

# G.A.S & G.A.C.S.

**GAS = GMES Atmospheric Services**  
*GACS stands for GAS **Core** element*

Why "core" ?  
Concept of **service chain**

Core | → Downstream services → users  
→ ..... users

**Downstream services:** apply to limited

- Areas (e.g. urban zone)
- Themes (e.g. health issues)

Build the core first

# Towards implementation 1

For each GMES service:

Orientation document  
(GAS: 11/06)

→ Workshop  
(GAS: 12/06)

→ IG = implementation group  
(GAS: 05/07 on)

Purpose of IG :

- Draft IG report (GAS: 07/08)
- Update it
- **Monitor implementation**

Purpose of IG chair :

- Get IG to work
- Act as GMES travelling salesman !

# Towards implementation 2

Preparatory projects

Preoperational pilot projects

**Supported** by

the framework EU R&D program

ESA

For GAS

Preparatory projects GEMS and PROMOTE

Pilot project **MACC**

# Core products

Illustrated by **MACC**

Mostly **gridded fields** obtained using **data** processed through numerical simulation tools (**numerical models**)

Advantages of introducing numerical models simulating the atmosphere:

- Data assimilation acts as an optimal **interpolation** method for data with limited sampling performances in space and time;
- also acts as a very sophisticated **blending** method between data provided by a huge variety of instruments;
- assimilation allows building **forecasts** for atmospheric constituents and aerosols.
- Beyond numerical simulation and forecasting, numerical simulation tool provide powerful constraints on the **fluxes** at the surface.
- Conversely, accepting various hypotheses about these fluxes (whether from anthropic or natural origin), allows testing various **scenarios**.

# From core products to users

**Global products:** towards climate monitoring



**Regional products:** to support fine scale descriptions, simulation, forecasts

# Evolution

- Optimization based on MACC results
- Improvements based on R & D
  - e.g. full chemical/dynamical coupling
- Improvements based on new data
  - e.g. geostationary payload Sentinel 4
- Iterations with users

# Main challenges & Assets

## **Challenges**

- Efficient EU + MS overall GMES governance
- Efficient interaction with users
- Achieving operationality

## **Assets**

- The simulation "paradigm"
- The natural coordination by ECMWF

# back to GAS themes

Services already exist for **weather**: physical/dynamical atmosphere  
→ GAS considers **chemosphere**, including aerosols

## 4 separated issues:

- Climatic evolution of the chemosphere
- Air quality
  - stratospheric ozone.
  - solar radiation

However is not everything interrelated in the climate system ?



# CO2 sink fluxes south of 40° S with / without O3 "hole"

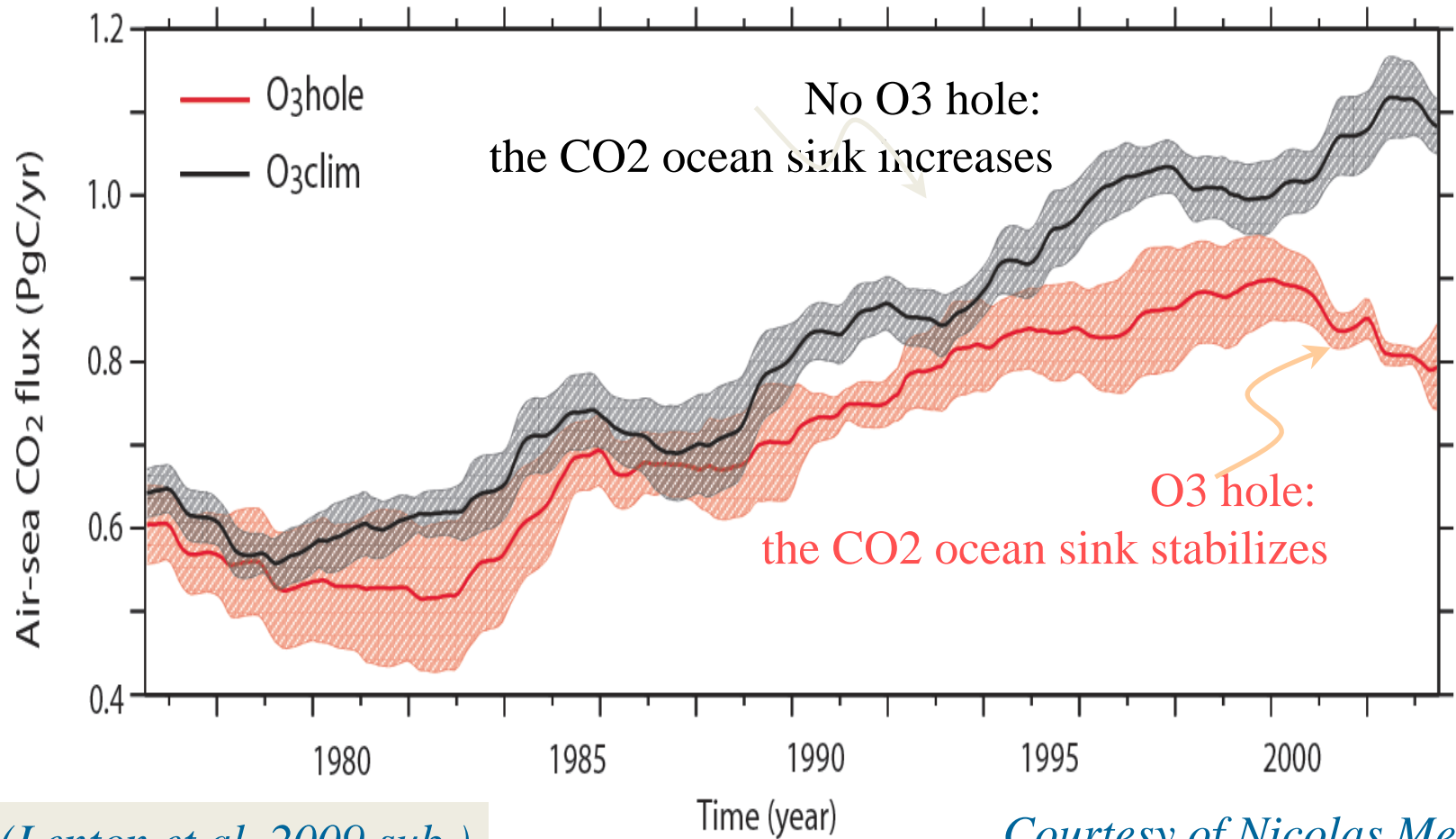
C coupled climate model

B)

Why ?



- O3 impacts radiative transfer
- Impact surface pressure & **winds**
- Impact vertical ocean **mixing**
- Impact surface ocean CO2 **content**
- Impact air→sea CO2 fluxes



(Lenton et al, 2009 sub.)

Courtesy of Nicolas Metzler