Report of the European Commission's Joint Research Centre

Jean-Luc Widlowski

DG Enterprise & Industry

European Commission

President
José Manuel Barroso

27 Members

Commissioner
Antonio Tajani
Industry & Entrepreneurship

Director-General
Daniel Calleja Crespo,
Enterprise and Industry

Brussels, Belgium

~1000 staff
responsible for ~1500 B€

space

European Space Policy

European Satellite Navigation programme

GALILEO

European Earth Observation programme

opernicus
The European Earth Observation Programme

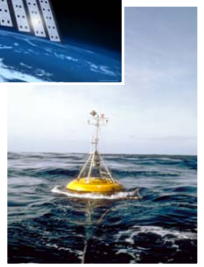
ENTR mission

- promote a growth-friendly framework for European enterprises
- support the European presence in space and satellite navigation

European Earth Observation Programme

GMES/Copernicus is an EU-led initiative

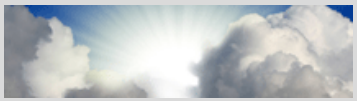
- aims at developing operational user services,
- based on satellite earth observation and in-situ data,
- consists of 3 components:
  - Space Component – coordinated by ESA
  - In-situ component – coordinated by EEA
  - Service Component – EU/public supported



‘Earth compartment’ services

Land

Marine



Atmosphere

‘horizontal’ services

Security

Emergency

Climate

On 9th Nov. 2010 GMES and its Initial Operations have come into force. Regulation (911/2010) gives Commission mandate for 2011-2013.

In Feb 2013 European Council agreed for GMES to be funded with 3783M€ inside the EU multiannual financial framework (2014-2020). MFF negotiations ongoing.

QAQC needs

DG ENTR requires mechanism to reliably assess the compliance of GMES/Copernicus CCS products with predefined quality criteria.

- Is quality of ECVs from other (Atmosphere, Land, Ocean) Copernicus services good enough?
- Is a new retrieval algorithm going to improve the quality of the products?
- Can EO product quality be guaranteed to private sector users (with business model for added value)?

DG CLIMA, DG DEVCO, DG AGRI & DG ENV needs:

- Does EO product quality permit its usage as baseline / reference in policy decisions and environmental legislation?

DG Joint Research Centre

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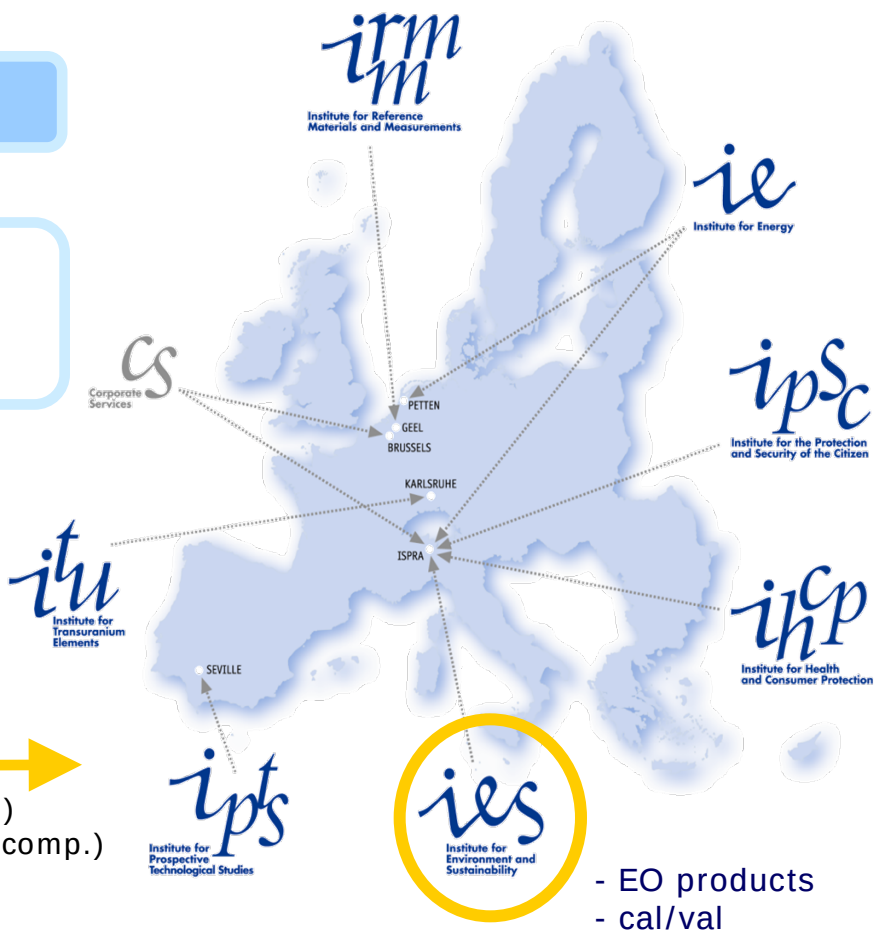
Commissioner
Mairé Geoghegan-Quinn

Research, Innovation & Science

Director-General
Dominique Ristori,
Joint Research Centre

7 institutes in 5 MS

~2600 staff (+250 comp.)
~330 M€/y (+ ~40 M€/y comp.)



- EO products
- cal/val

JRC mission

- provide customer-driven scientific and technical support
- function as reference center of science and technology for EU
- be independent of special interests, whether private or national.

