



afis[®]

Past, Present, Future

14 April 2015

Philip Frost, Cheewai Lai
CSPP/IMAPP Conference
Darmstadt

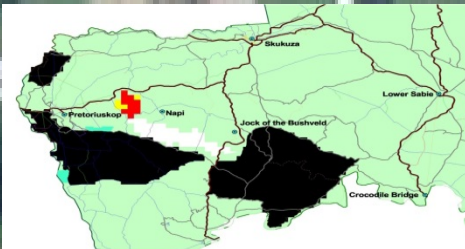
AFIS Origins

Kruger Park fire disaster 2001 initiated the idea of a Fire Information System for Southern Africa

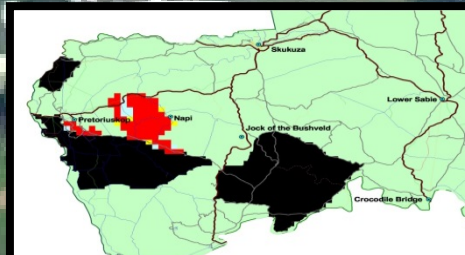
CSIR SAC was willing to invest in the development of a Fire Info System

Telkom provided research funding in 2002 to enable Uni of Maryland to develop a viewer and data system for SAC

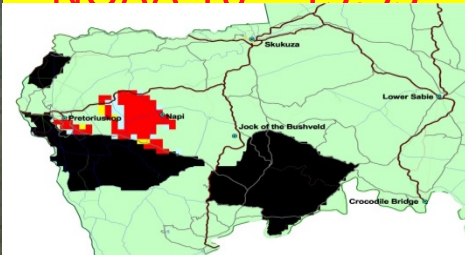
Dept of Agriculture provided funding for the first MODSI DB system in 2003



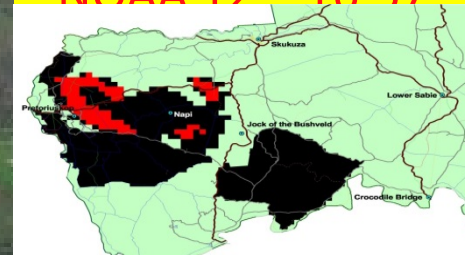
NOAA 16 - 13:53



NOAA 12 - 16:57



NOAA 14 - 17:23



NOAA 16 - 00:51

1st MODIS receiving station

- Funded by Dept of Agriculture (R7 mil) in 2003

Nuwe 'oog' bekyk oeste en brande

Annie Olivier

Suid-Afrika het 'n nuwe paar oë in die lug-ruiin bygekry wat oesopbrengste sal monitor, weidingvermoë kan bepaal én kan waarsku teen groot brande.

Die Modis-sensor kyk daaglik van twee Amerikaanse satelliete af na Suid-Afrika se oppervlak, oseane en atmosfeer en stuur dié inligting na die Satelliettoepassingsentrum (SAC) by Hartbeeshoek, noordwes van Johannesburg.

Die departement van landbou het die geld bewillig om die projek te bestuur.

Dié gee navorsers daaglik toegang tot beter satellietbeelde.

Dié beelde dek 'n veel groter gebied as die Landsat-satelliete wat die SAC die afgelope 20 jaar van satellietbeelde voorsien het.

Waar Landsat elke 16 dae oor dieselfde gebied beweeg, stuur die Modis-sensor daaglik inligting deur.

Een van die unieke gebruike van dié inligting is die SAC se brandmoniteringstelsel.

Volgens mnr. Philip Frost, satellietproduktontwikkelaar by die SAC, is dié stelsel in samewerking met Eskom ontwikkel om brande in Suider-Afrika so gou moontlik op te spoor. Die SAC kan Eskom waarsku sodra 'n brand naby een van sy kragdrade uitbreek.

Die inligting wat van die Modis-sensor ontvang word, sal navorsers ook beter in staat stel om byvoorbeeld plantegroei te bestudeer en rampbestuur toe te pas.



Dié klein antenna ontvang daaglik kosbare inligting wat in die landboubedryf en vir rampbestuur gebruik word. Adv. Dirk du Toit, adjunkminister van landbou en grond-sake, het die antenna gister by die Satelliettoepassingsentrum (SAC) by Hartbeeshoek bekend gestel. Langs hom is dr. Simphiwe Mkhize, assistent-direkteur-generaal van landbou en heel regs is mnr. Philip Frost van die SAC.

Foto: ROBBIE SCHNEIDER



Inception testing – Norway 2003

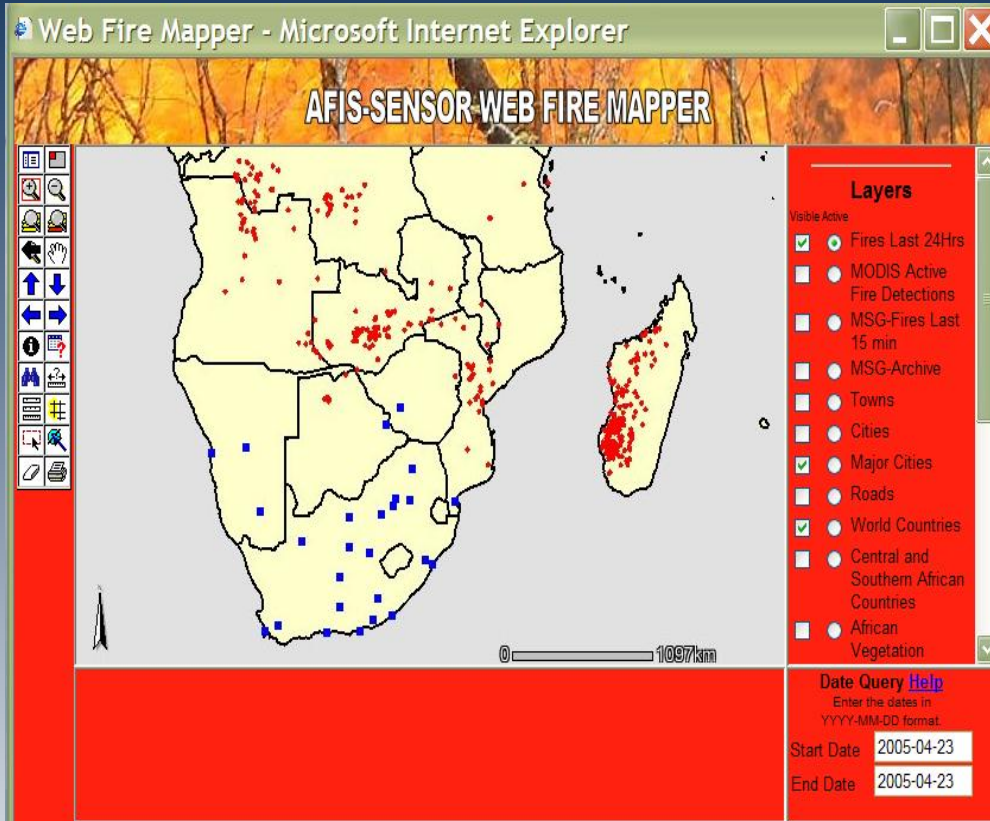
2nd MODIS receiving station

Funded by Eskom (Power Utility) in 2008

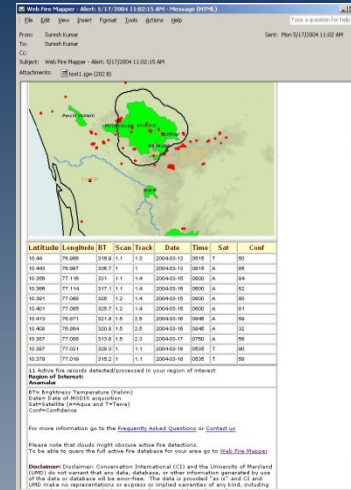
Orbital Systems



Previous Technologies

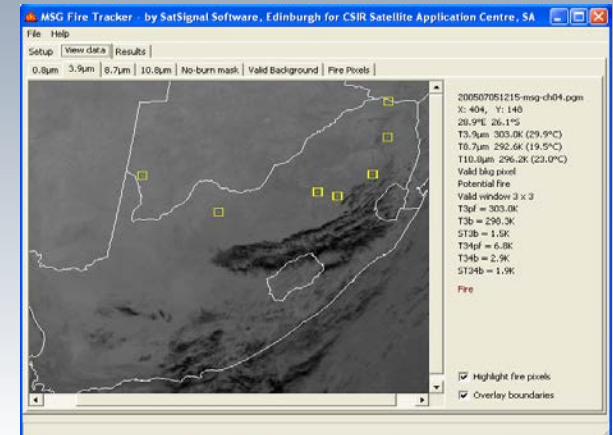


Developed by the University of Maryland



AFIS SMS and Email Alert platform developed by Maryland

Satsignal software contracted to develop the MSG Fire Tracker in 2004



AFIS on SABC



Value Proposition

globally competitive commercially viable business



Governments

- Standard, consistent information products aligned to legislative requirements
- Alerting, forecasting, operational information, mobile solutions, specific individualised notifications



