

climate change initiative

ANTHROPOGENIC WATER USE

Project Status



anthropogenic
water use
cci

18/10/2024



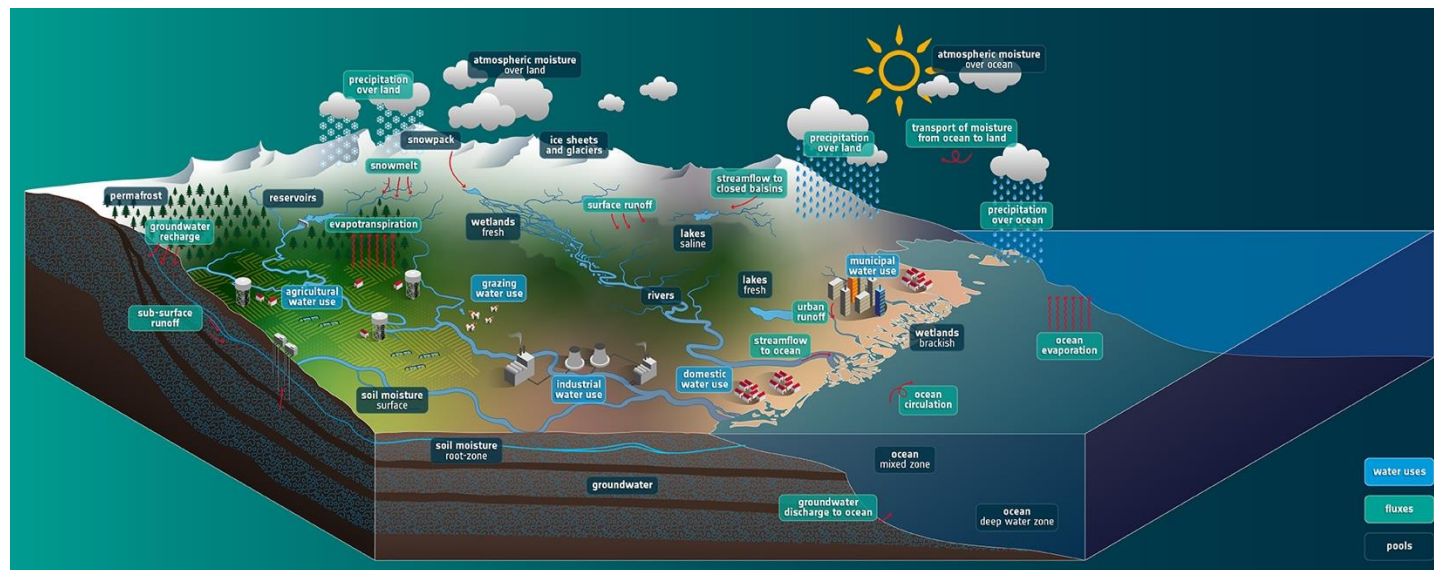
Background



2+ billion people affected by water stress

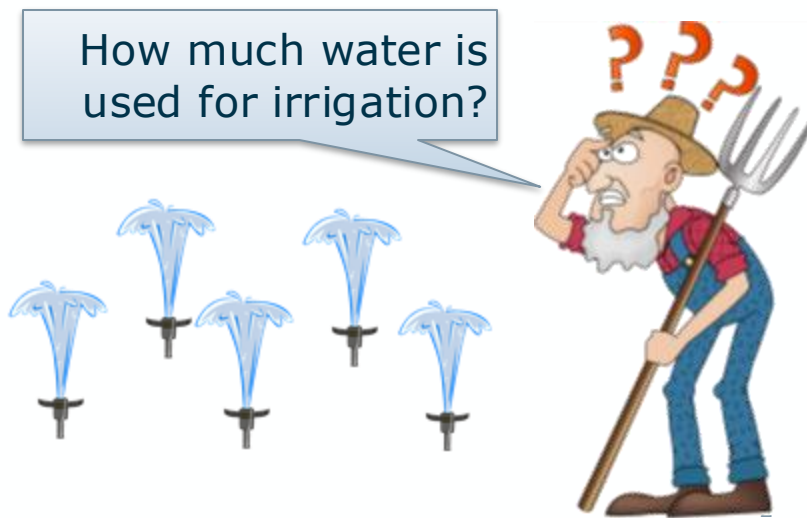
A number that will only increase with population growth, continued economic development and climate changing (United Nations, 2018)

The human impact has become a major component on the water cycle



70% of the water withdrawn worldwide is for irrigation, the major water consumer of our planet

PROBLEM: Lack of ground data at field level, leading to unknown quantity of water used for irrigation in the past, present and future