Non-Nuclear Direct Actions of the Joint Research Centre

The JRC shall focus on:

1) Excellent Science:

- Carry out research to enhance the scientific evidence base for policy making…

2) Industrial leadership:

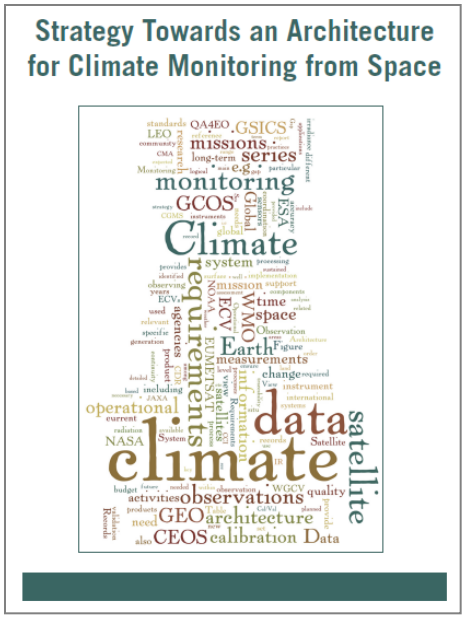
- Contribute to facilitating the use, *standardisation & validation of space technologies and data*, in particular to tackle the societal challenges.

3) Societal challenges:

- Climate action: Investigate the cross-sectoral challenges of the sustainable management of natural resources through *monitoring of key environmental variables*.

Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020)
Annex IV of COM(2011) 809 final

climate monitoring architecture



M. Dowell, P. Lecomte, R. Husband, J. Schulz, T. Mohr, Y. Tahara, R. Eckman, E. Lindstrom, C. Wooldridge, S. Hilding, J.Bates, B. Ryan, J. Lafeuille, and S. Bojinski, 2013: Strategy Towards an Architecture for Climate Monitoring from Space. Pp. 39.

wmo.int/pages/prog/sat/documents/ARCH_strategy-climate-architecture-space.pdf

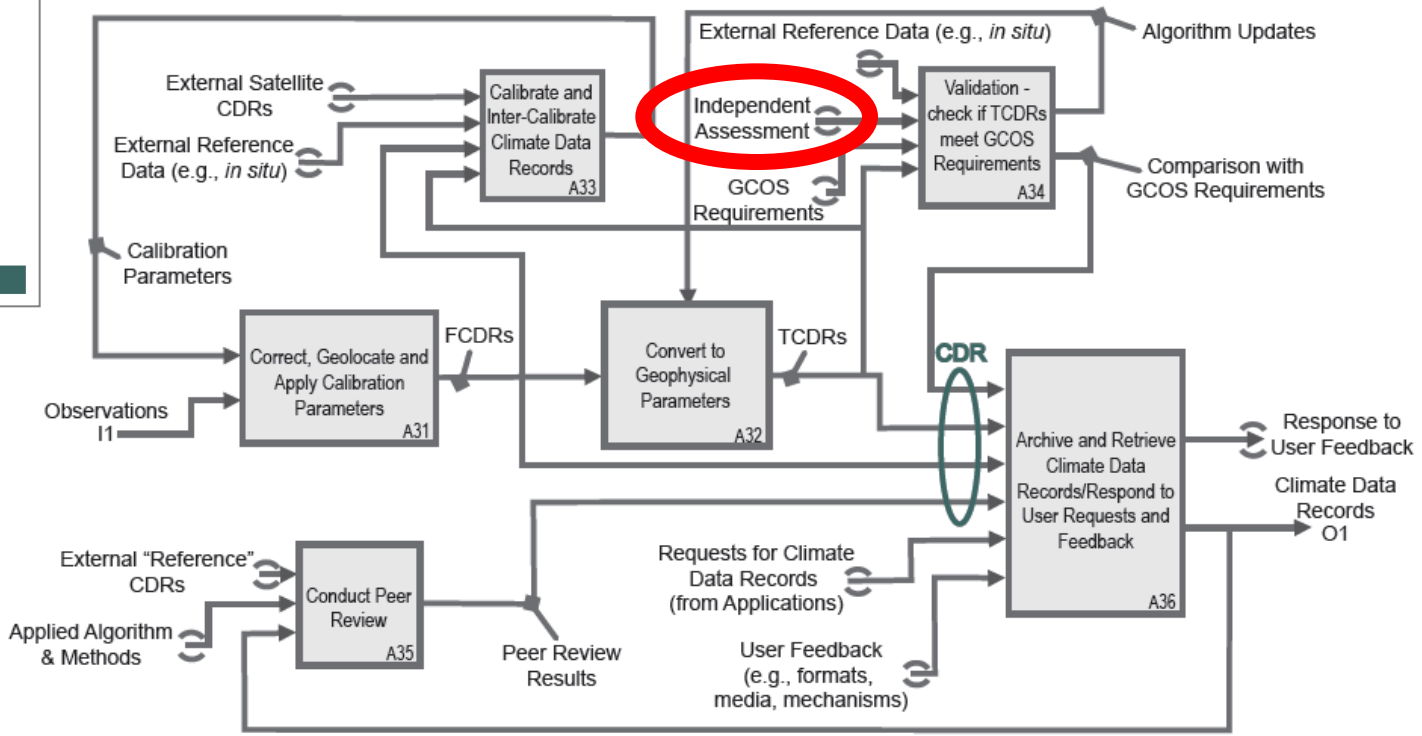
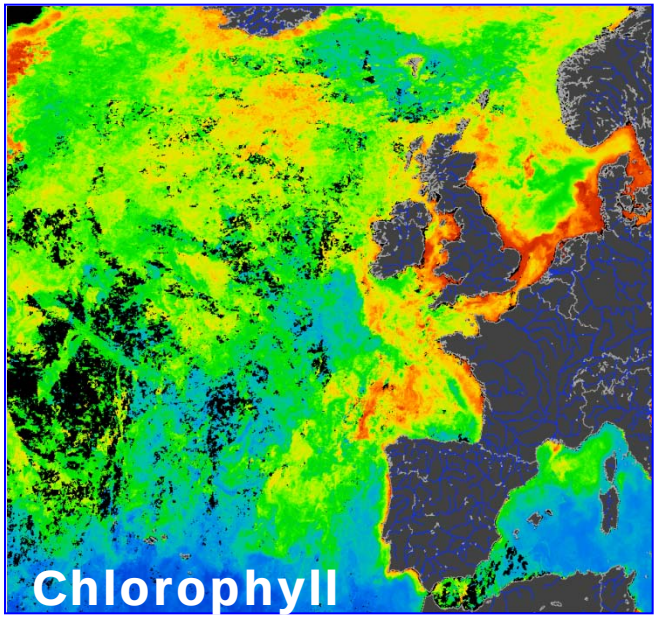


