ESA CLIMATE CHANGE INITIATIVE - ATMOSPHERE SATELLITE DATA RECORDS FOR ESSENTIAL CLIMATE VARIABLES

ESA Climate Change Initiative

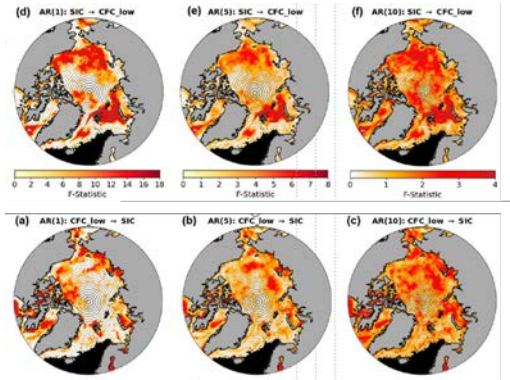
The European Space Agency's Climate Change Initiative (CCI) is leading efforts to generate global, long-term and stable satellite-derived time series for **21 Essential Climate Variables (ECVs).** These observation datasets enable scientists to identify climate trends, test models to predict future change and inform decision pathways towards meeting the goals of the Paris Agreement. The CCI is improving satellite-derived Climate Data Records for **Aerosol, Cloud, Ozone** and **Greenhouse Gases** atmospheric ECVs. New global **Water Vapour** datasets are under development to add to the existing suite of CCI data.

aerosol cci | cloud cci | ozone cci | greenhouse gases cci | water vapour cci

AEROSOL & CLOUD – reducing uncertainties

Aerosol, cloud and their interaction remain major sources of uncertainty in understanding how the climate will change due to global warming. The CCI has developed global time series for both **Aerosol (1995-onwards)** and **Cloud (1982-2016)** ECVs.

The CCI Cloud project finds strong evidence for a positive cloud – sea-ice feedback in the Arctic with the capability to contribute to autumnal Arctic amplification (Philipp *et al.*, J. Climate, 2020)



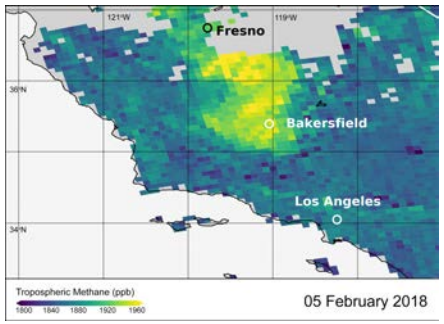
Less Arctic sea-ice
→ More low-level clouds

More low-level clouds →
Less Arctic sea-ice

METHANE detection

A new CCI **XCH4** retrieval algorithm for the **Copernicus Sentinel-5P TROPOMI** instrument is able to identify and quantify the impact of methane leakage from oil and gas fields.

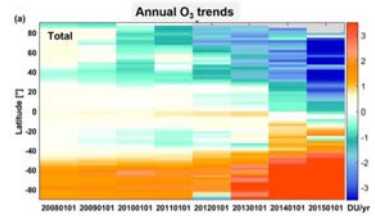
(Schneising *et al*, 2019)



Methane levels near Bakersfield, California

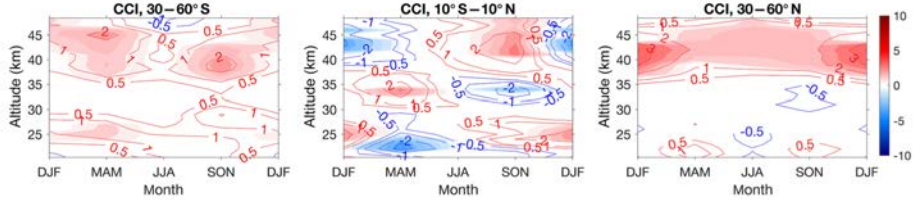
OZONE Recovery & Seasonal & Regional trends

Acceleration of ozone recovery detected by IASI. Concurrent ozone recovery detected in the lower, middle–upper stratosphere and total column from, IASI/Metop-A data (Wespes *et al.,* ACP, 2019)



Evolution of estimated linear trend (DU/yr)

Seasonal and regional stratospheric ozone trends reveal altitude, latitude and longitude-dependent structures. Improved spatial and temporal resolution provides more information than annual mean trends to better understand the role of dynamics for future ozone recovery predictions (Szelag *et al.,* ACP, 2020)



Altitude–season variation of linear trends in ozone for CCI merged data (2000-2018)