Infrastructure Owners

- Pro-active Risk management
- Automated 24/7 surveillance of extended infrastructure in a cost effective way, global presence, mobile solutions, individualised notifications
- On demand relevant historic data for planning and reporting



Fire Management

- New technology for fire detection and alerting over very wide areas
- Reliable information, collected in a cost effective and consistent way, delivered to mobile devices, individualised notifications
- On demand spatially linked historic data for planning and reporting



Aggregators/Regional Service Providers

- New technology solution with a proven business model
- Service with out the need to host operational infrastructure
- Scientific knowhow for localisation of products

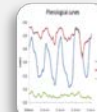
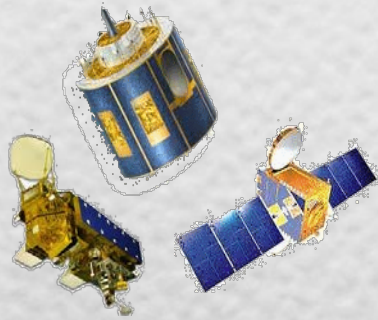
Technological Solution

Data

ICT Core

Analytics

User Experience

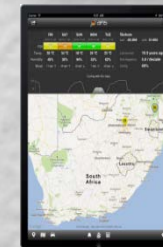
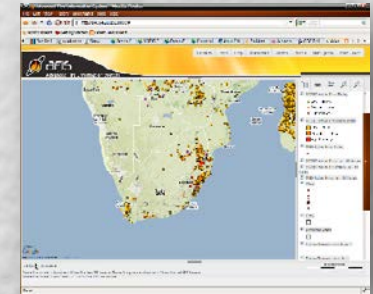


Fire Danger Forecasting

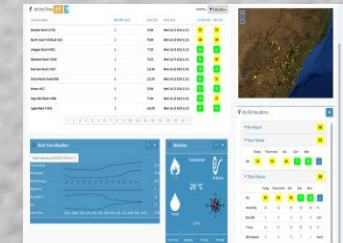
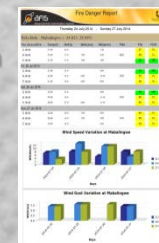
Active Fire Monitoring

Burn area mapping

Vegetation Dryness



Geo-Spatial Processing Platform



Current AFIS Services



Current AFIS Products

WildFire Prediction

- ECMWF/Custom Weather 4 day forecasts
- Lowveld and Canadian Fire Danger Index
- Can be implemented globally

Wildfire Detection

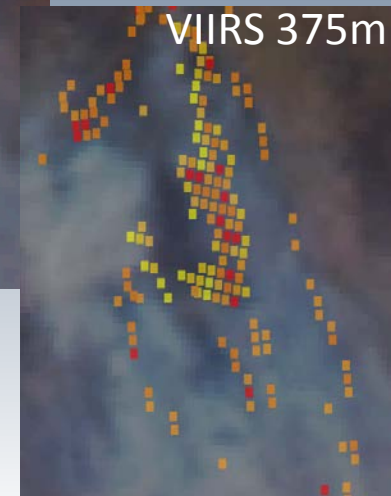
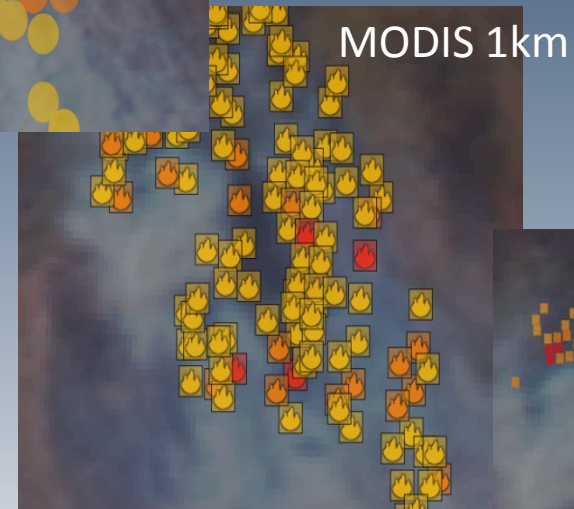
- MODIS/VIIRS 1km
- VIIRS 375m
- MSG/GOES/COM-01 (global 15 min)

Wildfire Assessment

- Landsat Burned area (30m)
- MODIS Burned area (500m)
- Vegetation condition (500m)

Active fire detection products

Wildfire - Mozambique



MSG active Fire data in AFIS

2004

Development of the
MSG Fire Tracker



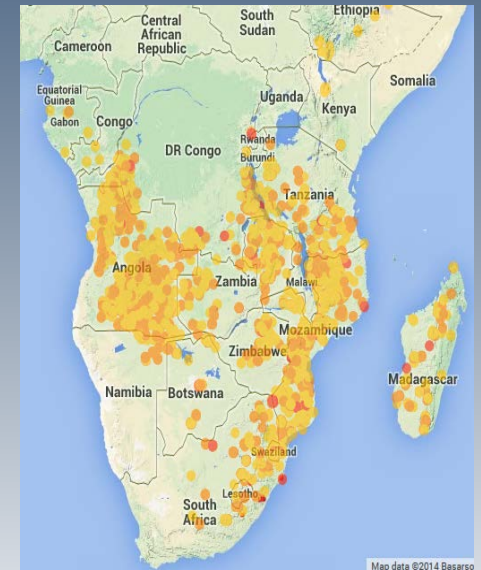
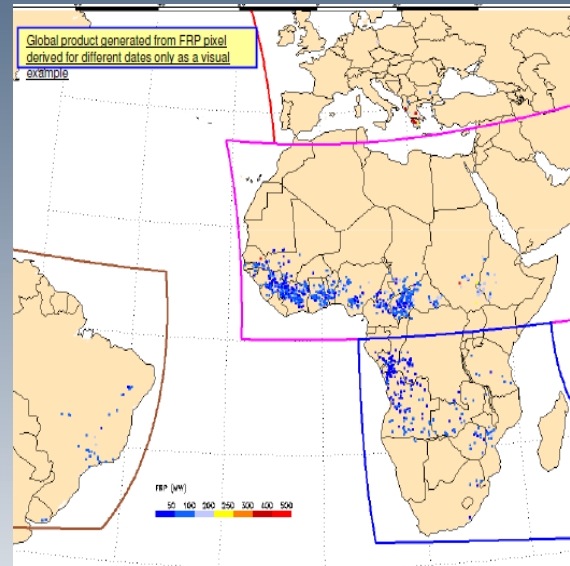
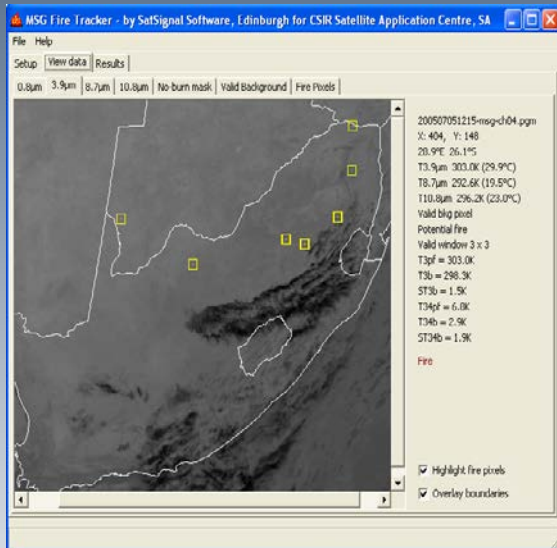
2008

