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Copernicus Climate Change Service

An update on CAMS and C3S: opportunities for the agriculture and forestry sectors

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Copernicus

Europe's eyes on Earth

POLLUTION, CLIMATE AND AGRICULTURE

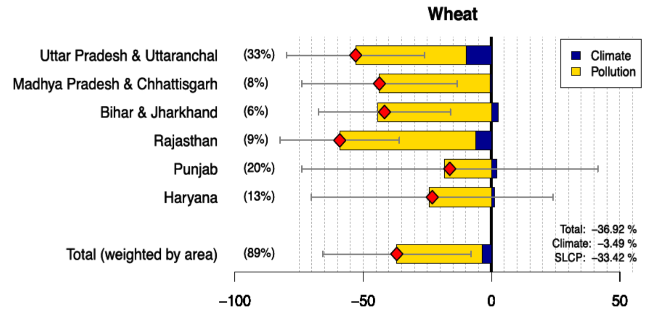
European Commission

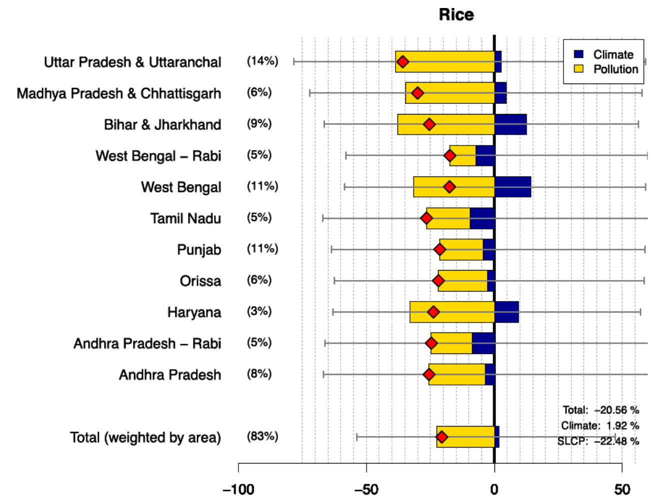

Recent climate and air pollution impacts on Indian agriculture

Jennifer Burney and V. Ramanathan

[Burney and Ramanathan, PNAS, 2014]

Relative Yield Change (%) for different Indian States between 1980 and 2010 due to air pollution and climate changes





[...] yields in 2010 were up to 36% lower for wheat than they otherwise would have been, absent climate and pollutant emissions trends.

Climate change and air pollution have significant impacts on crops and ecosystems...

... what is (and will be) available in the portfolio of CAMS and C3S that could be of interest for the agriculture and forestry sectors?

CAMS INFORMATION FLOW

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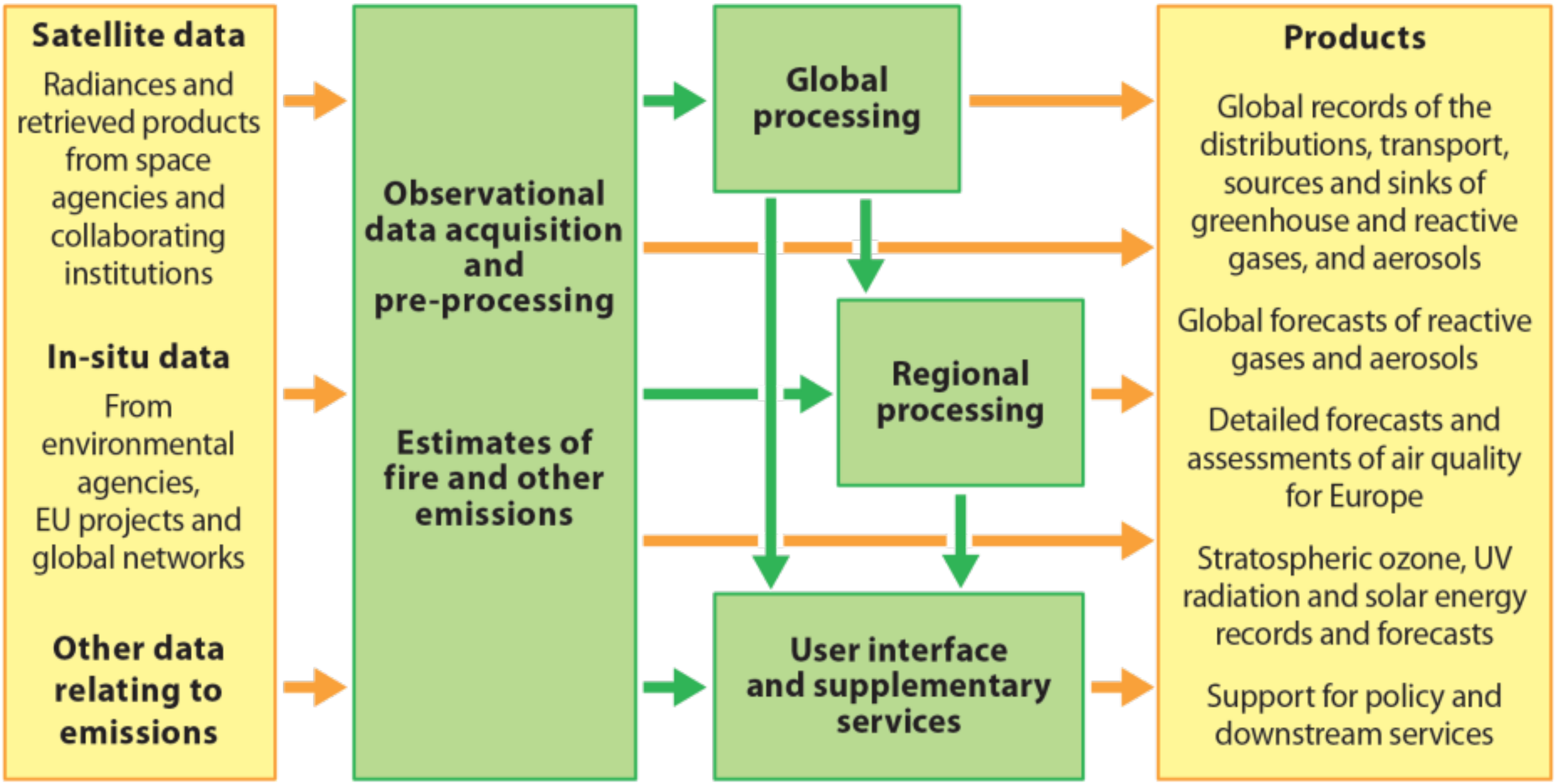

