

Dynamism



Growth of BIRA has been achieved solely through external project funding, requiring

- A very dynamic staff
- **Adaptation** to national and international research programmes
- **Flexibility** in management
- Keeping a high level of **competitiveness**

In 2013, the ratio of dotation to external funding is 1/7;

Only 30% of the personnel is statutory;

⇒ A fragile situation making us very (too much ?!) dependent on programmed research

It has required also adaptation as to local working conditions

Brussels, 25 November 2014

Adaptation as to local working conditions



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BIRA in the early years



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BIRA in 2014

Capacity



- Importance of **developing capacity**, by
 - **diversifying** applied science domains
 - hiring adequately trained people → go international
 - contributing to education in space sciences and environmental sciences in Belgium
 - building **structural and ad-hoc** national and international **partnerships**
 - Especially important for space missions: partnership with industries and space agencies
 - Especially for tackling topics like climate change that have a wide scope and socio-economic impact

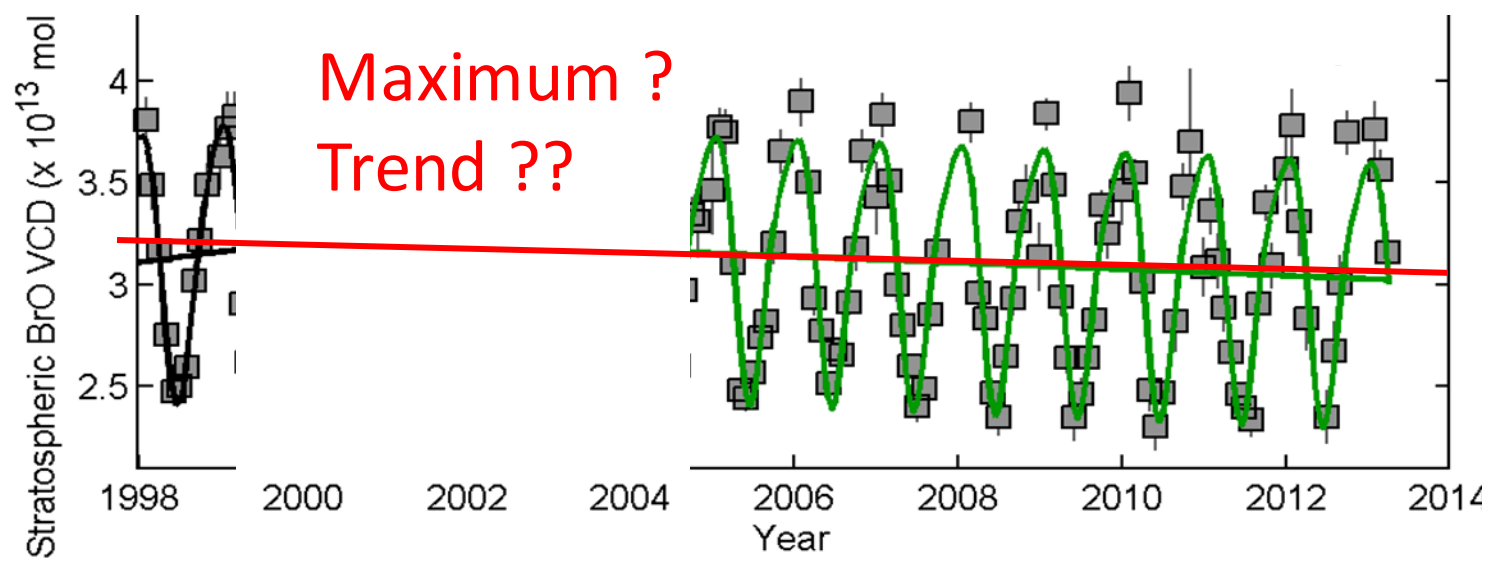
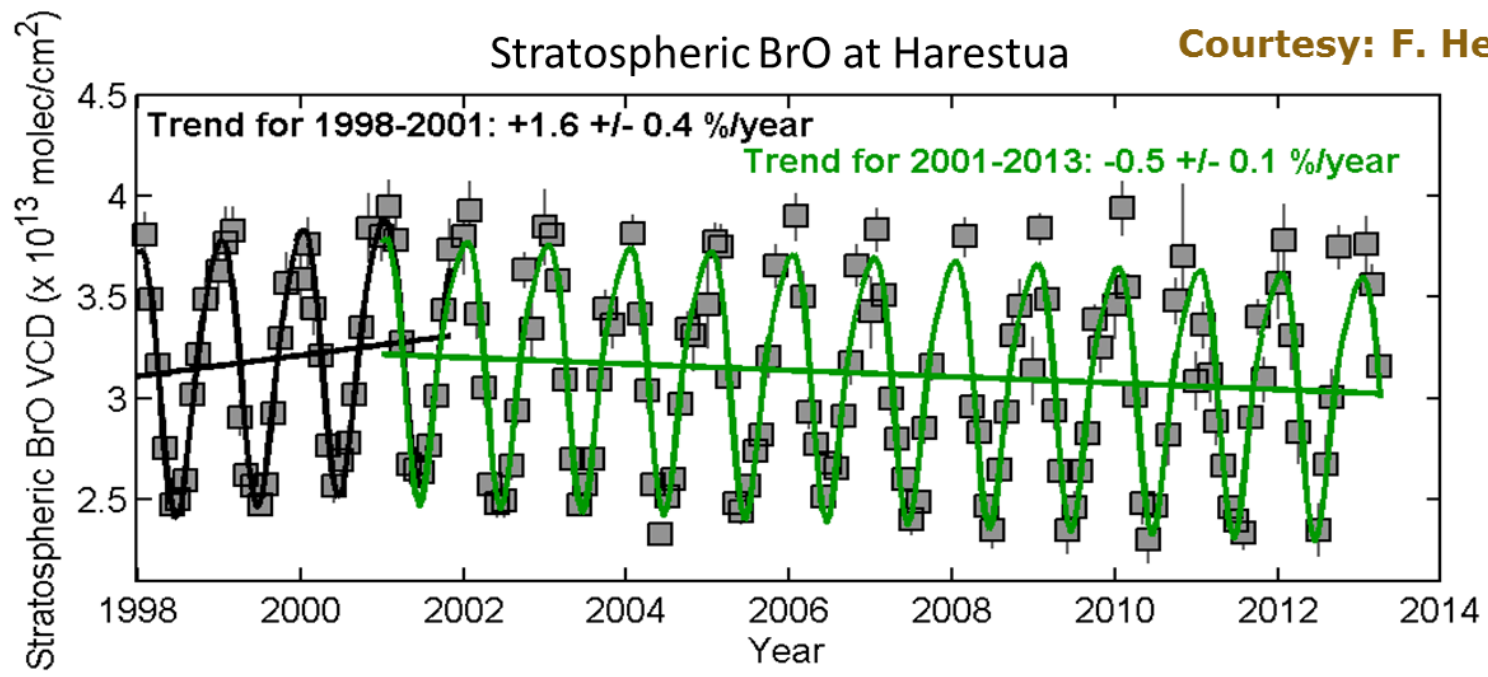
Capacity