LandSAF FRP
product



2011

Implementation of the
WF-ABBA product



No Service 0:32 20%

afis

Sabie Park, Mpumalanga, 1260

LAT -24.883 LON 31.487

	THU 2013-07-04	FRI 2013-07-05	SAT 2013-07-06	SUN 2013-07-07	MON 2013-07-08
FDI	49	38	50	52	46
Temp.	21 °C	20 °C	23 °C	26 °C	24 °C
Humidity	51%	58%	47%	42%	48%
Wind	18 kph ↘	8 kph →	13 kph ↑	11 kph ↑	9 kph ↑

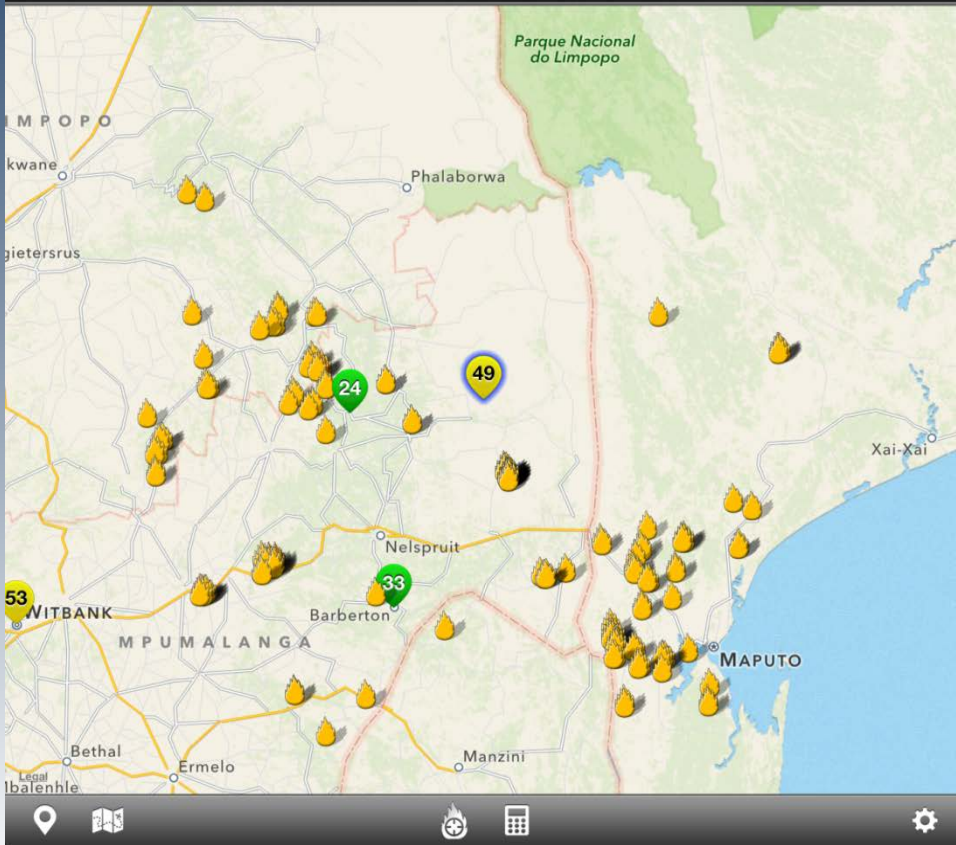
Land cover: Woodland

Last burned: 2.8 years ago

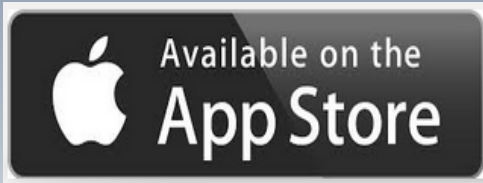
Fire frequency: 1.5 / decade

Curing: 57%

View fire history

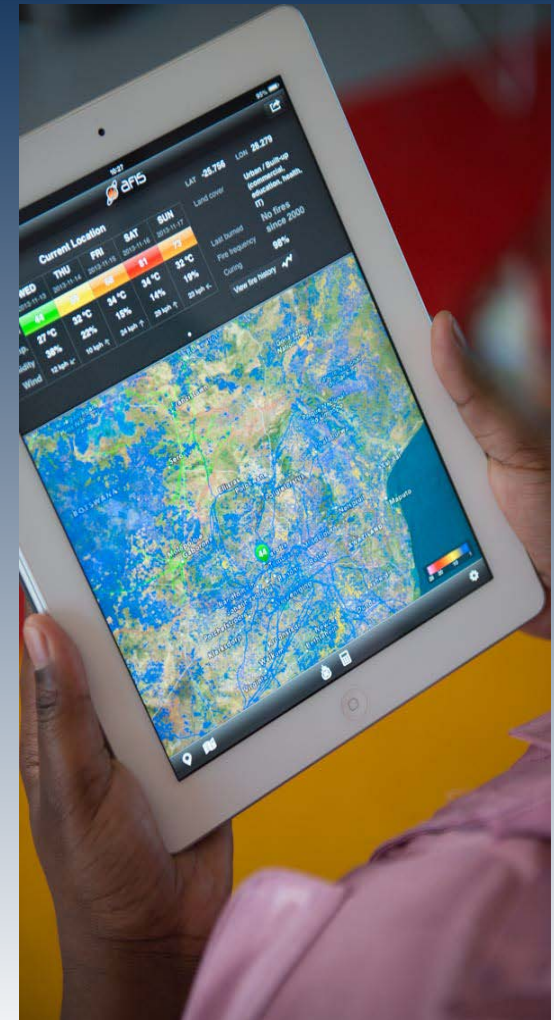


AFIS Mobile App

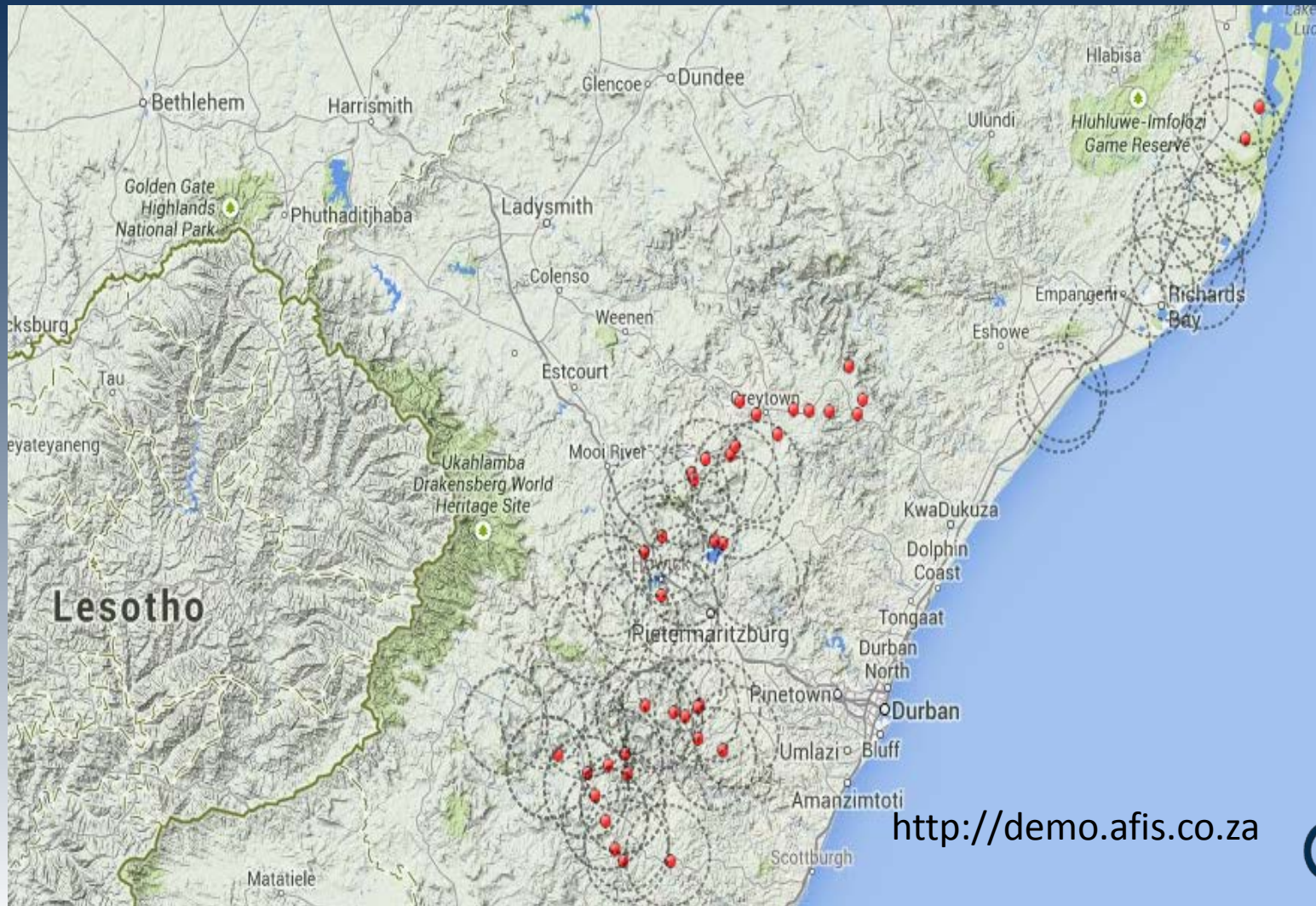


AFIS Mobile App

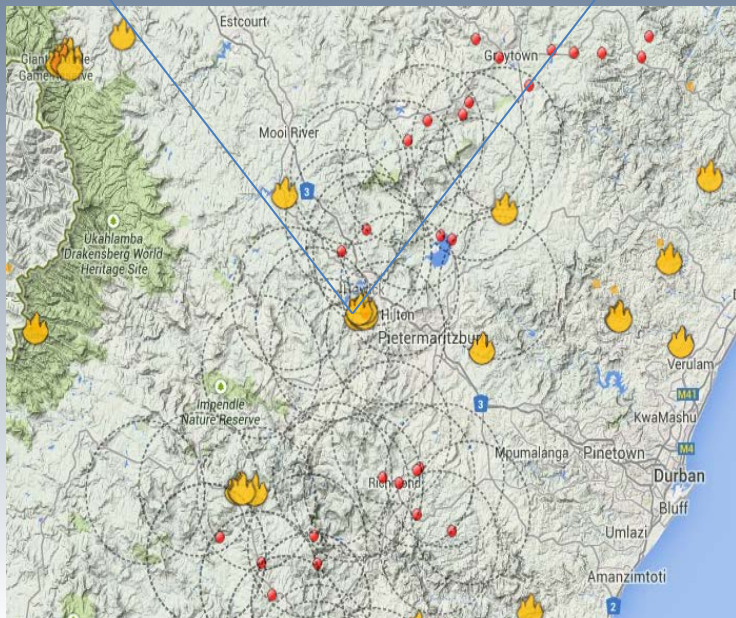
