

# **ALERTS: Automated Land change Evaluation, Reporting and Tracking System**

## **ALERTS Beta Release User guide and help manual**

Planetary Skin Institute

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## Introduction

ALERTS (the Automated Land change Evaluation, Reporting and Tracking System) is a decision support system developed by the Planetary Skin Institute and its R&D partners to support global efforts to monitor and record land cover and land use change. It is offered as a free public good to facilitate global collaboration in the analysis of land cover change.

This public Beta release of ALERTS is a direct result of the Planetary Skin Institutes community swarming efforts that harnessed the innovation and expertise from a global ecosystem of R&D partners across many sectors and disciplines. The team spent 12 months designing an immersive decision support environment to facilitate Planetary Skin Institute's mission for pioneering emerging R&D initiatives across sectors and disciplines for the monitoring and managing of scarce resources.

The team achieved pioneering approaches to aggregating and blending disparate sources of data, incorporating scientific analysis, and creating a decision support environment that facilitates the communities abilities to collaborate on analysis, increase fidelity of information, and seek out "aha" moments when comparing the human, sensor, and modeled data sets.

Its visualization and analysis tools enable users to analyze the spatial and temporal distribution of land cover disturbances, view disturbances in a context-rich environment, explore drivers of transitional risk and sign up for alerts of recent disturbances in areas of interest.

Further by incorporating over 170 layers that span spatial and temporal land related themes ALERTS empowers the users to go beyond disturbance detections and assess and analyze projected transitional risk scenarios. Users are also enabled to assess and compare the economic, environmental, social, and other input elements that feed those projections.

The Planetary Skin's decision flow oriented design techniques allow users to explore land cover dynamics and risk in many different directions. There are many ways to interact with the data, and different users will find value in different parts of the application.

The purpose of this guide is to provide an introduction on the ALERTS Beta release and the underlying Planetary Skin Platform that supports ALERTS and future Planetary Skin Institute R&D efforts.

The first part of the guide describes three possible uses that may interest users, and walks through each of these in detail. Through this exploration, users will gain exposure to some of the core functions embedded into the environment. In

latter sections, this guide provides more systematic descriptions of the different elements of ALERTS: the individual tools, the data layers, and the terminology associated with land use and land cover change.

This guide is focused entirely on how to use the ALERTS application. It does not provide a detailed discussion of the methodologies behind the various data layers in the application. For more details on the technical approach behind the different layers (such as the GOPHER algorithms or the transitional risk scores), consult the ALERTS technical library at [www.ourplanetaryskin.org](http://www.ourplanetaryskin.org).

## Getting started

### Steps to getting started

1. Create a user account. Creating a user account allows you access to the application, along with the ability to subscribe to change detection events and personalization features within ALERTS. Set up a user account at the Planetary Skin Platform website – [www.ourplanetaryskin.org](http://www.ourplanetaryskin.org)
2. Personalize your account. After creating a user account you should customize the account profile.
3. Log into ALERTS. There are numerous ways to log into alerts. We've conveniently put log in features throughout the site and with the “explore” options within the site.

## Functionalities and sample use cases

There is no single 'right way' to use ALERTS. The application has been designed to give users significant freedom to explore the data and tools for different uses. This section introduces key functionalities and sample use cases in order to familiarize you with the ALERTS tools, data sets and capabilities. We encourage you to experiment, improvise and share your experiences with those throughout our community.

### Sample ALERTS functionalities

ALERTS is designed with many different functions to allow you to analyze issues of interest to you. An illustrative list includes the ability to:

1. View and explore global hot spots in the past or in the most recent year
2. Gain multi-scale awareness of historical and recent regional and local disturbances, with increasing levels of detail as you zoom in
3. Assess effectiveness of the ALERTS GOPHER algorithm by local polygon analysis
4. Analyze disturbances to see potential patterns and identify types of changes
5. Compare detection points with reference polygons
6. Observe detected changes within protected areas and evaluate disturbances patterns and trends in close proximity to protected areas
7. View and compare land cover change risk in certain regions of the world
8. Investigate drivers of risk, such as biophysical suitability for agriculture, economic attractiveness, and other drivers
9. Draw polygons around areas of interest; analyze aggregate data for the area
10. Compare multiple data layers/products using the opacity tools
11. View estimates of historical and recent carbon stocks and flows
12. Bookmark disturbance areas and share with ALERTS community
13. Upload rich media and add comments to user-contributed disturbance areas
14. Be informed on your areas of interest through notifications of changes

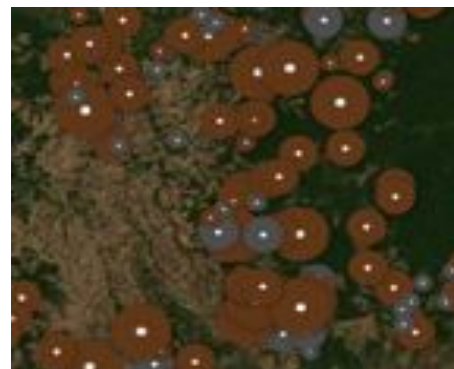
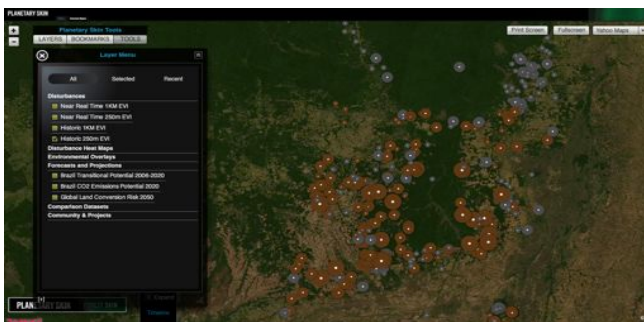
These functionalities allow many possibilities. We have described three potential use cases for illustration purposes.

## Sample Use Case 1: Understanding disturbances and trends

Land change is driven by human behaviour (i.e. converting forest to farm lands) and by natural forces (i.e. slowly through drought or quickly through wildfire). The ALERTS system allows users to view disturbances in land use and land cover patterns and provides several tools for understanding trends in land cover change since the year 2000. For example, users can observe the location and historical sequencing of land cover change around the world at various spatial scales; examine more detailed characteristics within and across detected disturbances over time; view disturbances in relation to areas of interest and comparison data sets (e.g. proximity to protected areas; comparisons to other approaches for observing change). Employing these tools improves our awareness of the environmental and historical context in which these disturbances occur and help us better understand potential threats or opportunities in our efforts to manage resources, develop sustainable resource policies and assess trade offs in alternative strategies.

To better understand where and when changes in land cover are occurring, users can apply a variety of tools to create different views:

- Use global heat maps of where disturbances in land cover have been detected over the last 10 years to quickly identify global and local “hotspots”
- Use the “history” tool to animate the historical sequence of disturbance points at historical 1km resolution and at monthly time steps
- Filter disturbances by severity of signal changes (which will show as varying sized circles), type (fire, conversion), etc.
- Focus on near real time observations, enabling users to view more recent data on disturbances that are still being processed.
- Turn on the Landsat background and zoom in to view higher-resolution imagery that might reveal the presence of roads, settlements, or other human factors.