- Importance of **maintaining capacity**
 - Need for funding **continuity at a certain base level**
 - E.g. space missions, typically lasting more than 10 years
 - To fill gaps between missions
 - To prepare new missions
 - ...
 - Need for **long-term monitoring capacity**
 - Cf. our mission to study global changes
 - Cf. need to support environmental policies with objective scientific information

Stratospheric BrO at Harestua

Courtesy: F. Hendrick



Scientific freedom

- Importance of fundamental and applied research
- Importance of exploratory, pioneering research

E.g., planets, comets,

E.g., new observation techniques

E.g., laboratory experiments

Not all research necessarily within a well-defined programme;

not all necessarily with direct societal relevance;

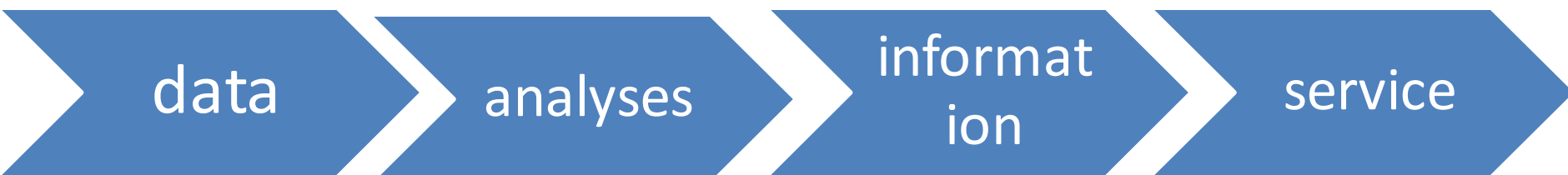
it must be accepted that pioneering research carries a risk and that the outcome is not predictable

Quality and excellence

Quality of research should be maintained to enable reliable scientific information and services to the society.

