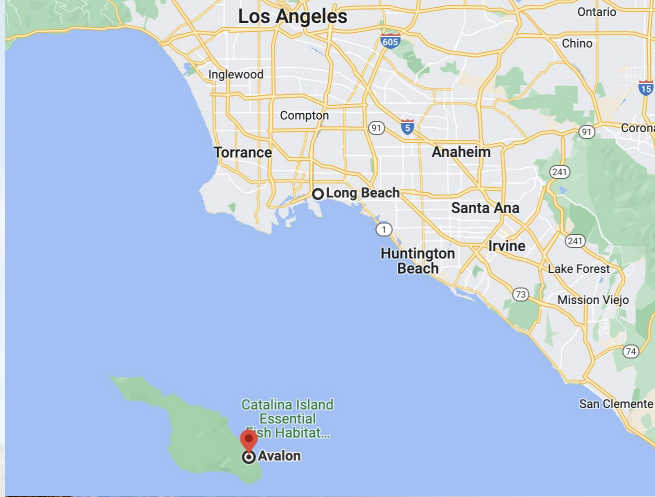
Get SARtsy

NASA Space Apps 2023
Ashley Nicole Warner

Exploring Catalina Island's Vegetation Growth using UAVSAR data

Introducing Santa Catalina Island

- One of the channel islands off the coast of Southern California.
- Home to about 4,000 residents, and a projected 850,000+ annual tourists.
- Majority of island is under conservancy
  - The two small towns have no options for expanding.
- Only fresh water source is rainfall.
  - Droughts put population in dire circumstances
  - Prolonged dry seasons = higher risk of brush fire



Catalina's unique geographical isolation means residents are cut off from resources. In situations where emergency response is needed (water reservoir runs dry, brush fire, etc), response will be delayed.

Catalina is at high risk in the climate emergency

The Data

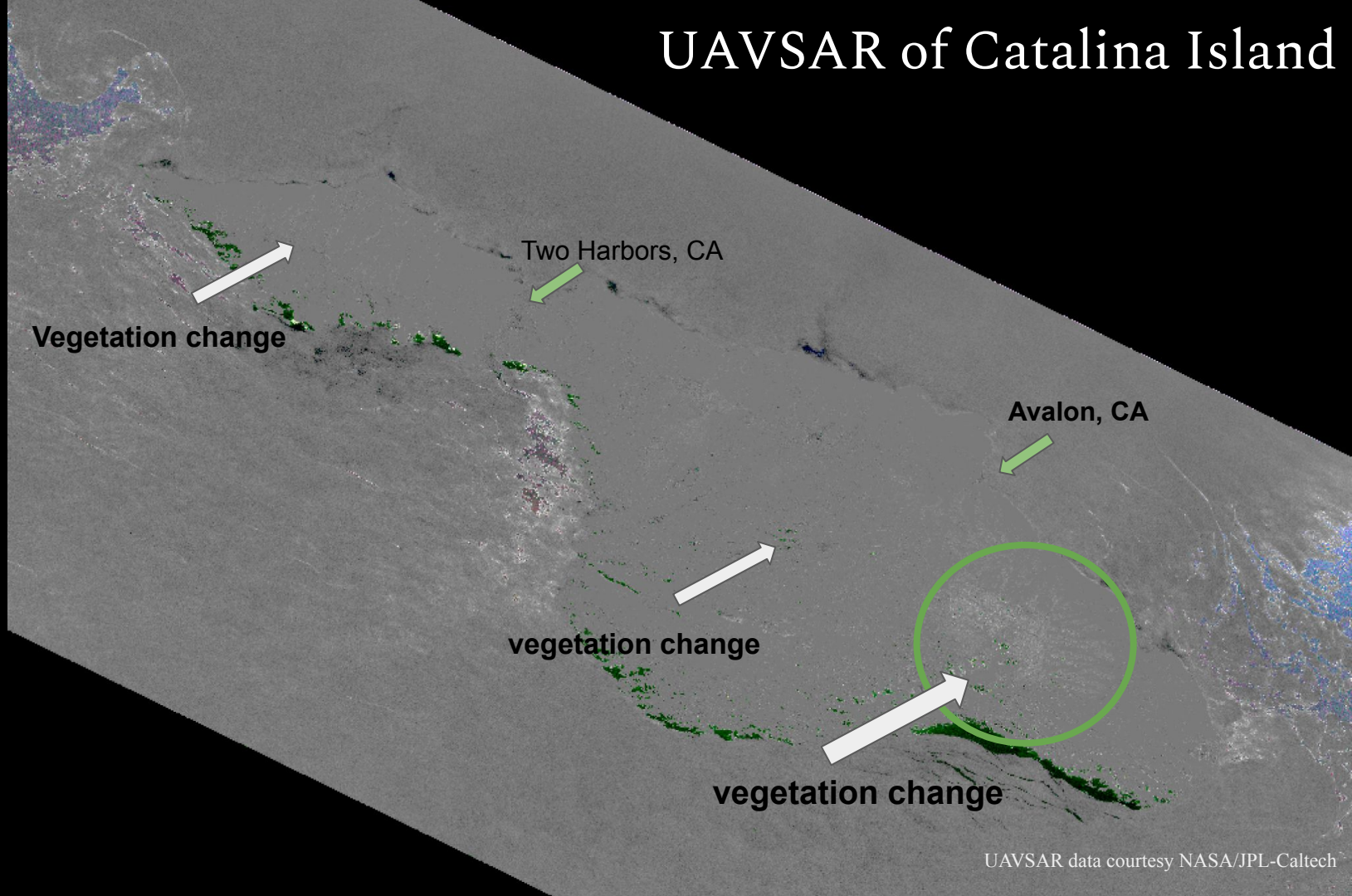
- Synthetic Aperture Radar (SAR) is a technique used to quickly acquire massive amounts of geospatial data.
- From JPL UAVSAR (uninhabited aerial vehicle SAR) data, there are two different datasets that record geospatial data over Catalina Island
  - 2009 and 2022.
- Using this SAR data, we can track the vegetation growth over the span of 13 years.
  - This will include before and after a historic 5 year drought.