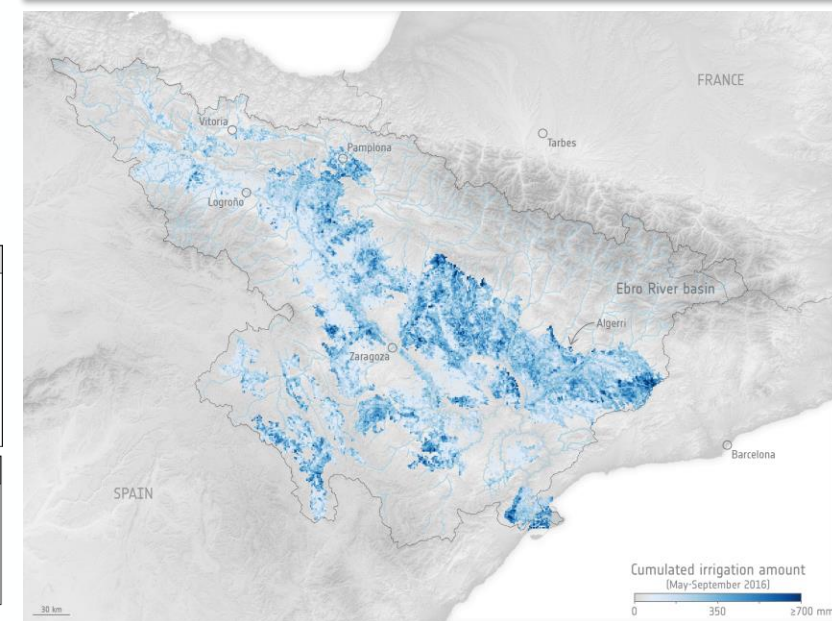
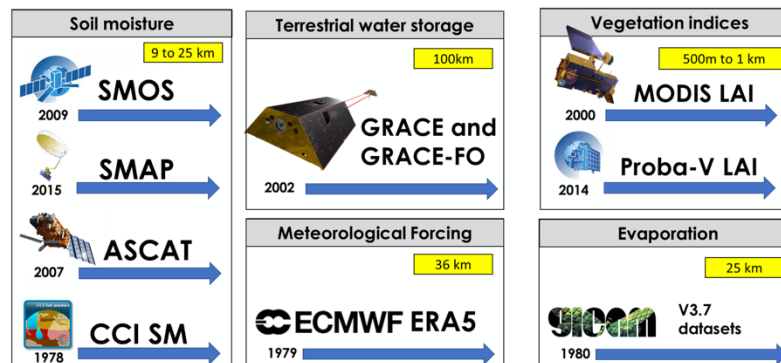
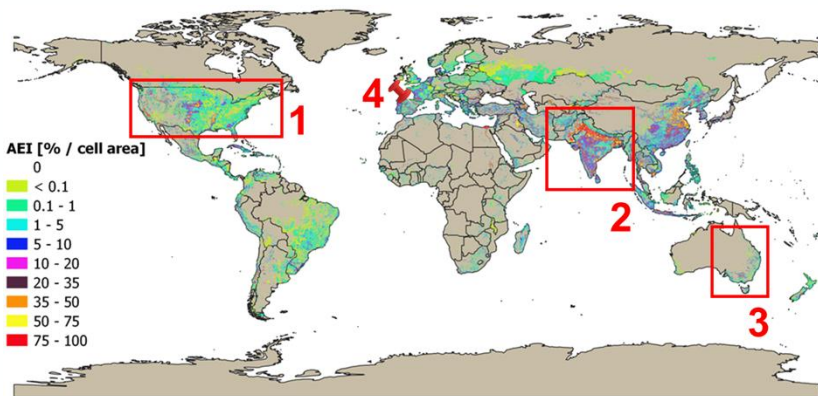


Objectives



The overarching objective of the **Climate Change Initiative – Anthropogenic Water Use (CCI-AWU)** precursor project is to develop and validate **long-term AWU time series** (mainly consisting of agricultural water use) for **four selected regions** where detailed ground-based irrigation estimates are available. Several approaches and algorithms using **remote sensing observations** will be considered, as a proof-of-concept towards a dedicated AWU ECV product.

The legacy of the **ESA Irrigation+** project, which developed advanced EO-based algorithms and techniques for **irrigation mapping, quantification and detection** from field to regional/global scale, is exploited.





Where we are?



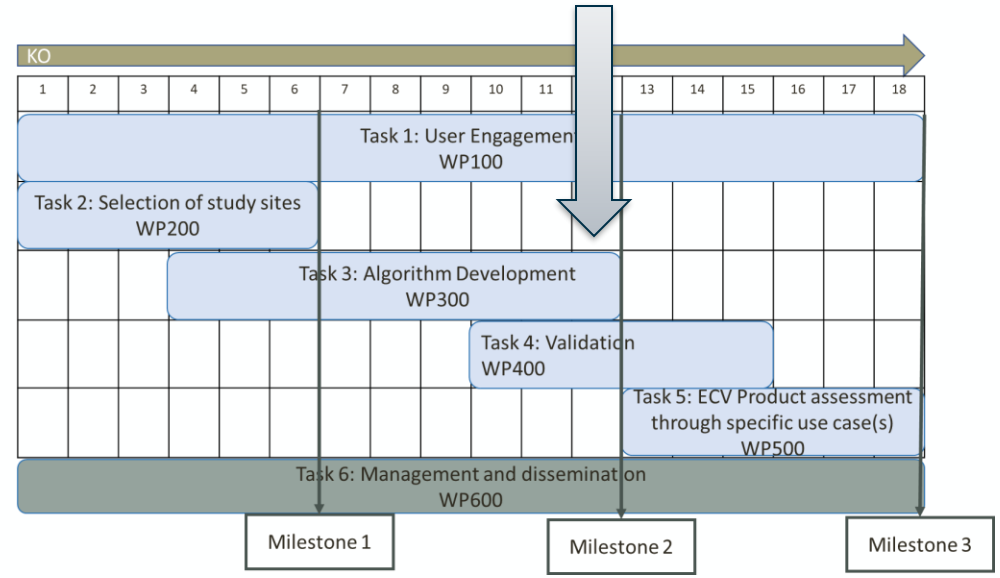
WP310: SM-based inversion approach (UNIPG+CNR-IRPI)

