



A central graphic featuring a globe with a satellite in orbit. Surrounding the globe is a ring of 12 circular panels, each displaying a different atmospheric data visualization, such as temperature, pressure, or chemical concentration. The background is a deep blue space with stars and a nebula.

ATMOS 2021

Welcome to the conference

Christian Retscher

ESA/ESRIN

2021-11-22

Introduction to ATMOS-2021



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ESA/ESRIN

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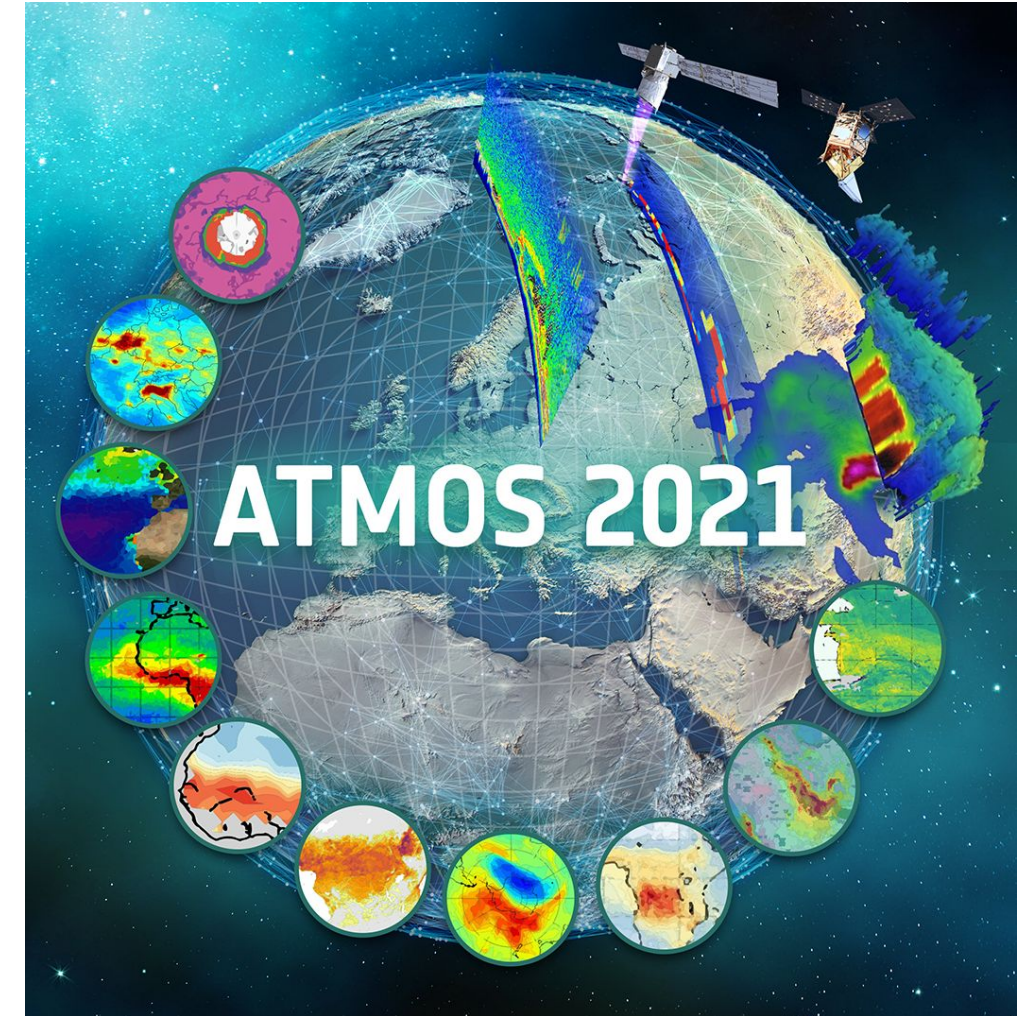
ATMOS-2021 – Programme



- 21 Oral, 15 e-Poster/LT sessions, 2 SW demos

Great thanks to chairs!