UAVSAR of Catalina Island

Data is the logarithmic ratio of 2022 L Band to 2009 L Band.

Brighter areas mean 2022 had higher values.

Wet vegetation in the L band tends to appear brighter than dryer soil.



UAVSAR data courtesy NASA/JPL-Caltech

Conclusions

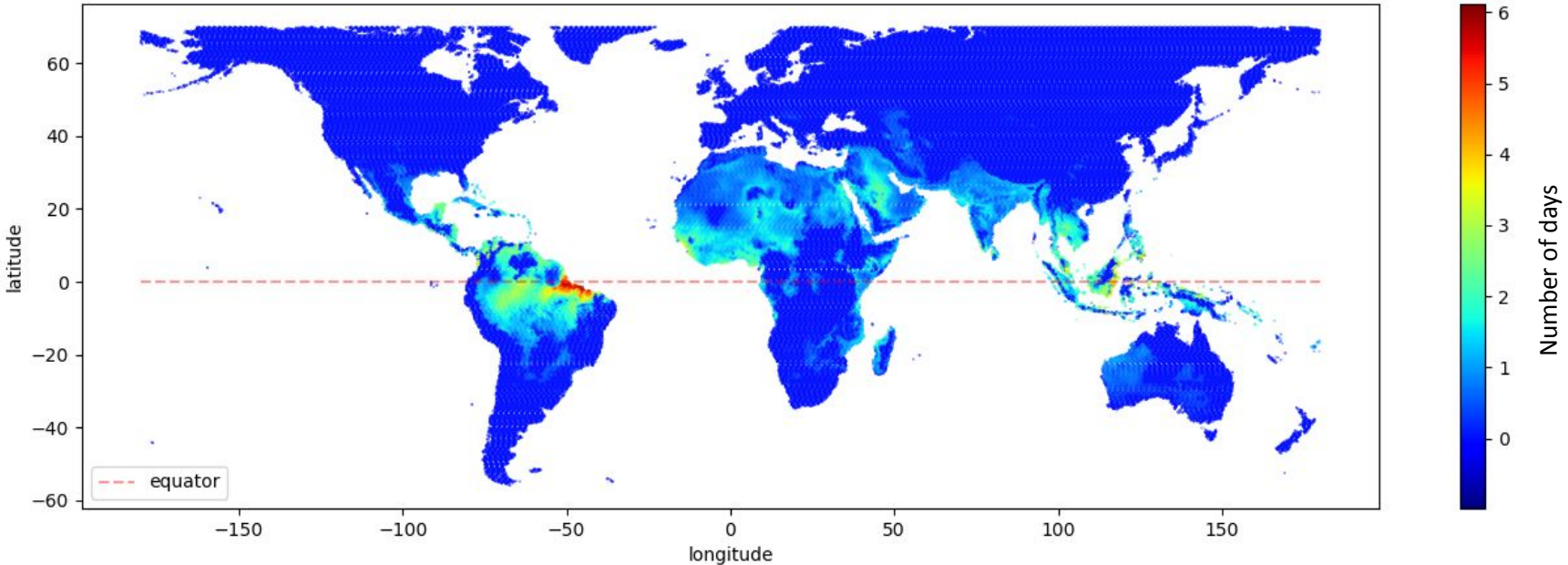
- New and/or healthy vegetation exists, specifically in the interior in the south west center.
- Less significant areas show a decrease in healthy vegetation across the island.
- The data were taken around the same time of year, (2009 in September, 2022 in November).
  - It is unlikely these changes are seasonal, as Southern California's wet season often starts in December or later.
- Historic rainfall after the 5+ year drought (2011 - 2016) potentially aided in vegetation recovery.
- This SAR data only uses two separate collection times, one for each year in a 13 year span. More data will be needed before arriving at a sound conclusion of the state of the island.

Disclaimer I am a SAR novice and do not guarantee any of this is correct lol

Bonus Slide

I spent a good chunk of time performing data clean up and analysis using data from SEDAC (socioeconomic data and applications center). The data recorded the number of days per year an area's temperature exceed dangerous hot-humid thresholds from 1983 - 2016.

US map showing average additional dangerous hot-humid days per year from 1983 to 2016 (humid above 28^{o} C)



Bonus Slide part 2

The figure below shows a colormap of the average amount of additional days per year a specific region exceeded dangerous hot-humid thresholds (high humidity with a temperature threshold of 28º C) from 1983 to 2016. For example, The north-east coast of South America saw an additional 6 dangerous hot-humid days a year from 1983 to 2016.

US map showing average additional dangerous hot-humid days per year from 1983 to 2016 (humid above 28º C)