WP 320: SM-based delta (TUWien)

WP 330: Flux-based approach (TUWien)

WP340: Data Assimilation (KULeuven+CNR-IRPI)

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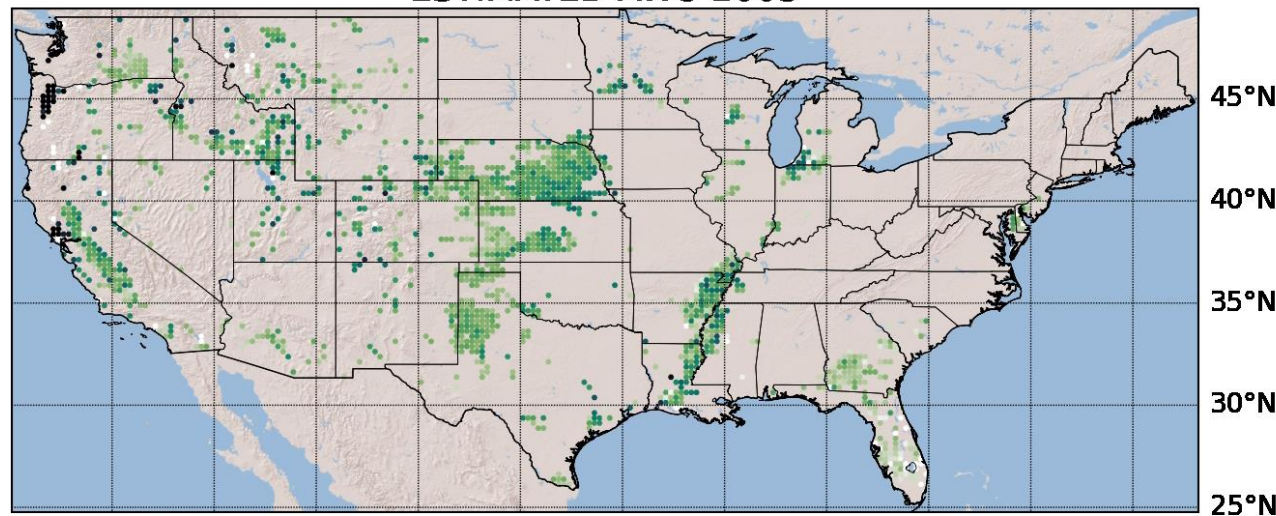




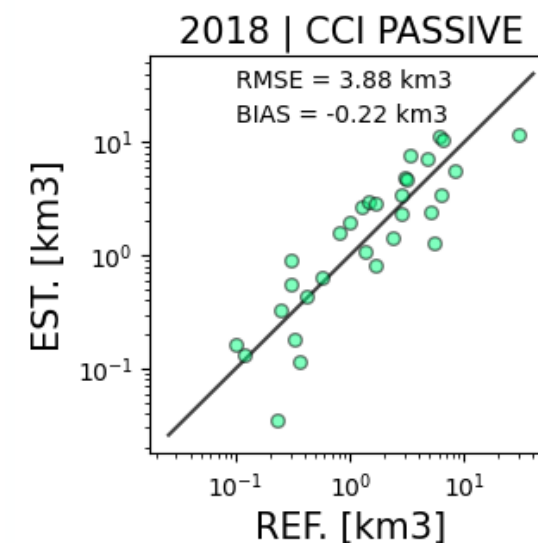
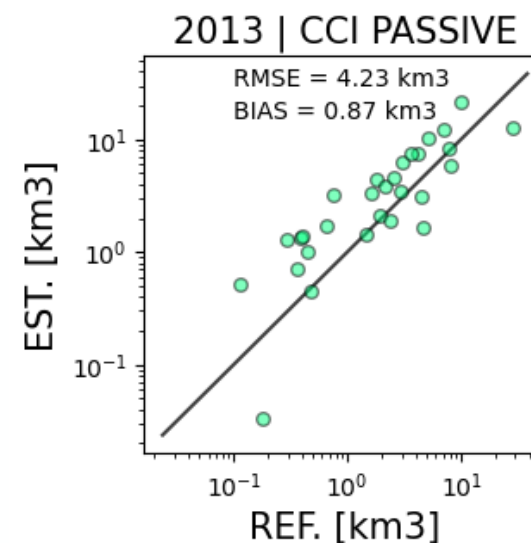
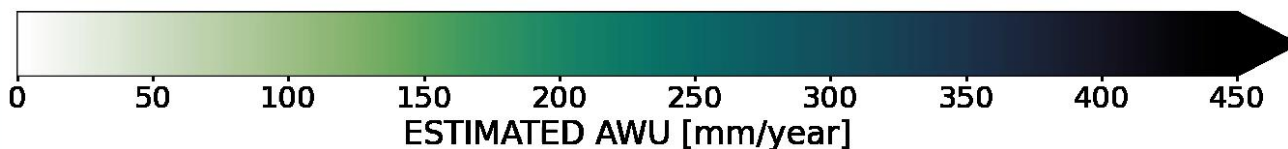
SM-based inversion approach Contiguous United States