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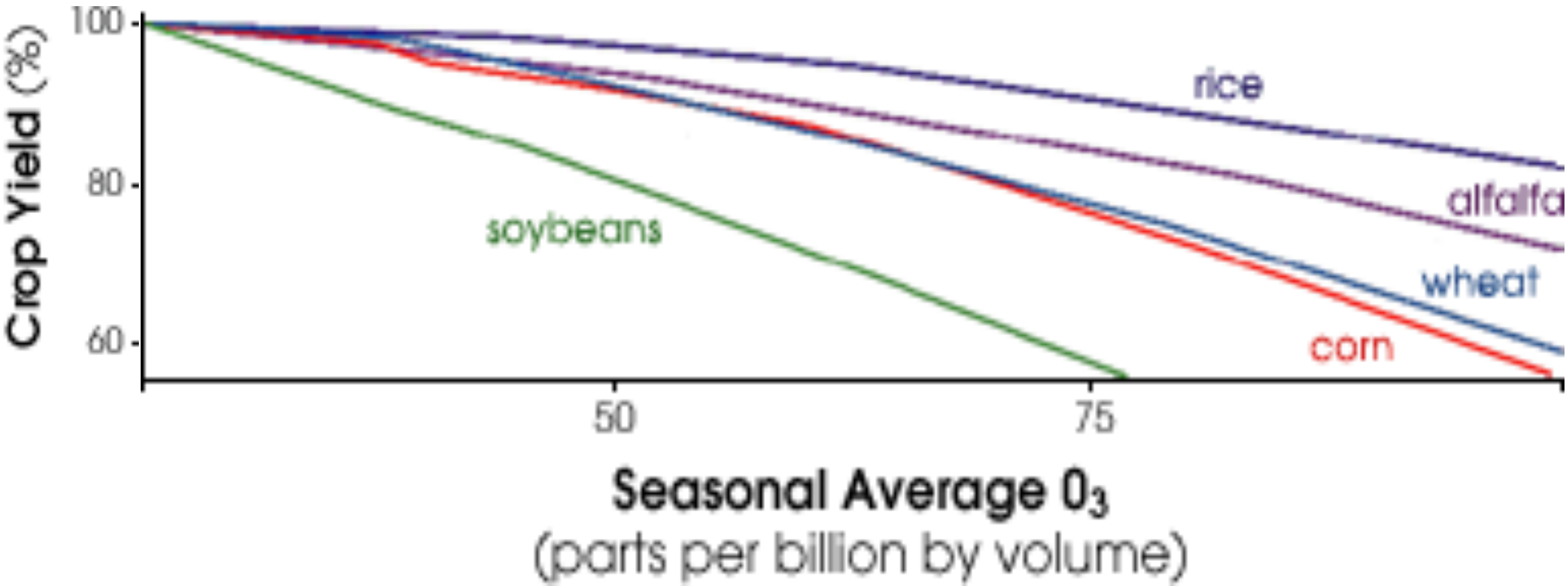
Copernicus Europe's eyes on Earth