By zooming into a particular region, users can apply the history tool to understand when different local changes took place. They can double click on individual points or compare two points to view the vegetation time series and analyze historical patterns of greenness, temperature, precipitation, and carbon stocks associated with that location.

User may group disturbance points together in polygons and conduct group-level analysis to understand these trends at a landscape scale.

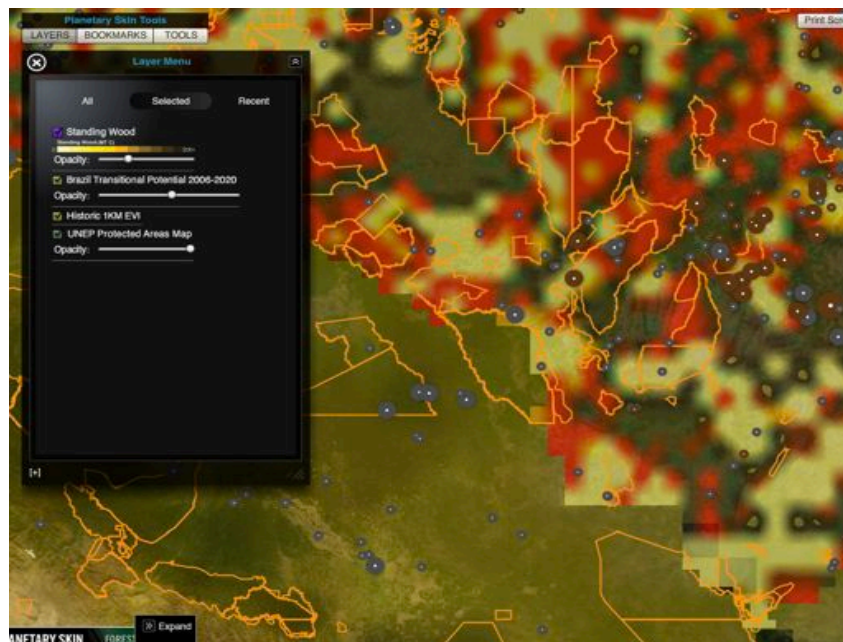
By combining views of disturbance points with other layers, users can contextualize and compare the data further. For example, to find evidence of land change in and around protected areas users can overlay mapped areas (polygons) of protected forests by selecting the UNEP Protected Areas Map layer under Environmental Overlays. We can also compare how the patterns of detected disturbances using the ALERTS approach compares to data collected and analyzed by others such as INPE's PRODES.

Finally, account holders can designate areas or regions of interest by selecting from pre-defined lists or creating their own in order to receive notifications about current disturbances, verification of disturbances or the addition of new data sets of relevant interest.

### Sample Use Case 2: Understanding risk

The ALERTS application allows users to view layers that describe the risk of land cover change around the world. These scenarios, produced by INPE and the Terrestrial Carbon Group, address risks of land conversion and CO2 emissions in specific regions of the world.

The projections and forecast allow you to investigate projected risk with overlays and comparisons to input factors that go into the risk calculations and scenarios. With built-in functions, users may further analyze disturbances, compare different time based assessments, or visualize the potential impacts. They allow users to test various hypotheses, or to facilitate collaborative planning and policy development based on projected risks in different areas.



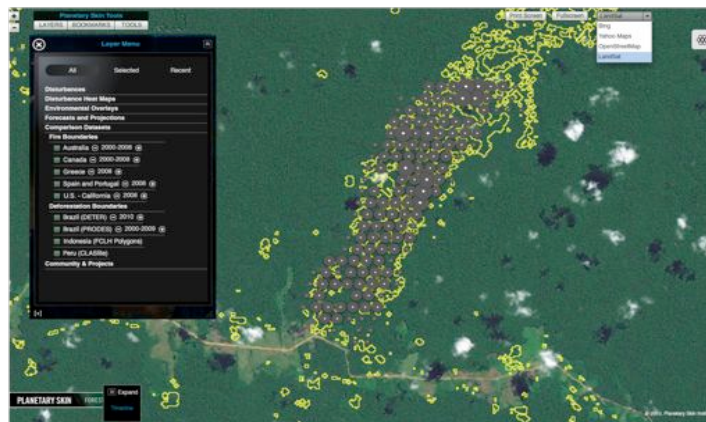
ALERTS risk assessments are based on a range of approaches that incorporate historical land use maps, accessibility, economics, mitigation policies, environmental factors, soil fertility and even secondary re-growth. The INPE data layer covers Brazil for a 2020 time frame; the Terrestrial Carbon Group data layer is global and is based on a 2050 time frame. With these risk maps, users features between 2020 and 2050. Comparing these projections through opacity features assist in the visual analysis of any high-risk area, enabling users to focus on specific locations for further study.

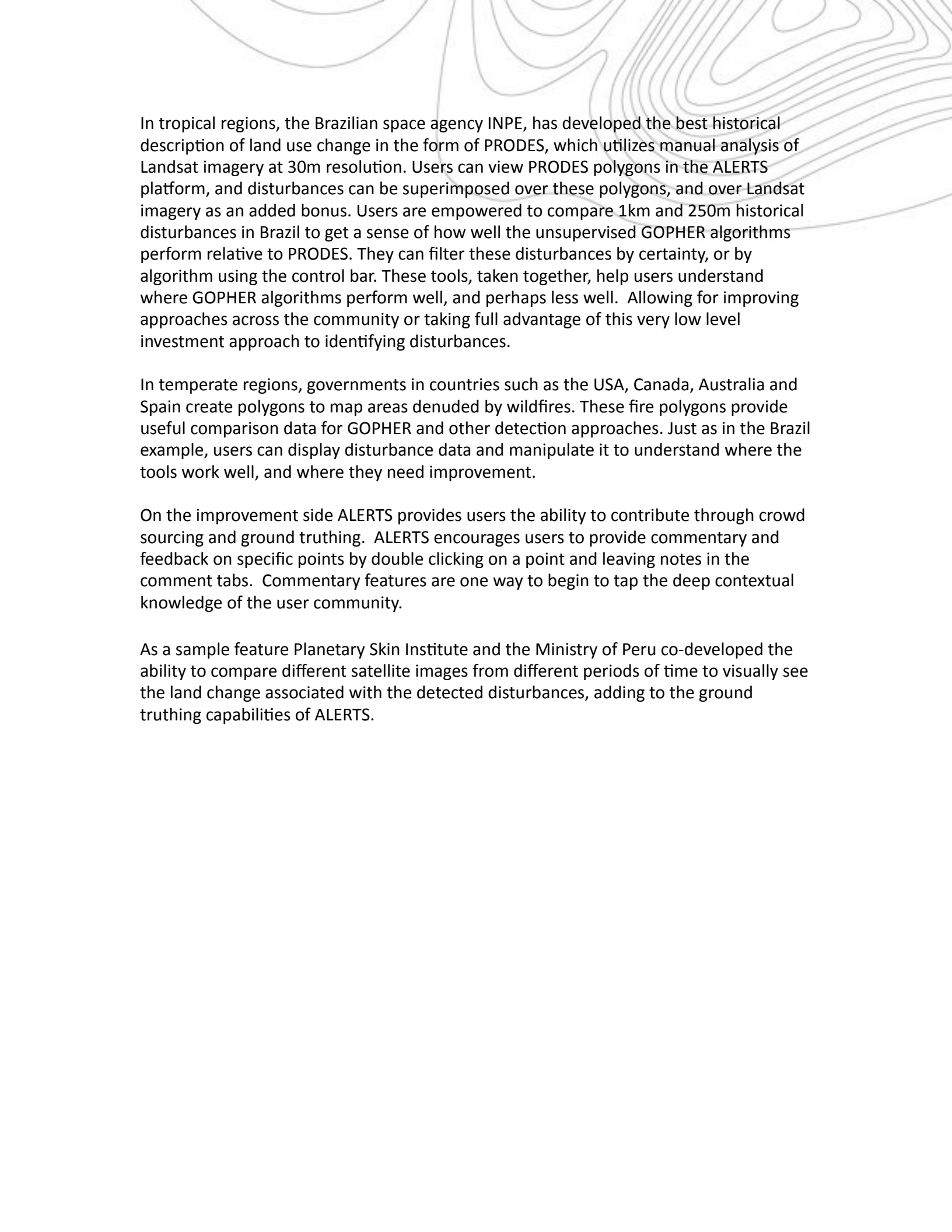
These risk maps are even more interesting when viewed against other layers, such as historical disturbances, NASA's carbon density estimates or UNEP protected area boundaries.