ESTIMATED AWU 2003



120°W 115°W 110°W 105°W 100°W 95°W 90°W 85°W 80°W 75°W 70°W



Results over the CONUS obtained leveraging **CCI PASSIVE** soil moisture

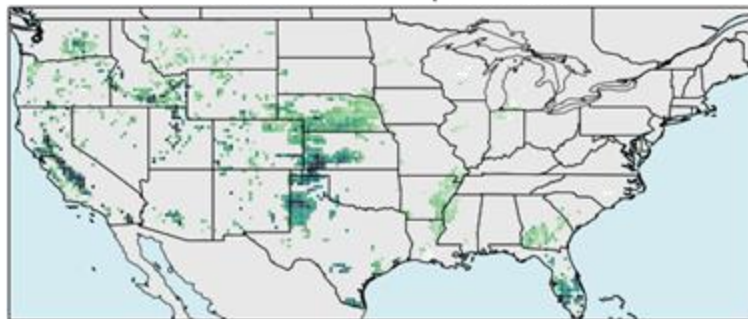




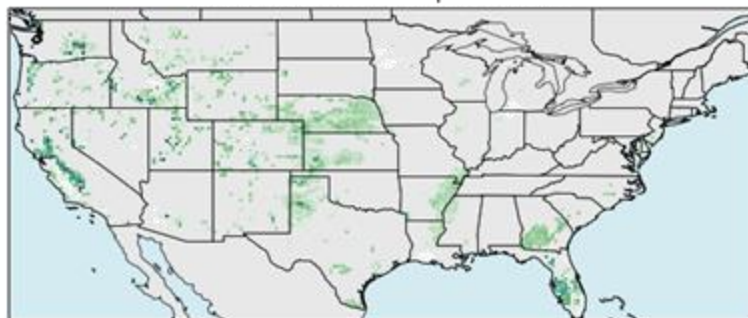
SM-based delta approach Contiguous United States



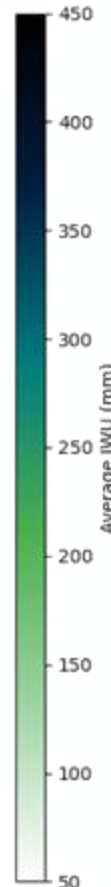
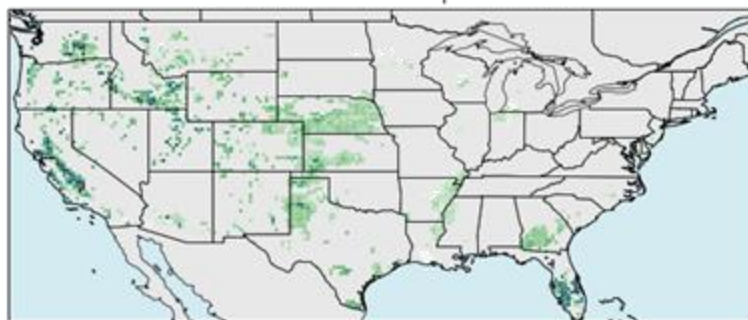
CCI PASSIVE SSEBOP | 2003-2022