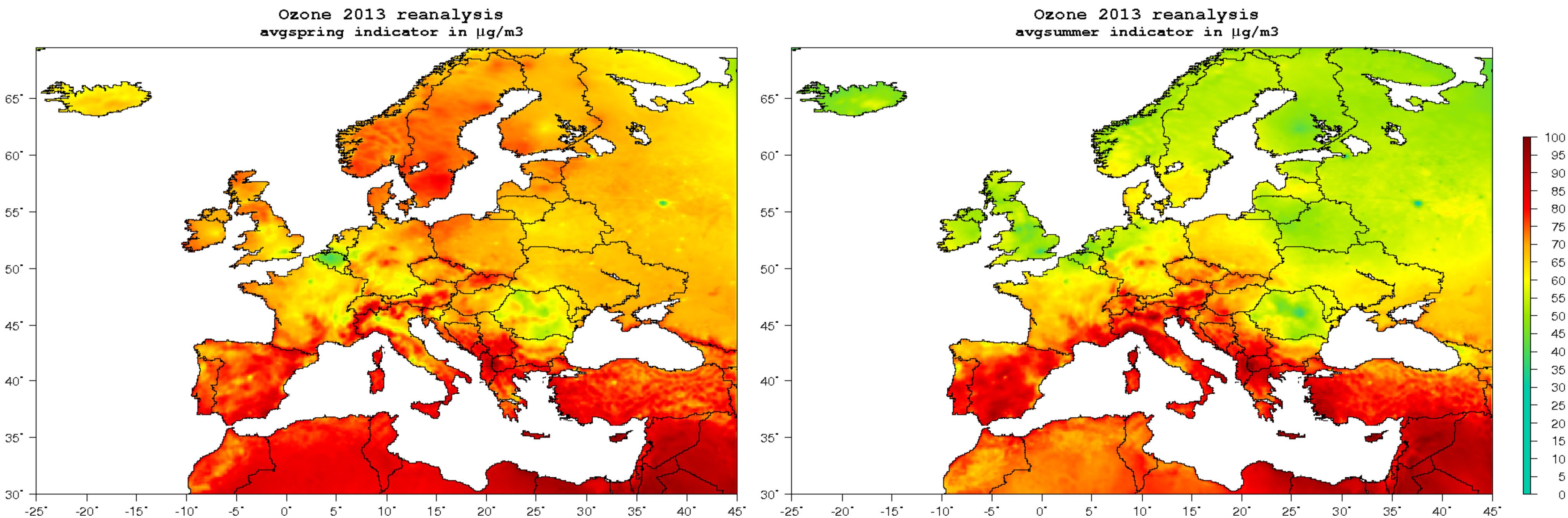
Effects of high ozone on soybean foliage

Effects of high ozone on potato leaves



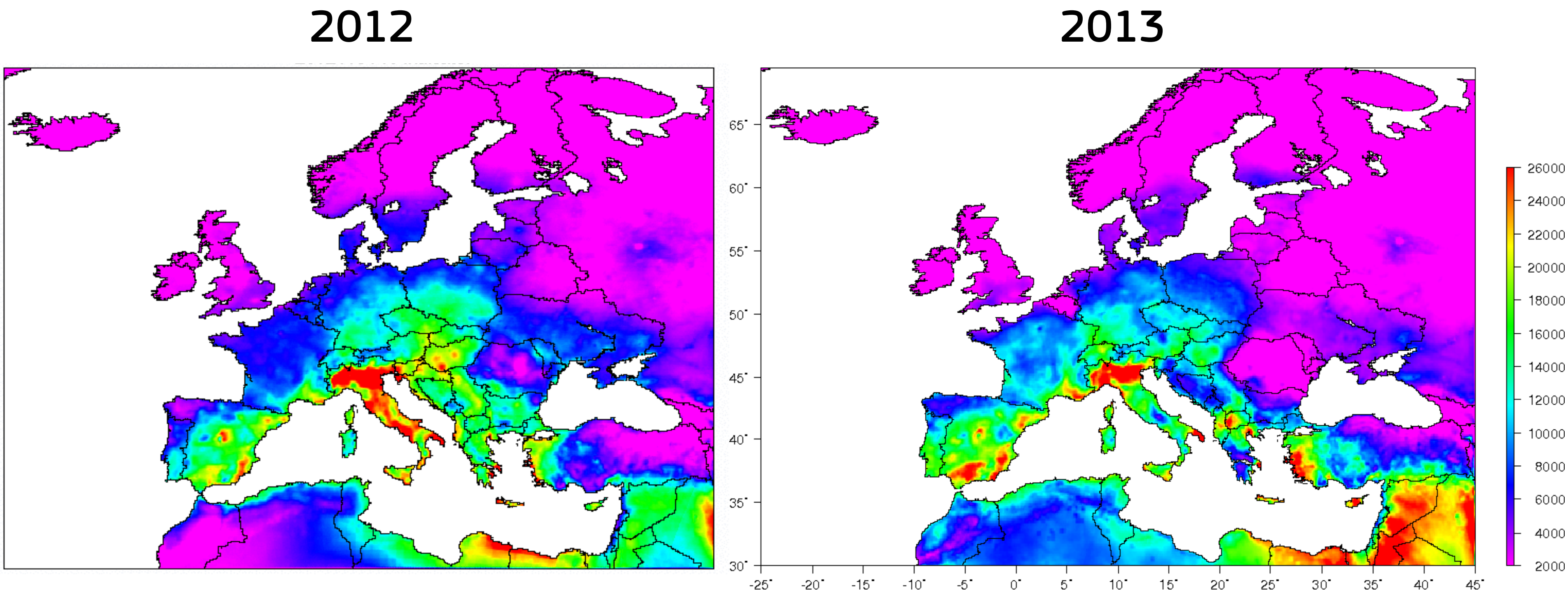
Graph by Adams et al., 1989, adapted by Chameides et al., 1999