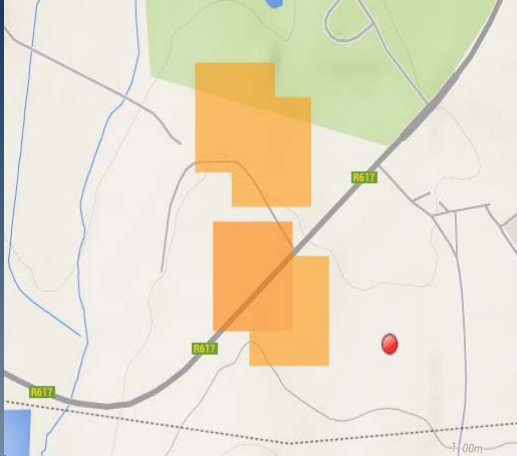
- Available on iOS and Android platforms
- 5 day Fire Danger forecasts
- Fire reports (date of last burn, fire frequency, vegetation curing)
- Geo-tagged picture uploads to the AFIS server
- Map of active fires within a radius of my location
- Track my location on the AFIS viewer (using the phone as a tracking device)
- View all my assets equipped with the AFIS GPS tracking device



FireHawk Camera network



VIIRS validation with FireHawk cameras



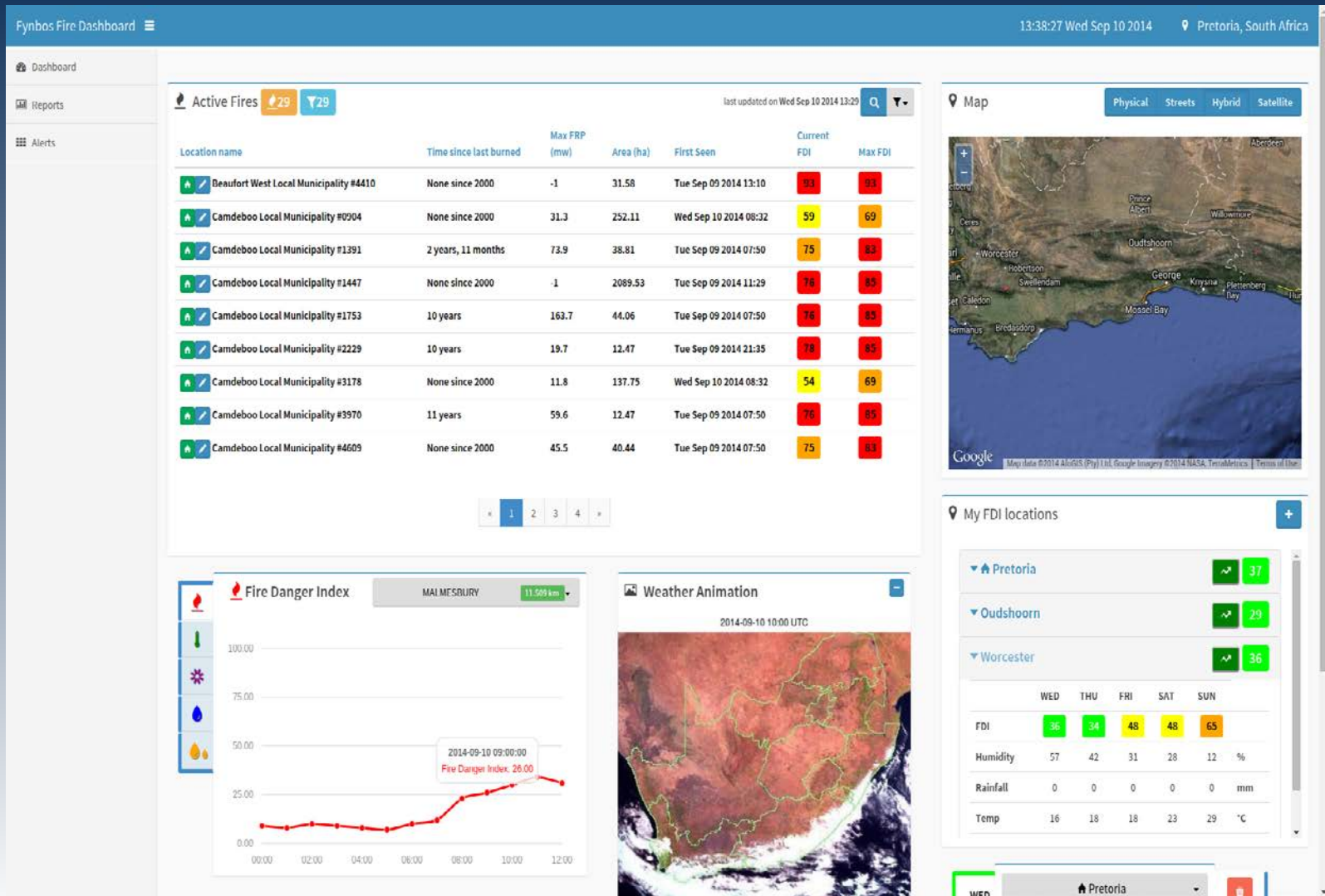
Log Id : 3307
Alarm : 69400
Date : 29/07/2014
Time : 12:25:52

[View Full Alarm Information]

SwatShop [13]
2014-07-29 12:22:38 Image 1/4(o)