A proper understanding of risk allows for focused and adaptive policy development and management. The ALERTS near real time change notification (via email in the formal beta release) provides awareness of recent changes. The ALERTS application further empowers users to monitor sensitive areas they have identified and bookmarked as polygons within their user account.

### Sample Use Case 3: Understanding uncertainties in land change detection

Land change detection in ALERTS uses GOPHER, a family of powerful algorithms developed by the University of Minnesota. These algorithms detect probable disturbances based on analysis of time series data for every point on the planet. Like many other emerging tools to identify land change at a large scale, these algorithms are powerful but imperfect. To what extent can users trust these algorithms to detect disturbances reliably? The ALERTS platform provides tools to help users address these questions and contribute to the community's effort to advance large scale detection approaches.





In tropical regions, the Brazilian space agency INPE, has developed the best historical description of land use change in the form of PRODES, which utilizes manual analysis of Landsat imagery at 30m resolution. Users can view PRODES polygons in the ALERTS platform, and disturbances can be superimposed over these polygons, and over Landsat imagery as an added bonus. Users are empowered to compare 1km and 250m historical disturbances in Brazil to get a sense of how well the unsupervised GOPHER algorithms perform relative to PRODES. They can filter these disturbances by certainty, or by algorithm using the control bar. These tools, taken together, help users understand where GOPHER algorithms perform well, and perhaps less well. Allowing for improving approaches across the community or taking full advantage of this very low level investment approach to identifying disturbances.

In temperate regions, governments in countries such as the USA, Canada, Australia and Spain create polygons to map areas denuded by wildfires. These fire polygons provide useful comparison data for GOPHER and other detection approaches. Just as in the Brazil example, users can display disturbance data and manipulate it to understand where the tools work well, and where they need improvement.

On the improvement side ALERTS provides users the ability to contribute through crowd sourcing and ground truthing. ALERTS encourages users to provide commentary and feedback on specific points by double clicking on a point and leaving notes in the comment tabs. Commentary features are one way to begin to tap the deep contextual knowledge of the user community.

As a sample feature Planetary Skin Institute and the Ministry of Peru co-developed the ability to compare different satellite images from different periods of time to visually see the land change associated with the detected disturbances, adding to the ground truthing capabilities of ALERTS.

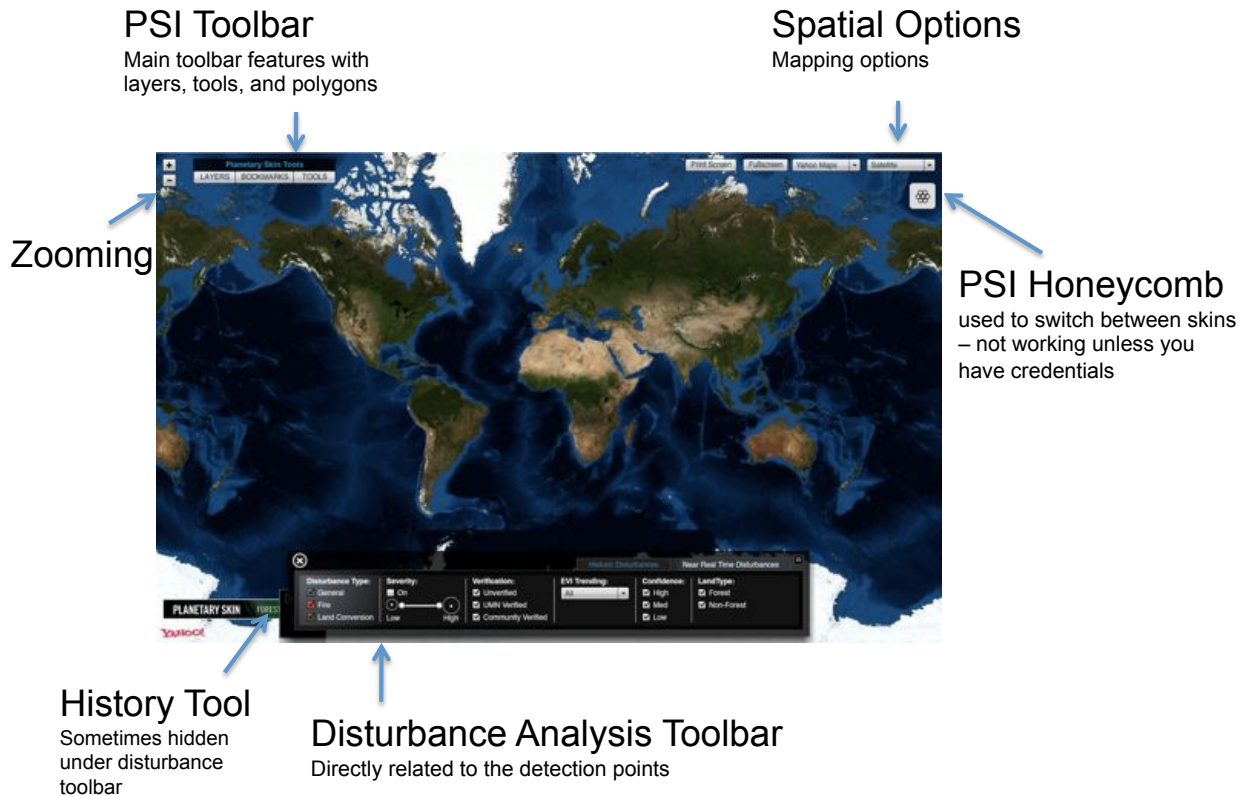
## Description of key application tools

ALERTS provides a rich suite of tools to help users manipulate and view the data in the platform. This section provides a detailed description of these tools in the following sections:

1. Overview of the ALERTS interface
2. Optional Full Screen Mode
3. PSI Toolbar
4. Layer Manager
5. Description of key layers in Layer Manager
6. Disturbance Analysis Toolbar
7. History Toolbar
8. Interactive Points
9. Tab Toolbox
10. Comparing Interactive Points
11. Comparing Layers
12. Bookmarks
13. Bookmark Filters
14. Spatial Data Tools

## Overview of the ALERTS interface

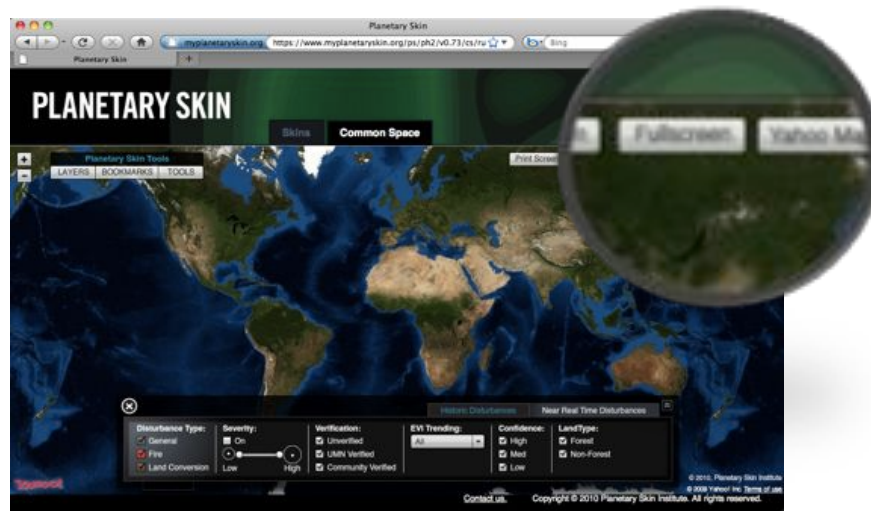
The ALERTS interface is the main decision support portal for users. The interface is oriented toward flexibility and adaptability to user needs. Below we highlight the core interface elements.



**ALERTS Beta release notes:** All tools have a pop out feature. Each tool is meant to be moveable on screen (you can arrange as you see fit). Each has the ability to be minimized or be resized to fit your analysis needs. Each is close either by close buttons or by tool bar buttons.

## Optional Full Screen Mode

The ALERTS interface has a full screen mode, empowering you to immerse yourself into the environment. The full screen button allows you to maximize both the spatial elements and the many tools we've provided for analysis and interaction. It is recommended to have screen resolution settings of 1024x768 or higher.



Click on the *Fullscreen* button to expand the map to your full screen size.

### **ALERTS Beta release notes:**

Attempting to take a screen shot may allow you to get the screen shot, but depending on your screen shot capture software and system type could cause the full screen to exit.

Full screen mode does increase the amount of spatial data elements, which may require more system resources. If you ever encounter very long delays please refresh browser to restart session. Restart session does reset settings in Layer Manager.

## PSI Toolbar

Layer menu, bookmarks, and tools are all available for the full featured analysis via this tab toolbar at top of the ALERTS interface. Clicking on the toolbar opens and closes any of the pop up tools associated with that button. Last known position and selections are kept stored upon closing as long as the session is still active (closing browser or refreshing browser clears all selections and restarts the session).



In the upper left corner is the Planetary Skins Tools.  
Click on the *Layers* button to bring up the Layer Menu.

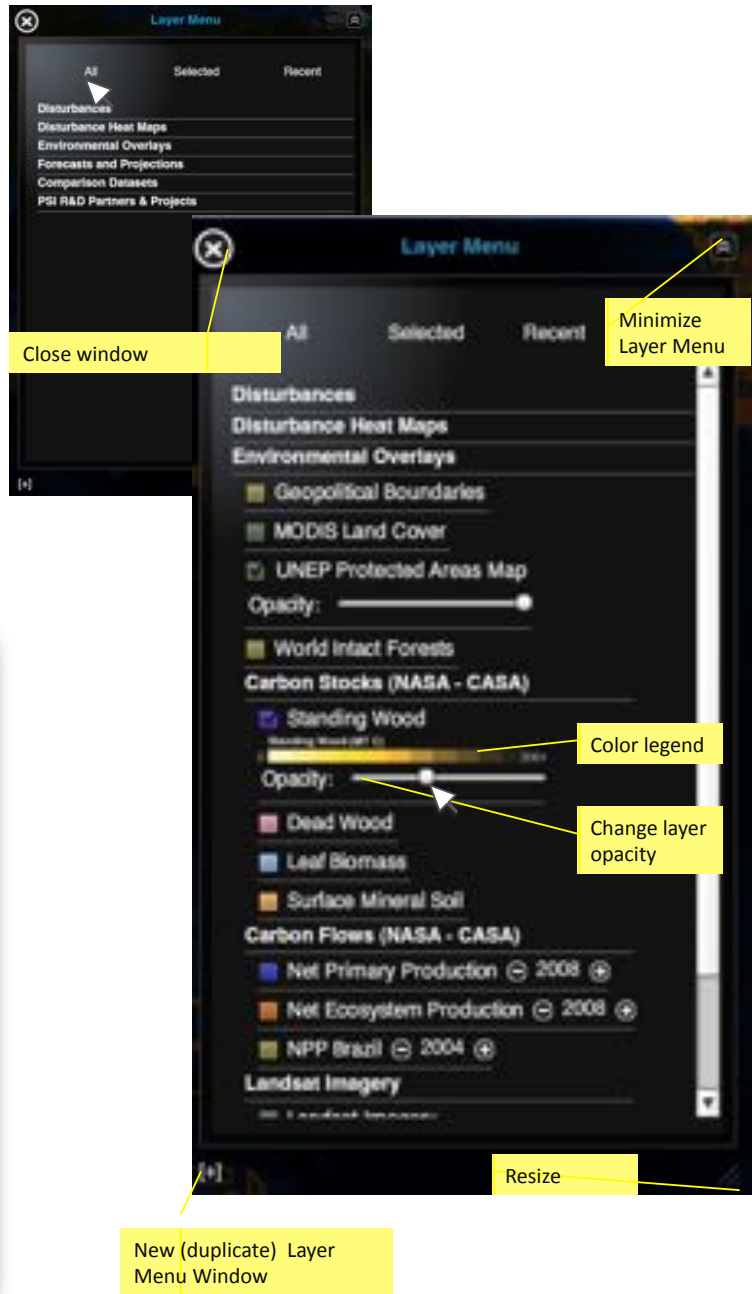
### **ALERTS Beta release notes:**

It is recommended to familiarize yourself with the pop ups and the moving feature for they assist with analysis and experience of ALERTS.

