



# SPOTLIGHT

Using space-based intelligence to understand  
and respond to Australian Brushfires

Gain a geospatial perspective on  
real-world problems.

See how Maxar satellite imagery  
and advanced analytics can be  
applied to solve the world's most  
complex challenges

# MAXAR



# AUSTRALIA IS REELING FROM THE WORST FIRE DISASTER IN YEARS

In Australia, bushfires are a fact of life. But severe weather and the effects of climate change are exacerbating the risk associated with seasonal fires. Record-breaking temperatures and months of extreme drought have fueled a series of unprecedented bushfires across the country—especially in Australia’s usually temperate southeast region. The country’s second-most population-dense state, New South Wales, has been the worst hit so far, with more than 12 million acres and 1,300 homes burned. For perspective, the 2018 blazes in California and the 2019 Amazon fires each burned less than 20% of the acreage impacted in Australia this season. Thousands of people are still seeking shelter from the fires, and countless wild animals have been displaced or killed.

The outlook for coming years is not positive. Current climate trends and recent studies by the Australian Government’s Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organization (CSIRO) suggest a continuation of the current trend. With that sobering reality in mind, national, state, and local governments need to start preparing now for future events like those happening in Australia. This issue of Maxar Spotlight showcases how Maxar’s industry-leading satellite imagery and unique

weather-monitoring tools can provide the near-real time data and analysis that governments and aid organizations need to protect resources and save lives as events unfold.

## SUMMARY OF UNIQUE TOOLS & APPLICATIONS

### Shortwave Infrared (SWIR) Imagery

Maxar goes deeper into the infrared spectrum—including SWIR, a non-visible range of light between 1,400 and 3,000 nanometers in wavelength—than any other very high-resolution commercial imagery provider. WorldView-3 provides eight spectral bands in the SWIR range, each narrowly focused on an area of the electromagnetic spectrum that is sensitive to a particular feature on the ground or a property of the atmosphere. Used together, these bands allow us to find, see, and interpret features in satellite imagery like never before—helping remote sensing experts unlock critical information through advanced analytic capabilities.

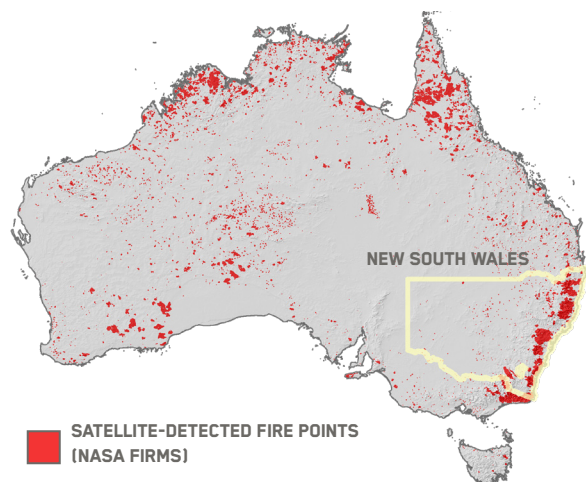
### NASA FIRMS

NASA’s Fire Information for Resource Management System (FIRMS) is a valuable tool that provides near real-time from active events across the globe and analysis of burn extent over time. For this study, satellite-detected fire points between November and January for each of the past five years was used to measure point densities to show the severity of recent fires in New South Wales. FIRMS data was also used to show the total extent of Australia’s bushfires between 2003 and 2018.

### Global Weather Interactive (GWI) and Weather Desk™

An application within Weather Desk™, GWI is the industry’s leading archive of global historical weather information. GWI provides custom access to over 900 domestic and 6,000 international weather stations for analysis of temperature extrema, precipitation, and derived parameters like average temperature, average precipitation, and normal departures for each.

