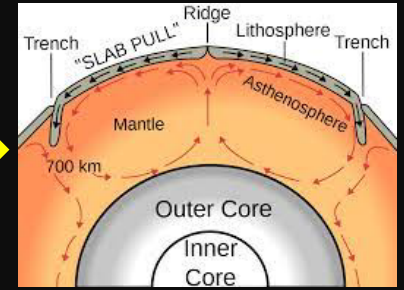
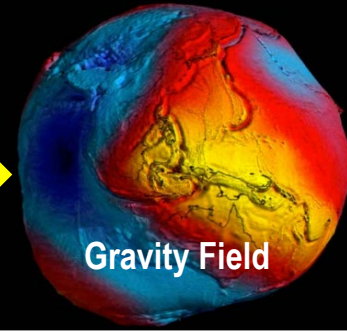
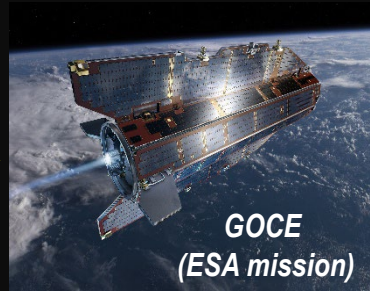
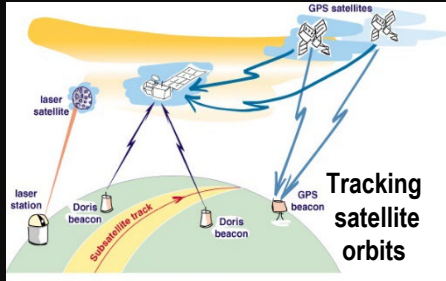


# ESA and Women In Aerospace-Europe

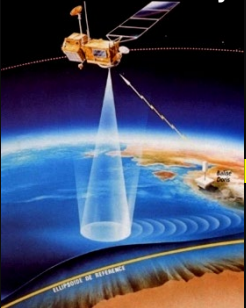


Anny Cazenave  
LEGOS-CNES

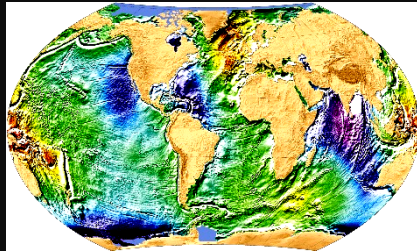
# My research: The Earth and the Environment observed from space