AFIS Dashboard



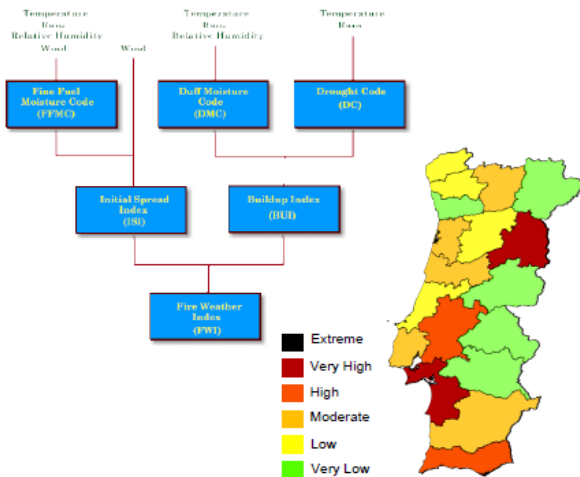
AFIS Fire Danger Products



Operational Fire Danger Forecasting

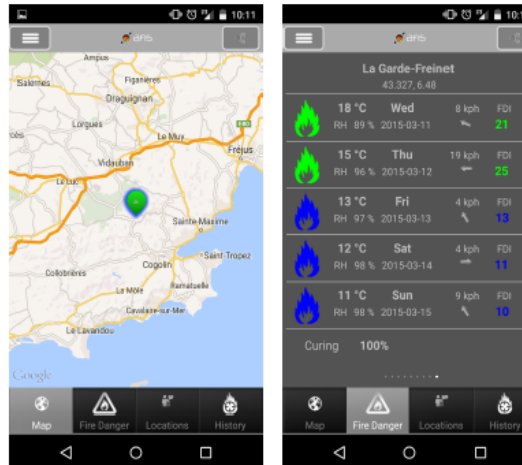


Daily Fire Danger Forecast maps



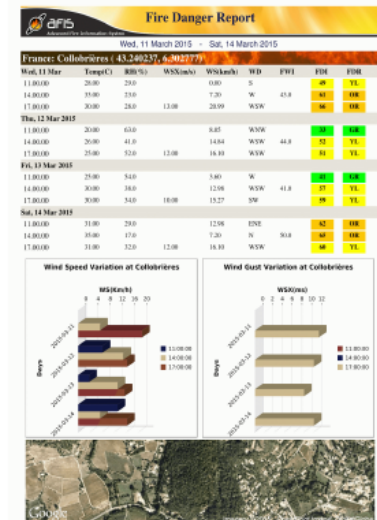
Based on the Canadian Fire Weather Index (FWI) model produced daily. Example of Portugal. Calibrated for any region of interest.

Specific location Fire Danger forecasts



Provide point based FWI queries via our Mobile Application

Fire Danger Email Reports



Automated Fire Danger Forecast reports emailed to clients

AMESD and MESA projects



AMESD Fire service:

Field terminals have been installed at the Ministry of Environment of 11 SADC countries

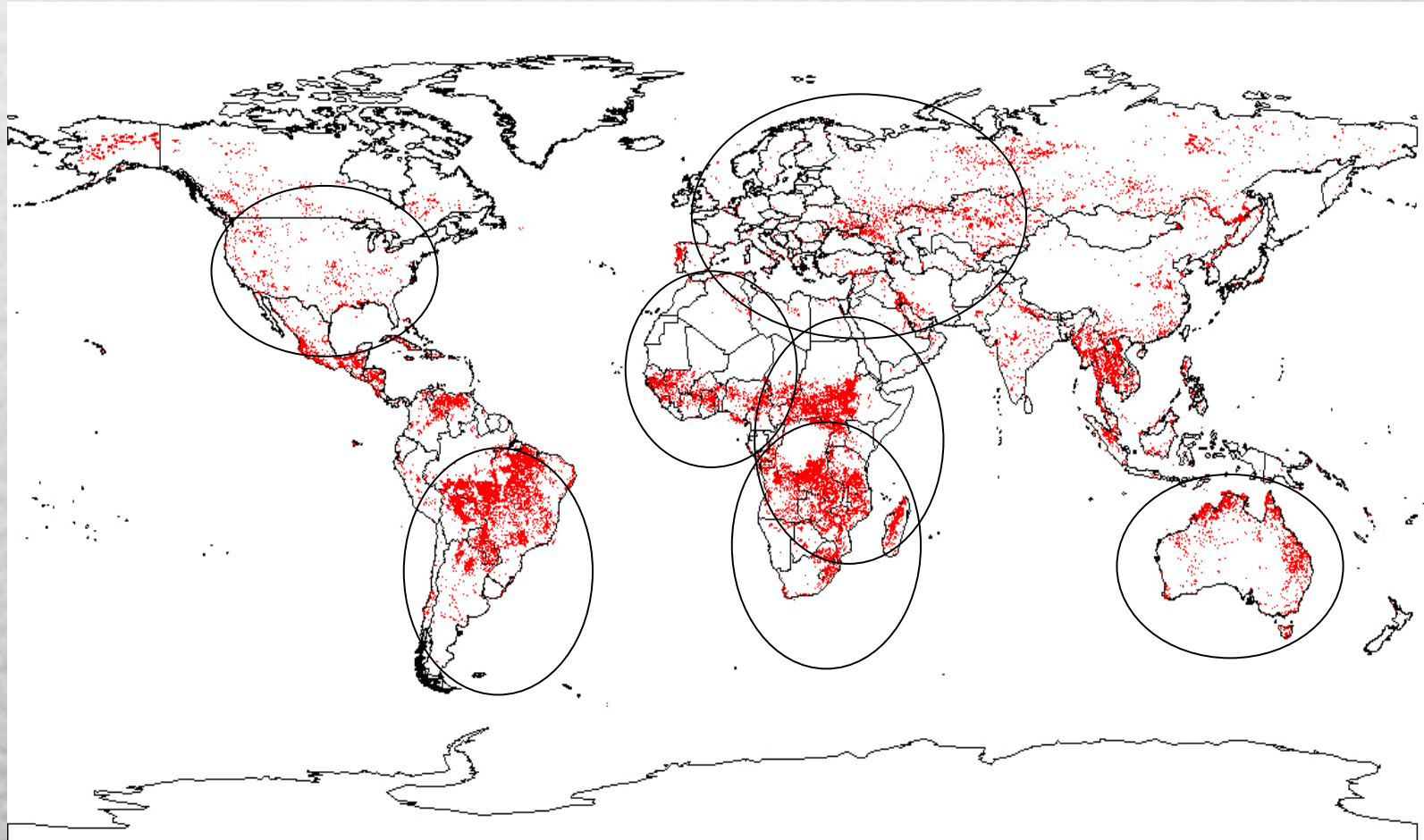
MESA Fire Service:

Expand on the AMESD service by rolling out the new Multi Hazard Field terminal

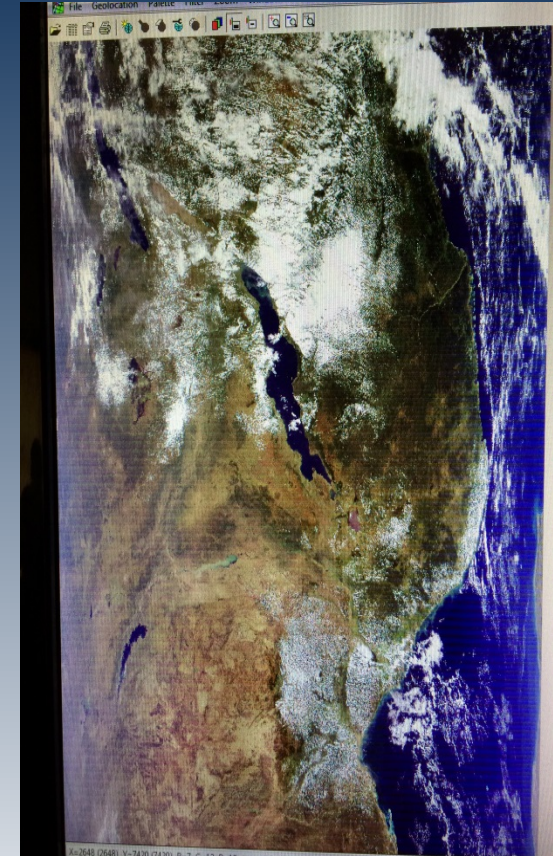
Meeting the Need

Global Growth Plan

Data Partners and Potential Licensee's



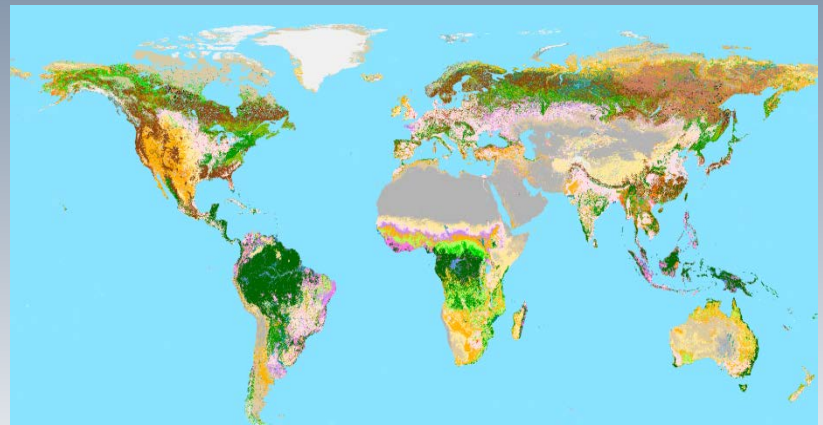
MODIS/VIIRS reception - Kenya



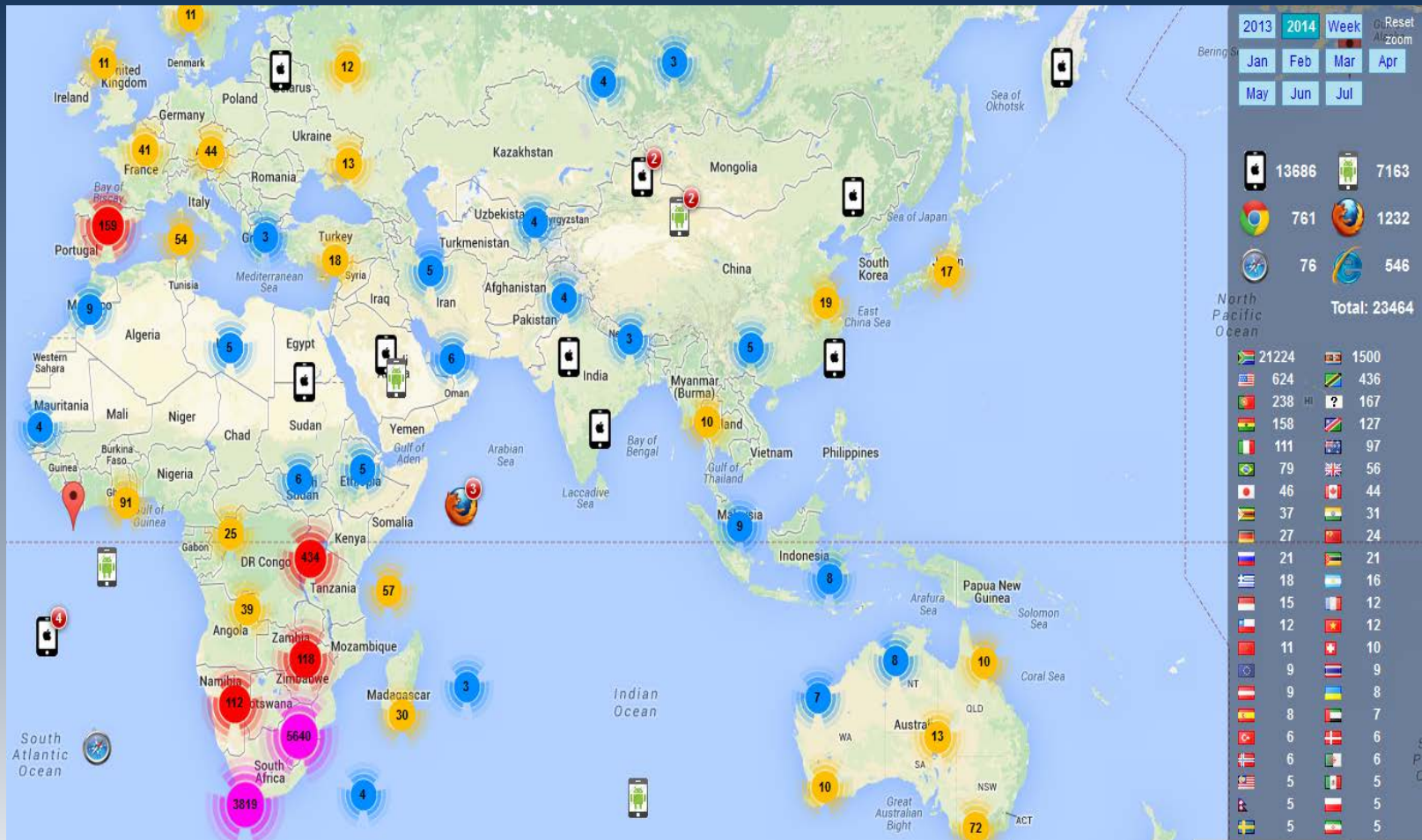
- Installed at RCMRD in Nairobi, Kenya
- Orbital Systems X band system

Current Data Partners

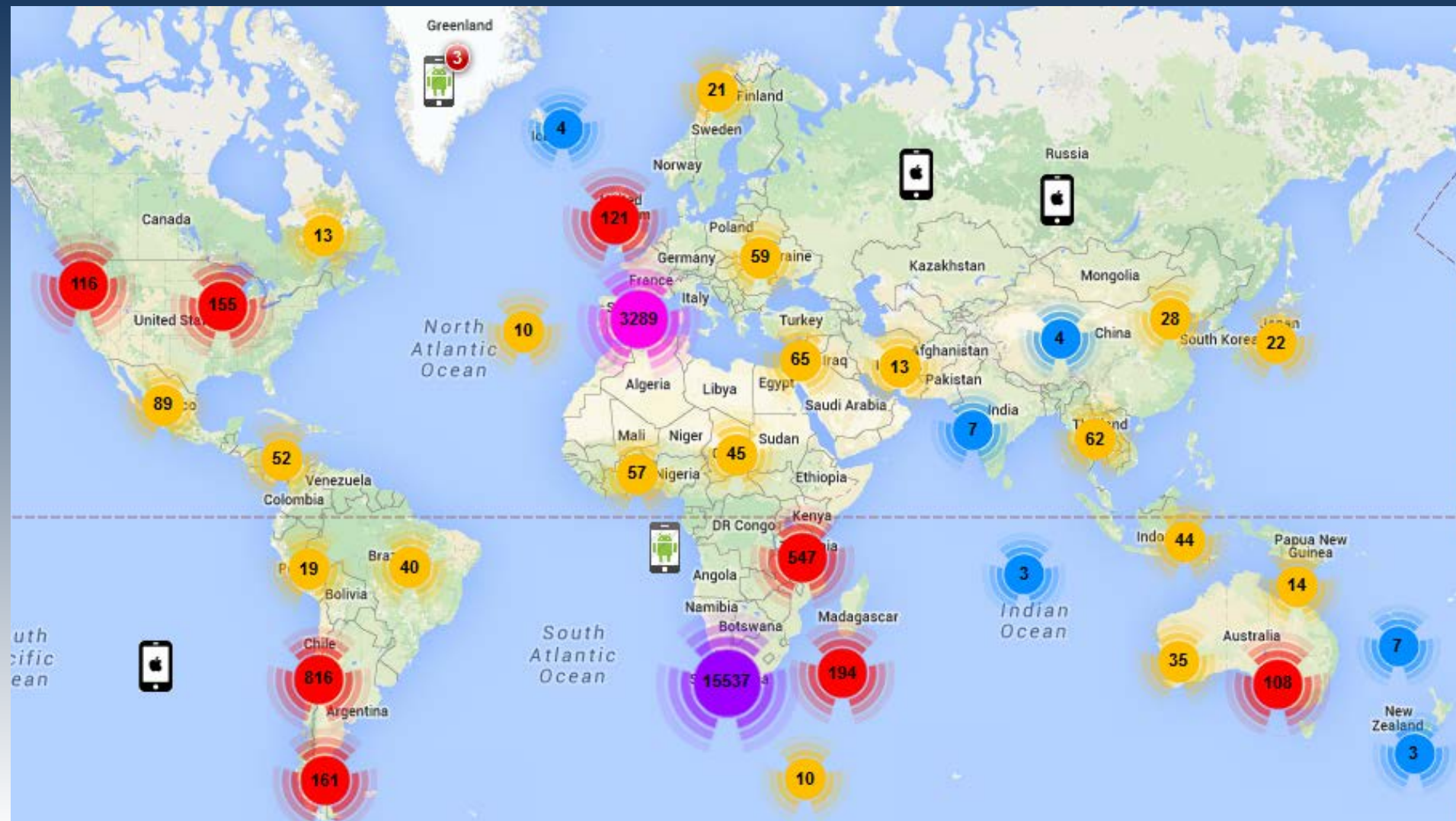
- SANSA/Meraka – Southern Africa
- Eumetsat – Africa and Europe
- RCMRD – East and Central Africa
- University of Wisconsin Madison - USA
- University of Dundee – Scotland, Europe
- INTA – Argentina
- Landgate – Australia,
Indonesia



AFIS Data Query Results 2014



AFIS Mobile App use - 2015





CAPE FIRE BY NUMBERS

ON 1 MARCH 2015, FIRES BEGAN TO ROAR ACROSS CAPE TOWN'S SOUTH PENINSULA. STARTING IN MUIZENBERG, THE FIRE SPREAD RAPIDLY TO SURROUNDING AREAS.