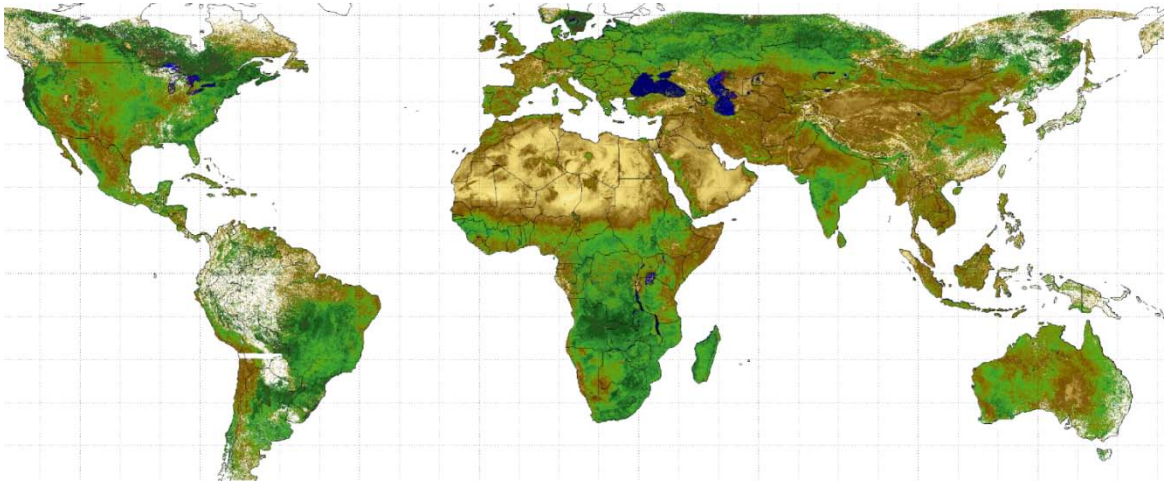
Figure 6.3: Decomposition of "Create and Maintain Long-term Climate Data Records"

targeted EO products

retrieval algorithms developed in-house



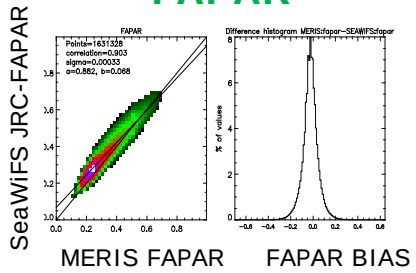
Surface Albedo

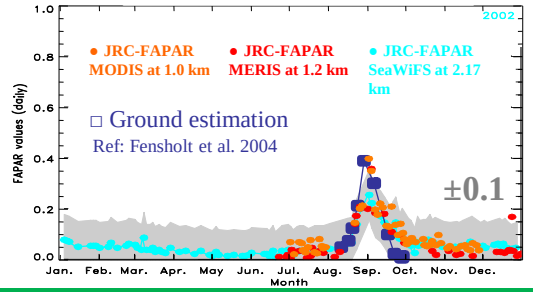


G.Zibordi et al., (2009), Gobron et al., (2007), Pinty et al., (2006), Melin et al., (2008), Govaerts et al., (2004), Lattanzio et al., (2006)

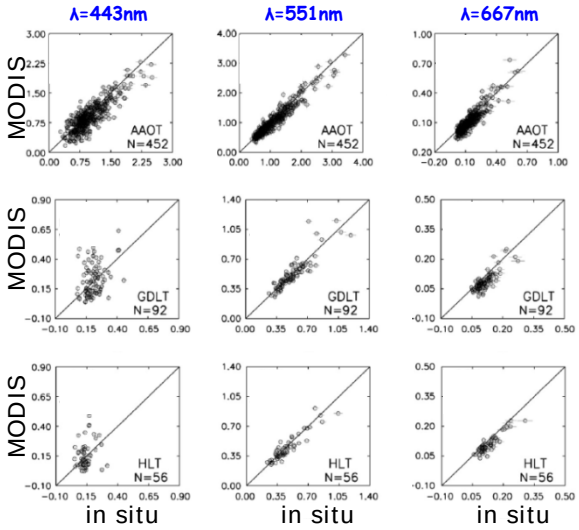
product verification efforts

FAPAR





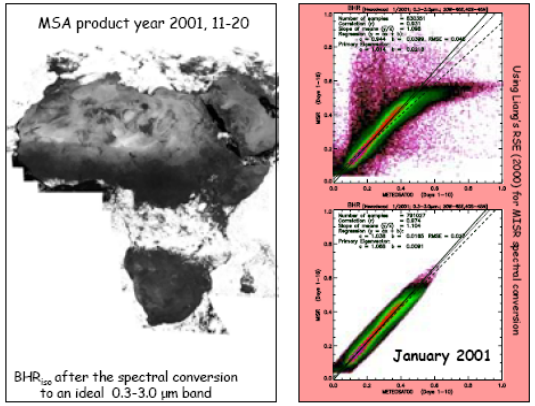
comparison with in-situ and similar products