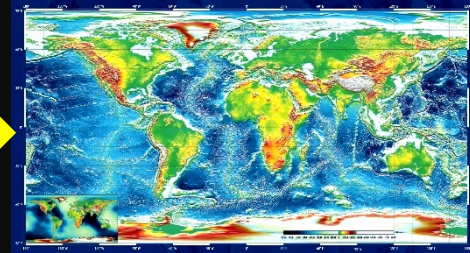
## Satellite altimetry



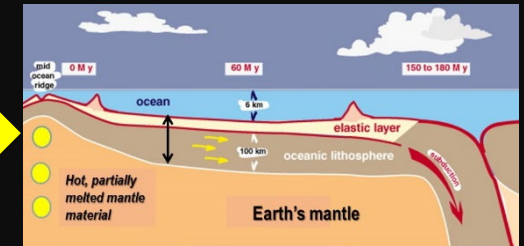
## Sea surface topography



## Seafloor topography



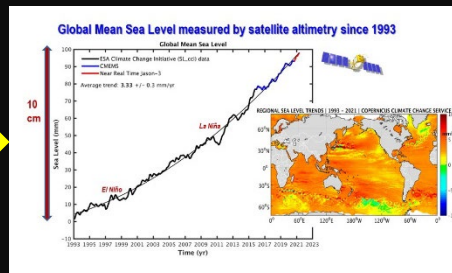
## Tectonic plates structure



## High precision satellite altimetry



## Sea