## FIRE POINTS, NOV 2019-JAN 2020

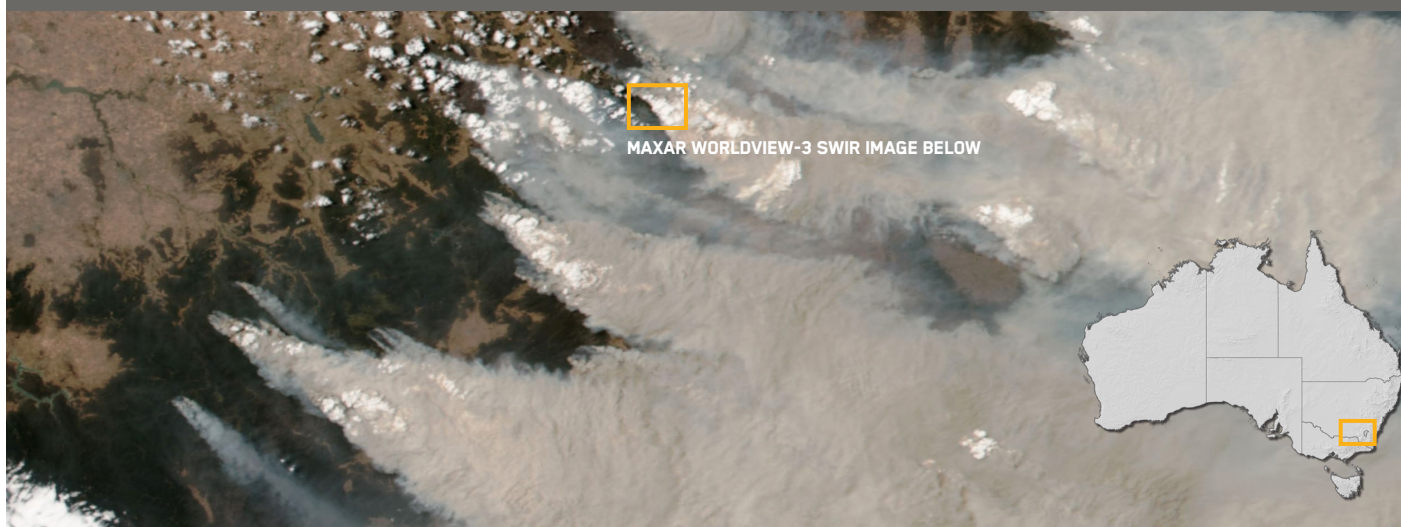


# DELIVERING ACTIONABLE INTELLIGENCE TO FIREFIGHTERS AND EMERGENCY RESPONDERS

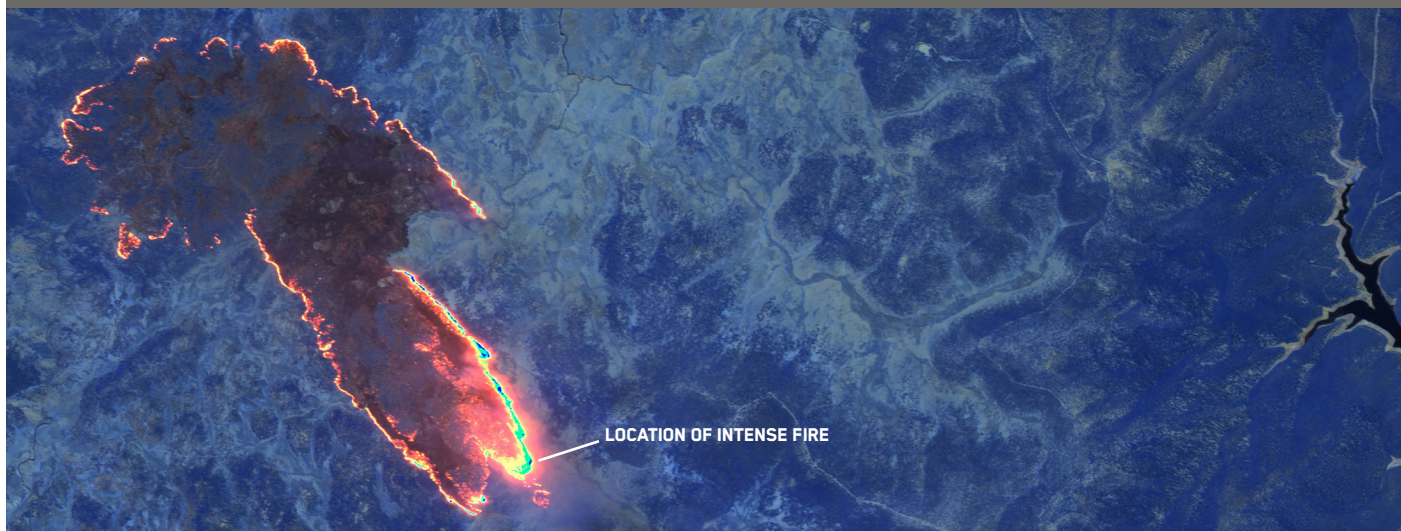
High-resolution satellite imagery reveals the unprecedented devastation of the ongoing fire season in Australia. The data collected and analysis empowered by Maxar's imagery are profoundly useful—and that utility extends beyond the visible spectrum. With the highest resolution and spectral diversity in the industry, Maxar has the unique ability to deliver highly accurate, time-sensitive intelligence during critical events.