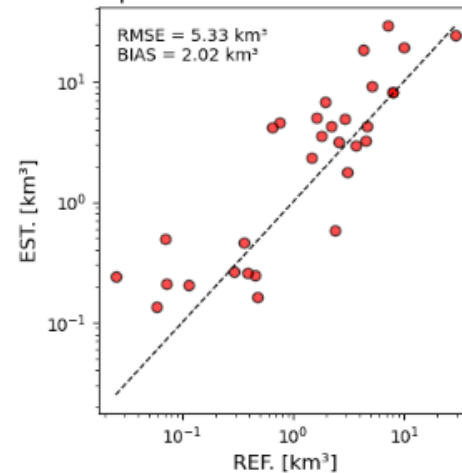
CCI ACTIVE FLUXCOM | 2003-2020



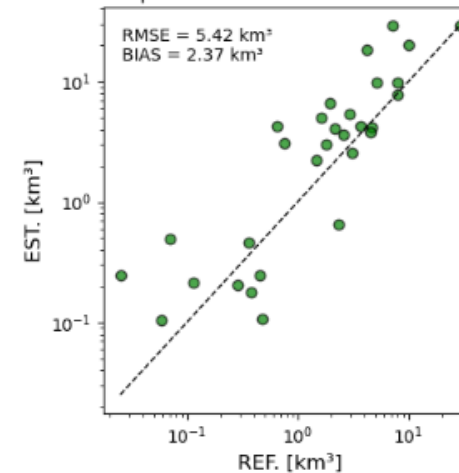
CCI PASSIVE FLUXCOM | 2003-2020



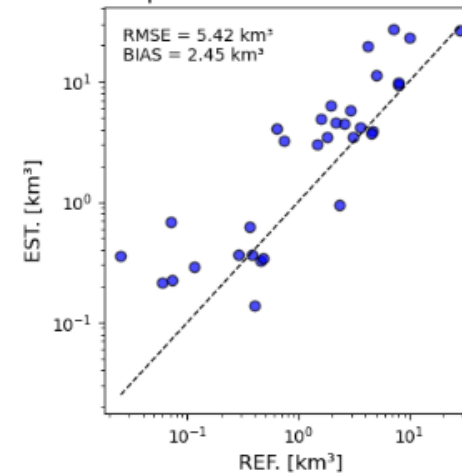
2018 | SM CCI COMBINED & ET SSEBOP



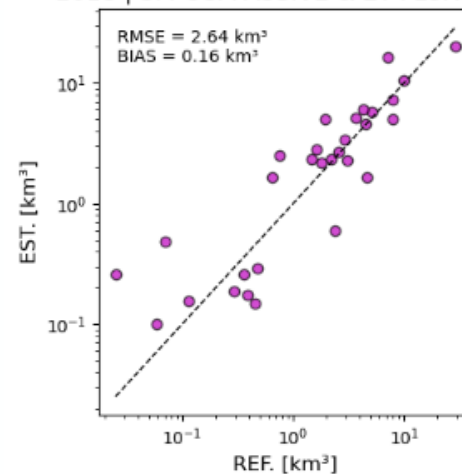
2018 | SM CCI PASSIVE & ET SSEBOP