level rise and climate change



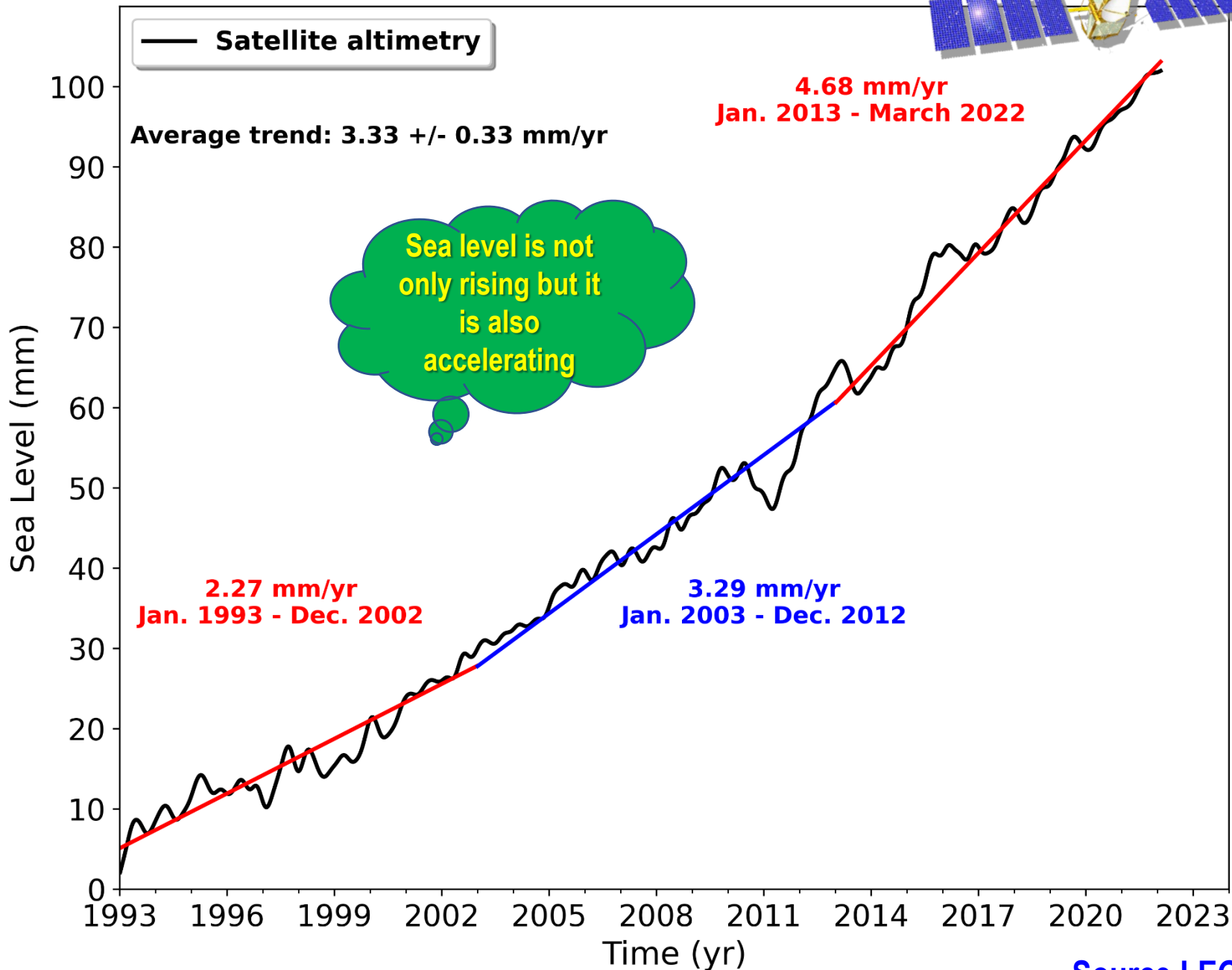
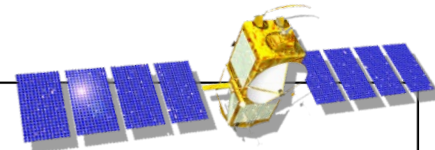
## Sea level rise impacts on the world coastlines



## Water cycle & water resources

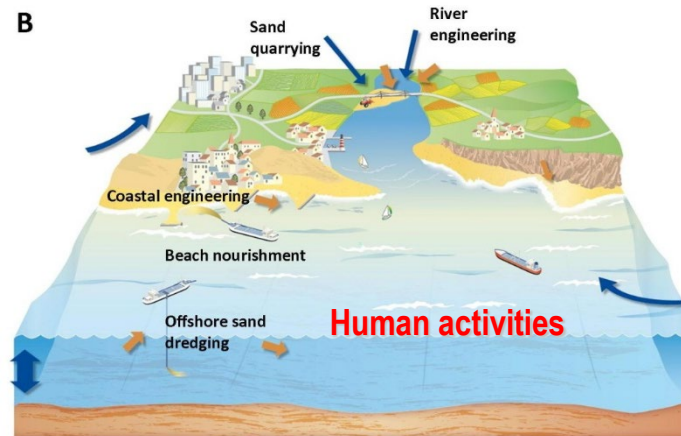
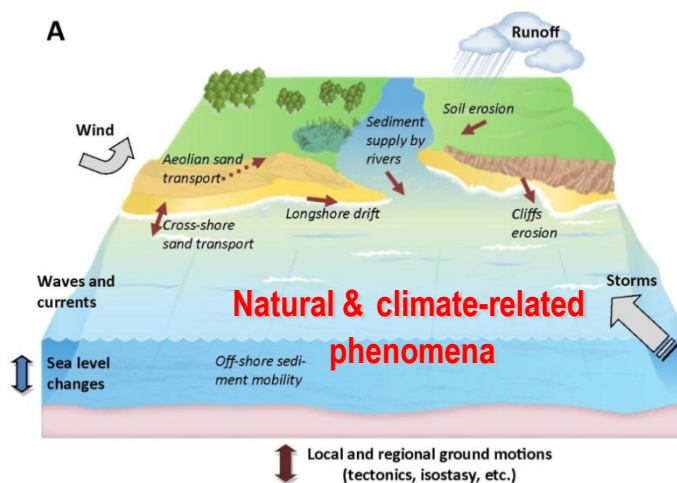