This requires

(a) quality at all levels of the research chain



(b) continuous revision of data and analysis to keep up with current quality standards



Is aeronomy a science without future ?

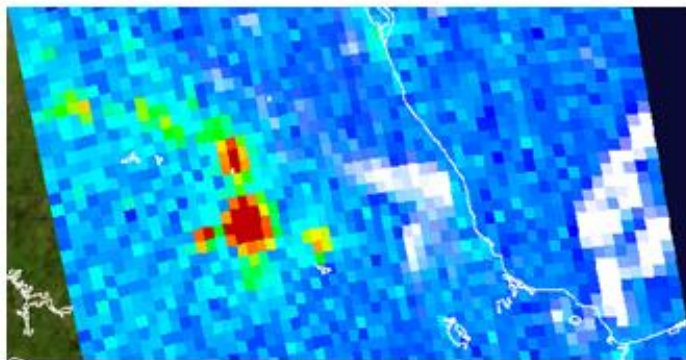


There are still many scientific challenges ahead of us !

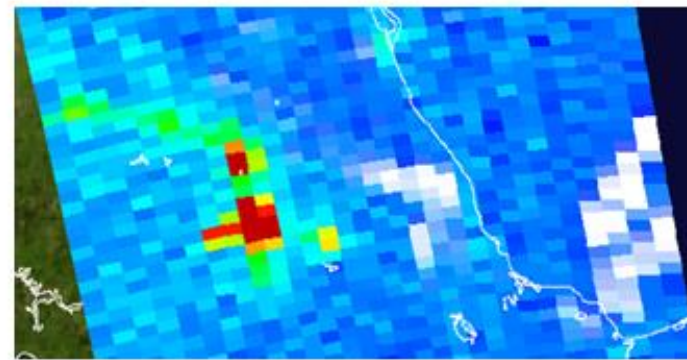
Just a few examples:

Some scientific challenges

Move from the global level to the regional and local level at the global scale

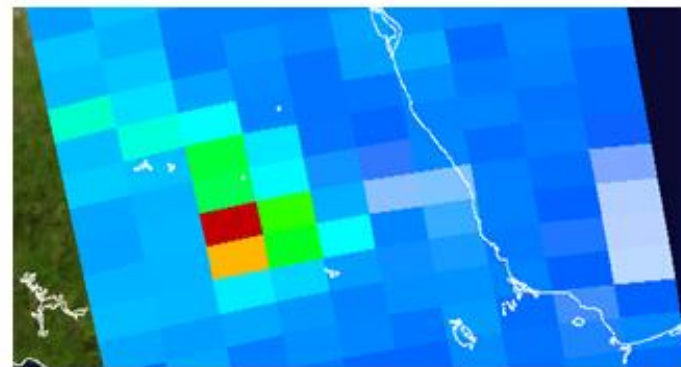


OMI Zoom 12x13 km²



OMI 24x13 km²

**NO₂ concentrations above
Mexico City
January 20, 2005**

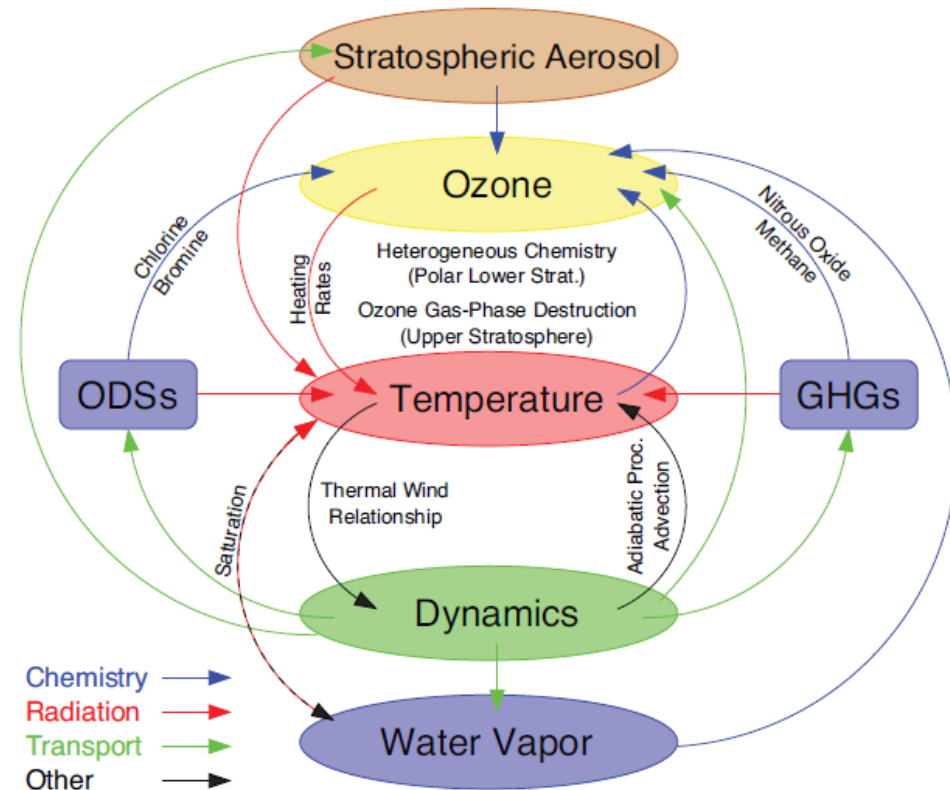


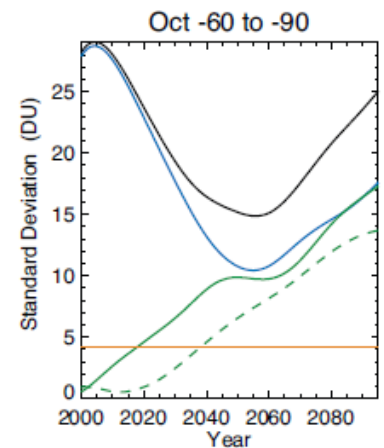
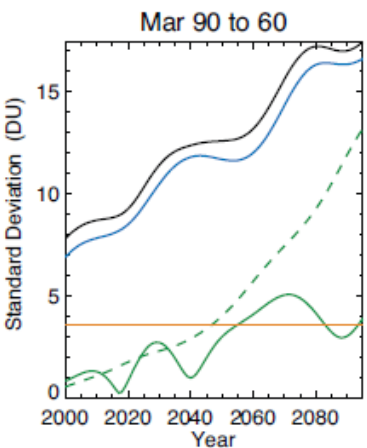
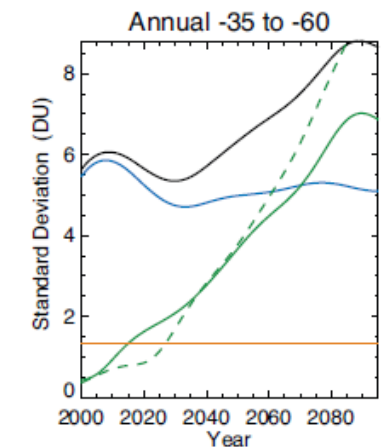
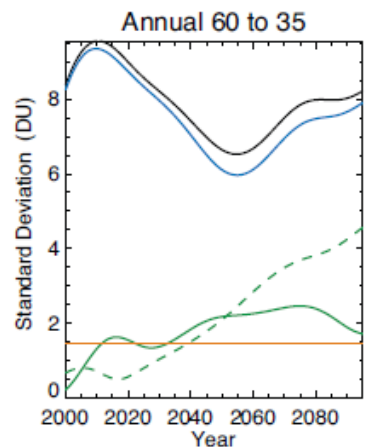
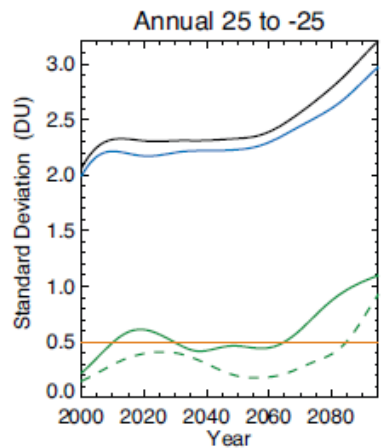
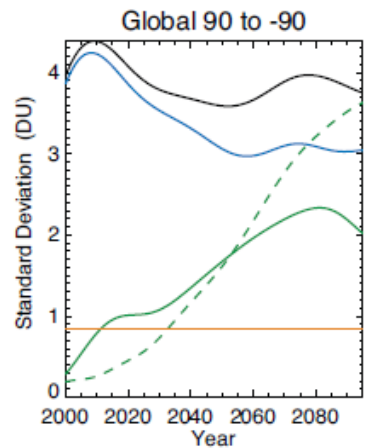
Approx. GOME-2 72x39 km²

