Prototyping products from the new ISCCP-NG Georing of advanced VIS/IR imagers

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Background

- **Motivation**
  - Satellite-based datasets that require **enhanced spectral information** were in the past limited to individual GEO-sensors or to polar-orbiting sensors with sparse temporal sampling (and partly issues with calibration and satellite drift)
  - The new ISCCP-NG activity aims at generating a new GEO-ring of passive imager measurements facilitating, among others, the retrieval of a rich set of cloud properties with near-global coverage and high spatiotemporal resolution

- **In this study…**
  - … we prototyped cloud (and radiative flux) properties based on the new **ISCCP-NG L1g test data**, applying a retrieval system developed in ESA Cloud_cci

CC4CL – an integrated retrieval system

→ Community Cloud retrieval For Climate (**CC4CL**, Sus et al., McGarragh et al., AMT, 2018) - **developed in ESA Cloud_cci**

Features:

- **ANN based cloud detection and phase determination**
- **OE retrieval of cloud properties (COT, CER, CTP, …CWP)**
- OE retrieval of T_{skin} in clear-sky pixels
- Post-processor for **radiative broadband fluxes** (SW+LW, TOA+BOA, up+dn, allsky+clear-sky using retrievals above and NWP data (BUGSRAD; Christensen et al., ACP, 2017)
- Potential to process aerosols (Aerosol_cci)
- Level-2 uncertainties for cloud properties (+ uncertainty propagation Level-2 to Level-3, Stengel et al., ESSD, 2017, 2020)
- CC4CL is working well for AVHRR, MODIS, AATSR, SLSTR, **SEVIRI** and other sensors.

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Channels of the adv. GEO VIS/IR imagers

id	name	ABI	AHI	FCI	AMI	AGRI	SEVIRI
1	00_47um	470 nm	455 nm	0.47 µm	470 nm	0.47 µm	
2	00_51um		510 nm	0.51 µm	509 nm		
3	00_65um	640 nm	645 nm	0.65 µm	639 nm	0.65 µm	0.635 µm
4	00_86um	860 nm	860 nm	0.86 µm	863 nm	0.825 µm	0.81 µm
5				0.91 µm			
6	01_38um	1380 nm		1.38 µm	1.37 µm	1.375 µm	
7	01_60um	1610 nm	1610 nm	1.6 µm	1.61 µm	1.61 µm	1.64 µm
8	02_20um	2260 nm	2260 nm	2.2 µm		2.25 µm	
9	03_80um	3.90 µm	3.85 µm	3.8 µm	3.83 µm	3.75 µm	3.92 µm
10	06_20um	6.15 µm	6.25 µm	6.2 µm	6.21 µm	6.25 µm	6.25 µm
11	06_70um	7.00 µm	6.95 µm		6.94 µm	7.1 µm	
12	07_30um	7.40 µm	7.35 µm	7.3 µm	7.33 µm		7.35 µm
13	08_60um	8.50 µm	8.60 µm	8.5 µm	8.59 µm	8.5 µm	8.70 µm
14	09_70um	9.70 µm	9.63 µm	9.6 µm	9.62 µm		9.66 µm
15	10_40um	10.3 µm	10.45 µm	10.4 µm	10.35 µm	10.7 µm	10.8 µm
16	11_00um	11.2 µm	11.20 µm		11.23 µm		
17	12_00um	12.3 µm	12.35 µm	12.4 µm	12.36 µm	12.0 µm	12.0 µm
18	13_30um	13.3 µm	13.30 µm	13.3 µm	13.29 µm	13.5 µm	13.4 µm

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Channels of the adv. GEO VIS/IR imagers