Regional atmospheric composition re-analyses



- Combines satellite and validated surface observations as well as model
- Maps with no gaps (including outside of cities)
- Available 2010 to 2013; horizontal resolution is 0.1 degree

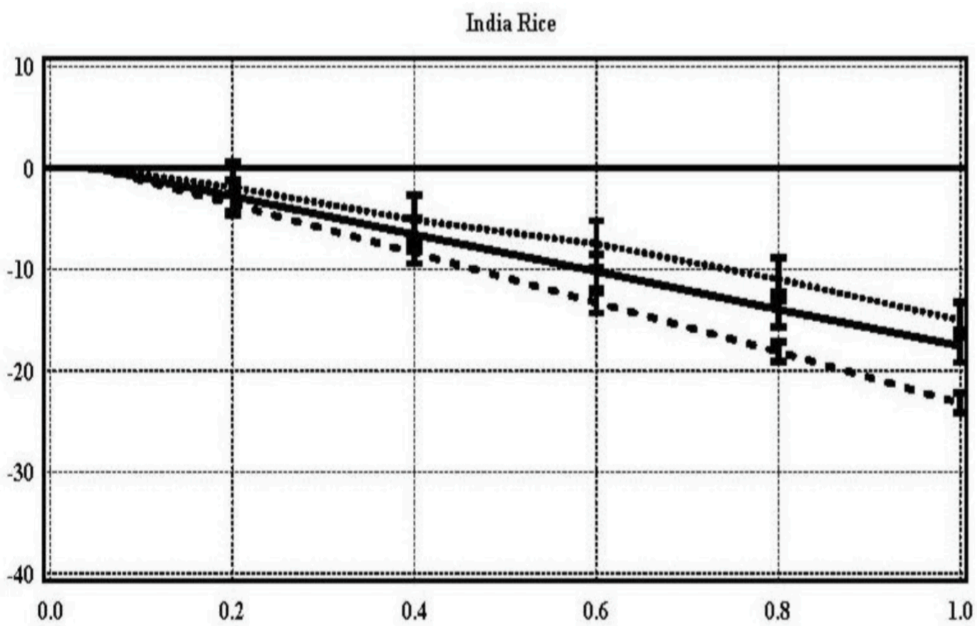
AOT40 indicator (µg/m³.hours)



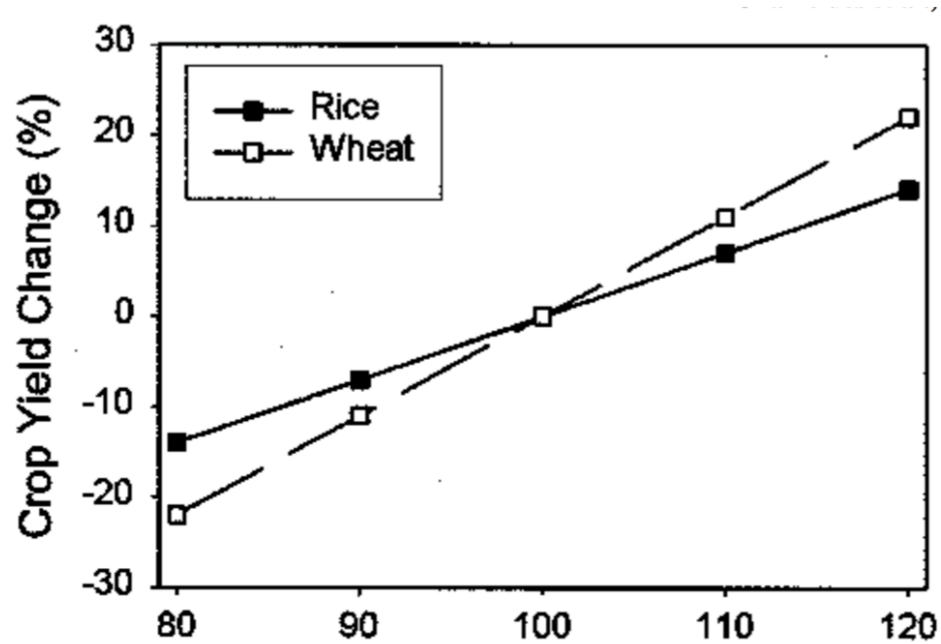
- In the Air Quality Directive, the target value of AOT40 calculated from May to July is 18.000 µg/m^3.hours, with a long term objective of 6.000 µg/m^3.hours.
- Data for other pollutants are also available (SO2, PM…).
- Deposition fluxes under evaluation.