Some scientific challenges

Better understand the interactions and feedbacks between various Earth system components

- *E.g., feedbacks between climate change and biosphere changes*
- *E.g., ozone recovery in a changing climate ?*
- *E.g., geo-engineering*





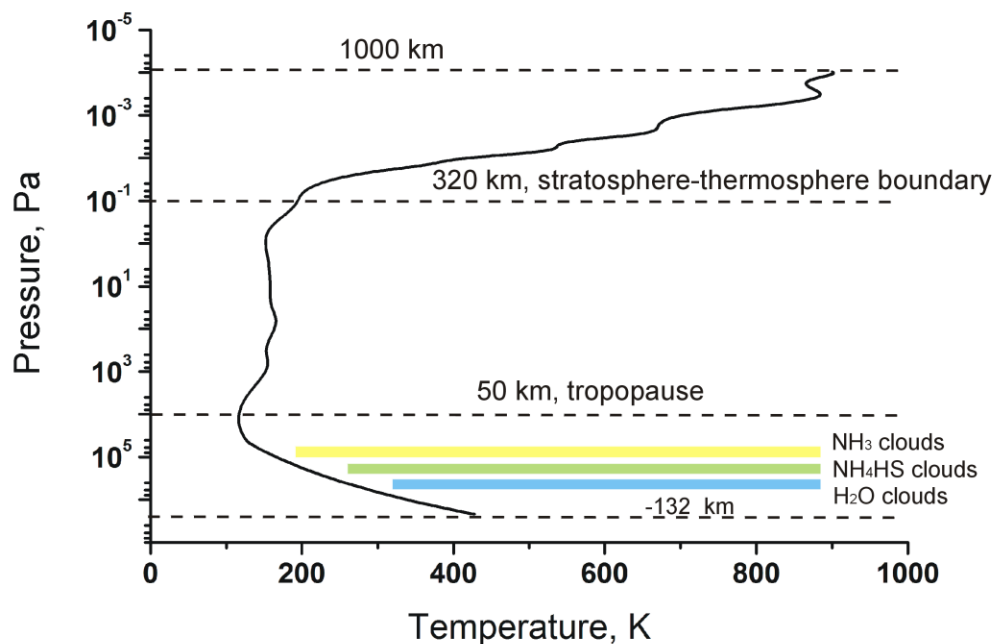
Model uncertainties are largest contribution to total uncertainty, esp. In 1st half of century!

- Several processes are represented differently in models
- Several processes are missing:
 - e.g., important couplings between the atmosphere, the oceans, and the cryosphere
 - e.g., feedbacks in the terrestrial biosphere – climate – stratosphere system incl. emissions of O₃ precursors

Some scientific challenges

Further explore the planetary system, in particular the atmospheres of

- more distant or giant planets like Jupiter
- exoplanets
- comets



[Sieff et al. \(1998\)](#)

How will the institute look like in 50 years from now ?



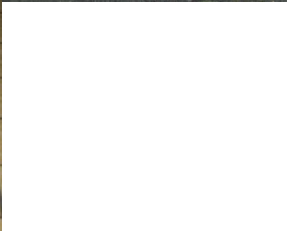
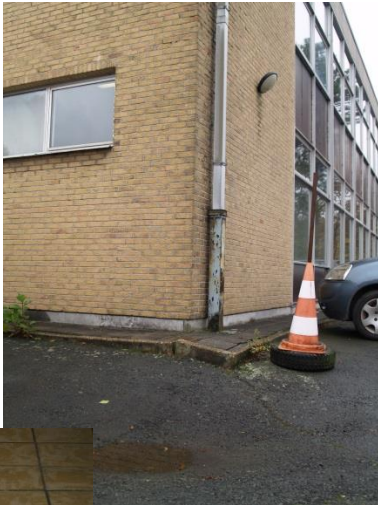
There are also some organisational and institutional challenges ahead of us!