5 DAYS

THE FIRE BROKE OUT ON 1 MARCH 2015, AND CONTINUED FOR 5 DAYS



5 500 HECTARES
AFFECTED BY THE FIRES

R5 MILLION

COST OF DAMAGE TO TABLE MOUNTAIN INFRASTRUCTURE

 **13**
PROPERTIES AFFECTED



TWO THOUSAND
PEOPLE HELPING TO STOP THE FIRE

500 PEOPLE
EVACUATED

2 MILLION LITRES

OF WATER DUMPED ON THE FIRE IN ABOUT 2 000 WATER DROPS



1 PILOT DEAD

A HELICOPTER PILOT WAS KILLED AFTER BEING FORCED TO MAKE A CRASH LANDING WHILE FIGHTING A BLAZE THAT BROKE OUT IN CAPE POINT. 1 CITY FIREFIGHTER TREATED FOR BURN WOUNDS, 52 ELDERLY RESIDENTS (FROM NOORDHOEK RETIREMENT VILLAGE) TREATED FOR SMOKE INHALATION.

R2.4M
ESTIMATED COST OF FLIGHT TIME

198 HOURS FLOWN

26 AIRCRAFT

11 HELICOPTERS,
6 FIXED-WING BOMBERS AND
9 SPOTTERS DEPLOYED TO
FIGHT THE 11 FIRES

ONE CIGARETTE POTENTIALLY CAUSED THE FIRE, ACCORDING TO REPORTS

AFIS Info Tweets

afis
Advanced Fire Information System

Register Login Places Date Query Base Layer Help

Advanced Fire Information System
southernafrica.afis.co.za

Get AFIS mobile Warnings Partners Disclaimer
Register Login Places Date Query Base Layer Help

afis
Advanced Fire Information System

Medium intensity
High intensity
Extreme intensity

Weather Stations
Additional
Burned Area
Satellite Images

- Mulzenberg Landsat7 False Color 2015-03-03 10:30 SAST
- Mulzenberg Landsat7 SWIR 2015-03-03 10:30 SAST
- MODIS True Colour: Latest
- MODIS False Colour: Latest
- MODIS True Colour: Previous
- MODIS False Colour: Previous

18.43637, -34.09949
You are not logged in, the changes won't be saved.

kilometers

High intensity Fire
Extreme intensity Fire
MODIS / VIIRS Active Fires Last 48 Hours
Low intensity Fire
Medium intensity Fire
High intensity Fire
Extreme intensity Fire

Active Fire (Geostationary)

- MSG / GOES Active Fires Last 48 Hours
Low intensity
Medium intensity
High intensity
Extreme intensity
- MSG / GOES Active Fires Today
Low intensity
Medium intensity
High intensity
Extreme intensity

Weather Stations
Additional
Burned Area
MODIS Burned Areas Last 4 Months

Satellite Images

- Mulzenberg Landsat7 False Color 2015-03-03 10:30 SAST
- Mulzenberg Landsat7 SWIR 2015-03-03 10:30 SAST
- MODIS True Colour: Latest
- MODIS False Colour: Latest
- MODIS True Colour: Previous
- MODIS False Colour: Previous

18.31269, -34.13184
You are not logged in, the changes won't be saved.

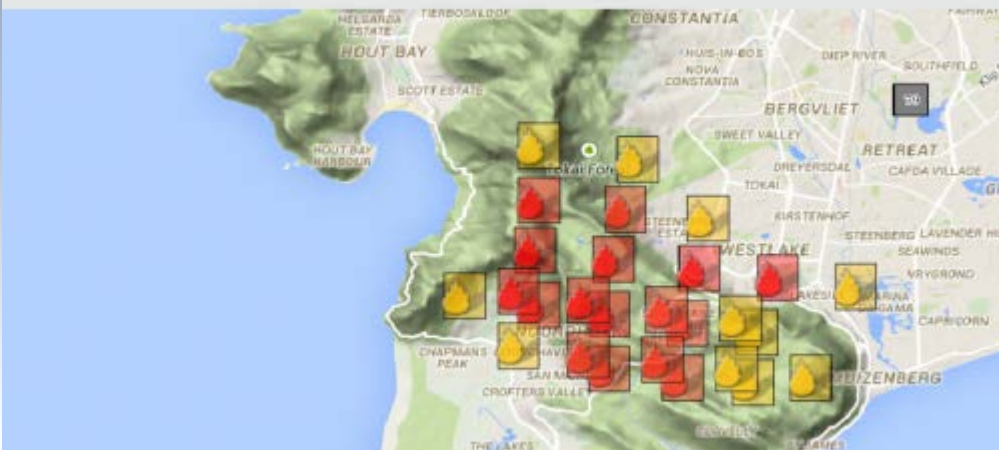
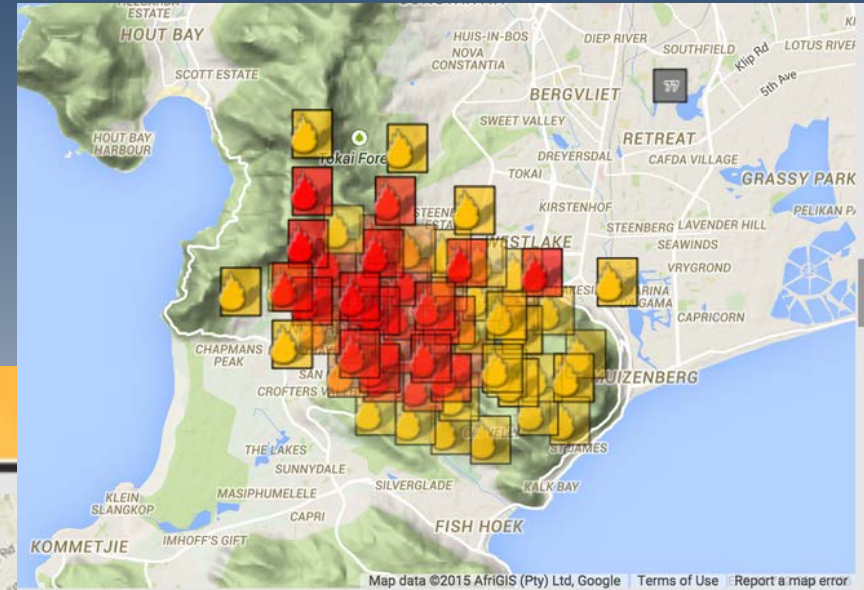
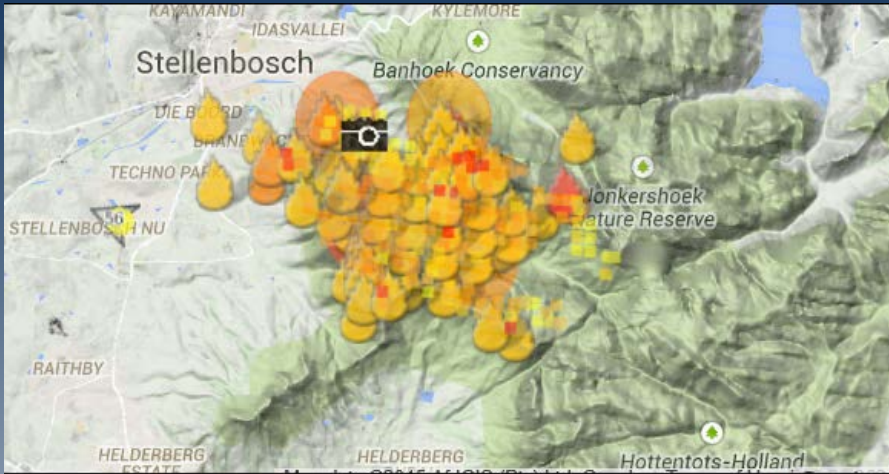
kilometers



Ashton Maherry @amaherry · Mar 4

Advanced Fire Information System @CSIR showing extent of #capefire & fires in the past 48hrs southernafrica.afis.co.za

AFIS Info Tweets



1.