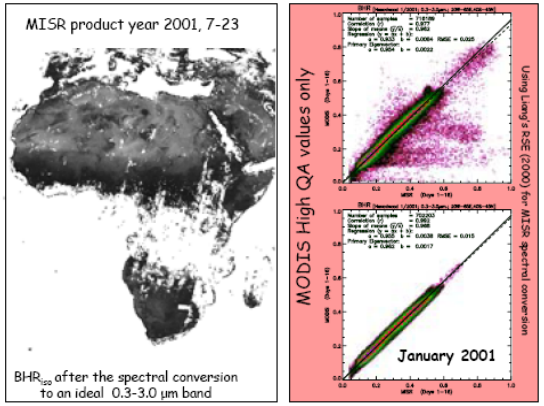
Normalised water-leaving radiance

Surface Albedo

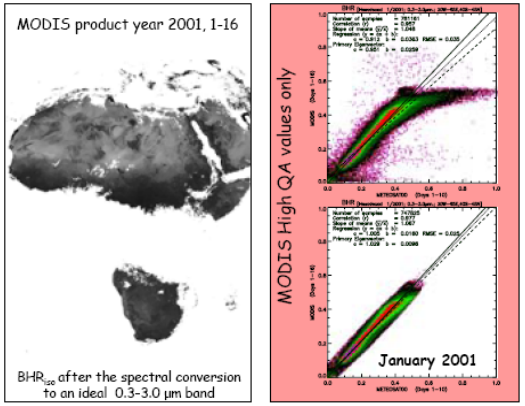
MISR versus Meteosat



MISR versus MODIS



MODIS versus Meteosat

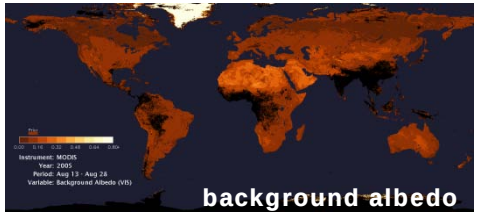


G.Zibordi et al., (2009), Gobron et al., (2004), Pinty et al., (2007)

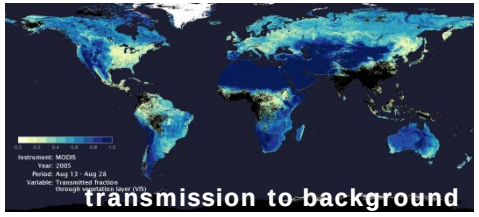
ensemble retrievals & validation

JRC-TIP

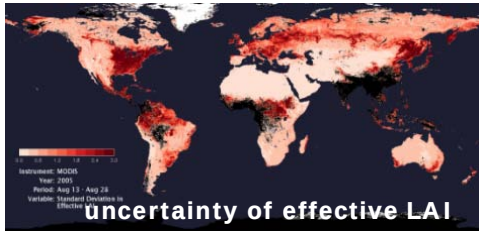
model parameters

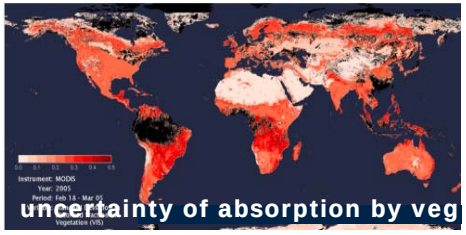


diagnostic fluxes

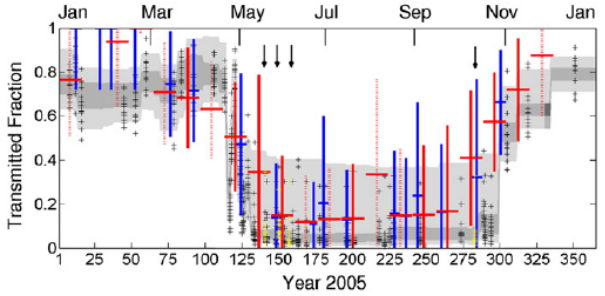


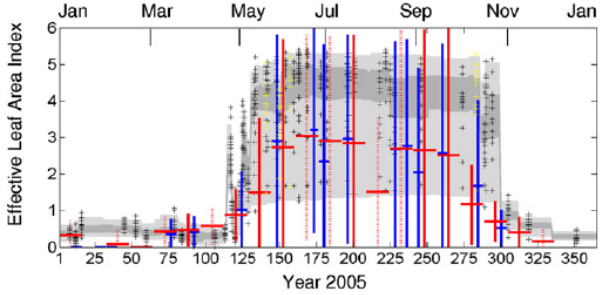
associated uncertainties

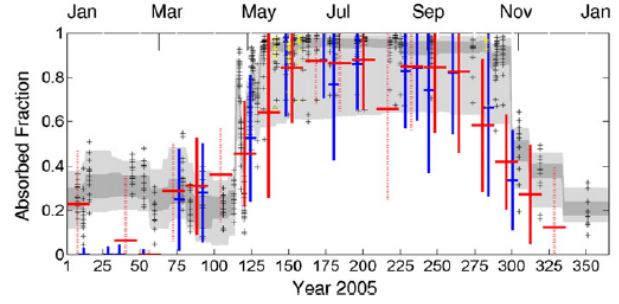




Hainich test site (Germany)