## Layer Manager

The Layer Manager is the interactive menu for all the spatial and temporal data sets that PSI is providing and/or ingesting from R&D partners. The ability to compare and contrast layers is tightly integrated into the opacity tool, allowing users to analyze detections, analyze modeled data, and analyze varying data sets in new ways. Some layers will incorporate temporal tools for change the time series of the data. Upon opening the Layer Manager the first time two complementary tools also pop up: the History toolbar and the Disturbance toolbar.





**ALERTS Beta release notes:**  
Performance for this pioneering application is great, yet with any intense spatial and immersive environment the more you turn on the more the drain on the system you are using.

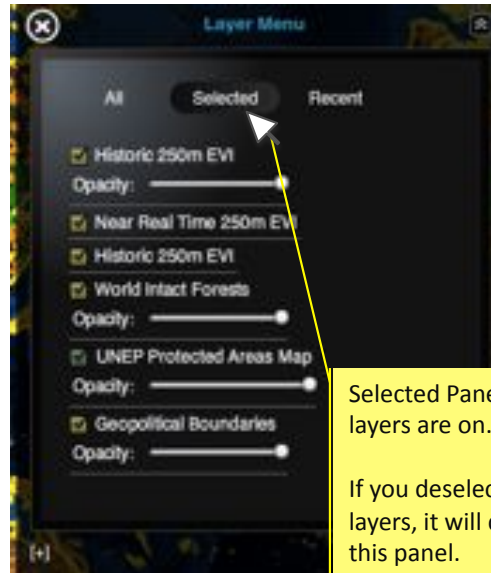
Our engineering team has turned on dozens of layers at once, but we do recommend to limit the layering to what your system is able to handle (6-8 is when you might start to see load times and tiling slow).

Duplicate feature is newer and buggy, may have a delay in duplication.

**ALERTS Beta release notes:**

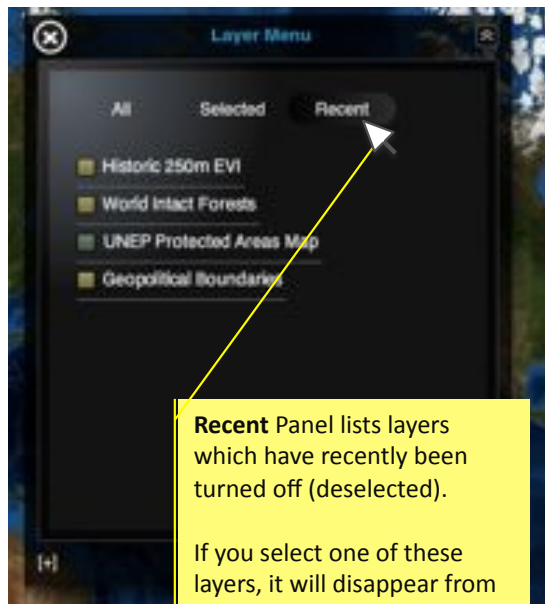
Selected is an outstanding feature users will use very often. It allows you to look at the layers selected and conduct multiple compare and contrast analysis. It further allows you to quickly clear all or some selections.

Recent is a feature allowing you to quickly bring back layers into your analysis without having to search for them within the layer taxonomy. Switching back and forth between Selected and Recent is very common for users conducting analysis or collaborating with colleagues.



Selected Panel shows which layers are on.

If you deselect one of these layers, it will disappear from this panel.



**Recent** Panel lists layers which have recently been turned off (deselected).

If you select one of these layers, it will disappear from this panel, but you can see it on the Selected panel or the All panel.

## Description of key layers in Layer Manager

The ALERTS application makes use of many layers. This section provides a description of the major layers and provides references for further information.

**Disturbances.** The disturbance layers in ALERTS are based on the GOPHER family of algorithms developed by the University of Minnesota. These algorithms are described in much greater detail in a white paper available on <http://www.ourplanetaryskin.org>.

There are four layers:

- Near real-time 1km EVI. This layer provides recent (up to 1-year-old) change detection points at a 1km resolution globally.
- Near real-time 250m EVI. This layer provides recent (up to 1-year-old) change detection points at a 250m resolution in selected regions of the world.
- Historical 1km EVI. This layer provides historical (2001-Sep 2009) change detection points at a 1km resolution globally.
- Historical 250m EVI. This layer provides historical (2001-Sep 2009) change detection points at a 250m resolution in selected regions of the world.

**Disturbance Heat Maps.** This disturbance layers in ALERTS allows for a visual heat map view of all disturbances throughout the world. The layers are static and do not contain specific data to ensure fast loading and visual analysis. The layers match the same definitions as above.

**Environmental overlays.** These layers are intended to provide analysis support for factors relating to protected areas, carbon stocks and flows, and high resolution LandSat imagery. They include:

- Geopolitical boundaries for countries globally
- MODIS Land Cover. This layer, created by NASA, classifies land cover around the world.
- UNEP Protected Areas Map. This layer, developed by the UNEP World Conservation Monitoring Center in Cambridge, UK ([www.unep-wcmc.org](http://www.unep-wcmc.org)), provides the boundaries for the world's protected areas. The layer contained in ALERTS is the 2010 edition.
- World Intact Forests. The World Intact Forests map provides boundaries for forests considered to be untouched by human activity. The map is available at [www.intactforests.org](http://www.intactforests.org).
- Carbon stocks and flows. These layers are model outputs from the NASA-CASA ecosystem model. Further information on this model and its outputs is available in the "Further Reading and Resources" section of [www.ourplanetaryskin.org](http://www.ourplanetaryskin.org)
- Landsat imagery. This layer turns on Landsat imagery, allowing users to view changes against higher-resolution maps.

**Forecasts and projections.** These layers provide assessments of transitional potential, or the risk that a particular area will change from forest to non-forest use in a given time frame. They include:

- Brazil transitional potential, 2006-2020. This layer, created by scientists at INPE, is based on a statistical analysis of various drivers of deforestation.
- Brazil CO2 emissions potential, 2020. This layer, created by scientists at INPE, combines data from the transitional potential map (above) with an emissions model for the Brazilian Amazon to identify areas at greatest risk for GHG release
- Global land conversion risk 2050. This layer, developed by the Terrestrial Carbon Group, maps the risk of land conversion globally through 2050 based on an analysis of biophysical suitability for agriculture, economic pressures, and institutions.

**Comparison datasets.** These layers provide alternative assessments of land use change for specific geographies at specific points in time. They are provided here in part to enable comparison with the GOPHER change detection points described above. Key layers include:

- Fire boundaries developed by national and sub-national government agencies in Australia, Canada, Greece, Spain, Portugal and the United States. These polygons map the boundaries of forest fires based on aerial photography.
- Deforestation boundaries developed by various sources:
  - The PRODES and DETER polygons, developed by INPE in Brazil, are remote sensing-based maps of deforestation in the Brazilian Amazon. Further information is available at [www.inpe.br](http://www.inpe.br)
  - The Forest Cover Loss Hotspots dataset has been developed by researchers at South Dakota State University based on MODIS imagery for the years 2000-2005
  - The Madre de Dios region in Peru is the site of a collaborative effort between the Ministry of Environment in Peru and the Carnegie Institution. This layer includes outputs from the CLASlite tool applied to Madre de Dios.