SEVIRI subset in current ISCCP-NG L1g

id	name	ABI	AHI	FCI	AMI	AGRI	SEVIRI
1	00_47um	470 nm	455 nm	0.47 µm	470 nm	0.47 µm	
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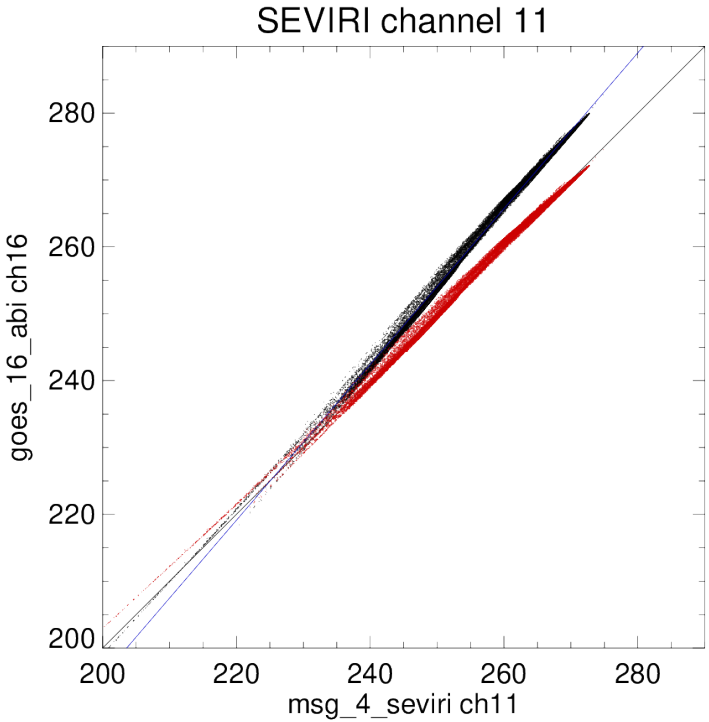
Spectral Band Adjustment (SBA)

- Based on applying SRFs to full spectrum measured by IASI and SCIAMACHY



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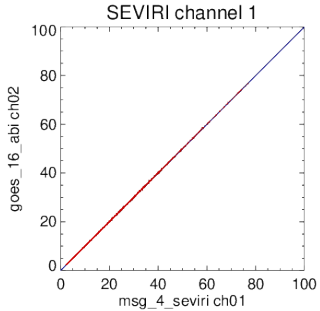