Greenwald et al., 2002

Chameides et al., 1999



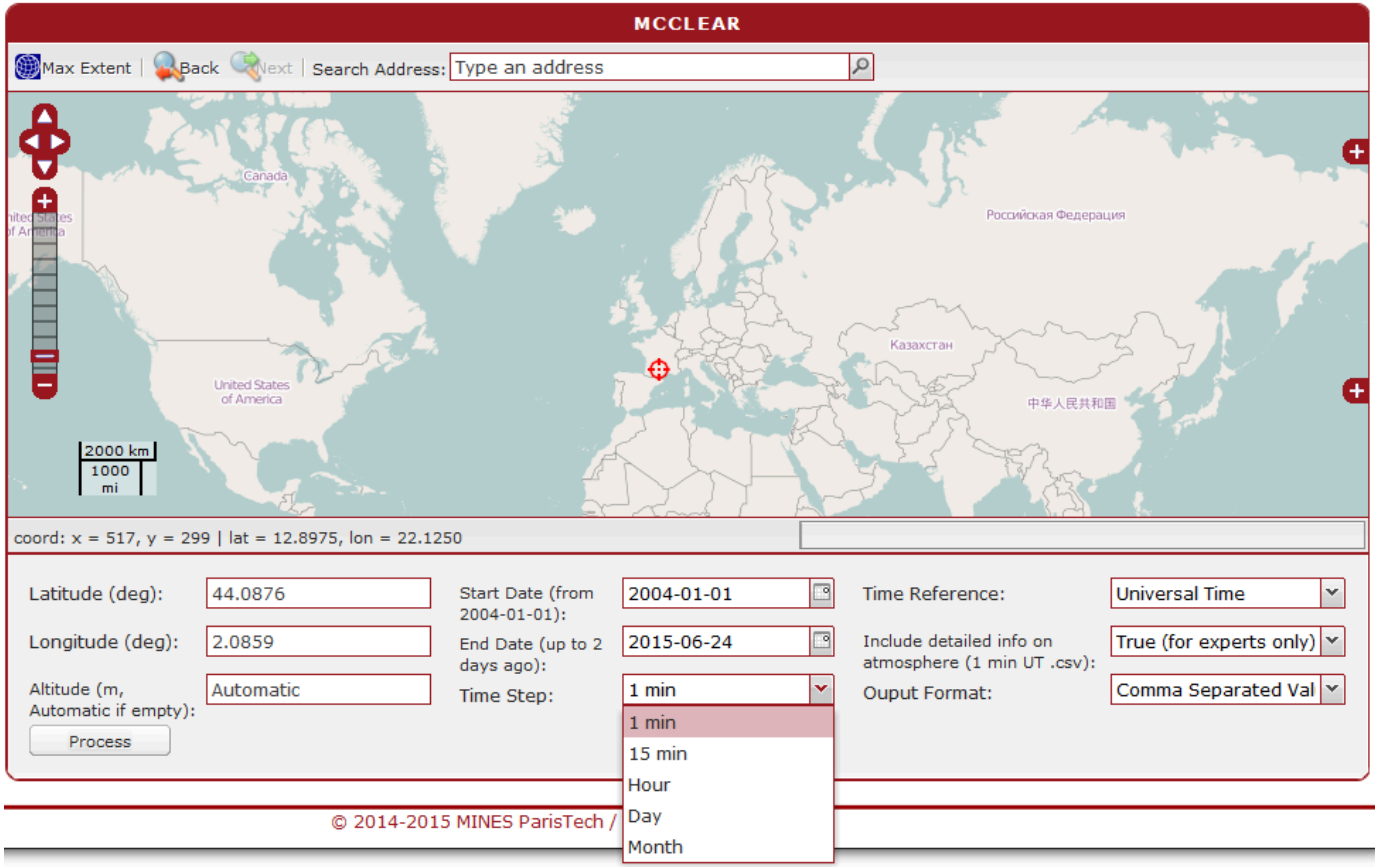
Aerosol Optical Depth



Available in CAMS!