- **200+ contributions**
- **2 Keynote Talks:** Johanna Tamminen (FMI), David Crisp (NASA/JPL, Caltech)
- **6 Invited Talks:** Carlo Buontempo (ECMWF/C3S), Vincent-Henri Peuch (ECMWF), Barry Lefer (NASA), Akihiko Kuze (JAXA), Heesung Chong & Jhoon Kim (Yonsei University, Korea) and Liu, Yi (Chinese Academy of Sciences)



□ ATMOS 2021 - ESA ATMOSPHERIC SCIENCE CONFERENCE



→ THE EUROPEAN SPACE AGENCY

ATMOS-2021 – Conference Themes



- Air quality and climate monitoring from space;
- Stratospheric and middle-atmosphere processes;
- Reactive trace gases in the atmosphere;
- Clouds and aerosols;
- Greenhouse gases;
- Volcanic emissions;
- Solar induced fluorescence;
- Water vapour;
- Atmospheric dynamics;
- Earth's radiation budget;
- Cal/Val;
- Modelling.
- Sentinel-5P & Aeolus;
- Other European and international missions e.g. GOME-2, IASI, Aura, ACE, S-NPP, GOSAT/-2, TanSat, GEMS;
- New Earth Explorers and Earth Watch EarthCARE, FORUM, Altius;
- New Copernicus Sentinel-4, Sentinel-5, CO2M;
- Earth Explorer Candidates;
- Groundbased instruments;
- Copernicus services CAMS, C3S;
- FutureEO, CCI;

- **Talks** are **12 min. + 3 min. discussion**; Keynotes are 25 min. + 5 min. discussion;
- **Lightning talks** are **~3 min.**;
- **e-Posters** are available at the main **conference page**;
- Each speaker shares his/her own slides live by using the **webex share** functionality;
- Questions during the session -> **webex chat**;
- Chairs pick questions; **left over questions** -> wrap-up discussion every (half-)day;
- In the **wrap-up discussion** ESA and chairs (pending availability) raise again the most **relevant points** of sessions + **open discussion**, possible **recommendations** to ESA;
- Discussion on **e-Posters** in dedicated sessions; **break-out rooms** available;
- Chairs' wrap-up of their session + further points from discussion -> **slides/gdoc** and the most relevant will be revisited and discussed again during the **final discussion**;
- ESA will wrap-up the conference contributions, discussions, recommendations in a **Workshop report -> input for ESA scientific agenda** (on atmosphere)

ATMOS-2021 – Scientific Objectives Highlights



- Provide a platform for **scientific exchange** and to assess the state of the art of atmospheric applications;
- Foster the scientific **community** in **atmospheric** research;
- Present **mission status**, algorithms, and products for Copernicus Sentinel-5p and Aeolus;
- Provide updates on **development** and **science** activities regarding **future missions**;
- Provide updates on activities regarding ESA **Third Party missions**;
- Present large scale **international initiatives** to support the R&D activities relevant to atmosphere satellite missions;
- Present scientific results related to the **Copernicus Services CAMS & C3S**;
- Discuss **novel** atmospheric **missions**.

Provide a forum for scientists to formulate community recommendations (scientific agenda)

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Scientific Exploitation -> eo4society

Atmosphere Science Cluster -> ATMOS-2021



- Promoting **networking, collaborative research**, and fostering international collaboration in Atmospheric science;
- Involves ESA funded **projects** and **activities** bringing together different **expertise, data** and **resources** in a **synergistic** manner;
- ESA is **contributing** to establish a strong **European Atmosphere research** area in close collaboration with the European Commission Directorate General for Research and Innovation and other European and **international partners**.



<https://eo4society.esa.int/communities/scientists/esa-atmosphere-science-cluster/>

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ATMOS-2021 – Review & Actions 1



<http://atmos2018.esa.int/files/ATMOS-2018%20Workshop%20Report.pdf>

-> **31 Community Recommendations, 17 in progress, 1 not handled yet, 13 outside the Atmos Cluster**