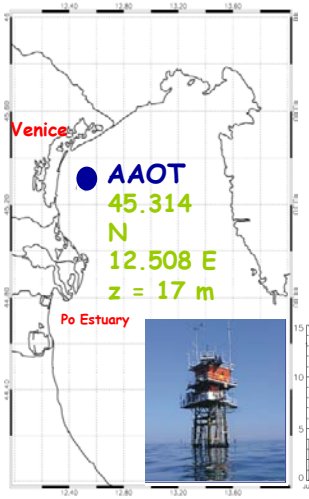


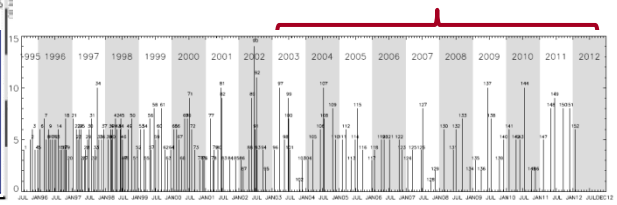
JRC-TIP uses BHR from **MODIS**, **MISR**

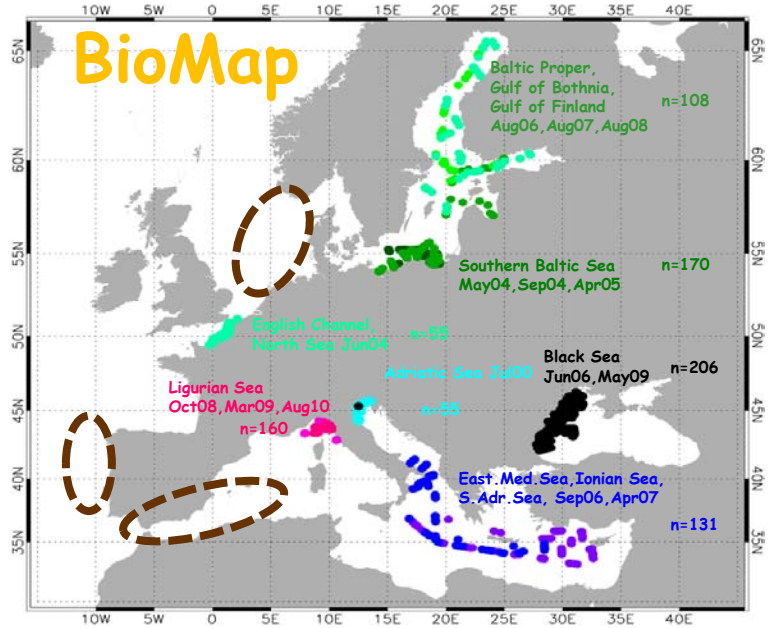
Gobron et al., (2007), Pinty et al., (2006), Melin et al., (2008), Govaerts et al., (2004), Lattanzio et al., (2006), Gobron et al., (2004), Pinty et al., (2007, 2011)

QA of *in situ* efforts

"Aqua Alta"Oceanographic Tower (AAOT) in northern Adriatic Sea

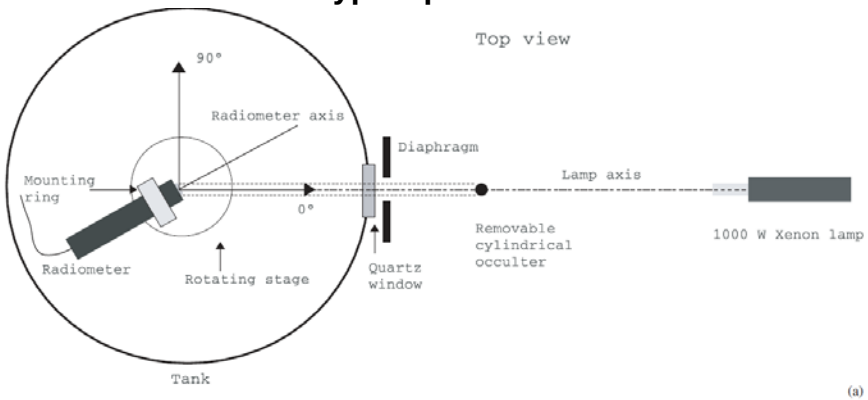




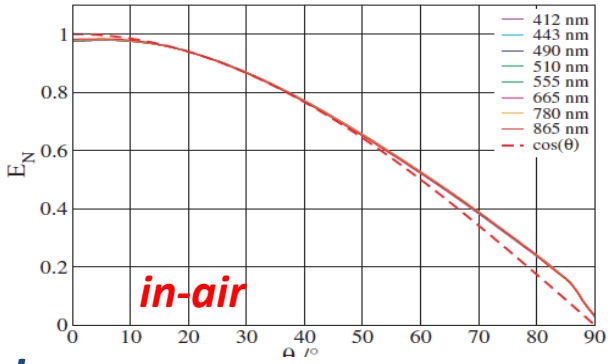


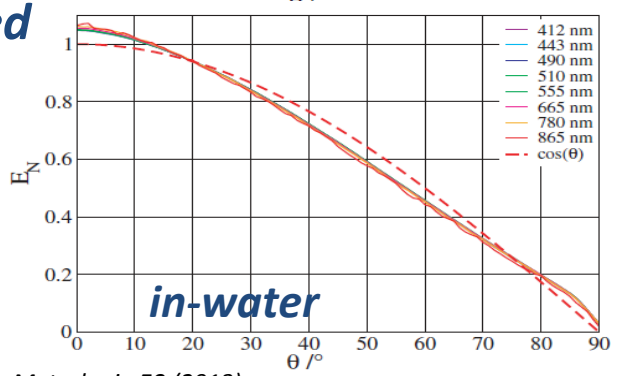
G. Zibordi et al. 2006, 2010. Berthon et al., 2007