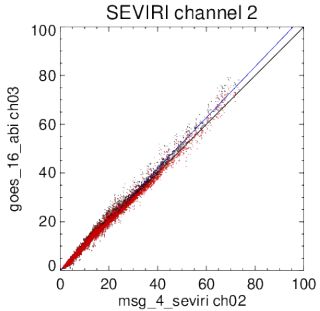

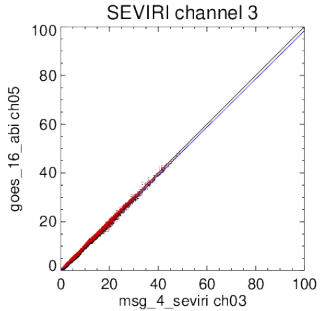

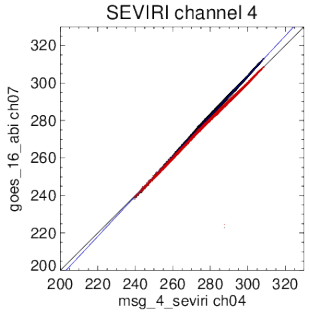

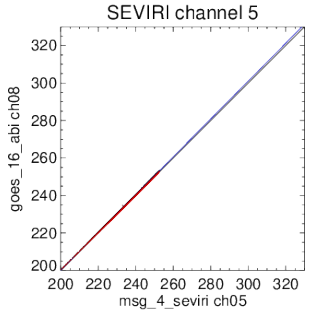

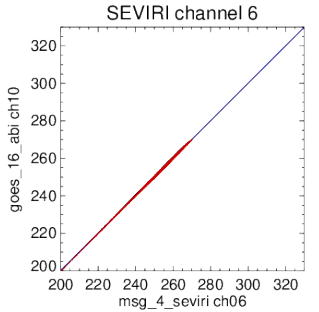

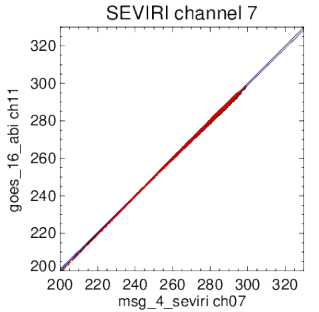

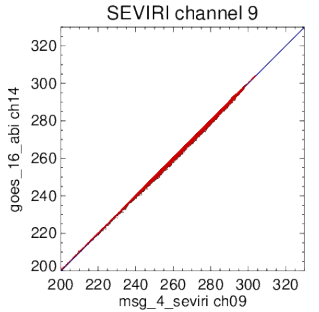

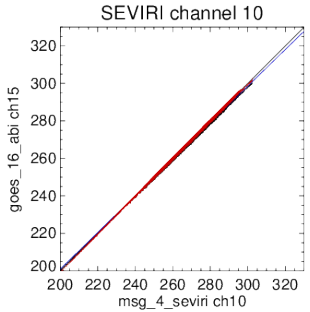

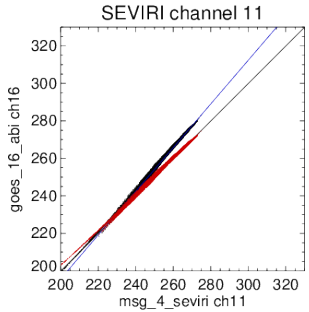

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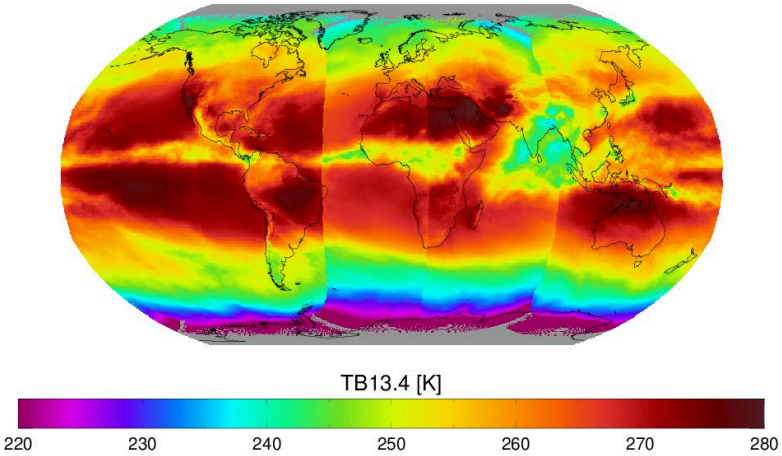
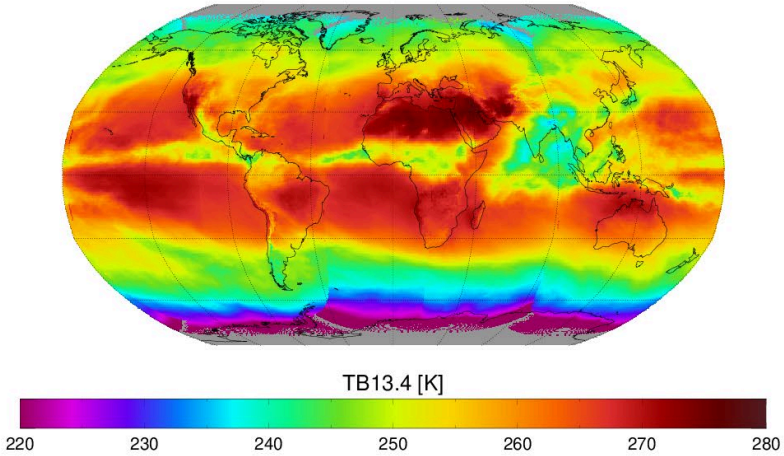
Spectral Band Adjustment (SBA)

- Monthly mean 13.3um/13.4um TB (July 2020)

