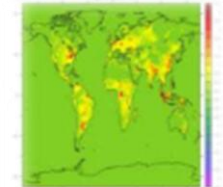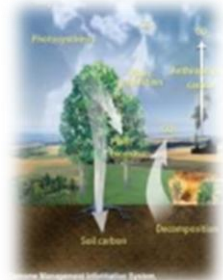# Global Carbon Project
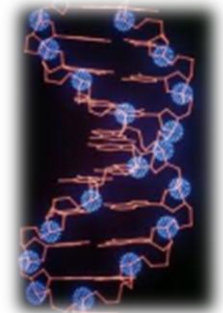## Towards an operational global CH$_4$ budget

San Francisco, AGU 2010
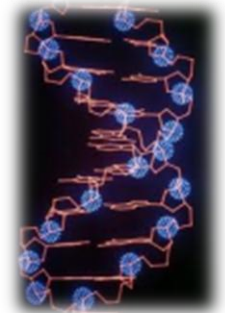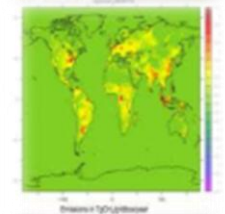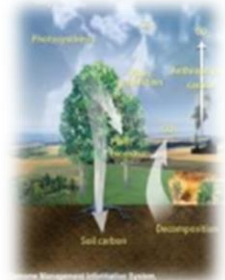
Stefanie Kirschke, LSCE

Pep Canadell, CSIRO

Philippe Ciais, LSCE

Philippe Bousquet, LSCE

Quick Intro

- CH_4 – one of the most important radiatively active trace gases

- Rapid rise in atmospheric concentrations since start of records in 1978 (0.8-2% y^{-1})

- Signs of decline in the 1990's, near-zero growth

- 2007/2008: increase in globally averaged atmospheric CH_4

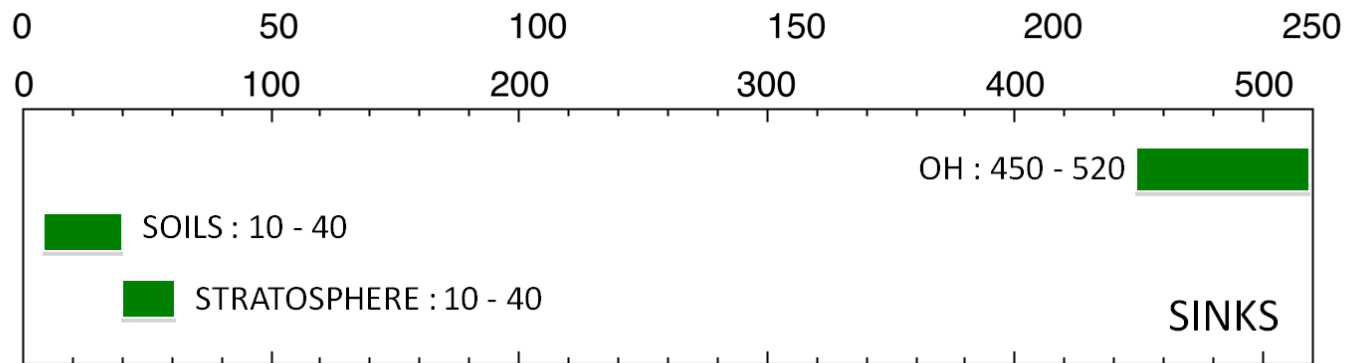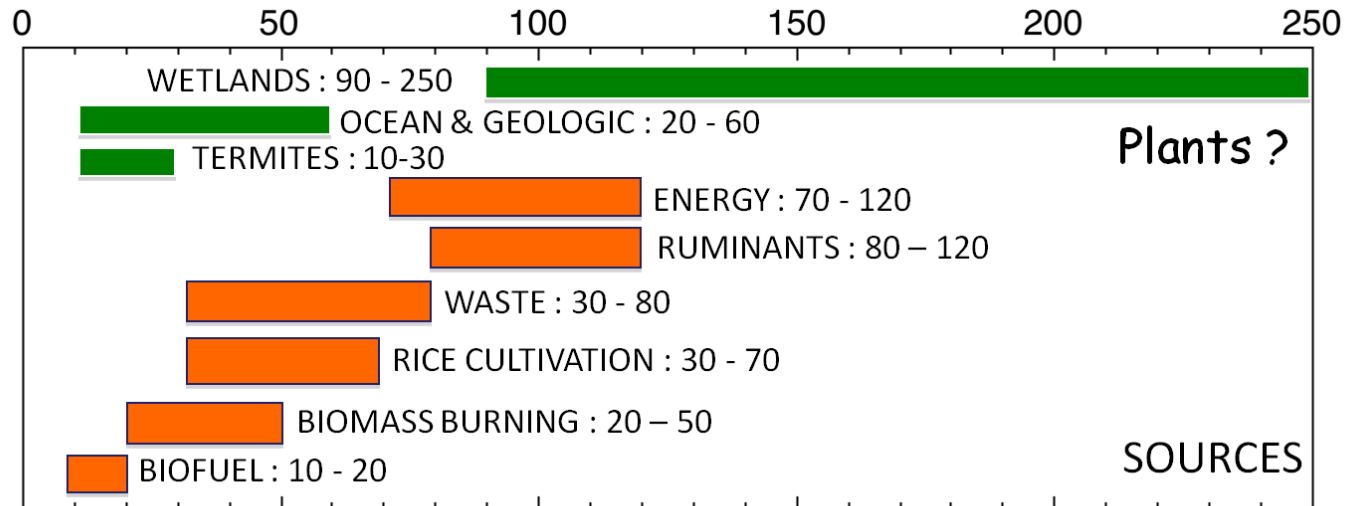# Methane sources and sinks for the past two decades ($TgCH_4 \ y^{-1}$)