**PSI R&D Partners & Projects.** These layers provide a range of data sets that relate to the R&D efforts of the Planetary Skin programs. Within ALERTS these partner provided datasets allow for deeper analysis into certain regions of the world. This section further allows user to dive into the inputs and drivers of the transitional potential and risk scenarios and projections. The projects included are:

- The INPE drivers and data inputs for transitional potential and emissions potential that span economic, biophysical, and other factors.
- The MINAM (Ministry of the Environment Peru) regional and special land category areas that cover over 54 million hectares and span protected forest to production forest to other areas.
- The Planetary Skin Projects where higher resolution carbon stocks and flows for Northern California where performed at the 250m resolution by NASA
- The Terrestrial Carbon Group Projections drivers and data inputs for the projections and scenarios

## Disturbance Analysis Toolbar

The ALERTS disturbance toolbar enables users to see the distribution of different disturbance types across a series of computed and community factors. It has both a Historic view, used for the Historic data series, along with a Near Real Time view, used with the Near Real Time data series.



### Disturbance Type

- ❑ **General** - – The GOPHER algorithm detected a disturbance at this location, but the specific disturbance type could not be determined
- ❑ **Fire** – The GOPHER algorithm detected a disturbance at this location and the EVI signal change is consistent with characteristics of fire events
- ❑ **Land Conversion** – – The GOPHER algorithm detected a disturbance at this location and the EVI signal change is consistent with characteristics of land conversion events

**Severity** – The GOPHER algorithm computes the severity of the disturbance.

**Determination** – The disturbance events were cross-referenced against existing disturbance datasets.

- ❑ Not Determined – Indicates the detected disturbance event was not in an existing disturbance dataset(s)
- ❑ Likely Cause Determined – Indicates the detected disturbance event was consistent with existing disturbance dataset(s).
- ❑ Ground-truthed by Community - Indicates the detected disturbance event was consistent with observations made by the ALERTS community.

**EVI Trending** – The GOPHER algorithm categorizes the signature of the EVI change into several categories.

- ❑ Abrupt Loss – A sharp decrease in EVI signal over a short time-frame
- ❑ Gradual Decrease – A slow drop in EVI signal over time
- ❑ Gradual Increase – A slow rise in EVI signal over time
- ❑ Other Conversion – The trend of the EVI signal for the detection could not be categorized

**Confidence** – The GOPHER algorithm determines a threshold score based on the characteristics of the disturbance

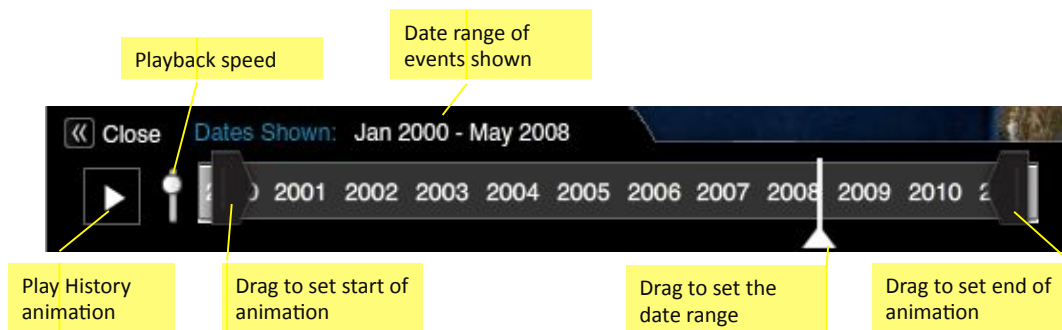
- ❑ High – A high (> ~ 90%) confidence that a disturbance event occurred at the location
- ❑ Med – A medium (> ~70%) confidence that a disturbance event occurred at the location.
- ❑ Low – A low (> ~50%) confidence that a disturbance event occurred at the location

**Land Type** – The MODIS land cover classification where the detection occurred.

- ❑ Forest – The detection occurred in a MODIS forest land cover classification
- ❑ Non-Forest – The detection occurred in a MODIS non-forest land cover classification

## History Toolbar

History toolbar is an interactive way to view the past ten years of land change detections. The toolbar allows you to analyze the history patterns and trends of any zoom level or location. The ability to play/pause, manually adjust the time line boundaries, manually move the time of focus, and minimize the toolbar all exist for users.



## Interactive Points

Each change detection point in ALERTS is interactive and allows the user to analyze the specific data associated with the change, to compare disturbance points, and to bookmark locations for your user account. The interactive points a robust feature for data analysis and community collaboration.

To open a disturbance, click once to see the point, and then click again to see the point's tab box tool set. Double click also works to open a popup window with detailed information about the disturbance.



### **ALERTS Beta release notes:**

There are over 1.6 million detections in the current version, along with over 170 unique layers (spatial and temporal). As you may imagine this amount of visual and spatial data could cause performance challenges for any environment. The Planetary Skin Institute design team focused on interactivity and immersion, and we felt it was critical to have disturbances interactive and not static. Thus, at the global level we have provided the ability to see the global interactive detections, view them over a timeline, and filter the results. At this global interactive level though we show a representative set of the detections and not all detections to ensure a positive user experience. As you zoom in, you will see more points with greater fidelity, showing the full representation of detections.

We have also augmented these interactive features though to allow users more visual options. ALERTS also provides additional spatial layers for all disturbances in heat map perspectives.

As a reminder ALERTS features two types of detections at two different spatial resolutions. Please note that at 1km there is global coverage. At 250m it is mostly limited to forest sections of the world for this Beta release.

## Tab Toolbox

The Tab toolbox allows for the analysis of the MODIS EVI signals and to see when disturbance took place. The interactive tabs allow you to adjust the analysis timeline, see specific data, and look at environmental data such as precipitation, temperature, and carbon stocks associated with that spatial area. The other tabs are oriented for the community collaboration and ground truthing aspects of the ALERTS mission empowering the community to add context through news, images, and video links.