no SBA



with SBA



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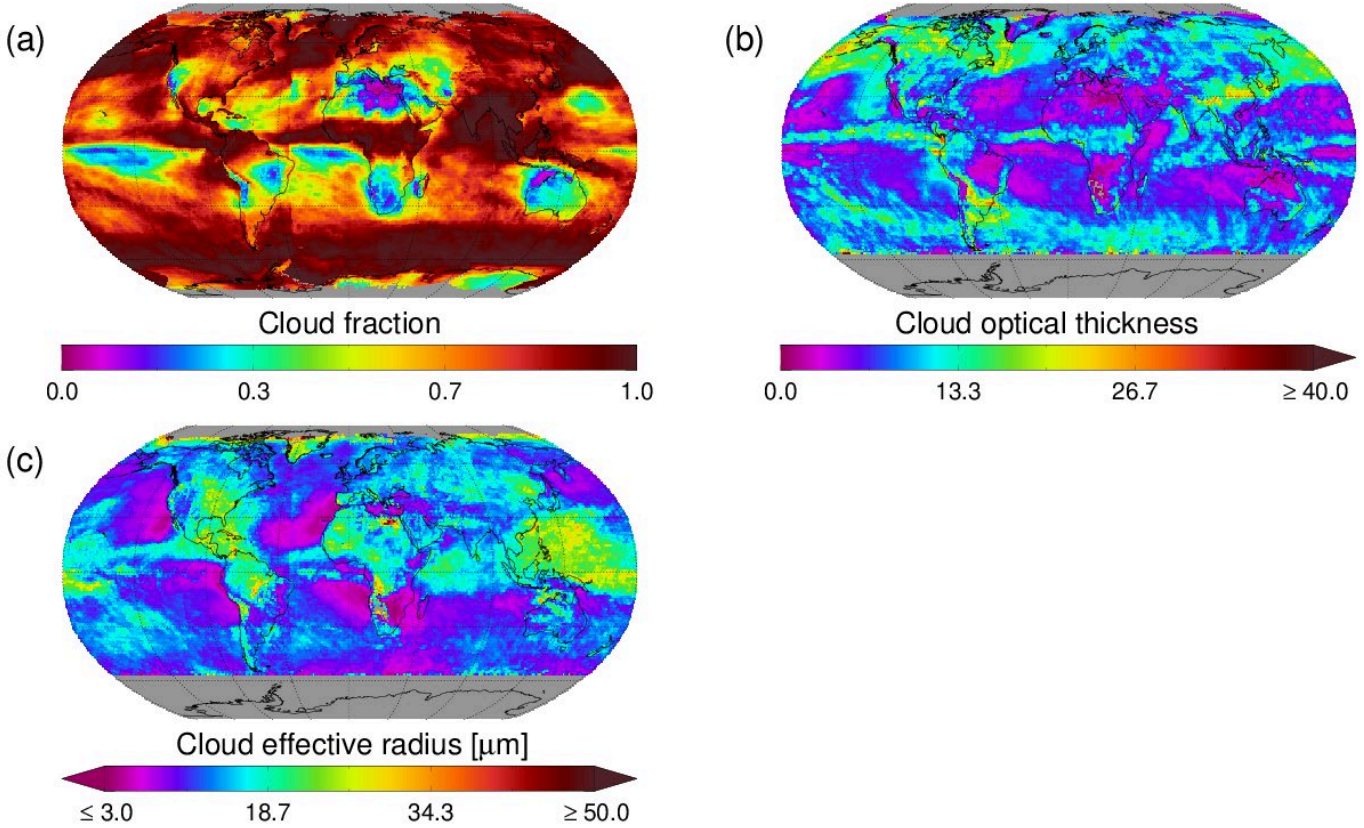
Examples – cloud properties



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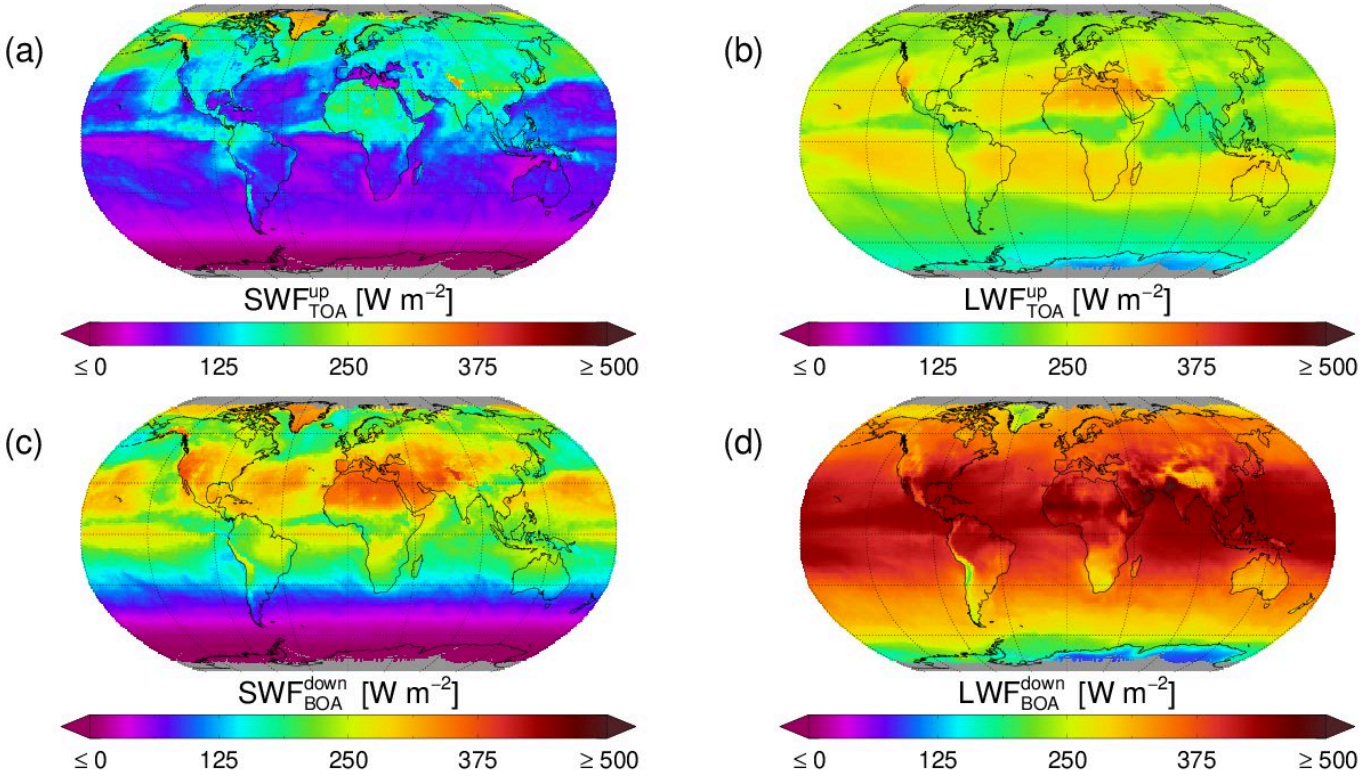
Examples – TOA radiative flux