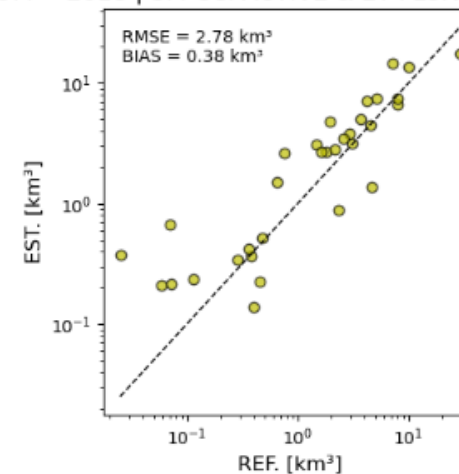
2018 | SM CCI ACTIVE & ET SSEBOP



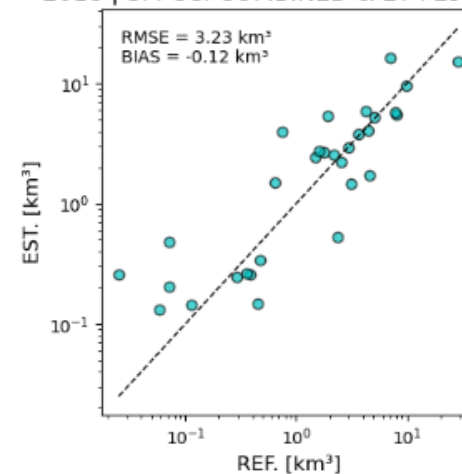
2018 | SM CCI PASSIVE & ET FLUXCOM



2018 | SM CCI ACTIVE & ET FLUXCOM



2018 | SM CCI COMBINED & ET FLUXCOM

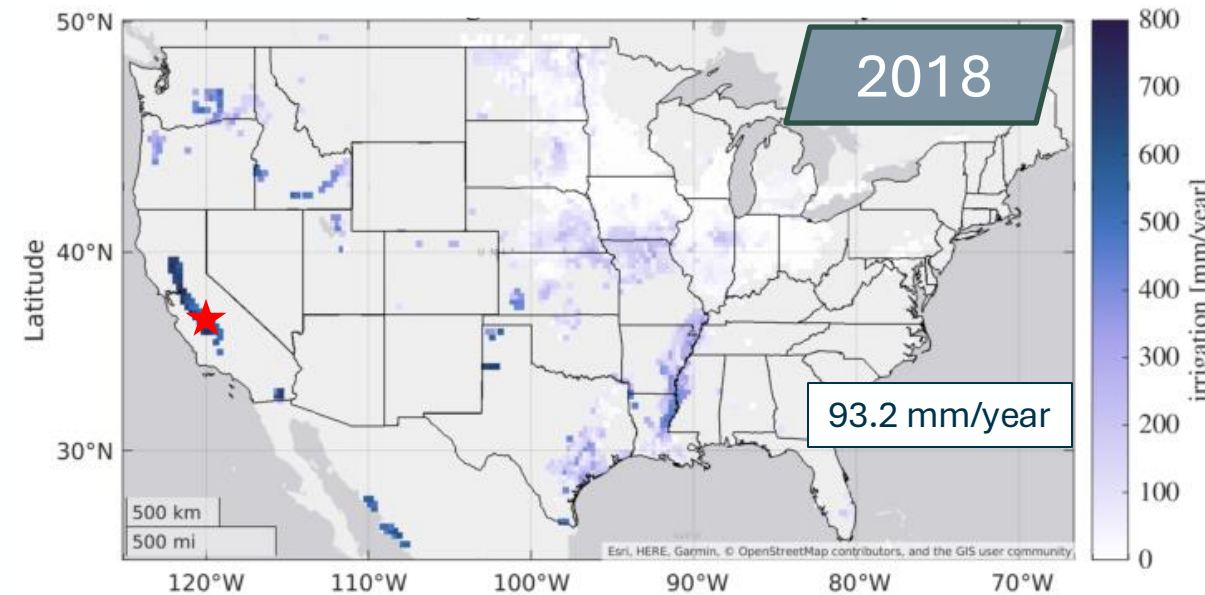
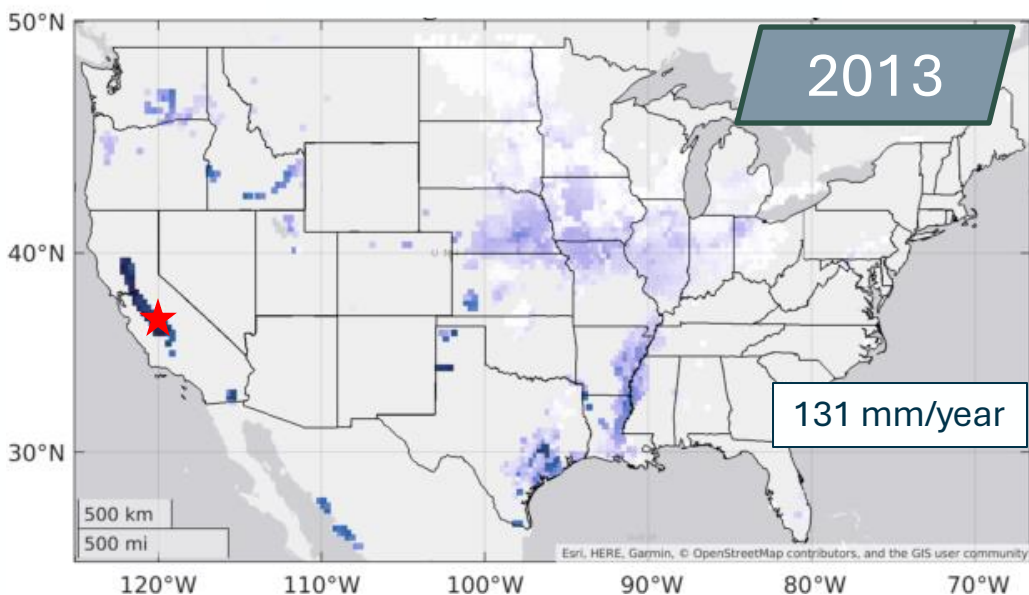




