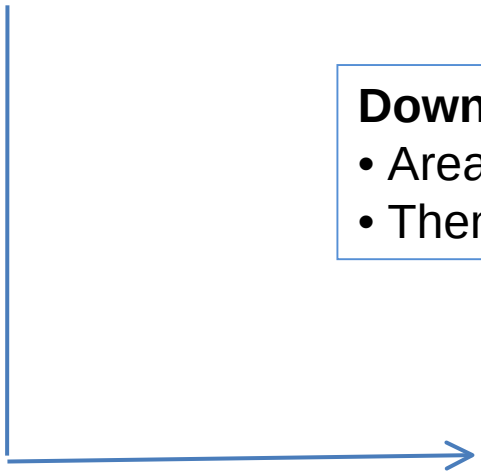
G.A.S & G.A.C.S.

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

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

Core → Downstream services → users
Core → - - - - - - - - - - - - - - - - - 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 gouvernance
- 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

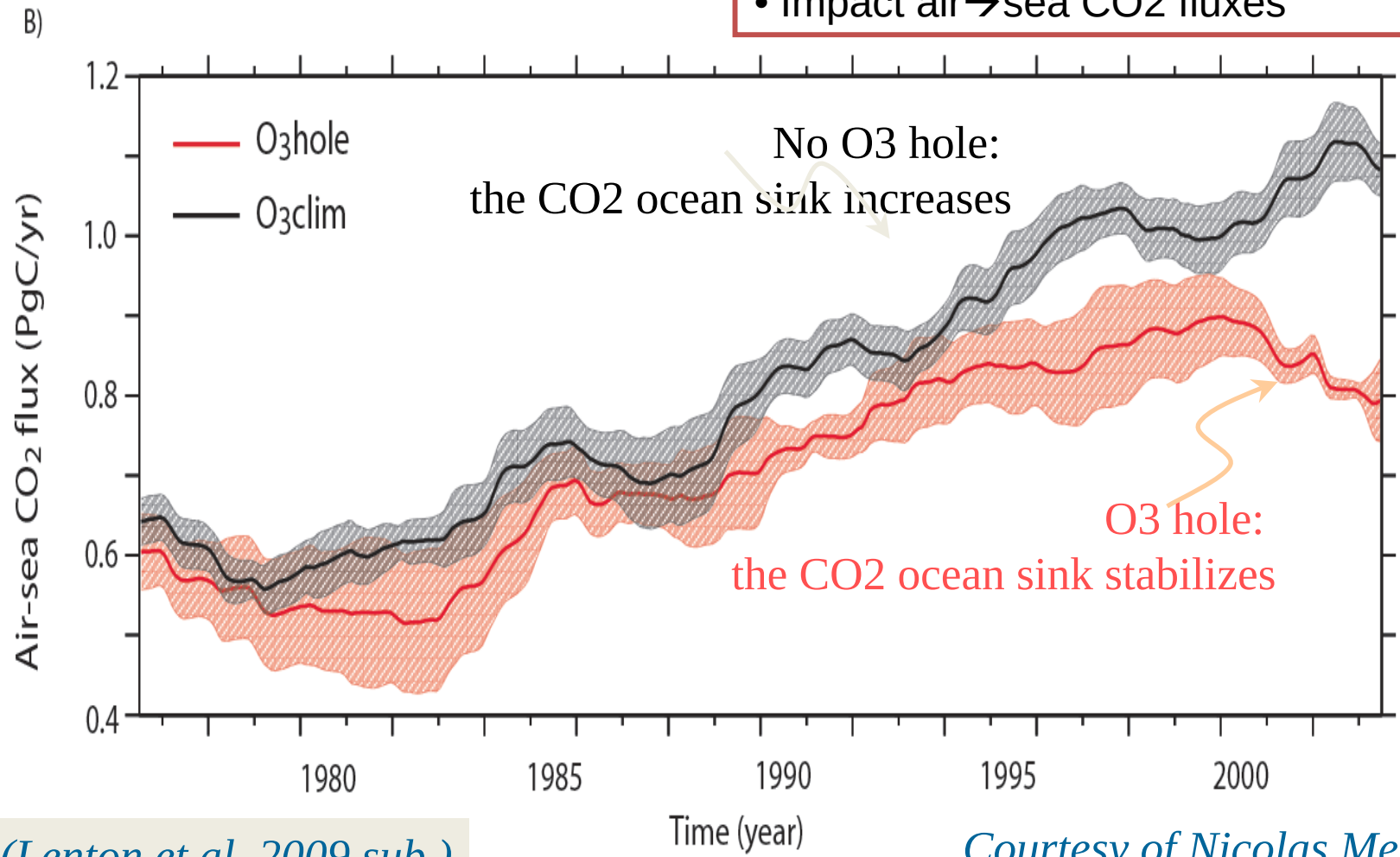
However is not everything interrelated in the climate system ?

CO_2 sink fluxes south of 40° S with / without O3 "hole"

C coupled climate model

Why ?

- O3 impacts radiative transfer
- Impact surface pressure & **winds**
- Impact vertical ocean **mixing**
- Impact surface ocean CO_2 **content**
- Impact air→sea CO_2 fluxes



(Lenton et al, 2009 sub.)

Courtesy of Nicolas Metzl