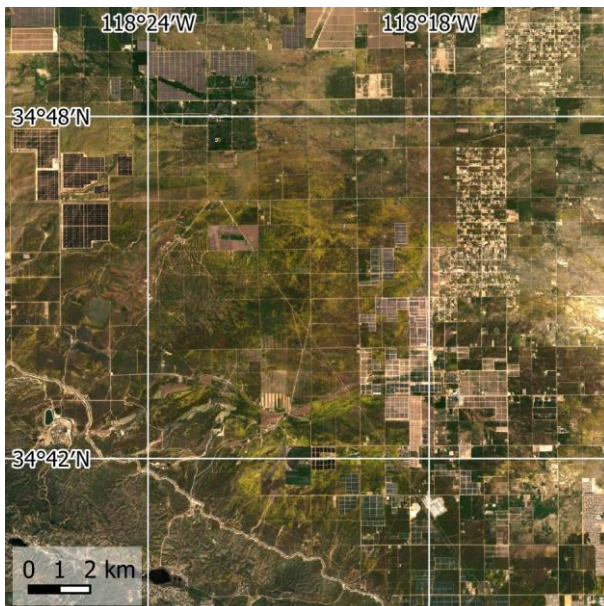


2023-04-08, Sentinel-2 true colours, during superbloom.



2023-04-13, Sentinel-2 true colours, after the superbloom.

Superbloom in California

California's superblooms are a very special phenomenon related to the distribution of biomass on land. They are rare and spectacular natural events in which vast expanses of desert and grasslands burst into vibrant displays of wildflowers. These blooms occur when the region experiences an unusually wet winter, allowing dormant wildflower seeds to germinate and grow in massive numbers. California's deserts, such as Anza-Borrego, Antelope Valley, and Carrizo Plain, are particularly famous for superblooms, which feature flowers like poppies, lupines, and desert sunflowers.

The superbloom of 2023 near Lancaster, specifically in Antelope Valley, was one of the most striking in recent years. Following the heavy winter rains from atmospheric rivers and an unusually wet season, the Antelope Valley California Poppy Reserve saw a dense bloom of California poppies, the state's iconic flower. The bloom attracted thousands of visitors, turning the landscape into a sea of bright orange flowers.

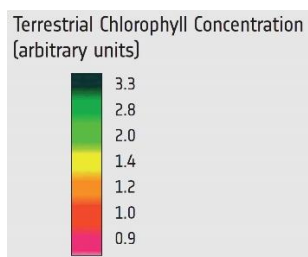
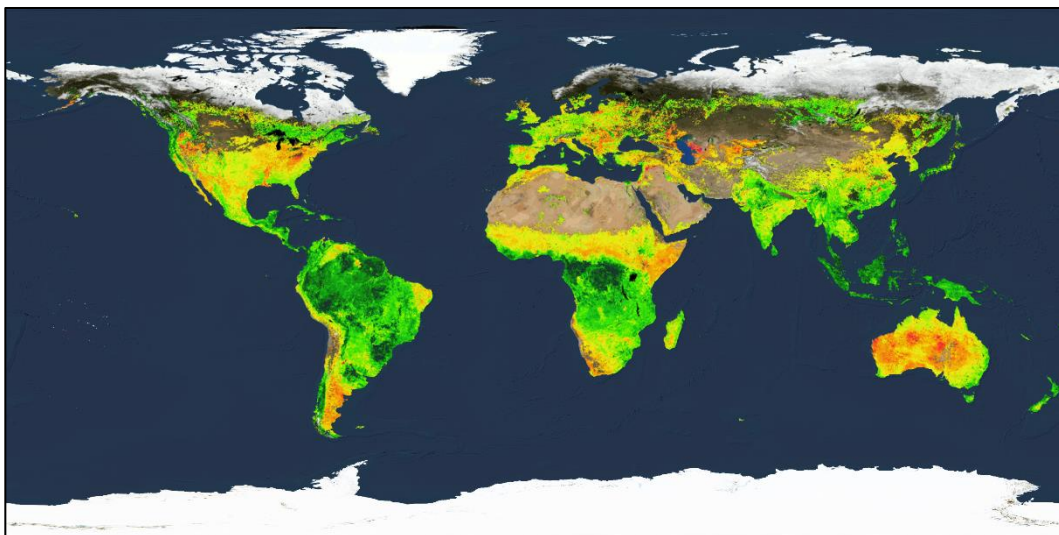
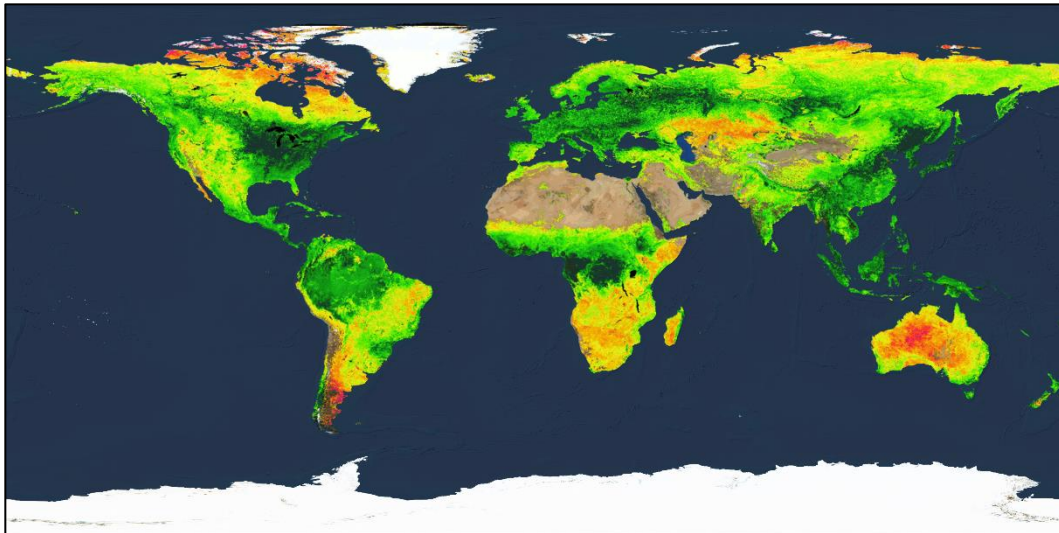
Data from satellites like Sentinel-2 and Landsat, which provide high-resolution imagery, help scientists track vegetation growth, soil moisture, and seasonal patterns that contribute to the blooms. These satellites can capture the extent and density of superblooms, offering valuable data on how climate factors like precipitation and temperature affect these phenomena.

Exercises

- Look at the true colour Sentinel-2 satellite image maps and compare. What differences can you identify? What can be the reason of the differences? Compare with the photograph below!
- Note that the images have been taken within a period of less than a week. What does this tell us about the duration of a superbloom? Note how simultaneously the flowers bloom!
- Similar colour differences can be observed for agricultural land, too. Which agricultural products can you imagine will show this behaviour? Think about rape or tulips.
- Looking at the global distribution of chlorophyll in the maps below, where do you think is most chlorophyll stored? Think about forests, and which types of forests exist.



Additional Material



*Concentration of chlorophyll (in arbitrary units) on the land surfaces in June 2023 (top) and December 2023 (center);
photograph of a poppy superbloom in California (photo: John Fowler)*

Links and Sources

- Aerial photographs of a superbloom: <https://www.nasa.gov/image-article/nasa-aircraft-captures-images-over-antelope-valley-californias-superbloom/>
- NASA Earth Observatory with Landsat data on a superbloom: <https://earthobservatory.nasa.gov/images/151192/a-flood-of-wildflowers>