Image courtesy P. Bousquet

What do we want to do?

- Operational update of the CH_4 global budget, annually or bi-annually (high-profile paper)

- Synthesis of existing data, value-added products

- Work towards an arrangement with observational networks (NOAA, CSIRO, LSCE, AGAGE) for annual data provision

- Work towards and arrangement with inventories (EDGAR, GEIA, GFED) for regular update

- Work towards an arrangement with inverse modeling groups for annual data provision (model results based on obs. and inventory data)
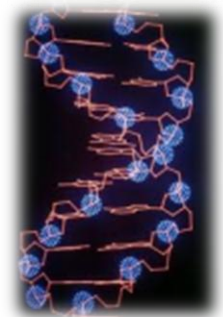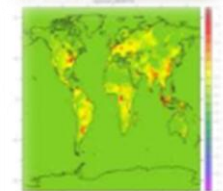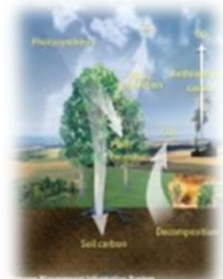
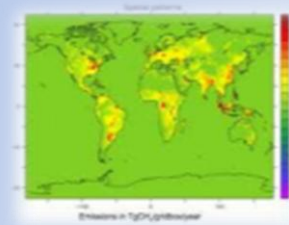| Satellite Observations	Emission Inventories	Biogeochemistry Models	Inverse Models	OH Sink
Satellite data to support global flooded area estimates.	Number of livestock, area of rice cultivation (FAO). Fossil fuel CH_4 emissions. Fire emissions (GFED/GEIA).	Ensemble of possibly 3 wetland models: LPJ-WHyMe, ORCHIDEE, ??? Top-down model to calculate annual flooded area.	Number of groups working on atmospheric inversions within the TransCom project.	Long-term trends of the OH sink, not year-to-year variability.
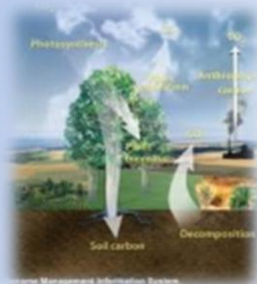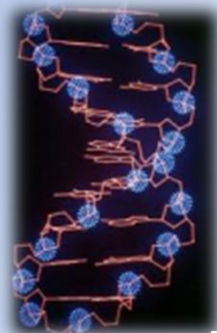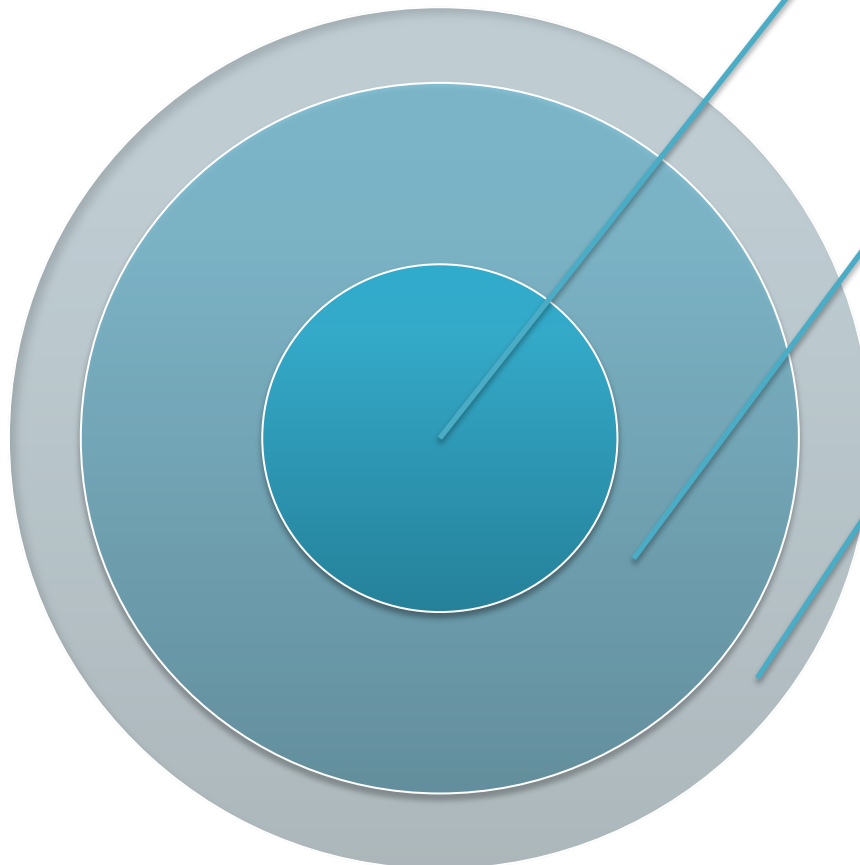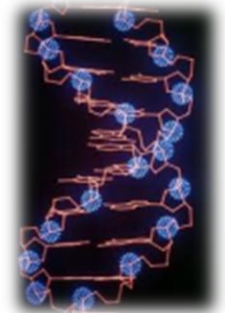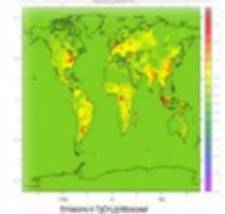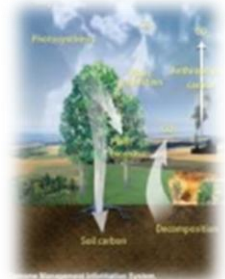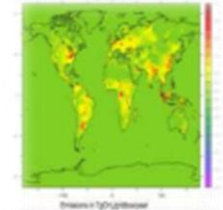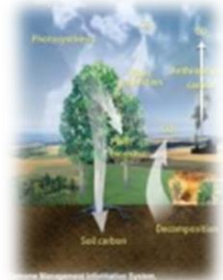
Core Level:

Data Providers (experimental groups, inventories)

Analysis Level:

Data Analysis (modeling groups)

Synthesis Level:

Data Synthesis by GCP Lead Team
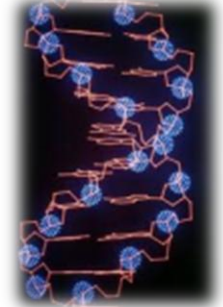
Activity 1 – Core Level
Collect bottom-up flux data and atmospheric data

- **Historical Period (1850-1980)**
  - Evolution of the mix of different sources of CH_4 from literature/references.
- **Modern Period**
  - High Growth Rate Period 1980-1990
  - Low Growth Rate Period 1991-2006
  - Recent Anomaly 2007-ongoing

- Compile historical and modern global budget

- Global total flux

- Global error

- Spatio-temporal distribution

Activity 2 – Analysis Level
Global inverse models using different inverse systems

- **ACCES.CSIRO**
  R. Law
- **ACTM.RIGC**
  P. Patra
- **GEOS-Chem.UofE**
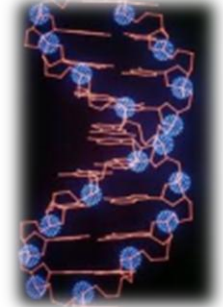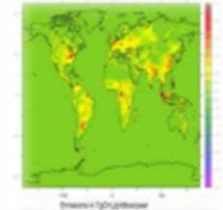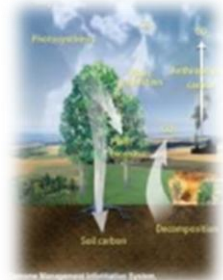 P. Palmer
- **LMDZ.LSCE**
  P. Bousquet
- **Mozart.MIT**
  M. Rigby
- **NIES-08h.NIES**
  S. Maksyutov
- **TM5.JRC**
  P. Bergamaschi
- **Carbontracker CH4.NOAA**
  L. Bruwhiler
- **TM5.KNMI**
  M. van Wheele
- **Harvard model**
  J. Wang/J. Logan

- Compile annual updates of CH_4 inversion fluxes

- Global inversion fluxes

- Global error

- Spatio-temporal distribution

- Generate maps
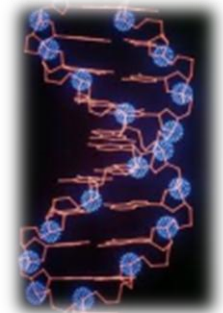
Activity 3 – Synthesis Level
Data synthesis across all levels

- Work towards agreements, manage activity
- Compile data sets across levels
- Provide timelines for data provision, and budget publication

- Compile annual updates of CH_4 inversion fluxes

- Global inversion fluxes

- Global error

- Spatio-temporal distribution

- Generate maps

General timeline :

| End-of-year meeting (AGU?) | Core Level: Data collection, experimental groups and inventories Beginning of year | Analysis Level: Data analysis/provision by modeling groups Spring/summer | Synthesis Level: Data synthesis by GCP lead team Annually |

March/April: Annual data provision (observations, inventories)

Timeline 2011:

| AGU Meeting Dec 2010 | Core Level: Data collection, experimental groups and inventories Feb 2011 | Analysis Level: Data analysis /provision by modeling groups Feb-Jun 2011 | Synthesis Level: Data synthesis by GCP lead team Jul-Sept 2011 |