Examples:

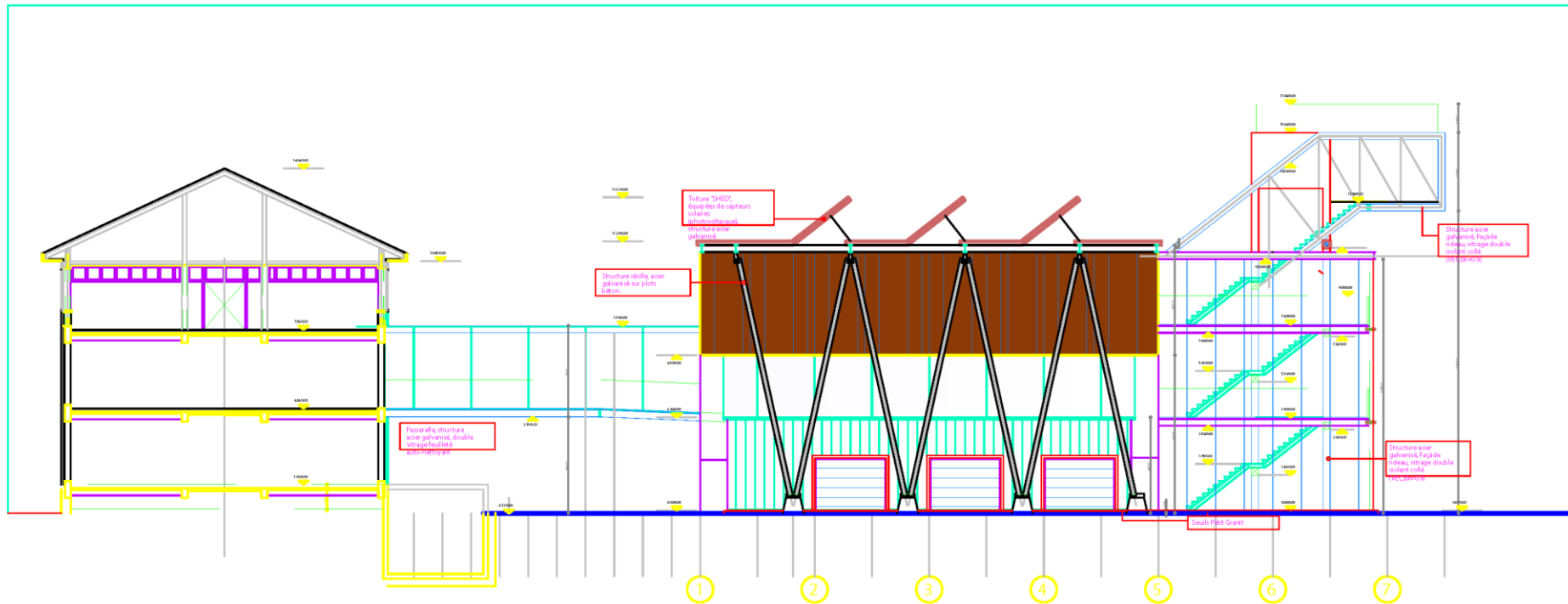
- *Technological progress requires more specialisation, e.g., HPC specialists, electronics specialties like FPGA*
- *More multidisciplinary to study the Earth System as a whole*
- *Faster, cheaper, ...delivery of information to society*
- *E-administration to be completed with support from IT*
-