Cosine Error for HyperSpectral Irradiance Sensors



Angular response normalized at 20 °

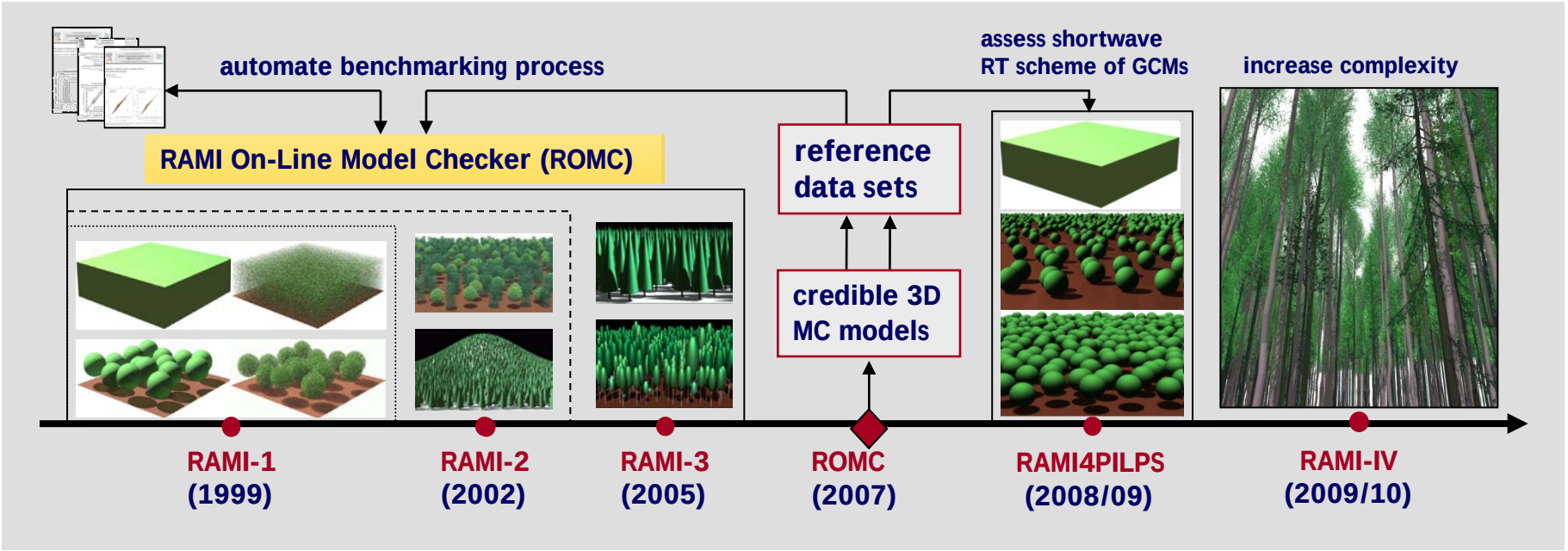




Mekaoui & Zibordi, *Metrologia* ***50*** *(2013)*

quality assurance of RT models

Canopy RT models are used in design of satellite retrieval algorithms

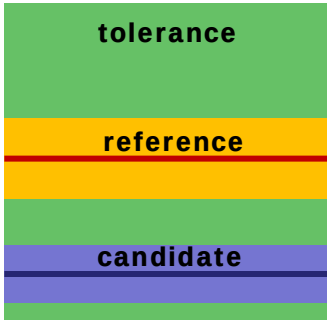


RAMI-IV **"abstract canopy" analysis complete:**

- **uses existing ISO-standards to evaluate models**

ROMC **is being expanded to increase functionality:**

- **emphasis on "user friendliness" & data content**



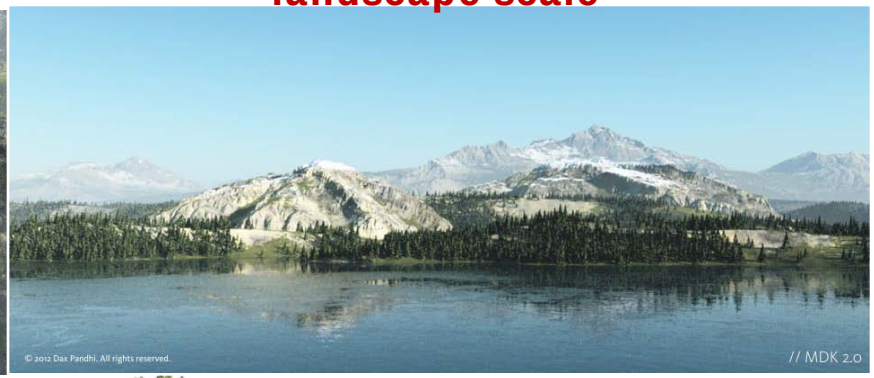
Pinty et al., 2001, 2004 (JGR); Widlowski et al., 2007 , (JGR), 2008 (RSE); Widlowski et al, (2013 – under review) JGR