# GLOBAL MEAN SEA LEVEL



Source LEGOS

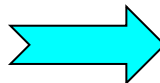
# World Coastal Zones



## Complex processes and impacts

### *Climate & Other Drivers*

- Sea level rise
- Hurricanes, Storm surges
- Extreme waves and winds
- Changes in sea state, coastal currents & eddies, nutrient supply
- River floods
- Ground subsidence
- Coastal engineering
- etc.....

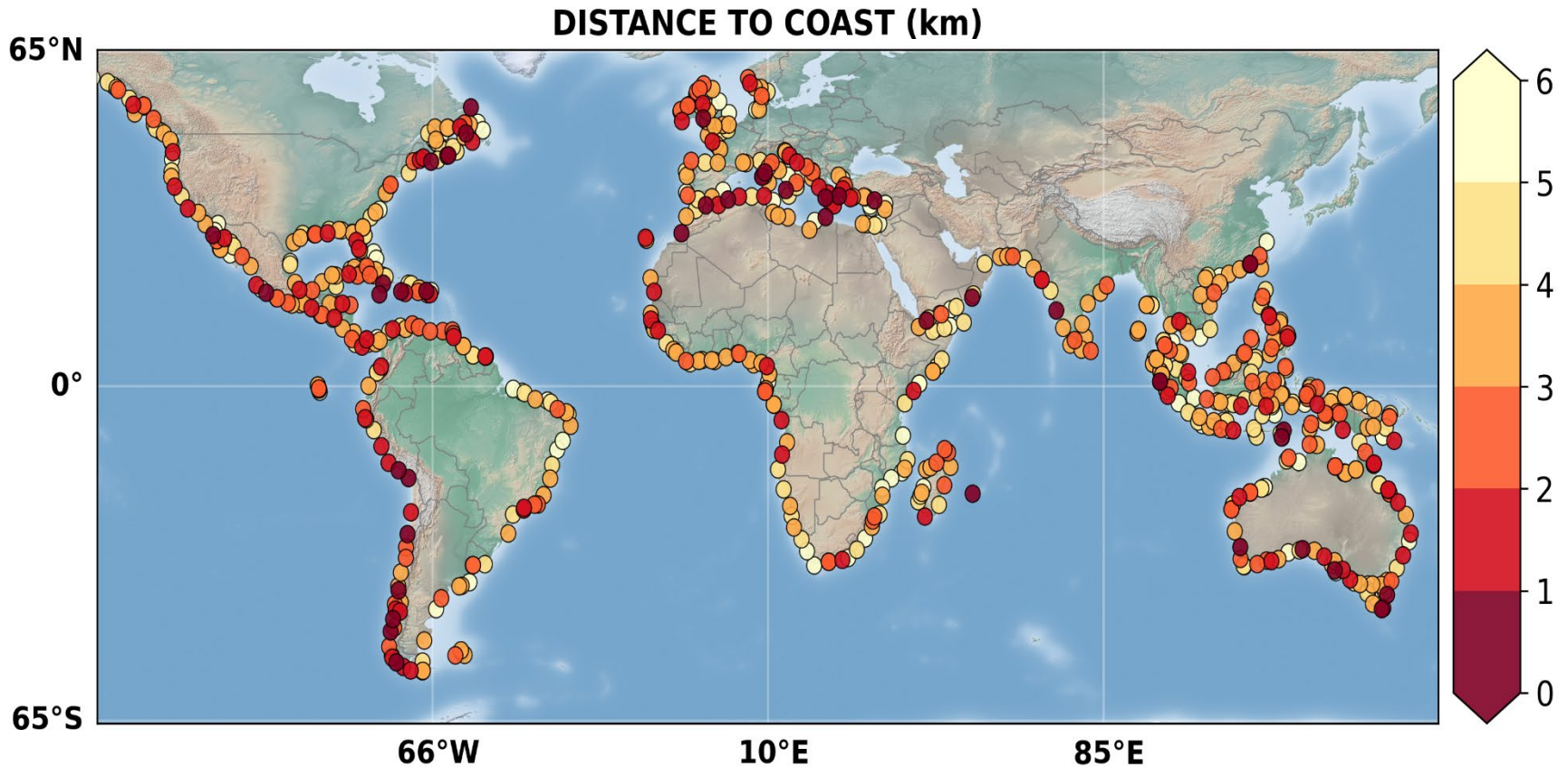


### *Coastal Impacts*

- Shoreline erosion & retreat
- Temporary and permanent flooding
- Changes in sediment stores and seafloor topography
- Changes in estuaries morphology
- Changes in coastal ecosystems
- Salinization of coastal aquifers
- etc.....