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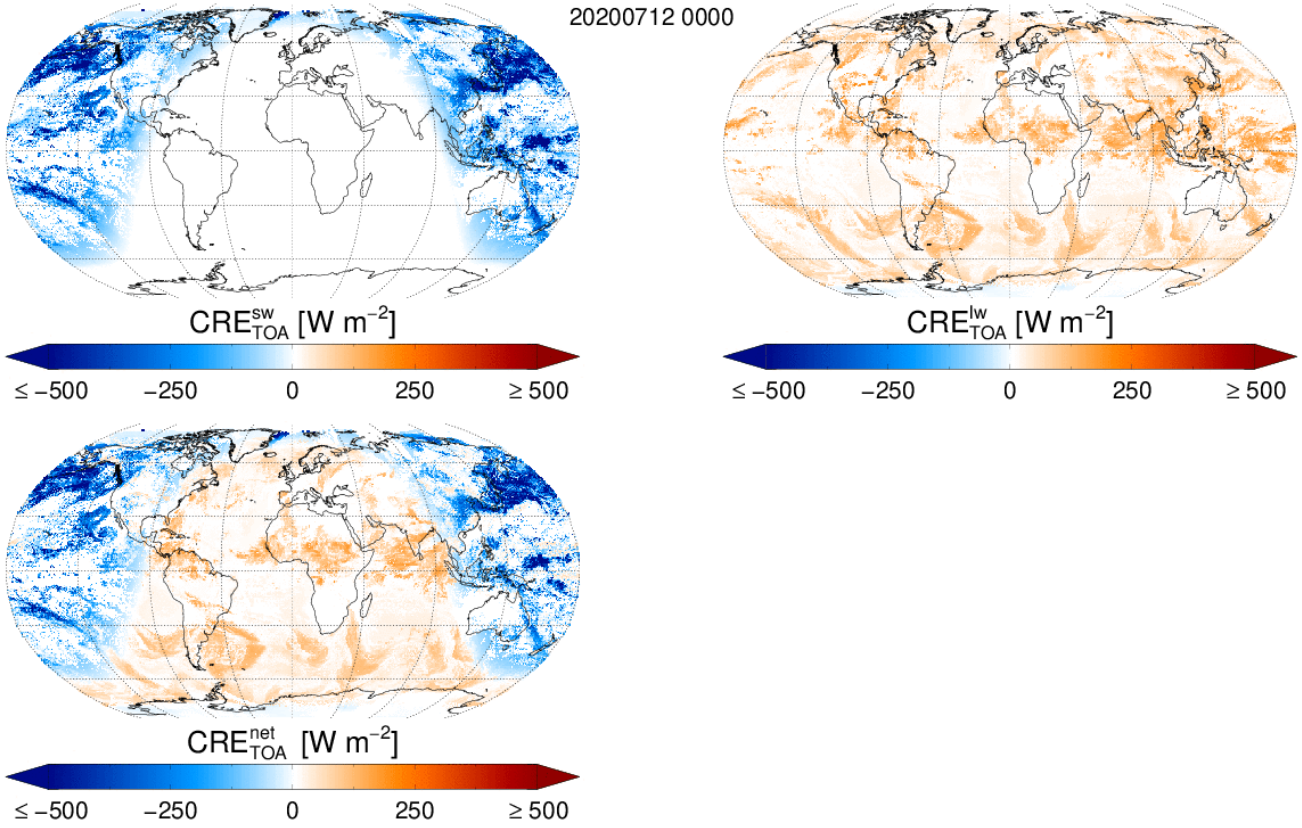
Examples – TOA net CRE (30min)