model-based QA of retrieval methods

local scale

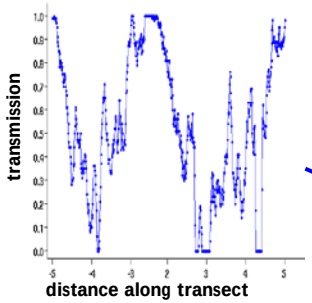
canopy scale

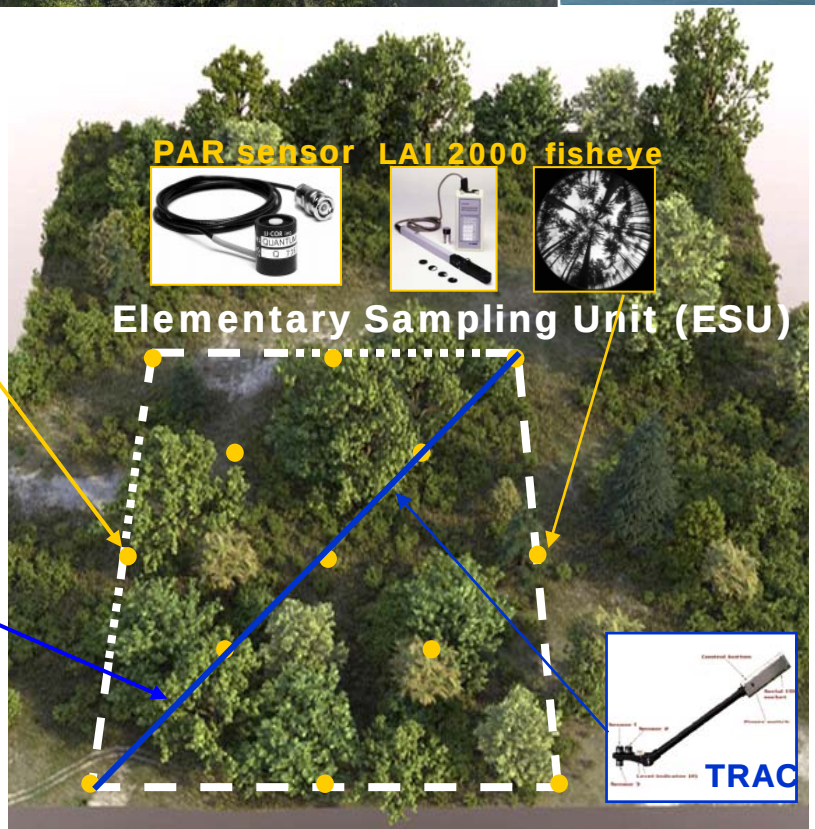
landscape scale

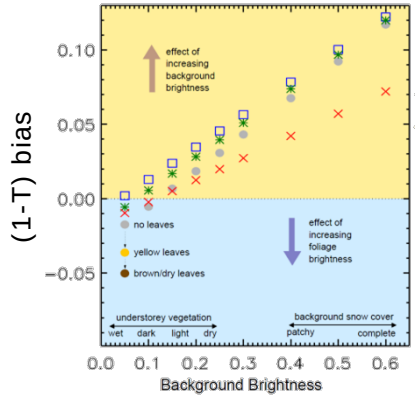


thresholded fisheye

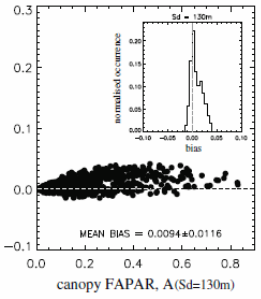
transmission transect



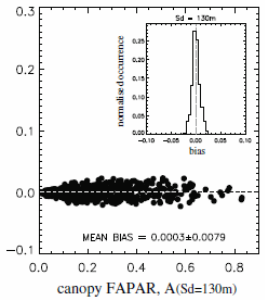




3-Flux (α=R)



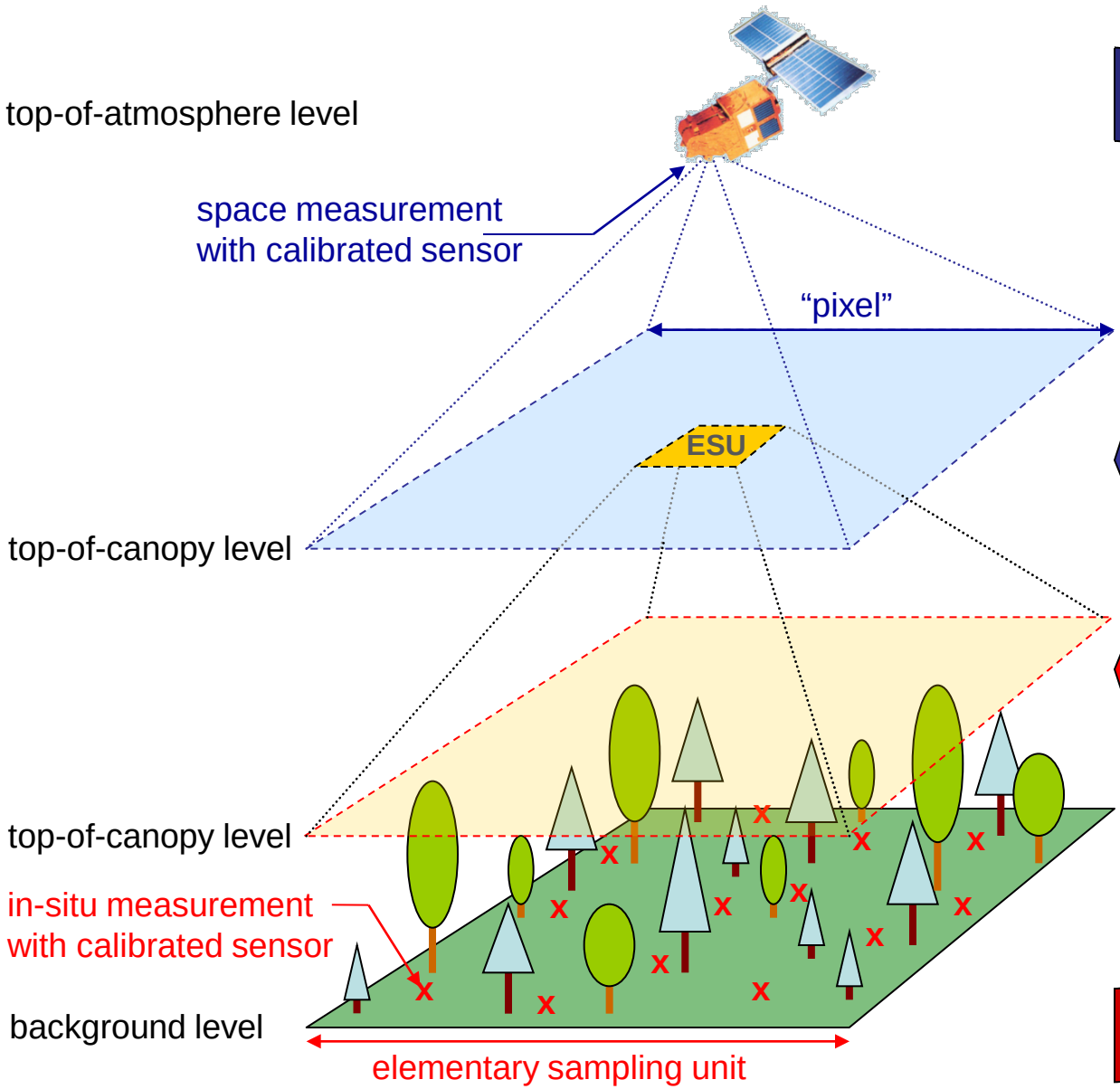
2-Flux (1-T)