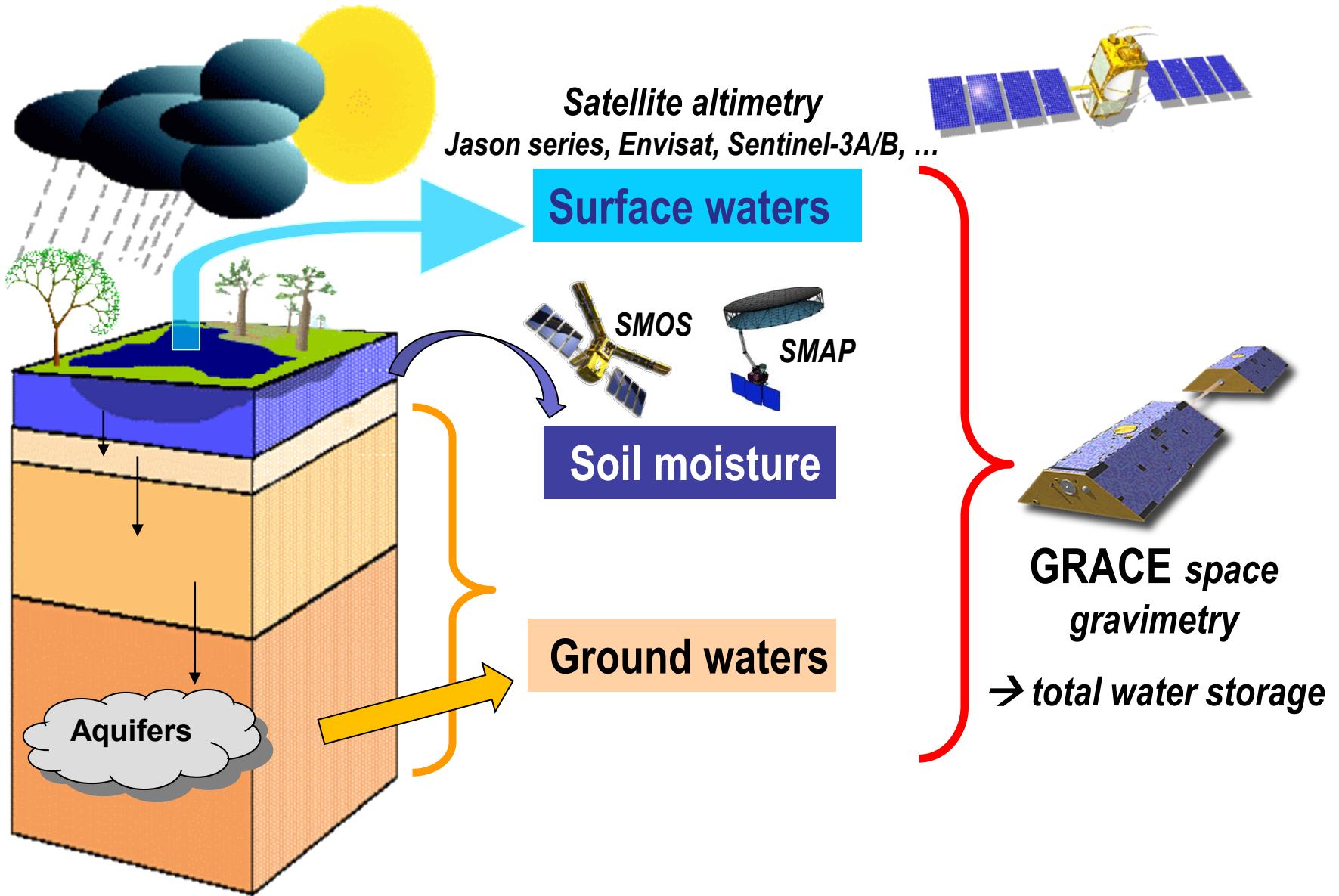


## Distance (km) to the coast with valid sea level time series from satellite altimetry



**ESA Climate Change Initiative Coastal Sea Level Project**

# Space observations of terrestrial waters

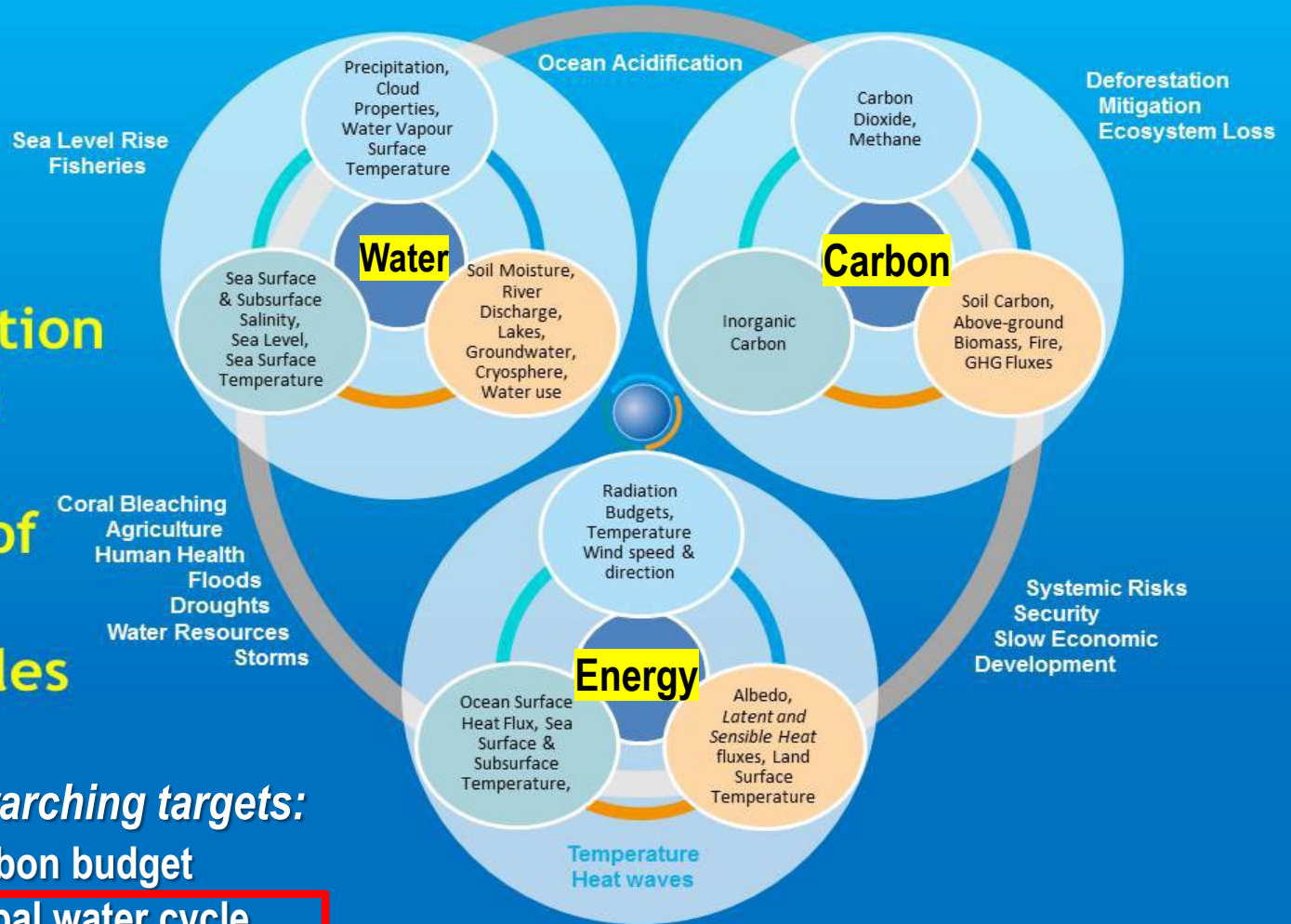


# GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

**GCOS new  
Implementation  
Plan aims to  
improve  
monitoring of  
Global  
Climate Cycles**

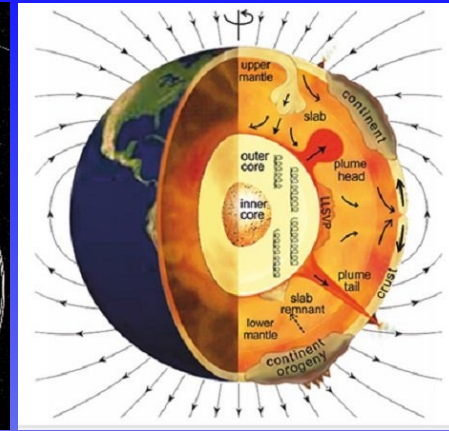
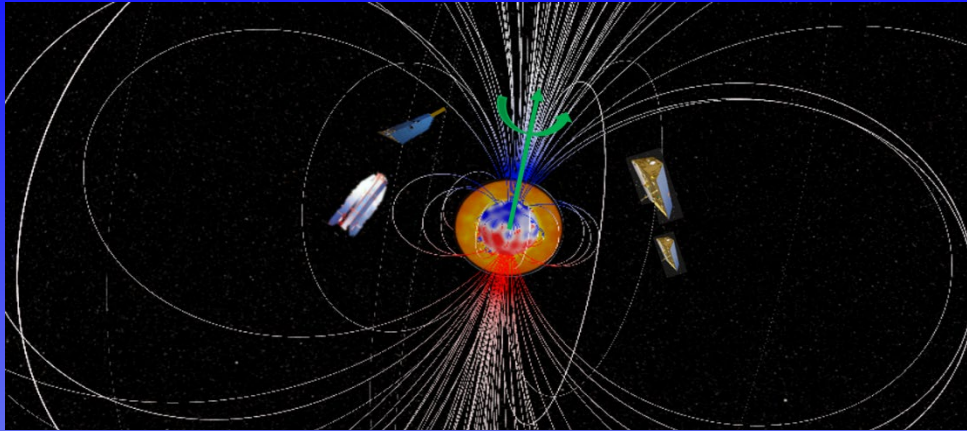
*4 long-term, overarching targets:*

- (a) Closing the carbon budget
- (b) **Closing the global water cycle**
- (c) Closing the global energy balance
- (d) Explaining changing conditions to the biosphere



→ Future ESA CLIMATESPACE Programme





## GRACEFUL project (ERC SYNERGY)

“Probing the deep Earth’s interior by synergistic use of observations of the **magnetic field** + **gravity field** and of the **Earth’s rotation**”

3 women PIs...

8

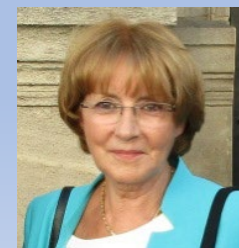


Royal  
Observatory  
of Belgium

Véronique Dehant



Mioara Mandea



Anny Cazenave





# The Role of Space

**Space-based observations provide a global perspective which contributes to improved understanding of the Earth system**

**They allow studying the complex dynamical interactions between atmosphere, ocean, land, ice, solid-Earth and human societies at a planetary scale**