Maxar's WorldView-3 satellite is equipped with a shortwave infrared (SWIR) sensor that can penetrate the dense smoke of an active fire and identify both the flame front and current hot spots. The following image series of the bushfires in southeast Australia demonstrates how Maxar's WorldView-3 can see beyond what is visible to conventional sensors and the naked eye.

AUSTRALIAN BUSHFIRES ALONG THE NEW SOUTH WALES AND VICTORIA BORDER | JANUARY 4, 2019 | NASA SUOMI NPP

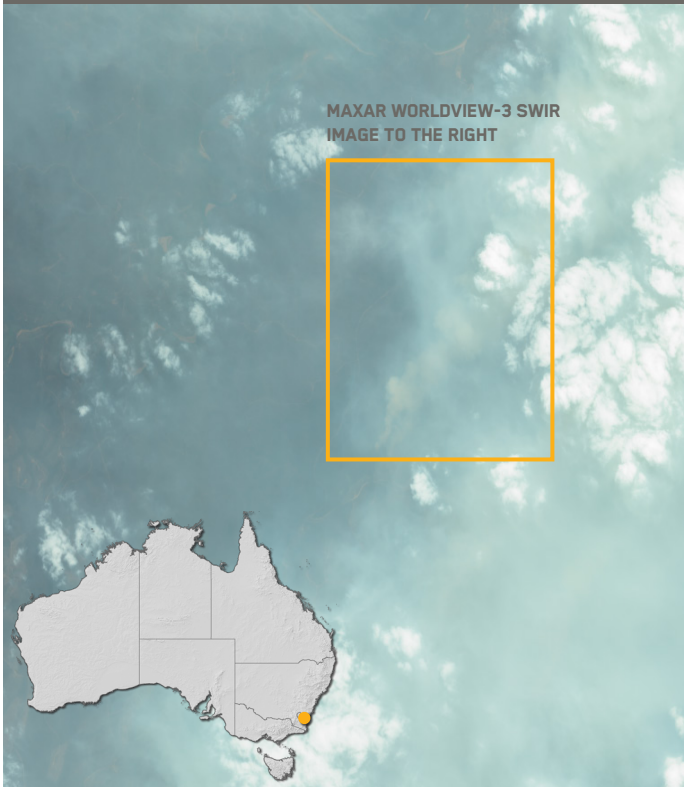


SWIR IMAGE OF BUSHFIRE IN KOSCIUSZKO NATIONAL PARK, NEW SOUTH WALES | JANUARY 4, 2019 | WORLDVIEW-3

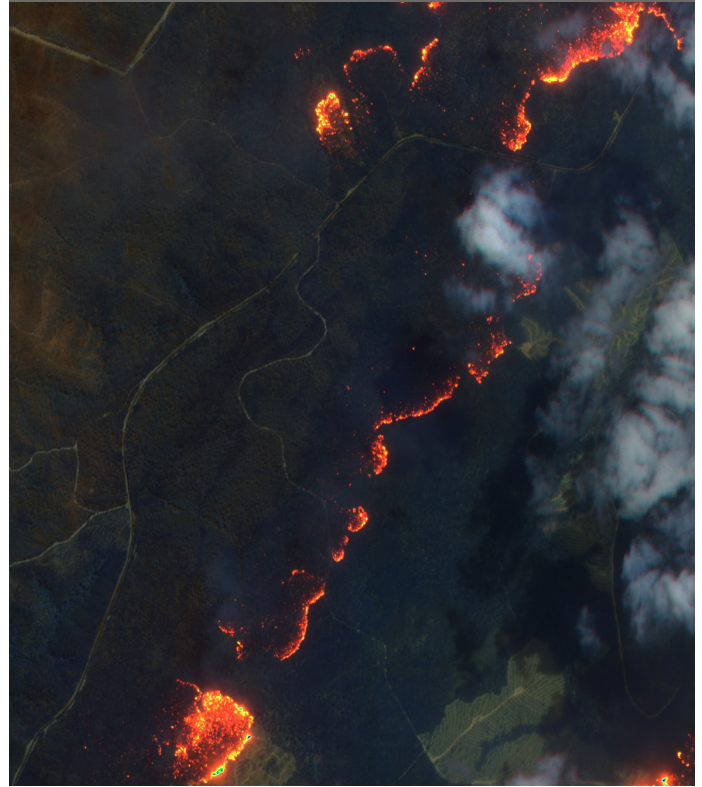




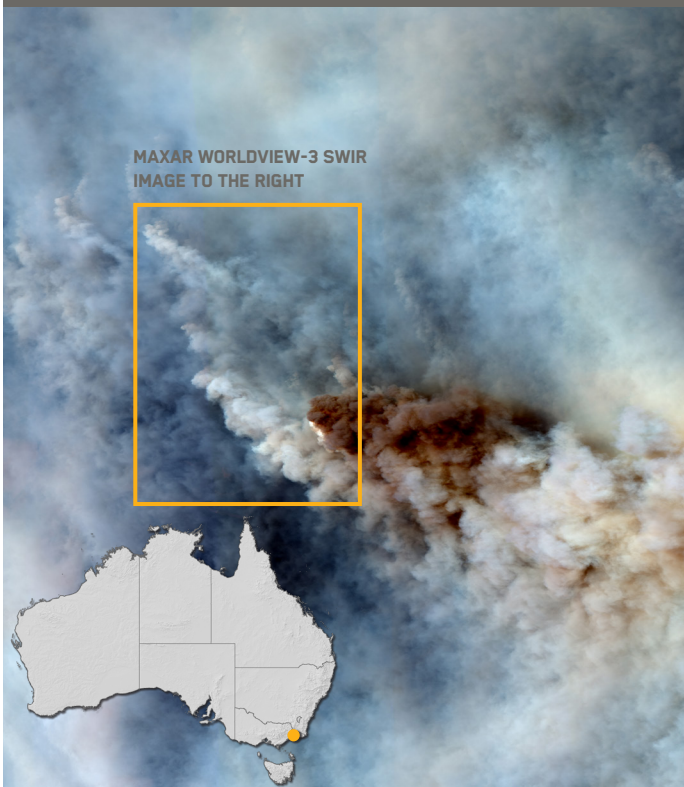
BUSHFIRE NEAR EDEN | JANUARY 12, 2019 | WORLDVIEW-3



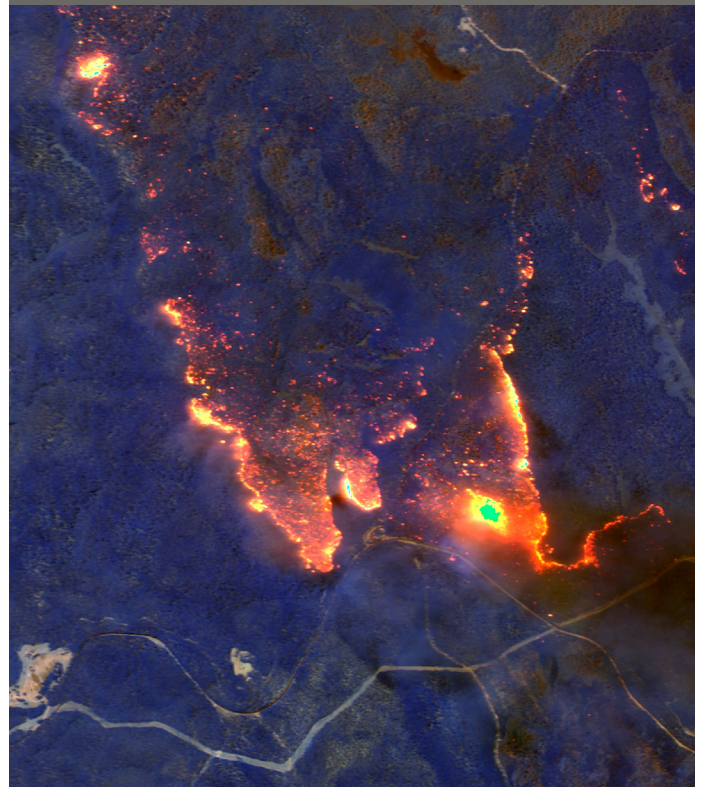
EDEN SWIR IMAGE | JANUARY 12, 2019 | WORLDVIEW-3