- **R2 synergistic use of satellite data**
-> Methane+, SUNLIT, HiResCH4, GROSAT, HARPOL, ...
- **R3 continuous development of remote sensing retrieval algorithms**
-> S5p+ Innovation, Aeolus+ Innovation, ...
- **R7 O3 recovery, R9 O3 algorithm improvement, R10 recommendations from LOTUS**
-> Atmosphere Science Cluster RO-1, CCI, SUNLIT, AnREO
- **R8 Continue to improve L1 and L2 algorithms for stratospheric trace gases**
-> some of this is covered by Atmosphere Science Cluster RO-1
- **R11 air quality applications + tropospheric ozone retrievals**
-> Atmosphere Science Cluster RO-1
- **R12 Optimal Cloud model**
-> MIT3D, Atmosphere Science Cluster RO-2
- **R15 GHG more accurate measurements/retrievals; improvement in atmospheric inverse/assim techniques; RTM**
-> Methane+, Atmosphere Science Cluster RO-2, DACES
- **R18 Stratospheric aerosol research**
-> CREST

- **R19 Spatial downscaling of satellite observations -> air quality applications**
-> Atmosphere Science Cluster RO-1/2, CitySatAir
- **R20 BRO, SO₂ in volcanic plumes**
-> S5p+ Innovation
- **R22 Use satellite observations to optimise information on emissions**
-> WorldEmission
- **R23 Consistent and consolidated calibration of L1 data from UVN(S) missions; Continued improvements on L2 retrievals, specifically cloud/aerosol corrections for UTLS**
-> Partially covered by S5p+ Innovation, MIT3D, Atmosphere Science Cluster RO-2, HARPOL
- **R27 Assimilation of data into models, used as “transfer standard” to quantify biases between satellites;**
-> not picked up yet in dedicated project
- **R28 Process studies on observation data, gravity wave, ... + Combination of different observing systems of compositions & aerosols may provide useful information on atmospheric dynamics**
-> Partially picked up by Aeolus+ Innovation and Atmosphere Science Cluster RO-3
- **R30 Continuity of the ESA open call studies**
-> On atmosphere: 10 running, 1 planned, 4 concluded
- **R31 The ESA Living Planet and CCI Fellowship schemes**
-> 3 + 1 running; 1 concluded

ATMOS-2021 – Review & Actions 3



Handled outside the frame of the Atmospheric Science Cluster budget

- R1 ESA to develop a roadmap beyond Sentinel-5p, Sentinel-5, Sentinel-4, ...;
- R4, R5, R6 on Sentinel-4 and Sentinel-5 configuration;
- R13 need for a GHG satellite mission +CH₄;
- R14 Adequate characterisation and calibration of Sentinel-5B/C;
- R16 GHG funding for small satellites;
- R17 Sustained support for ground-based/air-borne GHG validation;
- R21 Make full use of Sentinel-5P and GOME-2 heritage when setting up the Sentinel-4 UVN and Sentinel-5 UVNS Cal/Val;
- R24 The development of suitable FRM data sets is essential;
- R25 There is no standard validation source yet for cloud optical depth and aerosol absorbing index;
- R26 In Cal/Val more research is needed to understand factors affecting error closure budgets;
- R29 On infrastructure, needs for a user driven infrastructure providing functionality that is currently offered by DIAS.

Atmosphere Science Cluster Projects



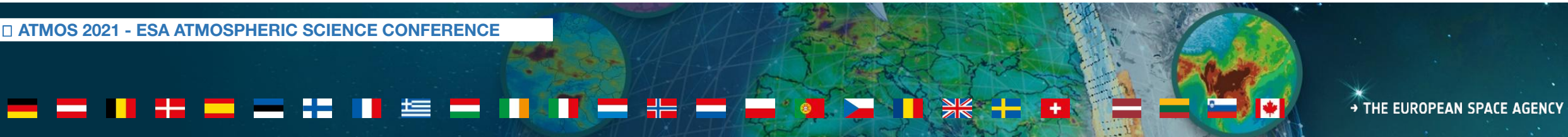
	Ozone	AQ	SO2	CH4	CO2	CO	H2O	Aer	Clid	SIF	Sur	HNO3	VOC	Ocean Color	Dyn	Mod	App	Tools
Projects	0	9	5	7	3	1	2	8	1	1	3	2	4	4	2	5	3	7
1 Aeolus+ Innovation 1 LISA															x			
2 Aeolus+ Innovation 2 NEWTON								x										
3 AlpAirEO		x															x	
4 Atmosphere Virtual Lab																		x
5 Carbon+ Methane				x											x			
6 CCI: GHG_cci				x	x													
7 CCI: Ozone_cci	x																	
8 CitySatAir		x																
9 CREST								x										
10 DACES		x			x													
11 GROSAT								x			x							
12 HARPOL								x										
13 HiResCH4				x														
14 METHEO				x							x					x		
15 MIT3D																		
16 MOOC-ATM																		x
17 S5p+ Innovation 1 CHOCHO		x											x					
18 S5p+ Innovation 2 OCIO	x																	
19 S5p+ Innovation 3 H2O-ISO							x											
20 S5p+ Innovation 5 AOD/BRDF								x			x							
21 S5p+ Innovation 5 SO2-LH			x															
22 S5p+ Innovation 6 SIF										x								
23 S5p+ Innovation 7 OC														x				
24 VISTA			x															
25 WIFVOS							x											