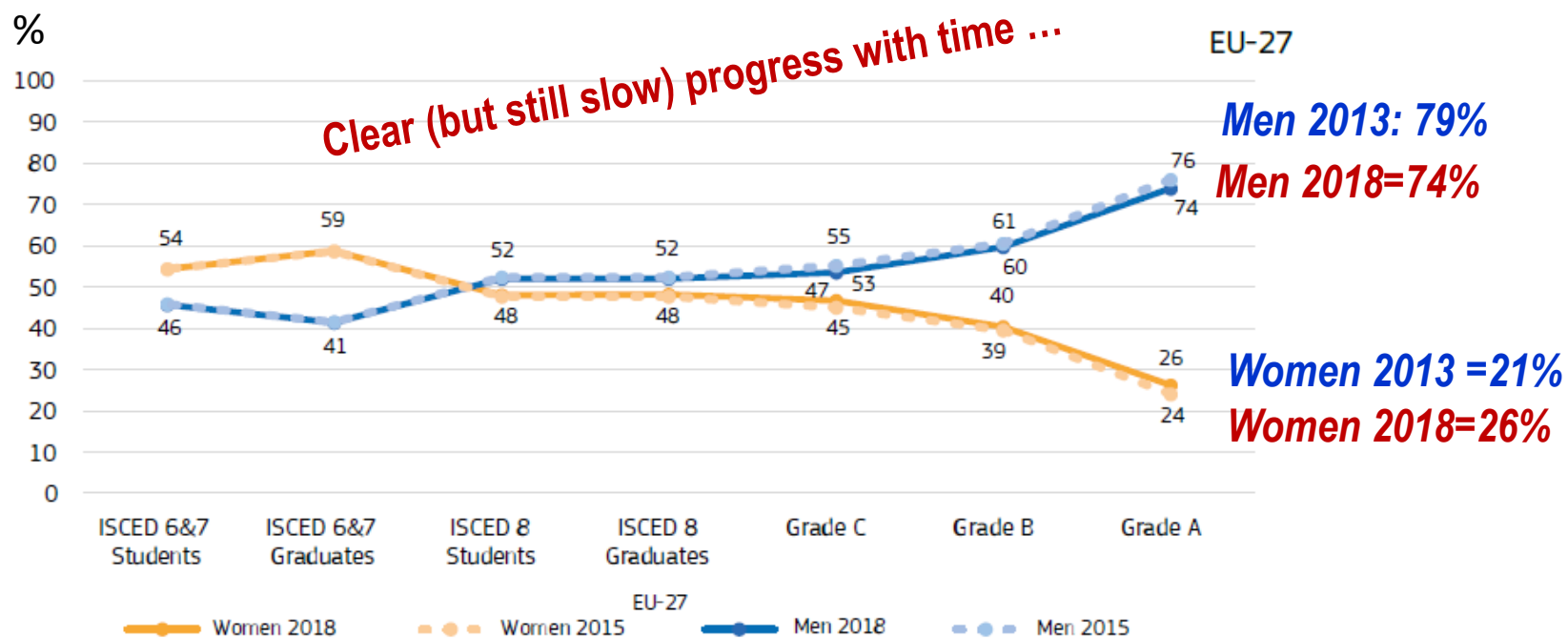
***Women in STEMS***



**STEMS→**  
**Science, Technology,**  
**Engineering & Mathematics**

# Proportion of women and men in Science, Technology, Engineering and Maths (STEM) in a typical academic career (2015-2018)

**Figure 6.1** Proportion (%) of men and women in a typical academic career, students and academic staff, EU-27 & EU-28, 2015-2018