BUSHFIRE NEAR ORBOST | JANUARY 4, 2019 | WORLDVIEW-3



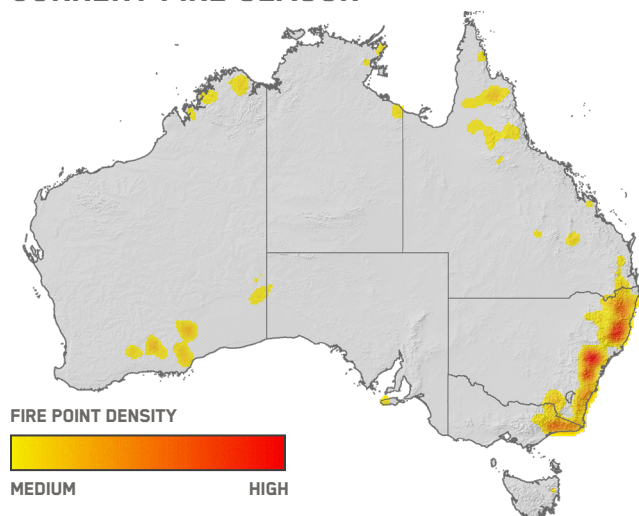
ORBOST SWIR IMAGE | JANUARY 4, 2019 | WORLDVIEW-3



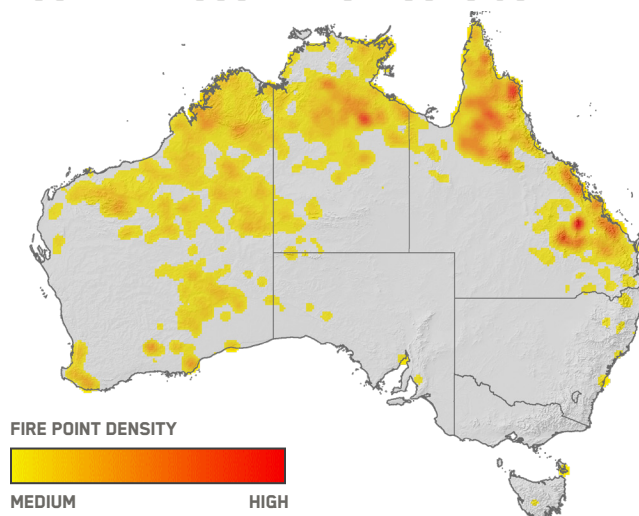
# WHY THIS YEAR IS SO DEVASTATING

The destruction caused by this year's fires is compounded by their location. New South Wales, the hardest-hit state, is a highly populated coastal region whose forests are home to important and diverse wildlife. While fire season is always dangerous in Australia, New South Wales' temperate climate typically spares it from the extreme fire behavior commonly experienced in northern and central Australia. As shown in the two maps below, satellite-detected fires in the late spring (November) through mid-summer (January) have been uncharacteristically concentrated in New South Wales during this fire season.

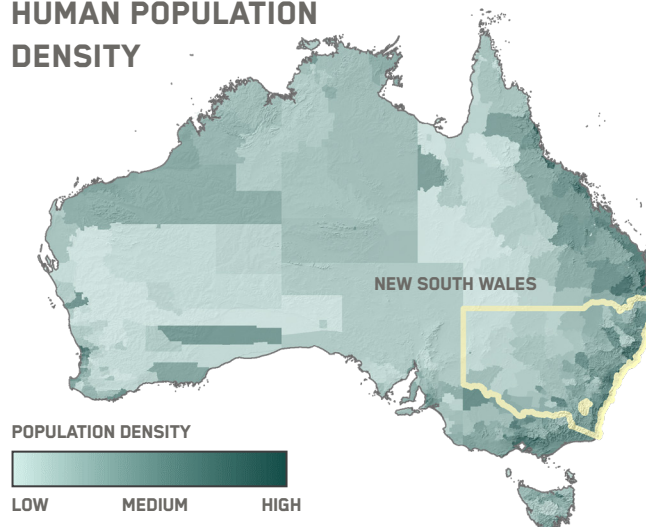
## NOVEMBER-JANUARY FIRE POINT DENSITY CURRENT FIRE SEASON