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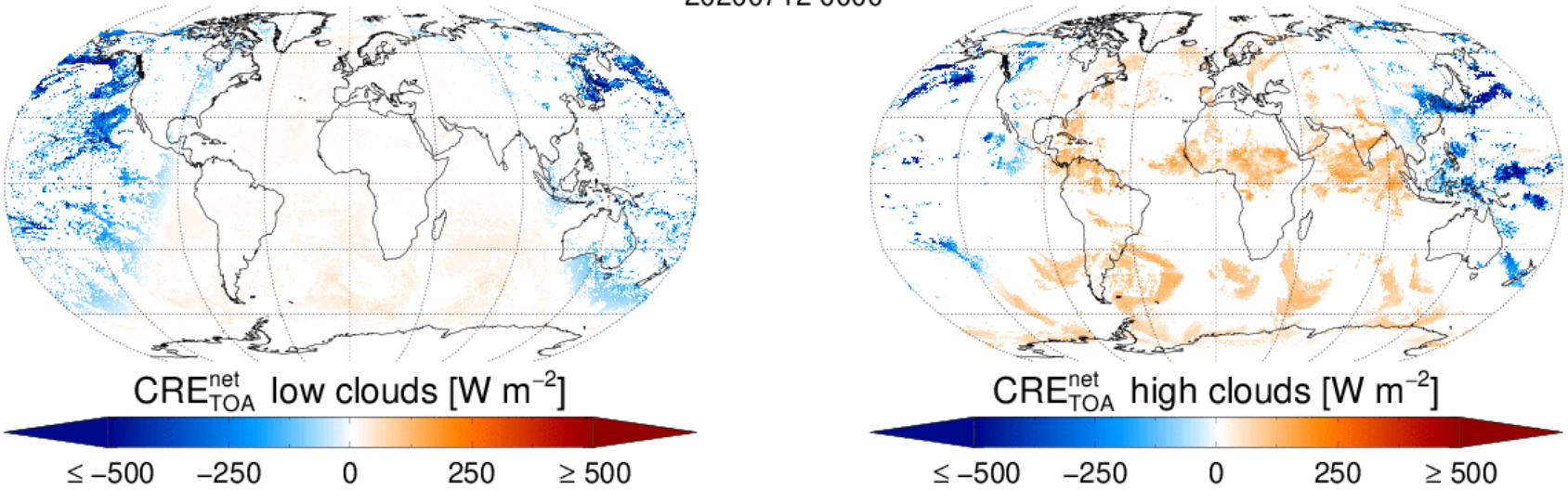
Examples – TOA net CRE by type (30min)

20200712 0000



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Takeaways

- Conducted a feasibility study applying CC4CL to the new ISCCP-NG L1g
- Now a rich set of cloud properties can be inferred with high temporal resolution and near-global coverage

ESA Cloud_cci+

- ESA Cloud_cci+ project phase II: 2023/03-2025/02
- Potentially fine-tune and run Cloud_cci algorithm on ISCCP-NG L1g for extended period
- Sustained framework for long-term application unknown

EUMETSAT CM SAF

- CDOP-4 Phase (2022/03-2027/02):
- Applying CM SAF cloud algorithms, a 1-year demonstrator cloud dataset will be generated based on ISCCP-NG L1g
- Contribute to and support ISCCP-NG cloud property intercomparisons done in ICWG
- CDOP-5 Phase (2022/03-2027/02) and beyond:
- Broadening/intensifying the CM SAF data production activities for ISCCP-NG to establish a sustained European contribution

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Thank you

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