory and Flow Diagram



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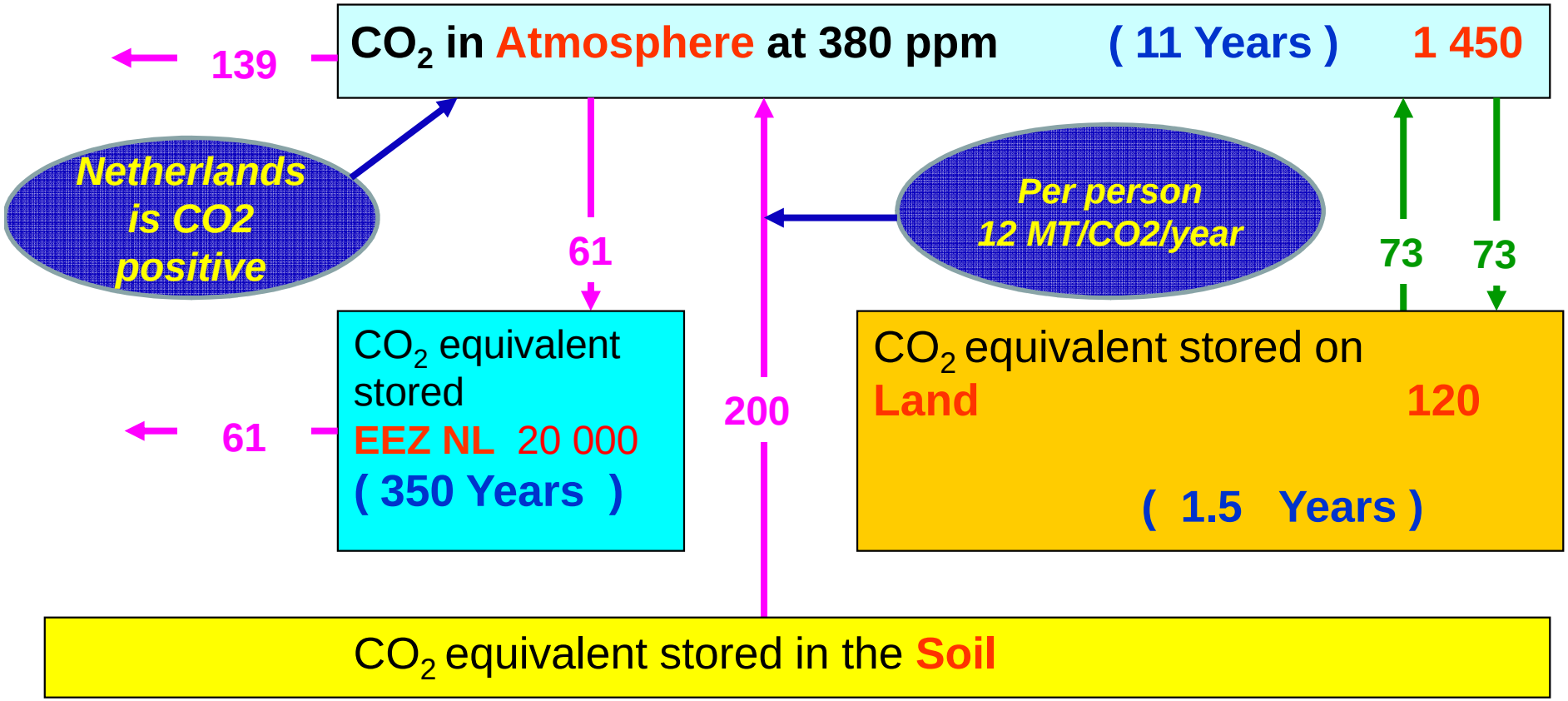
The Netherlands CO2 Inventory and Flow Diagram in Mmt



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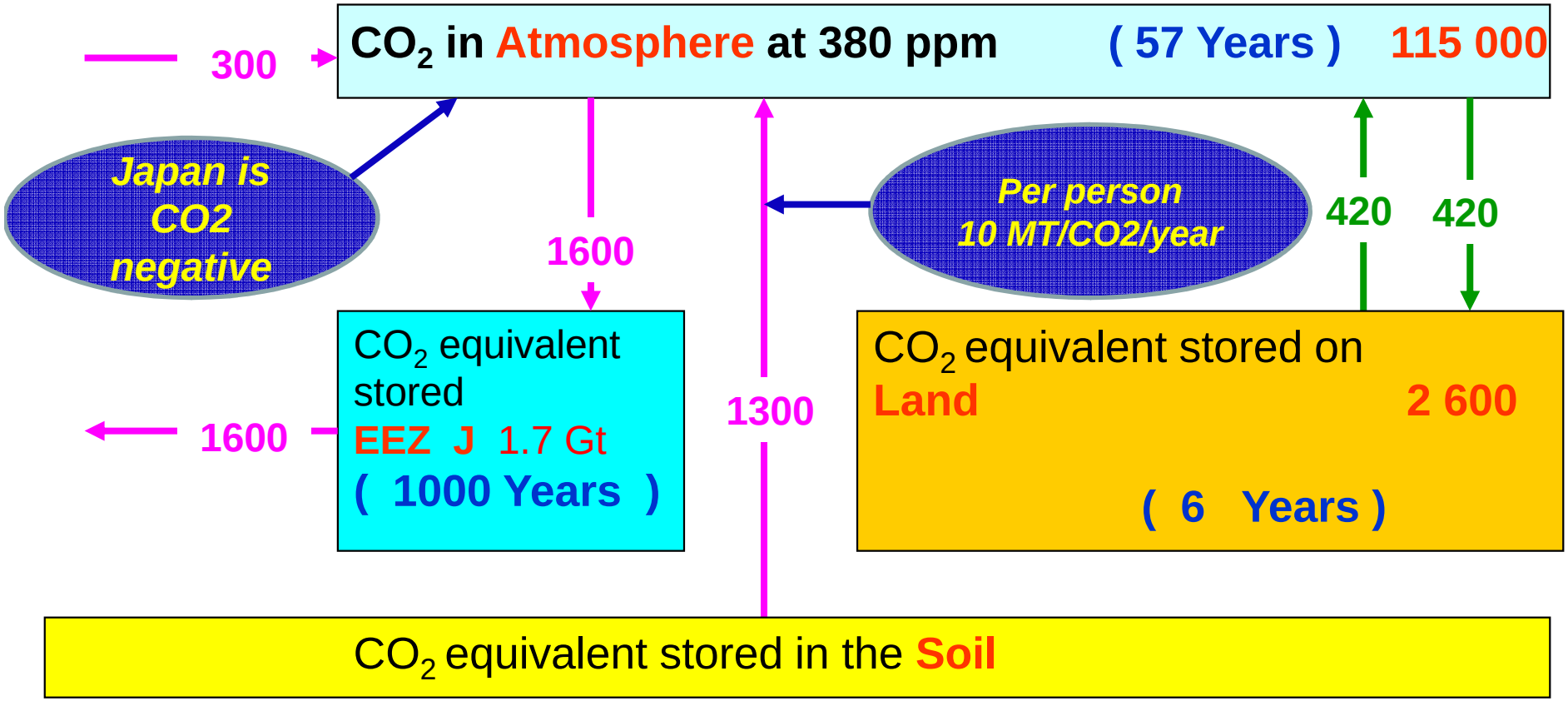
Japan CO2 Inventory and Flow Diagram in Mmt



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MANY QUESTIONS

HOW DOES CO_2 RELATES TO GLOBAL WARMING ?

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