## FOUR PREVIOUS FIRE SEASONS COMBINED

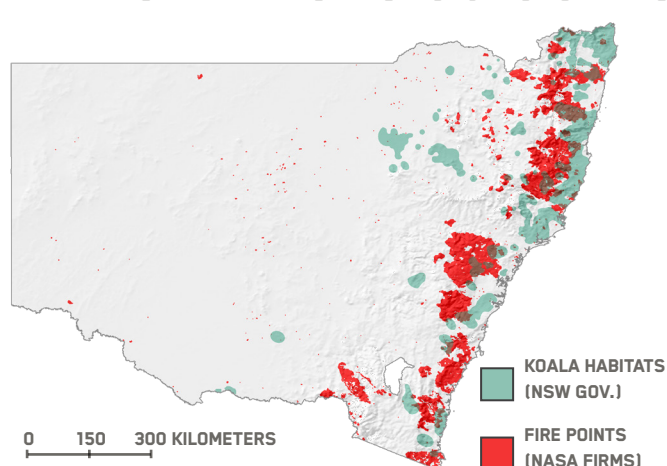


## HUMAN POPULATION DENSITY



Beyond the devastating damage to homes and farms, estimates suggest that 1.3 billion mammals, birds, and reptiles have also died. Among the most impacted species is the koala, an emblematic animal whose future was already in doubt. New South Wales experienced a 33% decline in its koala population between 1990 and 2010. Measurements of newly burned forests and habitats suggest that the recent fires have caused nearly the same level of koala loss in a single season. The map below depicts the locations of the most significant koala habitats (as reported by the New South Wales government) in conjunction with satellite-detected fire points in late 2019 and early 2020.

## NEW SOUTH WALES SIGNIFICANT KOALA HABITATS IN RELATION TO 2019-2020 FIRES

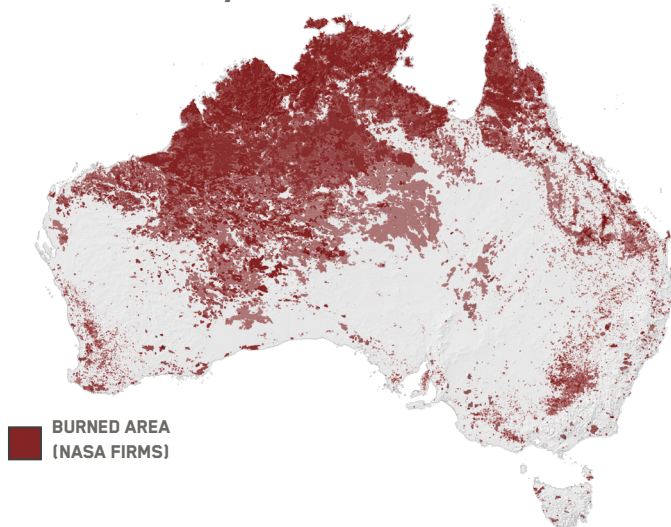




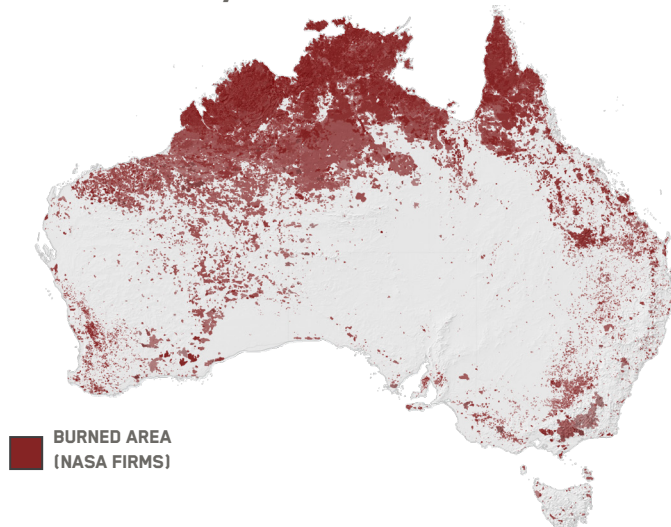
# AUSTRALIA IS REELING FROM THE WORST FIRE DISASTER IN YEARS

While Australia has averaged at least one devastating bushfire every decade and a half since 1960, the frequency of moderate-to-severe fire events has increased in recent decades. Significant fire seasons are now three times more likely than at the end of the previous century—and recent years have witnessed even more extreme fire events. The maps below use data from NASA's Fire Information for Resource Management System (FIRMS) to compare the amount of territory burned in the 8-year period from 2011-2018 with that from the previous 8 years.