Data assimilation approach Contiguous United States

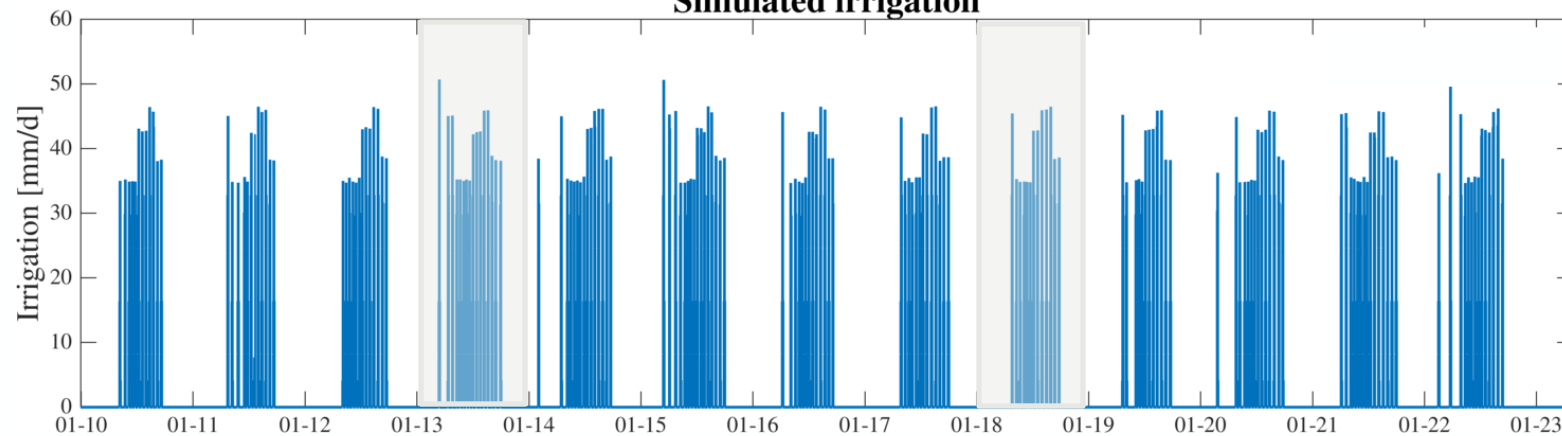


Example maps of annual irrigation and long-term time series



**25km/daily
spatio-temporal
resolution**

Simulated irrigation



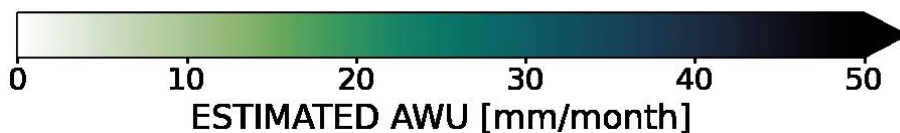
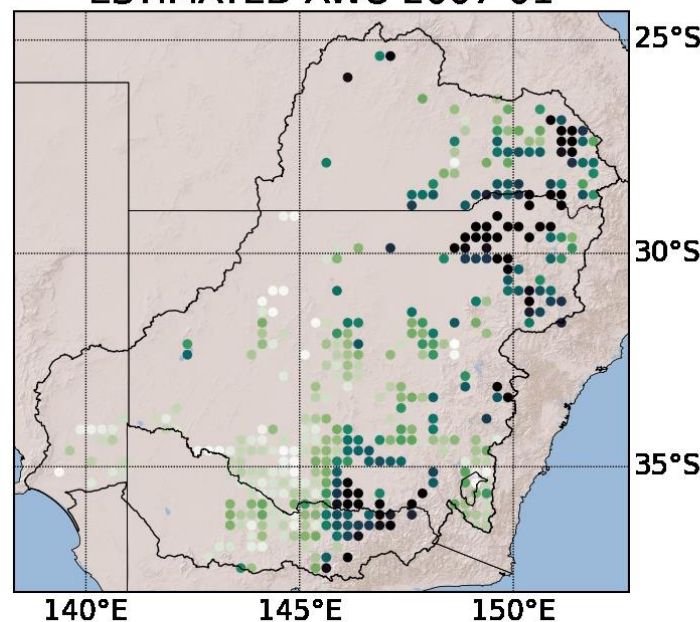
* Long-term
(2010-2022)
irrigation over an
irrigated pixel in
California



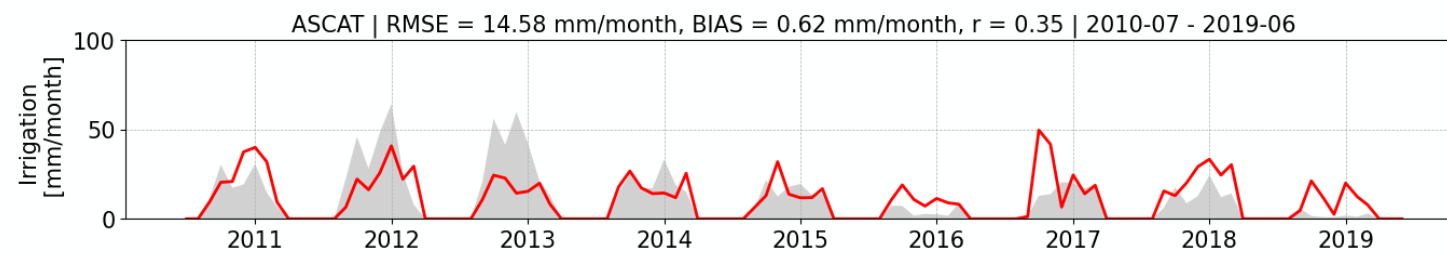
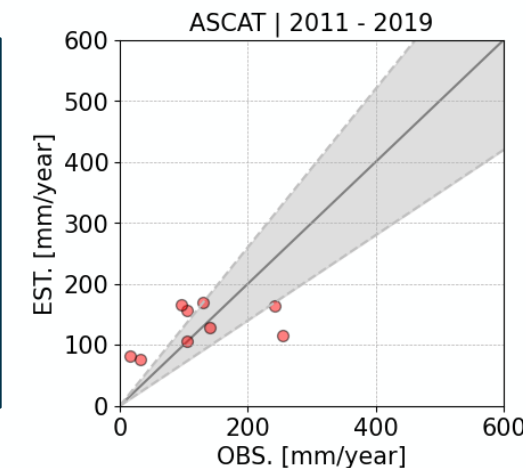
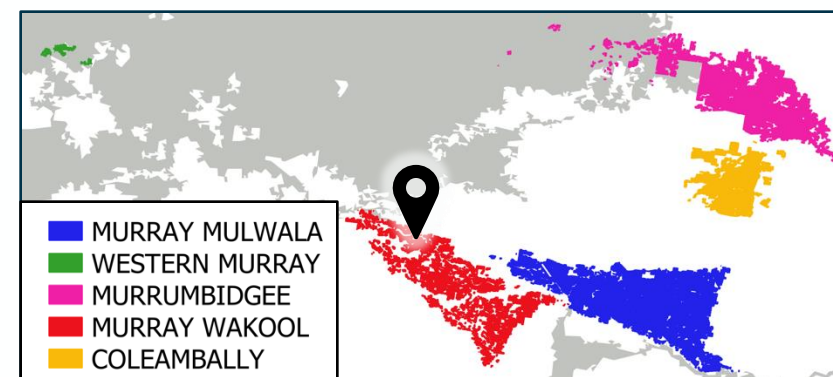
SM-based inversion approach MURRAY-DARLING BASIN, AUSTRALIA