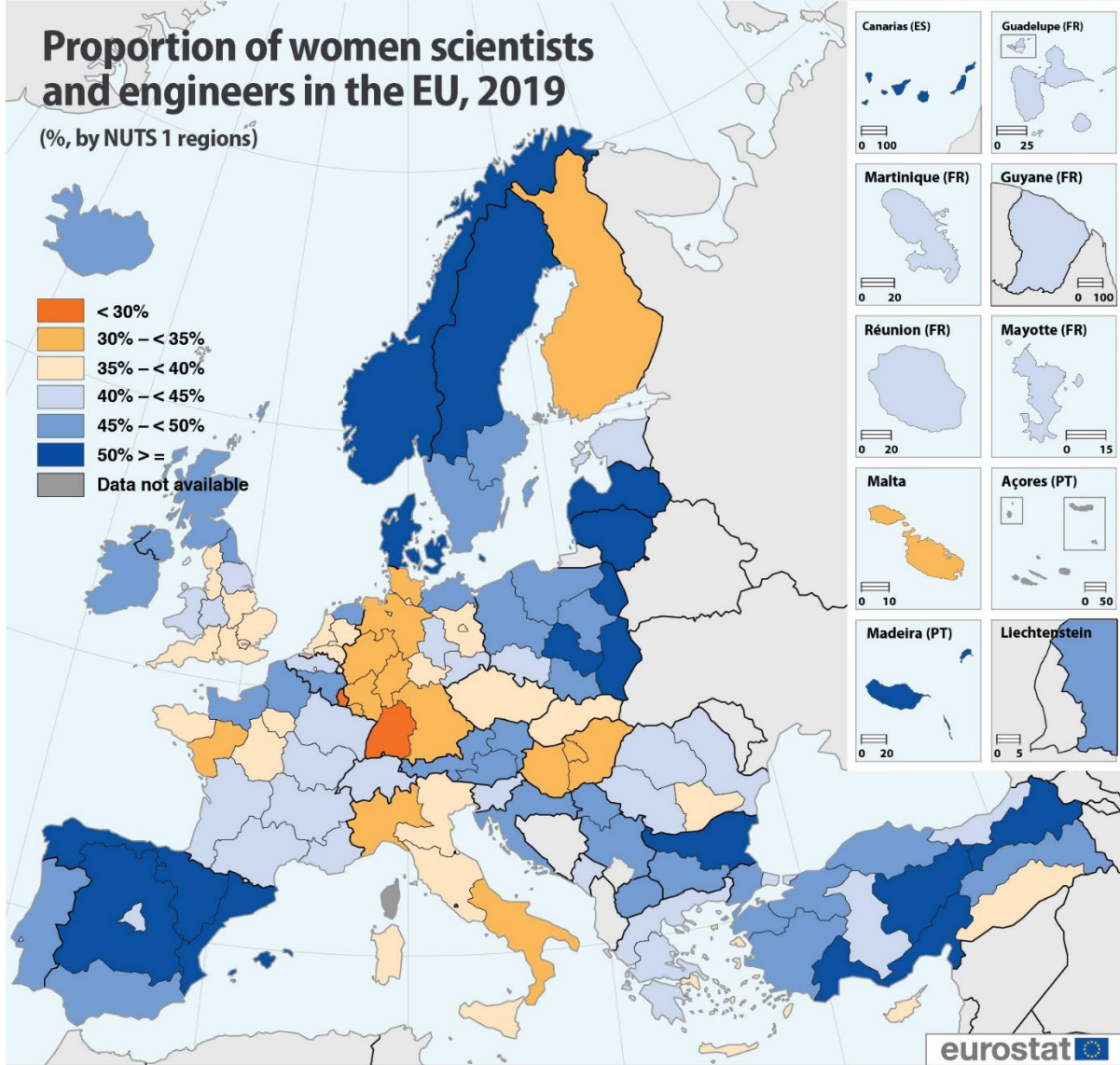


**Report of the European Commission « She Figures, 2022 »**



# Proportion of women scientists and engineers in the EU, 2019

(%, by NUTS 1 regions)



**On average  
Women: 41%  
Men: 59%**

Mesurement unit not yet entered



Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat  
Cartography: Eurostat – IMAGE, 01/2021

Regional data for Croatia, Cyprus, Czechia, Denmark, Estonia, Ireland, Lithuania, Luxembourg, Latvia, Malta, Slovenia and Slovakia: single regions at this level of detail.

Corsica (FRM), Azores (PT2) and Åland Islands (FI2): data not available due to low reliability.

*Support and mentoring*


**WIA**





**How senior (women) scientists  
can help the younger generation?**



- 
- **Peer-mentoring provided by and for women scientists is extremely important**
  - **Women who occupy higher positions within academia/institutes can serve as role models for junior women**



**Support women PhD students, post-docs and early career scientists, at the research lab level, conveying basic messages such as:**

- **work with passion**
- **develop curiosity**
- **pursue excellence**
- **increase self-confidence ....**



**Provide financial support to young women scientists for participation to international meetings & conferences :**

- important for gaining scientific visibility and developing personal research networking**
- social relationship important in research!**





**Fight against “push” factors leading women scientists to leave research between PhD and faculty position, because of:**

- **Family pressure,**
- **Lack of mentorship and encouragement**
- **Lack of structural support for child care**
- **Lack of mobility due to partner’s position**
- **.....**

## **Importance of mentoring**

- **Same-gender mentoring more effective**
- **Encouragement and supportive climate very important**
- **Help junior scientists to apply for grants**
- **Explain there is no need to choose between science and family → can do both!**
- **Help accommodation for family**



*How to increase the opportunities  
for women to grow  
into leadership positions?*

**WIA**





## **Examples of initiatives**

- **Nominate women colleagues to Prizes and Awards, and other types of Honors**
- **When possible, propose women names for national and international committee membership**
- **.....**



**Accept scientific competition in fields mainly dominated by men.**

**3. Do not practice self-censorship (e.g., candidate in due course to high-level positions).**

**4. Participate as much as possible to international meetings/conferences.**

**⇒ A way of gaining outside scientific visibility.**

**Fight against conditioning  
and stereotypes about  
the social role of women in STEMS**



**Education**

- **Learn science by doing science, even at very young age → helps making science concepts accessible to everybody all along the life**
- **Develop science education for children at school (elementary and junior high-school) (e.g., programme « La main à la Pâte », initiated in 1995 by Nobel Prize Georges Charpak, Pierre Lena and Yves Queré (French Academy of Sciences) → how to learn about science & technology through experimentation; Today, similar initiatives in several countries, in particular in the EU**
- **Women (and men) scientists → participate in/organize scientists-schoolchildren meetings to exchange about science questions**
- **....**

## **To conclude...**

### **A few recommendations to young women scientists**


**Involve yourself in decision-making roles at every level in the research institution**

**→ helps women to be involved in key committees that set scientific policy, in panels that give grants and recruit candidates, etc.**

**→ very important to ensure gender balance (men are still over represented in such committees)**

**→ criteria in selecting proposals, candidates, etc., are influenced by male patterns of working...**





**To conclude...**  
**A few recommendations to young women scientists**

- Keep a good balance between personal life and work;
- Some scientific work can be done at home...

The old saying «*the more you have to do, the more organized you get*» definitely applies to women scientists!



**The most promising way of increasing the number of women at top levels in research is through education and mentality evolution.**



*never give up*

Thanks for your attention