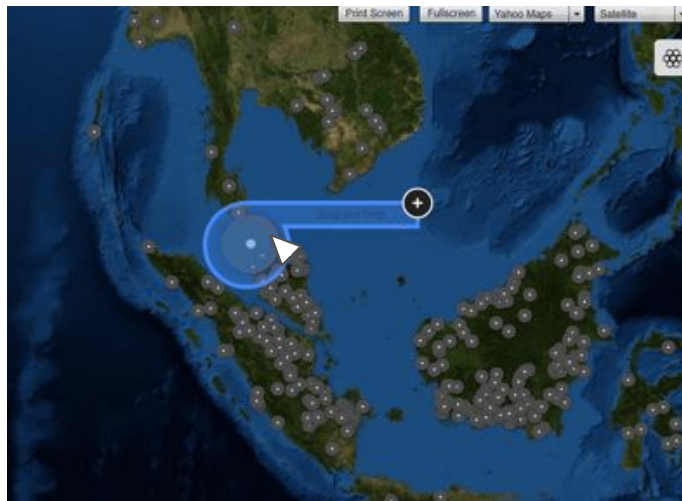


Location

Disturbance date

## Comparing Interactive Points

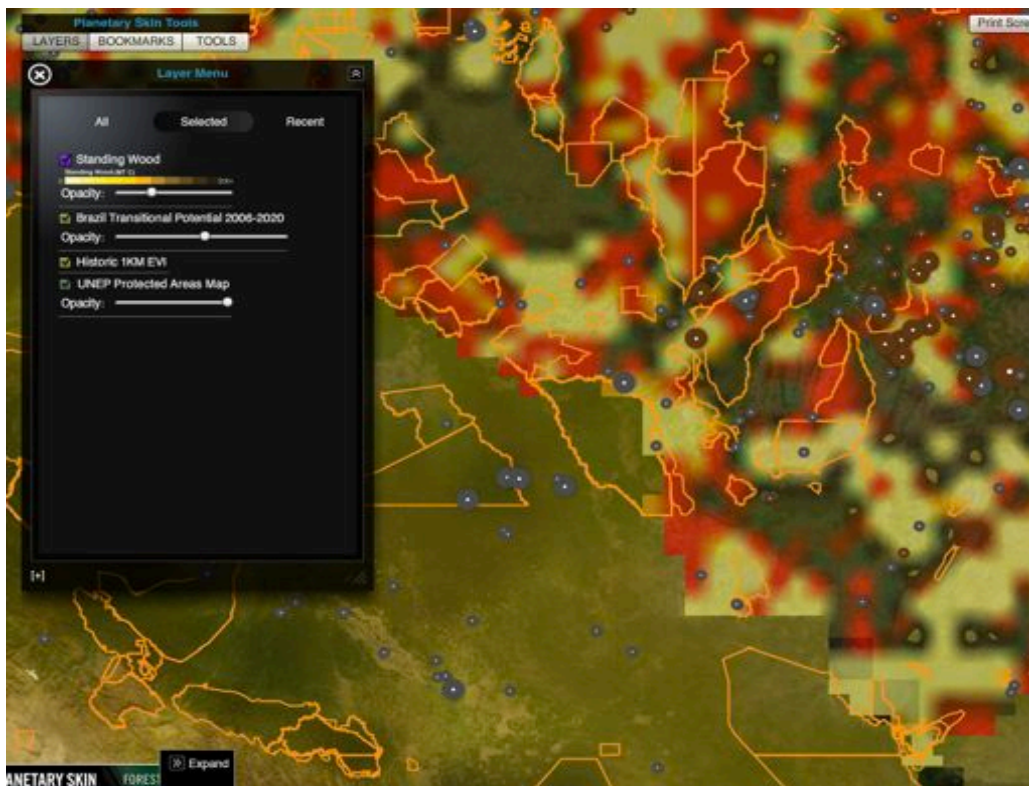
Comparing different detections empowers the users to analyze any disturbance to any other disturbance across spatial and temporal perspectives. It empowers you to compare signals and associated data of the lat/long locations. Doing comparisons within or around protected areas has revealed great pattern insights and is useful to many user from policy makers to researchers to forest managers



Location of each point

## Comparing Layers

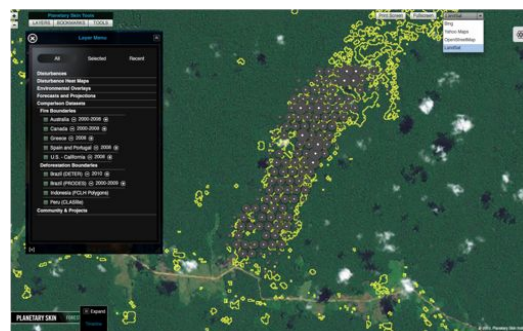
ALERTS facilitates analysis of varying spatial outputs across historic through to modeled data sets in pioneering ways. The intent is to facilitate the communities ability to improve analysis techniques, assess risk scenarios, form collaborative swarming across disciplines, and allow for the emergence of the “aha” moments when the tacit knowledge of human experts are integrated into the system.



### ALERTS Beta release notes:

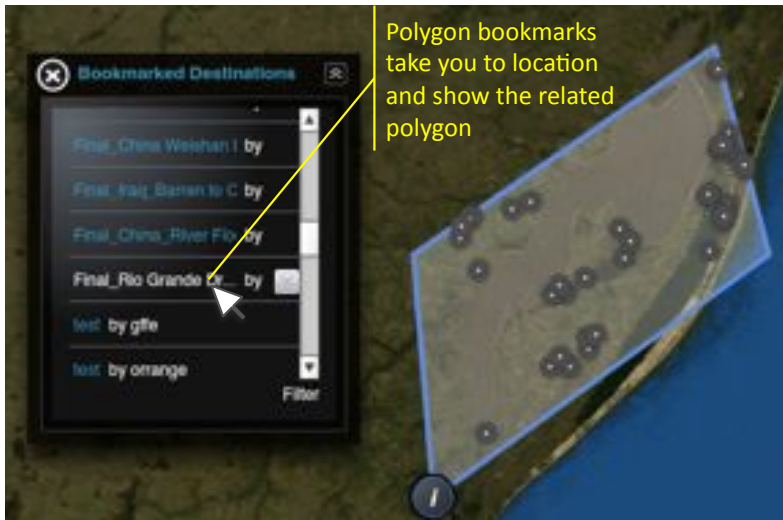
A nice feature for comparison analysis is when you zoom in closely to see all the detections within the Comparison layers. This example is within Peru and using a CLASlite polygon data set.

LandSat is turned on in the spatial tools. Either used for image comparison or used when the leveraged mapping service doesn't render imagery at certain zoom levels (lower altitude).



## Bookmarks

Bookmarks are locations of single points (bookmarking a disturbance interactive location) or of a polygon (a polygon that captures the aggregate information of all points within the polygon boundaries). The interactive point on the polygon labeled “I” will give you aggregated analysis of all signals and data across the total polygon area in a similar way the individual interactive points perform.



**ALERTS Beta release notes:**  
Polygons are a growing feature set so we appreciate your patience.

## Bookmarks Filters

Bookmarks have a filter and search capability allowing you to filter the polygons and single point locations based on users, time, type, and trend. Type are the type of disturbances (similar to disturbance analysis toolbar) and trend is the type of signal (similar to the disturbance analysis toolbar).

The image shows a screenshot of the 'Bookmarked Destinations' panel with a filter overlay. The filter panel includes the following options:

- Created by:** All, PSI Polygon, My Polygons
- Sort by:** Last Added, Name (A-Z), Username
- Type:** Polygon an..., Polygon and Point, Polygon, Single Point
- Trend:** All, Uncategorized, Drop and Gradua, Drop and Sudden, Gradual Drop, Gradual Rise, ...