Cote et al, 2009, Widlowski et al, 2013 (sub), www.onyxtree.com/gall-borrett1.html

Pinty et al, 2010, Widlowski 2010
www.xfrog.com, Dax Phandi, MDK2.0

‘space’ versus ‘in situ’ retrievals



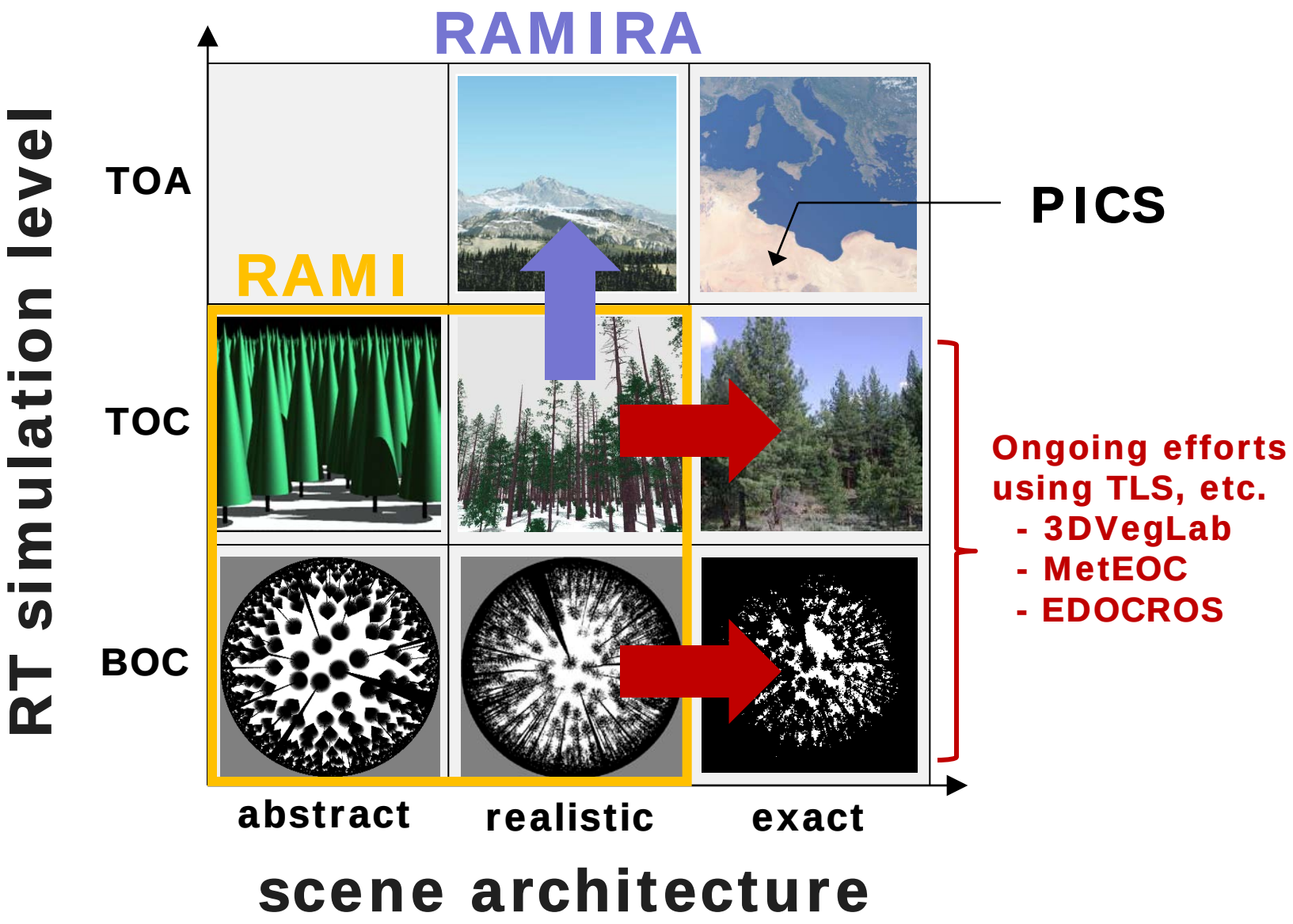
space retrieval:

- **account** for impact of atmosphere (atmos. correction)
- **transfer** radiation measurements to quantity of interest

in-situ retrieval:

- **account** for impact of spatial variability (upscaling)
- **transfer** radiation measurement to quantity of interest

QA of satellite retrieval algorithms



WGCV

- *"Agencies to indicate interest for participating in an intercomparison effort of ECV 'retrieval algorithms' under controlled conditions using instrument-specific synthetic TOA datasets generated over highly realistic land sites (both vegetated and non-vegetated) with RAMI-verified Monte Carlo models of known accuracy and precision."*

- *"A letter of support from WGCV to the JRC would be needed for this effort due to the substantial commitment of resources required to generate agency and instrument-specific TOA datasets."*

Thank you!

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