Total surface solar irradiance (% of observed irradiance)

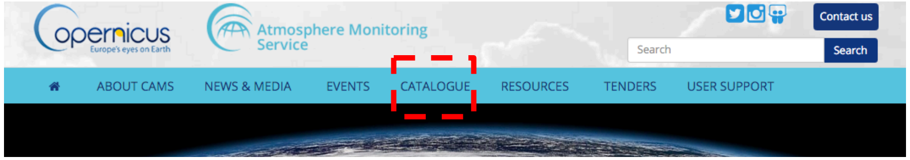
- Aerosol deposition on leaves under evaluation. Results suggest as much as a 30% reduction in PAR available to plants over a growing season due to extinction of photons by deposited aerosol particles (Bergin, 2002).



Post-production of clear-sky (global) and all-sky surface (MSG disk currently) radiation products taking into account CAMS aerosol information. Provider is DLR (Germany).

HOW TO ACCESS PRODUCTS?

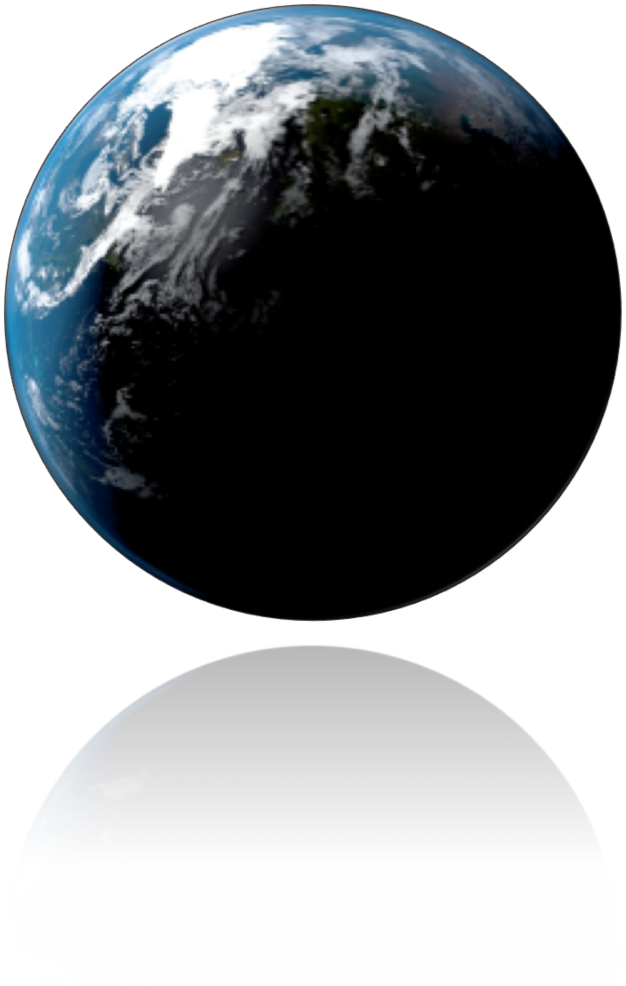
1. Search the on-line interactive catalogue



Portfolio	Product groups
A. Regional products	European AQ NRT analyses
	European AQ NRT forecasts
	European AQ interim reanalyses
	European AQ reanalyses
B. Global products (troposphere and stratosphere)	Global atmospheric composition NRT analyses
	Global atmospheric composition NRT forecasts
	Global atmospheric composition reanalyses
C. Supplementary products	Policy support products
	Solar radiation
	Greenhouse gas fluxes
	Climate forcings
D. Emissions products	Anthropogenic emissions
	Fire emissions

2. Or download the Service Products Portfolio (including detailed products data sheets) at: http://atmosphere.copernicus.eu/reports. Edition available is dated 24/03/2016.

