

EARTH OBSERVATIONS IN SUPPORT OF THE PARIS AGREEMENT

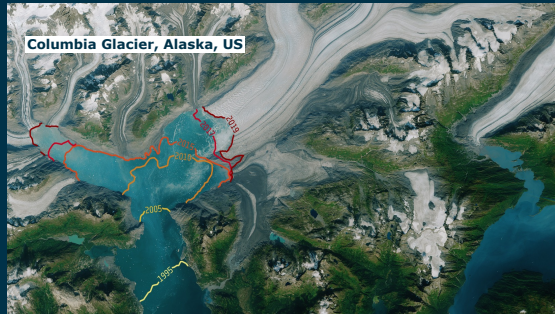
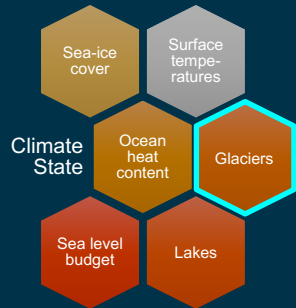
Earth Observations (EO) help quantify the changing climate, and thus can be used to **measure progress and achievements** towards the **UNFCCC Paris Agreement's** overarching goals to combat climate change at both the national (reporting within the **ETF**) and the global level (**GST**). However, how to translate EO variables to actionable information for policymakers is not always straightforward. This ESA study assembled **case studies to showcase opportunities** on how EO can already be used in support of the Paris Agreement.

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 ESA Climate Change Initiative
 (CCI) Science Leads



MONITORING THE CLIMATE STATE AS KNOWLEDGE-BASE FOR ACTION

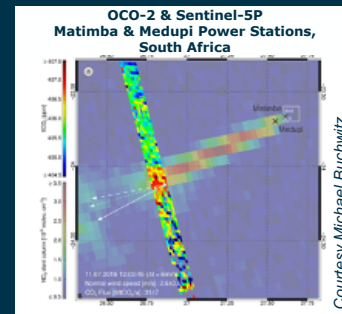
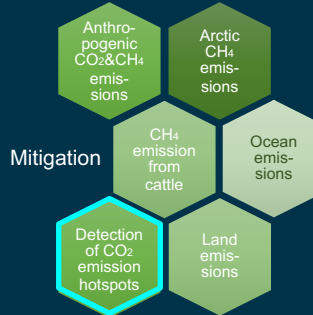
Is the climate system responding according to our expectations? The climate system has experienced rapid changes with consequences for life on Earth not yet fully understood. The retreat of glaciers as documented by Landsat imagery yields information on the sensitivity of the cryosphere to global climate change.



Courtesy Zemp et al., Nature 2019

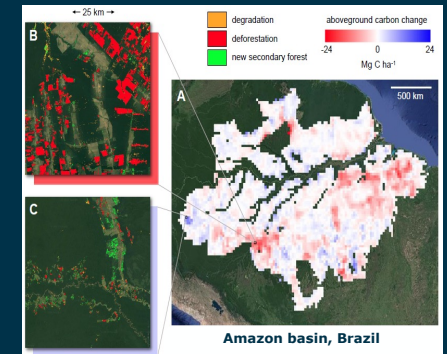
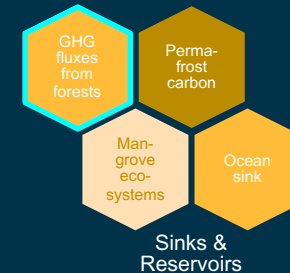
ASSESSING PROGRESS WITH MITIGATION AND MAINTAINING SINKS & RESERVOIRS

Are our mitigation efforts effective? EO are used to detect CO₂ and CH₄ hotspots of emission sources and also help quantify various natural and anthropogenic sources and sinks on country to continental scales using model-based inversion methods.



Courtesy Michael Buchwitz

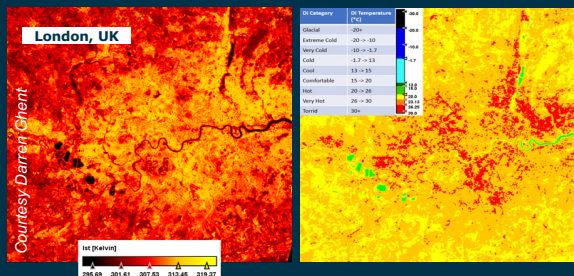
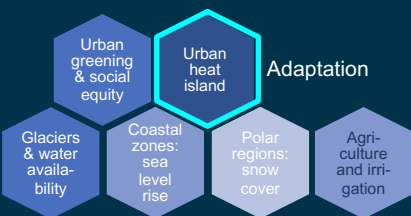
How do human activities change the magnitude of greenhouse gas sinks and reservoirs? EO can be used to monitor the health of forests, a major carbon sink. Deforestation, forest degradation, but also reforestation efforts are all visible from space.



Courtesy Dominic Fawcett

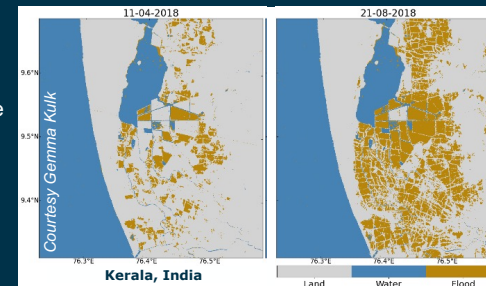
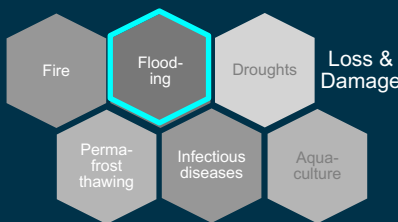
INFORMING ADAPTATION AND MONITORING THE EXTENT OF LOSS & DAMAGE

Are our adaptation efforts adequate? Urban areas experience higher temperature extremes than surrounding areas, due to the Urban Heat Island effect. Adaptation strategies (such as urban greening) are measurable over time. ESA CCI land surface temperature and modelled relative humidity are used to derive a thermal discomfort index (DI), a 'feels like' temperature at urban structure scales of ~100 m.



Courtesy Darren Ghent

Are we protected against economic and non-economic loss and damage? Flooding is one of the most frequent natural disasters. Currently, Sentinel-1 and Sentinel-2 data can be used to map flooding at 10 m resolution to help inform about the extent of loss events.



Courtesy Gemma Kulk

OUTLOOK Key to realising EO's full potential for guiding the world in its fight against climate change is the co-development of **innovative** solutions-oriented information derived from EO. This requires **collaboration across communities** in research, industry, and governments, both nationally and internationally, and with a specific focus on **capacity building**.