## BURNED AREA, 2011-2018



## BURNED AREA, 2003-2010

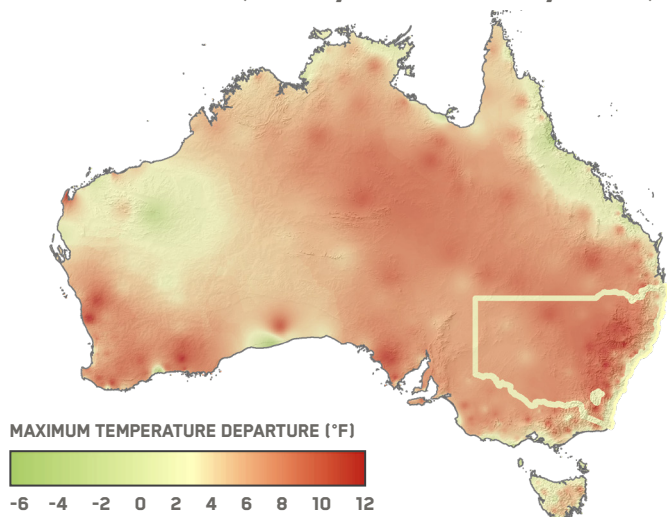


On the following page, data from Maxar's Global Weather Interactive (GWI) application shows how extreme weather variability in southeast Australia created conditions favorable to uncharacteristically strong bushfires. GWI is a highly responsive and intuitive web application that provides custom access to robust, accurate, and manageable weather data across the globe. The maps show that parts of New South Wales experienced maximum temperatures nearly 14% higher than the 30-year average and precipitation 96% lower during the period from December 1, 2019 to January 15, 2020. Registered departures across 10 geographically dispersed weather stations in New South Wales showed a 10.7% increase in average maximum temperature combined with a 82.5% drop in average precipitation.

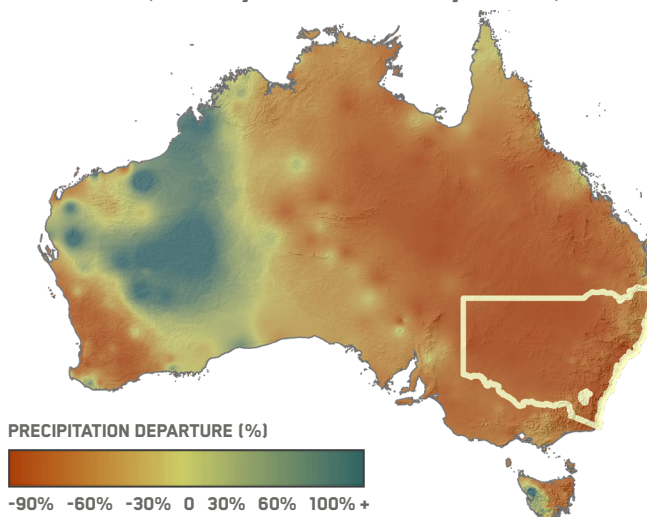
Two atmospheric phenomena in the Pacific and Indian Oceans directly impact Australia's weather. A positive El Niño Southern Oscillation (ENSO) is associated with warmer sea surface temperatures in the Pacific Ocean and a weakening of westerly trade winds, which lead to cooler sea surface temperatures in the waters surrounding Australia. A similar cooling of water is associated with a positive Indian Ocean Dipole (IOD) and the weakening of westerly winds towards Africa. Both atmospheric phenomena frequently result in decreased rainfall and increased daytime temperatures over parts of Australia.