C3S VISION

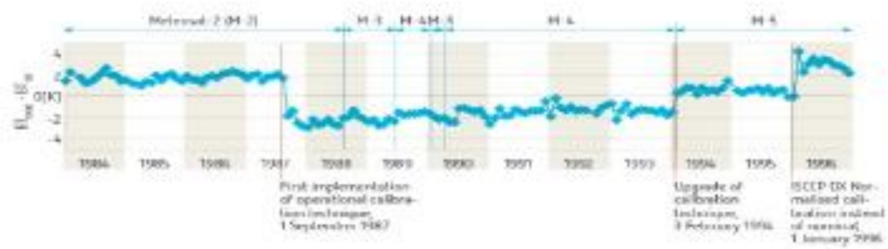


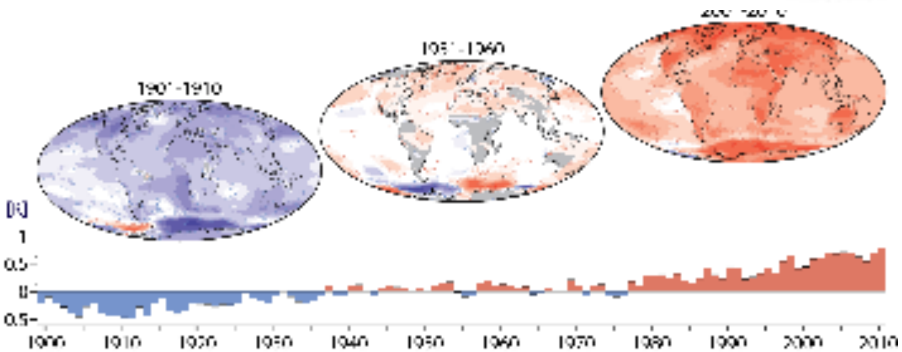
To be an **authoritative source** of climate information for Europe

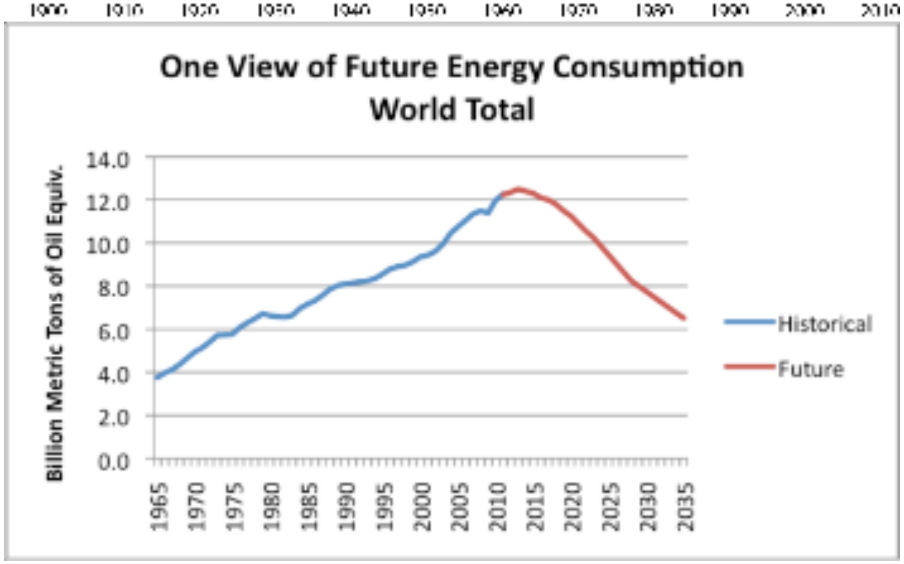
To **build upon national** investments and **complement** national climate service providers

To **support the market** for climate services in Europe

QUESTIONS ADDRESSED







How is climate changing?

- Earth observations
- Reanalyses

Will climate change continue or accelerate?

- Predictions
- Projections

What are the societal impacts?

- Climate indicators
- ▶ Sectoral information

Climate Data Store

- ECVs past, present and future
- Observed, reanalysed and simulated
- Derived climate indicators
- Tools to support adaptation and mitigation at global and European level
- **Open and free access**

Sectoral Information System

Proof-of-concept developments

Evaluation and Quality Control

- **Monitors quality of C3S products and services**
- Ensures C3S delivers state-of-the-art climate information to users
- Identifies gaps in service provision
- Bridges Copernicus with the research agenda in Europe (e.g. H2020, national research projects)

Outreach and Dissemination

- Web content
- Public outreach
- Coordination with national outreach
- Liaison with public authorities
- Conferences, seminars
- Training and education

Seven proof of concept SIS contracts have been awarded

SIS water management

- SWICCA (Service for Water Indicators in Climate Change adaptation) – lead SMHI (Sweden)
- EDgE (End-to-End demonstrator for improved decision making in the water sector in Europe) – Lead CEH (UK)

SIS energy

- CLIM4ENERGY (Climate for Energy) – Lead CEA (France)
- ECEM (European Climatic Energy Mixes) – Lead UEA (UK)

SIS others

- AgriCLASS (Agriculture Climate Advisory Services) – Lead Telespazio – Vega (UK)
- WISC (Windstorm Information Service) – Lead CGI (UK)
- URBAN-SIS (touching health, infrastructure, water) – Lead SMHI (Sweden)

Derek GREER
Chief Operating Officer
Telespazio VEGA UK Ltd

AgriCLASS: Agricultural CLimate Advisory ServiceS

To Build: C3S Agricultural Information System

Using: High Quality Climate & Agricultural data & models

Demonstrated Through: Producing Impact Indicators for woody perennial Crops - that are high investment, multi-year yield, responsive to cumulative change – i.e. climate affected.