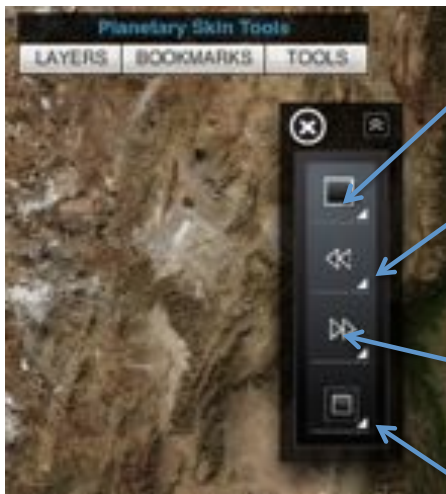
A yellow callout box points to the 'Trend' dropdown with the text: "Trend refers to the type of pattern in the point's EVI signal."

A yellow callout box points to the 'Open filter panel' button with the text: "Open filter panel".

Use the Bookmarks Filter panel to show only particular bookmarks.

## Spatial Data Tools

Spatial data tools provide a variety of useful tools to assist users in their analysis, store favorite locations, and conduct measurements.



### Polygon Drawing Tools

Allows you to draw a polygon of interest

### Disturbance Analysis Toolbar

This icon reopens the Disturbance analysis toolbar if you've closed it or will close it if opened

### History Toolbar

This icon is for history and is not functional at this time since history doesn't close at this time.

### Spatial measurements

These tools are for measuring distance, area, and so forth.

## Glossary of terms

**ALERTS** – Automated Land change Evaluation, Reporting and Tracking System. An application developed by the Planetary Skin Institute to help create global transparency for land cover change

**Aqua** - Aqua is a NASA Earth Science satellite mission named for the large amount of information that the mission will be collecting about the Earth's water cycle. Additional variables also being measured by Aqua include radiative energy fluxes, aerosols, vegetation cover on the land, phytoplankton and dissolved organic matter in the oceans, and air, land, and water temperatures.

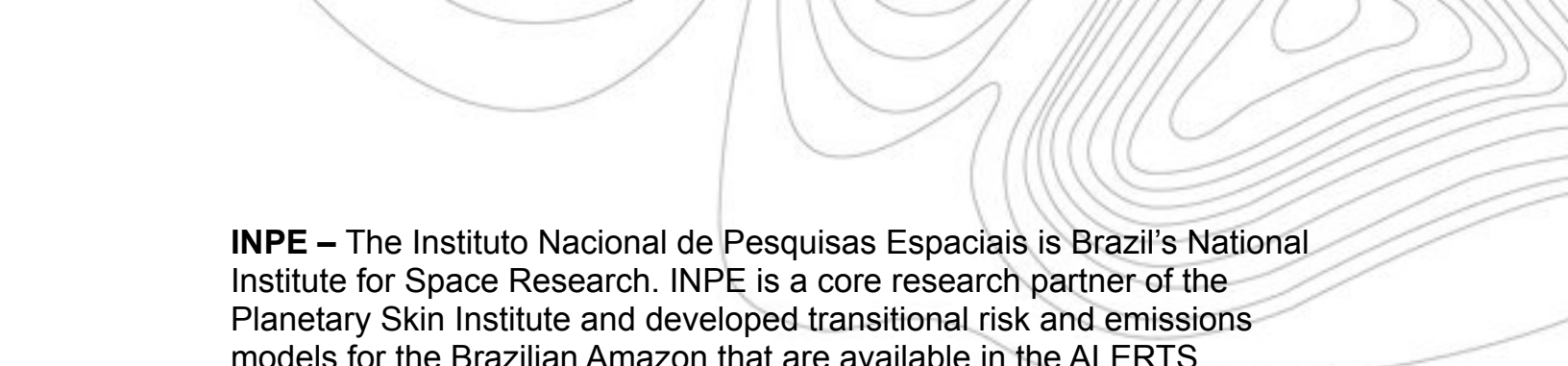
**CASA model** – The NASA-CASA (Carnegie-Ames-Stanford Approach) model simulates net primary production (NPP) and soil respiration (Rh) at regional to global scales.

**Disturbance** – In the ALERTS platform, a disturbance refers to a significant disruption in land cover identified by a break in the vegetation signal of a given area over time. At present, these disturbances are detected by GOPHER, a class of algorithms developed by computer scientists at the University of Minnesota

**EVI** – The Enhanced Vegetation Index. EVI is an 'optimized' index generated from MODIS sensor data designed to enhance the vegetation signal with improved sensitivity in high biomass regions and improved vegetation monitoring through a de-coupling of the canopy background signal and a reduction in atmosphere influences. The GOPHER algorithms use EVI data at 1km and 250m resolution to detect disturbances.

**FPAR** - FPAR is the Fraction of Absorbed Photosynthetically Active Radiation that a plant canopy absorbs for photosynthesis and growth in the 0.4 – 0.7nm spectral range. FPAR is expressed as a unitless fraction of the incoming radiation received by the land surface and is derived from MODIS sensor data.

**GOPHER.** GOPHER stands for Global Observation of Planetary Health and Environmental Resources. GOPHER refers to a class of data mining algorithms developed by the Department of Computer Science at the University of Minnesota. These algorithms are capable of detecting meaningful breaks in vegetation signals over time and identifying them as disturbances.



**INPE** – The Instituto Nacional de Pesquisas Espaciais is Brazil’s National Institute for Space Research. INPE is a core research partner of the Planetary Skin Institute and developed transitional risk and emissions models for the Brazilian Amazon that are available in the ALERTS application.

**Land change** – Refers to changes in land cover or land use as detected by the GOPHER algorithms.

**MODIS.** The Moderate-Resolution Imaging Spectroradiometer, is a sensor on board two NASA satellites, Terra and Aqua. With its sweeping 2,330-km-wide viewing swath, MODIS sees every point on our world every 1-2 days in 36 discrete spectral bands.

**NASA.** The National Aeronautics and Space Administration is the space agency of the United States of America. NASA is a core research partner of the Planetary Skin Institute. In addition to providing valuable technical assistance and advice, NASA provided global data from the CASA ecosystem model to inform estimates of carbon stocks and flows in forests

**PSI.** The Planetary Skin Institute. A non-profit organization founded to develop information technology-based tools for global resource and risk management.

**TCG.** The Terrestrial Carbon Group, a network of scientists and policy researchers dedicated to helping reduce terrestrial carbon emissions through institutional design.

**Segmentation.** One of the algorithms in the GOPHER family, identifying statistically significant model discontinuities in the vegetation signal of a specific area.

**Terra.** A NASA Earth Science satellite mission carrying the MODIS sensor and delivering data products used to detect disturbances in the ALERTS application.

**Transitional potential.** A measure of the propensity of a particular area to transition from one land use to another, and in particular, from a forest to non-forest use.