ESTIMATED AWU 2007-01



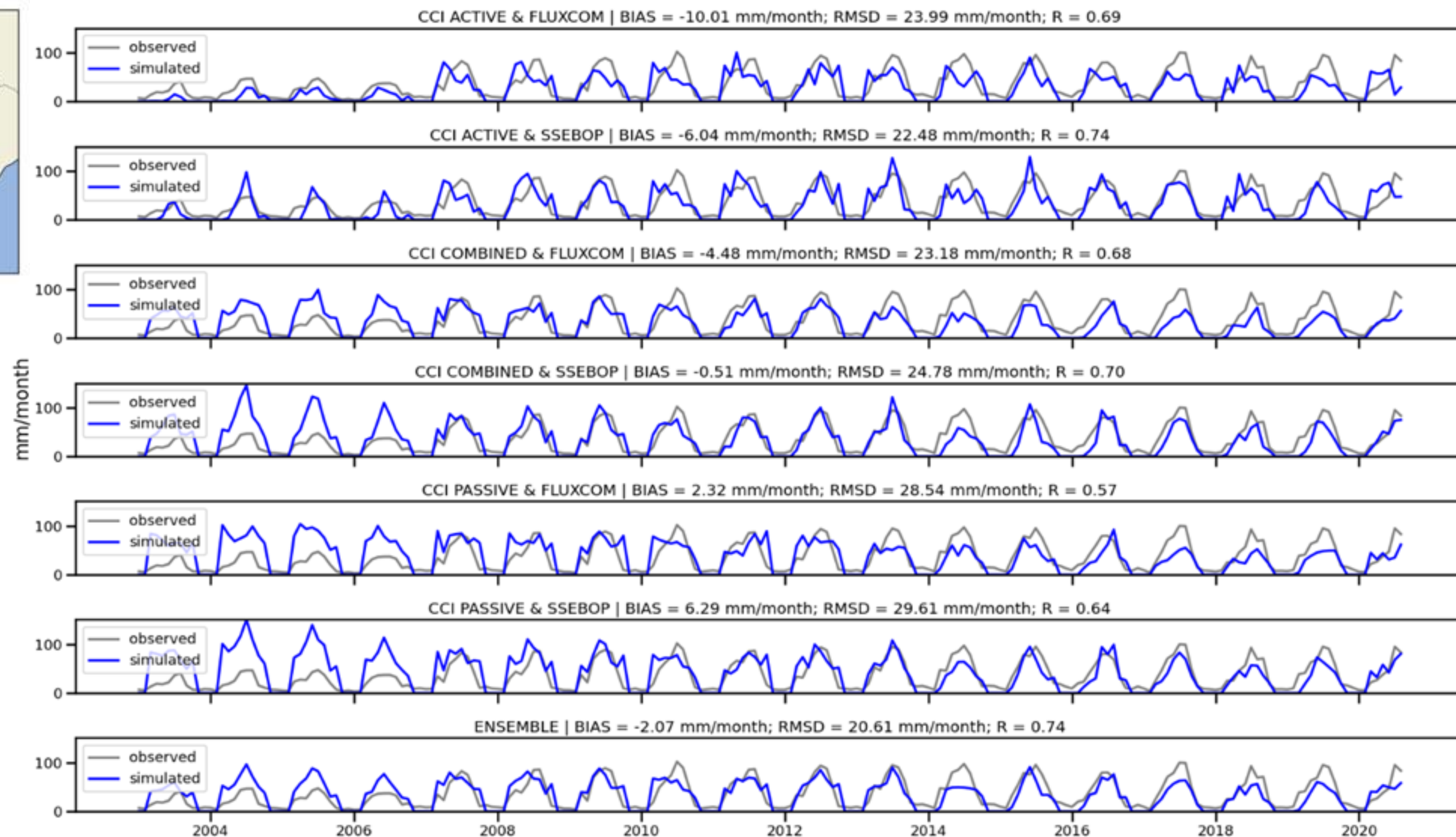
Murray-Wakool, 1455.2 km²



Results over the Murray-Darlin basin (Australia) obtained leveraging **ASCAT** soil moisture



SM-based delta approach EBRO (Spain)





Website

<https://climate.esa.int/en/projects/anthropogenic-water-use/>

Papers

Dari J, Morbidelli R, Quintana-Seguí, P and Brocca L (2024) The Temporal-Stability-Based Irrigation MAPping (TSIMAP) Method: A Virtuous Trade-Off between Accuracy, Flexibility, and Facility for End-Users. *Water*, Volume 16, Issue 5. <https://www.mdpi.com/2073-4441/16/5/644>

Presentations and posters

- Poster “CCI-AWU: precursor Project for Anthropogenic Water Use” at the 13th CCI colocation meeting
- Presentation at the MAGIC Workshop in Assisi on 2 November 2023
- Presentation at the NGGM MAG Meeting in ESTEC on 18 January 2024
- Presentation at the ESA EO4AGRI 2024 Workshop: <https://eo4agri2024.esa.int/>
- Presentation at the DTE Hydrology Webinar:
<https://www.youtube.com/watch?v=VIFMXvvPTb8>
- Presentation at the Hydroterra+ MAG Meeting in ESTEC on 23 July 2024



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Thanks!

