# What’s New in Worldview - Script

## Slide 1: Intro: What’s new in Worldview

Hello Everyone

I’m Zach Rice, one of the developers on the Worldview Team.

Today I’m going to talk about What’s New in Worldview.

## Slide 2: Major Releases

So, Let’s Get Started.

This year we have had 9 major releases since January.

We started the year with the 2.0 major release.

This release focused on refactoring JavaScript ES5 code to ES6, simplifying build scripts and improving developer tools.

We were able to develop features quicker by utilizing linter files, adding a watch mode, and better handling build script errors. We were able to achieve a lighter weight application by using JavaScript modules which allowed us to only pull in individual modules from larger JavaScript libraries.

So, this release set the foundation for what was to come the rest of the year.

Notable features which followed the 2.0 release, and which we will cover in this talk, include:

* Improved Snapshot & GIF resolutions
* Geostationary imagery support
* Multi-day event tracking
* Support for natural events in the polar projection views
* Vector layer support
* Our upcoming comparison feature

As well as a few other Worldview related projects

## Slide 3: Improved Image Resolution

So, Version 2.2 introduced a higher capacity image-download method.

Previously we had a limit of about 40MB uncompressed, which sounds quite large but there was a growing number of users who were hitting this limit, especially when using the animated GIF feature.

The new limit will implemented allows a user to request an image at a size of 250MB uncompressed. And, what the user actually receives is a smaller, compressed size.

So, as you see on the left, that animated GIF is 7-days worth of imagery at 10km resolution for the entire Geographic projection.

On the right, these images are of the entire polar projection at a 1km resolution.

Both of which would not have been achievable in the past.

~~Our original implementation of the animated GIF feature relied on an open-source library originally developed at Yahoo called GitShot. Initially we worked with the maintainers of this library to add increased capacities, but technical deviations on how they wanted to implement certain features saw us develop our own solution out.~~

## Slide 4: Geostationary Imagery Support

Version 2.3 saw the implementation of geostationary imagery support. This was specifically to accommodate the work of the NASA CAMP2Ex team who had hoped to stand-up their own Worldview to view sub-daily, geostationary imagery.

As you can see in the top right image, we are now able to show layers at a minute interval, (10-minute intervals with the Himawari layer being shown), compared to a 1-day interval shown below that. This greatly increases the amount of visual data that can be extrapolated; such as cloud formation, wind direction, and even the movement of the sun as it is reflected off of the Earth’s surface.

In the left image, you can see how the timeline adapts based on the availability of a sub-daily layer in the layer list. We now have a ‘Minutes’ zoom-level; there is an hour and minute field on the timeline, and the animation widget allows for a minute-base range.

Let’s see how this looks within the application…

## Slide 5: Geostationary Imagery Support

So **starting out**, the timeline has 3 zoom levels; daily, monthly, yearly.  
There is also the standard year, month, day selectors.

But if we **add a layer with sub-daily intervals**, we can see the timeline adapts.  
There is now hour and minute selectors as well as a new minutes zoom level.

And then, you can see **dragging the pick on the timeline** shows a new layer for every 10-minute interval.

And, **if we build an animation**, the imagery will animate at that 10-minute intervals. And this creates stunning visuals which can be saved as an animated GIF.

Ok, moving on…

## Slide 6: Event Tracks & Polar Events

Our next major feature was the ability to track events over time; first introduce in version 2.4.

So, within Worldview we show major events such as Volcanos, Hurricanes, Dust Storms, etc. With multi-day events such as icebergs and severe storms, it was difficult to see the movement of these events over-time. Most of these events occur for multiple days and, sometimes over the course of years, in the case of Icebergs.

These event dates have always been tracked in the event’s listing and shown as an icon on the map but there was never a way to visualize the distance an event has moved. With this feature, when a user clicks a multi-day event, you will see a line connecting those days and clicking the points on the line, jumps you to that day. And on that event track line, you are able to see the direction in with the event is moving as well.

In addition to improving the temporal context of an event; version 2.6 added the ability to view events within the polar projections. Previously, events were only viewable in the Geographic projection.

So, the image on the left image is showing an iceberg as viewed in the Geographic projection; the right image shows the same event as seen in the Antarctic Projection.

## Slide 7: Vector Support

Next up we have vector support.

Version 2.7 added basic, unstyled, vector layer support and more advanced feature development is ongoing. The images above, for example, demonstrate the capabilities we have achieved while prototyping styled vector layers.

On the left, we see the Terra Ascending Orbit Track layer with a line showing the path of the satellite, as well as points styled at 1 and 5 minute intervals with labels added every 5 minutes.

On the right, we see the FIRMS MODIS layer with fires styled by color based on their confidence level.

So, how do we style vectors?   
With map vector tiles, data about the layer is encoded within each tile. We then use a separate style JSON file to define styles and map those styles to features. In our orbit track example, a time value is encoded into the MVT as a regular expression; as well as a color value, and size in order to render the circle and labels you see. This information is passed to OpenLayers when the tile is being rendered and it is cached in an array of points.