Achieved By: Productivity impacts are multi-factoral: water, light, temperature, day length, phenology, local conditions, past history, future trends

- Combine know-how of climate data experts, system implementation experts, local meteorological data
- Agricultural experts apply crop response models
- Make available proof-of-concept system and published indicators

AgriCLASS PRELIMINARY SYSTEM DESIGN

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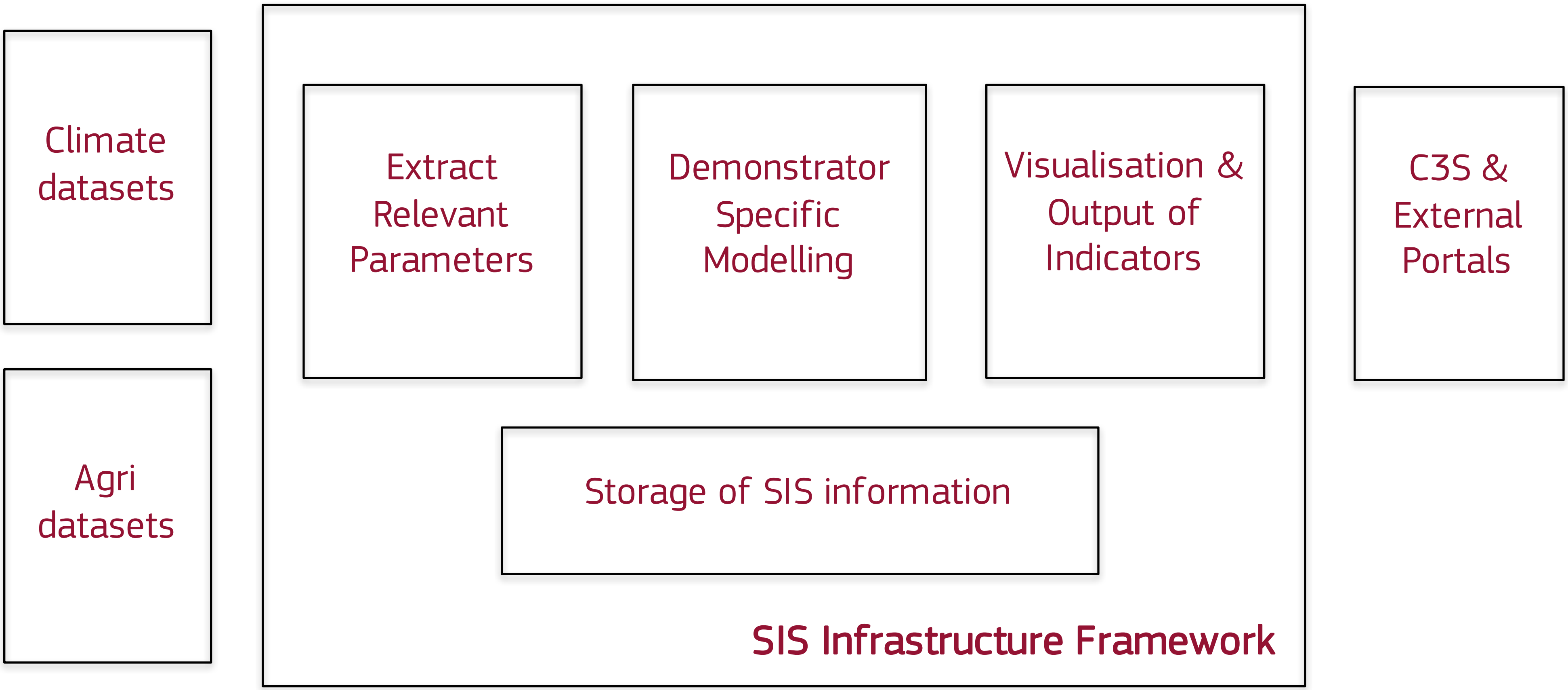

Hosted at Agrimetrics - Centre for Agri-Informatics and Sustainability

AgriCLASS INITIAL CROPS AND INDICATORS

European Commission

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Forestry

Southern forests die-back due to drought, reduced productivity/ biodiversity

Drought Stress Indicator

Olives

40% loss of crop due to pest, increasing scarcity of virgin olive oil – quality drop

Pest Impact Indicator

Viticulture

3-4 weeks shift in harvest date, reduced sugar content, change in typicality

Phenological Indicator

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Thanks for your attention!

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