50 Years of Earth Resources from Space

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Slide 1: Building on Landsat Legacy timeline graphic with talk title

My name is Allison Nussbaum and I'm an outreach coordinator with the Landsat Communications and Public Engagement team at NASA Goddard Space Flight Center. Today, I'm going to be talking to you about how the Landsat program – spanning 50 years – views and studies our Earth's resources from space. Starting with the launch of Landsat 1 in 1972 up to the launch of Landsat 9 in 2021, the Landsat program, managed jointly by NASA and USGS, has made up the world's longest continuous space-based record of Earth's changing surface. Now, Landsat Next is on the horizon, set to launch in late 2030.

Slide 2: L9 launch video

Landsat 9 launched from Vandenberg Space Force Base in Lompoc, California on September 27, 2021. The images and data acquired by Landsat 9 have added to the millions of scenes in the Landsat archive – all cost free to users thanks to the Free and Open Data Policy established in 2008. Now, let's go back and time with Landsat and watch as Mount St. Helens erupts, and the surrounding land slowly recovers over time.

Slide 3: Mt St Helens

With Landsat data, we can not only visualize the extent of the 1980 eruption, but we can measure it at 30-meter pixel spatial resolution and assess the subsequent recovery from the 80s to now.

Slide 4: Spectral graphic

Landsat satellites have improved significantly since the early days of the program. We started with 4 spectral bands on Landsats 1-3 and have made our way up to 11 spectral bands on Landsats 8 and 9. Landsat Next will have improved spectral resolution still, with 26 bands, making it what we call, "super-spectral".

Slide 5: A-68 – thermal

One of the cool things we can do with Landsat is essentially "see in the dark". During the Antarctic winter, there is no reflected sunlight off the Earth's surface. Luckily, with the thermal infrared sensor on Landsat 8 and 9, we can measure and visualize land surface temperature. This allows us to create infrared-color images like these showing the movement of iceberg A-68 as it breaks off the Larsen C Ice Shelf.

Slide 6: Spatial resolution, Saudi Arabia crop circles and sustainability

Landsat's spatial resolution is another important capability. Landsat scenes are made up of 30-meter pixels, about the size of a baseball diamond. This allows us to track changes in agriculture, as seen in this time series of center pivot irrigation systems in Saudi Arabia. We can also track changes in our planet's climate.

Slide 7: Climate glacier

One of the benefits of Landsat's medium-resolution data is that we can track evidence of climate change. Glacier retreat is one of the most direct and understandable effects of climate change and

with Landsat data, we can measure it. This infrared-color timelapse of Alaska's Columbia Glacier shows how the glacier and the surrounding landscape changed between 1986 and 2011.

Slide 8: ESW poster back
When it launched in 1972, Landsat 1 was called ERTS-1, the Earth Resources Technology Satellite. Even though its name changed, the goal of the program remains the same: monitor changes in Earth's resources. We can see all kinds of land features, land uses, and resources with over 50 years of Landsat data.

Slide 9: Contact info with ESW poster back
Thanks so much for listening and please let me know if you have any questions. You can also visit our website for Landsat news, interactive activities, posters and games (like the one seen here), and more.