But still : poor status of our mechanical workshop

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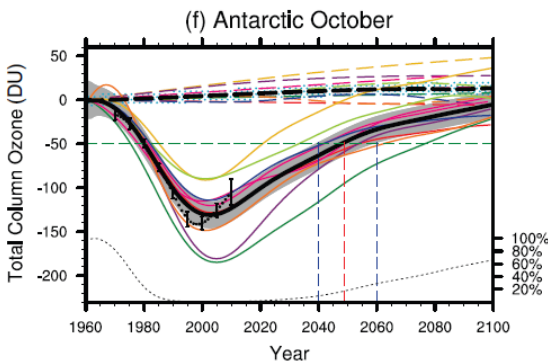
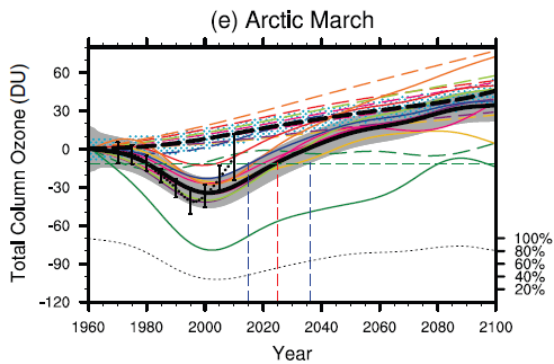
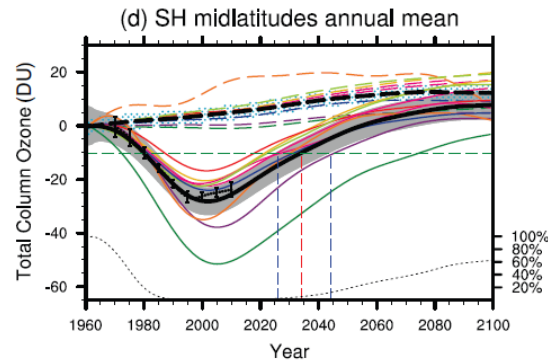
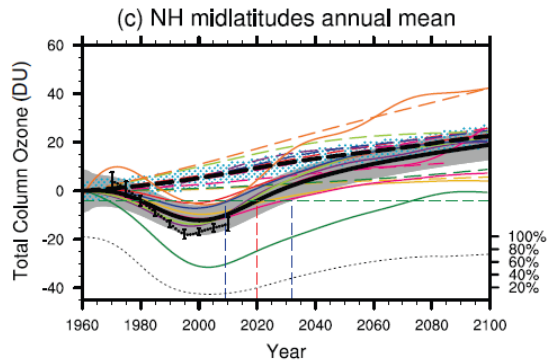
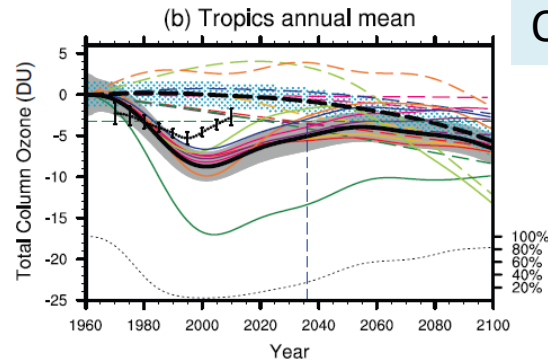
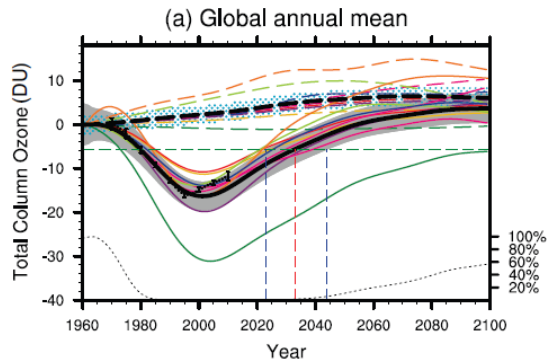


hopefully turned into a modern building accommodating our needs, in 2015 ?



1960 Baseline-Adjusted Total Column Ozone (fODS)

WMO Scientific Assessment of Ozone Depletion: 2010



- | | | |
|------------------|-----------------|-----------------|
| — CCSRNIIES fODS | — ULAQ fODS | — UMSLIMCAT REF |
| — CMAM fODS | — WACCM fODS | — SOCOL REF |
| — GEOSCCM fODS | — CCSRNIIES REF | — ULAQ REF |
| — LMDZrepro fODS | — CMAM REF | — WACCM REF |
| — MRI fODS | — GEOSCCM REF | — MMT fODS |
| — UMSLIMCAT fODS | — LMDZrepro REF | — MMT REF |
| — SOCOL fODS | — MRI REF | ••••• OBS |