According to Australia's Bureau of Meteorology, the country had one of its strongest positive IOD cycles on record during 2019. This fact undoubtedly contributed to the ferocity of this season's bushfires. But what makes Australia's recent climate trajectory even more significant is the increasing temperatures and precipitation variability during neutral ENSO and IOD cycles. In fact, recent La Niña years (a negative ENSO cycle often associated with cooler days in southern Australia) have exceeded temperatures of positive ENSO events in the 1980s. This has led many scientists to believe that climate change has already begun to alter how these climate phenomena impact Australia.

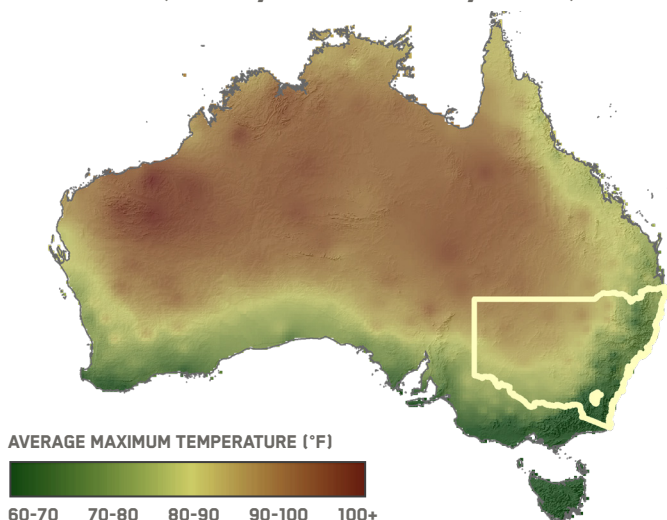
### MAXIMUM TEMPERATURE DEPARTURE FROM NORMAL (DEC 1, 2019-JAN 15, 2020)



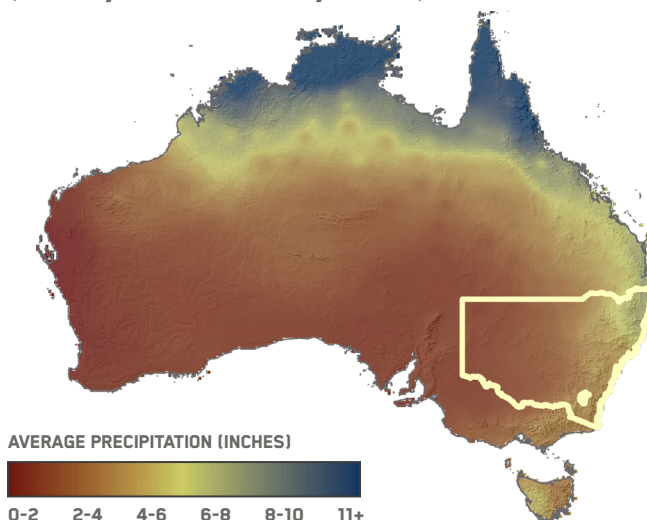
### PRECIPITATION DEPARTURE FROM NORMAL (DEC 1, 2019-JAN 15, 2020)



### MAXIMUM TEMPERATURE 30-YEAR AVERAGE (DEC 1, 2019-JAN 15, 2020)



### PRECIPITATION 30-YEAR AVERAGE (DEC 1, 2019-JAN 15, 2020)



## CONCLUSION

As global climate changes, fire-prone areas are seeing more severe events, and regions not accustomed to extreme fire activity are finding themselves vulnerable. Maxar's imaging and remote sensing capabilities give response teams the timely intelligence they need, and our weather data and analysis evaluate fire vulnerability and augment resource management and planning efforts in crucial urban-wildland interfaces.

Maxar is committed to supporting the humanitarian community by providing critical and actionable information for public use through our Open Data Program. This licensing allows for non-commercial use of the information, meaning it can quickly be integrated into first responder workflows with organizations like Team Rubicon, the Red Cross, and other nonprofits. We will continue to release data to support ongoing disaster response in New South Wales as long as the need exists.





# FOR A BETTER WORLD

Maxar is a trusted partner and innovator in Earth Intelligence and Space Infrastructure. We deliver disruptive value to government and commercial customers to help them monitor, understand and navigate our changing planet; deliver global broadband communications; and explore and advance the use of space.

Our unique approach combines decades of deep mission understanding and a proven foundation of commercial technology to deliver solutions with unrivaled speed, scale and cost-effectiveness.

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