	Ozone	AQ	SO2	CH4	CO2	CO	H2O	Aer	Clid	SIF	Sur	HNO3	VOC	Ocean Color	Dyn	Mod	App	Tools
Projects	0	9	5	7	3	1	2	8	1	1	3	2	4	4	2	5	3	7
1 AtmosRO-1 AQ	x	x	x													x		
2 AtmosRO-1 Ozone	x															x		
3 AtmosRO-2 CH4				x														
4 AtmosRO-2 Clouds									x									
5 AtmosRO-2 HONO		x																
6 AtmosRO-2 Open																		
7 AtmosRO-2 Open																		
8 AtmosRO-3 Aeolus+ Aerosol								x										
9 AtmosRO-3 Processes															x			
10 O3Prof																		
11 WorldEmission	x	x	x	x	x							x	x			x	x	
1 S5p+ Innovation 5 AOD/BRDF PRISMA								x										
2 ICOVAC		x	x	x		x							x					
3 AnREO	x																	
4 AMIDA																		x
5 ATS (BEAT)																		x
6 MOOC-ATM COVID																		x
7 SOLFEO		x										x	x				x	
8 SUNLIT	x																	
9 TOP																		x

running/planned/concluded

-> 20+ scientific publications

ATMOS 2021 - ESA ATMOSPHERIC SCIENCE CONFERENCE



The organization of ATMOS-2021 – Thanks!



- **Organizing Committee**

Christian Retscher, Claus Zehner, Thorsten Fehr, Simon Pinnock, Diego Fernandez Prieto

- **Scientific Committee (many also acting as session chairs)**

Ilse Aben, Dimitris Balis, Hartmut Boesch, Helen Brindley, Dominik Brunner, Michael Buchwitz, Carlo Buontempo, John P. Burrows, Andre Butz, Alexander Cede, Ugo Cortesi, David Crisp, Doug Degenstein, Oleg Dubovik, Didier Fussen, Frank Hase, Anthony Illingworth, Brian Kerridge, Ruediger Lang, Barry L. Lefer, Yi Liu, Diego Loyola, Doina Nicolae, Vincent-Henri Peuch, Caroline Poulson, Oliver Reitebuch, Andreas Richter, Philipp Schneider, Ad Stoffelen, Johanna Tamminen, Michel Van Roozendaal, Pepijn Veefkind, Thomas Wagner, Kaley Walker

- **Scientific Committee ESA**

Angelika Dehn, Matthias Drusch, Michael Eisinger, Alex Hoffmann, Yasjka Meijer, Hilke Oetjen, Anne Straume, Ben Veihelman, Jonas Von Bismarck, Tobias Wehr

- **Organizing Support, Content, Media, Logistics**

Daniele Gasbarra, Alexandru Dandocsi, Ulla Vayrynen, Sabrina Lodadio, Irene Renis, Matteo Corona, Valeria Rosicarelli, Fabrizio Pera, Federica Mezzo, Alessio Ciaravino, Giorgia Marino

E-Icebreaker TODAY, 18:00 – 18:30, open cameras and microphones

**We wish you a pleasant and
successful ATMOS-2021 conference.**