The result is super-fast rendering and styling of thousands of points at once.

## Slide 8: Vector Support

So, let’s dig deeper into composing a stylized vector layer.

On the left, there is an example of feature data encoded within a vector tile. You can see there is information such as date, time, brightness, confidence level etc.

On the right, is a JSON file we created to be used consumed by OpenLayers to style the vector points.

In the case of fires, we have 3 styles defined, “Low Confidence, Medium Confidence, and High Confidence”. Each style has color, radius, property and range values defined.

If you notice, the property value within the style JSON is matched to the property vector feature data key of the same name; in this case CONFIDENCE.

That CONFIDENCE value within the MVT is compared to each style’s range of values.

So, for example, if the MVT Confidence value is “56”, then that point of data will be styled with “Medium Confidence”. Which means an orange point will be rendered as that is what is defined within the “color” and “radius” fields in the style JSON.

## Slide 9: Comparison Mode (Sept 2018)

The next feature we are very excited to show is our new Comparison Mode which will debut in our September release. This feature enables the user to compare 2 states of the application using 3 different methods of comparison. Once the feature is enabled by the user, a State A & State B will appear which can be setup independently with separate layer lists and different dates. This gives the user the ability to compare data by time, by layer, or both.

The left image above shows the opacity mode. Opacity mode will allow the user to fade between the “A” layer and the “B” layer using the slider above the timeline.

The image on the right shows the slider mode. Slider mode allows the user to grab the divider and swipe left and right across the map.

The third mode is the “spy” mode which brings up a circle region containing the State B when State A is the main layer shown. This allows the user to hover over a very specific region at a time.

## Slide 10: New Layers

Of course, Worldview’s best feature is the ability to view layers. And we have added quite a few since January as you can see. Over 80 layers in total….

## Slide 11: New Layers

…And we will be adding 30 more in our next release.

So, what are people looking at in Worldview?

## Slide 12: Metrics

Here is a look at the Daily User metrics in Worldview. As you can see, we have about 3500 users on average a day but we get significantly more users during major events.

We have seen daily users rise to over 15,000 users a day during events such as Hurricane Harvey, Irma, Jose and Maria as well as during the Fires in Spain in Portugal in 2017.

## Slide 13: Metrics

And, here is a view of users by city over the same time period. We see a large number of individuals from California and British Columbia as there were fires in those regions as well as a concentration of users in Spain and Portugal because of the fires there as well.

## Slide 14: Worldview AR

In addition to features developed and available in Worldview, we have also been busy working on other projects.

One of those projects was the development of Worldview AR which was created by our summer intern Jack Miller using the Unity 3D modeling tool.

This application displays GIBS layers through your phone in an augmented view using the camera on your phone or tablet to display either a floating virtual Globe or a virtual map. The application is designed to work with image targets; unique printable pieces of paper that can be used to add overlays or work as a magnifying glass to zoom into regions.

There is even a multi-player mode where multiple devices can be connected to the same AR instance. This multiple player mode allows users to interact together and a trivia game mode was built, making learning about our world fun and interactive.

You can download the app now at apps.nasa.gov

## Slide 15: Short-Term Goals

So, what’s next?

I mentioned we were working on a few other projects in addition to just new features. One was Worldview AR, another is a new tool we are working on called Worldview Snapshots, which Mike will demo in a minute. This tool is designed to take the place of the Rapid Response tool with the goal of remaining lightweight and accessible to a large range of users. We are looking for beta-testers, so please get in touch with us if you are interested.

We are also in the process of designing a new tour. This new tour is being designed to encourage users to explore new events; during that exploration, the tour will also teach the user how to use a various features of the app that they might not normally use.

Next up, is continuing our development of vector layers. Incorporating some of the styling techniques shown earlier using the Mapbox style specification. We will also be exploring other features such as allowing users to inspect the information encoded in the vector points.

Revamping image download is also priority. Our users have requested some features including the ability to capture imagery across the dateline and add metadata over the image such as legends, color bars, and time stamps. And, with the addition of vector layer support, we will also add the ability to download those layers.

## Slide 16: Mid to Long-Term Goals

There are many more features which we are looking to incorporate in the mid-to-long term.

[List out features]

Historical event browsing, migration to NGAP, a UI overhaul, improved data download, improved timeline, an omni search box, user customizations, crowdsources event information, a virtual globe and data curtains, and any features that are needed to support new missions.

## Slide 17: Thank You

So, I would like to Thank you for your time.

One thing to note is Worldview is open-source and available on GitHub. So, if you have an idea or want to contribute, I highly recommend you go there and check out the project. You can also go there to review our release notes or open a ticket to request a feature or report a bug.

So again, thanks for your time, and I’ll hand it over to Mike for the Snapshots demo.