 **Glenn Moncrieff** @Glennwhtwons · Mar 1
#MuizenbergFire extent from @MerakaAFIS late last night

12

AFIS Burned Area Mapping



Cape Fires mapped by the AFIS Landsat 8 Burned Area program - 11 March 2015

Burn Severity

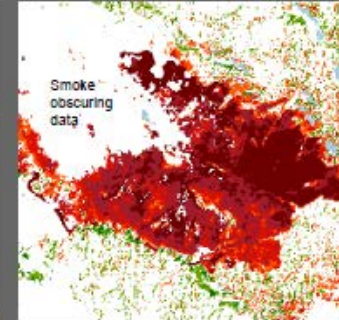
Muizenberg fire
1 March 2015 - 5 March 2015



Cape Point fire
4 March 2015 - 6 March 2015

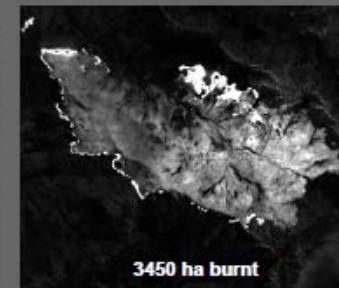
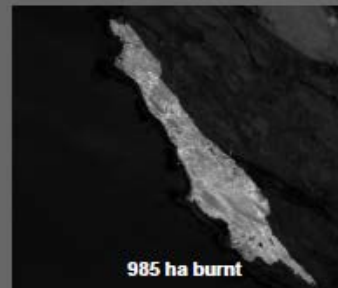


Stellenbosch (Jonkershoek) fire
10 March 2015 - 13 March 2015

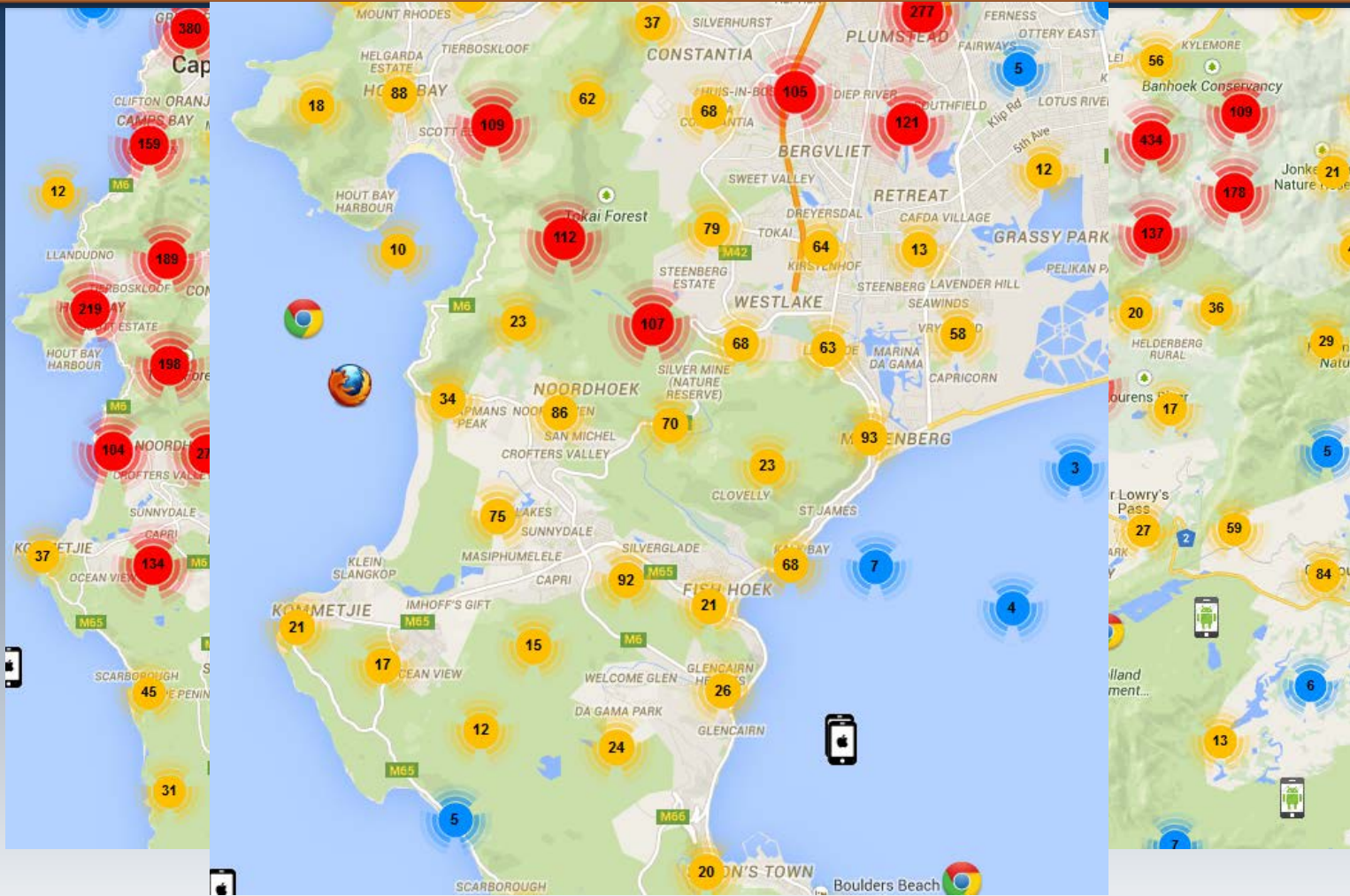


The Normalised Burn Ratio (near-infrared band 4 and the short-wave infrared band 7) provides an index of fire severity in a number of categories and identify areas where the vegetation was most affected (highest fire intensities) by the fire.

Burned area



AFIS Mobile App use during fires

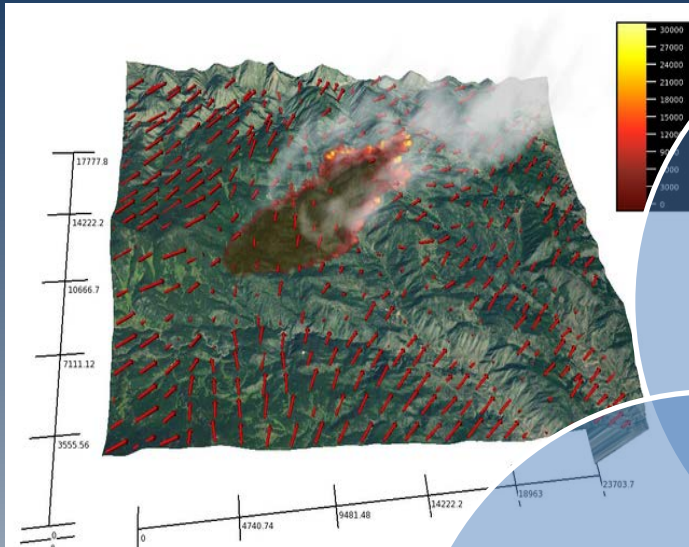


Weather Forecasting	10 Day, hourly weather forecasts (4km) Weather models: Meteogroup - ECMWF
Fire Danger Estimation:	Lowveld, Canadian Fire Weather Index, KBDI, Simple FDI
Weather stations:	SAWS, Vital weather, Fynbos, Wunderground,
Fire detection:	MODIS, VIIRS (High res), MSG, Landsat 8, Firebird, AFIS app reports
Burned area mapping:	MODIS And Landsat burned area mapping and statistics
SMS/Mobile Alerting:	SMS and Email Fire alerts
Fire Risk mapping	Operational Fire risk model (Nov 2015) based on fuel type, condition, load, topography and population density
Fire Spread modelling:	Australis Model operational and displayed in a 3D visualisation environment
AFIS Tactical visualisation:	Create 3D view of fire locations Forecasted wind field flow Link with fire spread products
Vegetation Condition Estimates	Relative greenness mapping every 16 days Keetch Byram Drought Index
Satellite imagery:	MODIS/VIIRS true colour/false colour Landsat true colour Landsat NBR Planet Labs imagery MSG Cloud and Precipitation animation

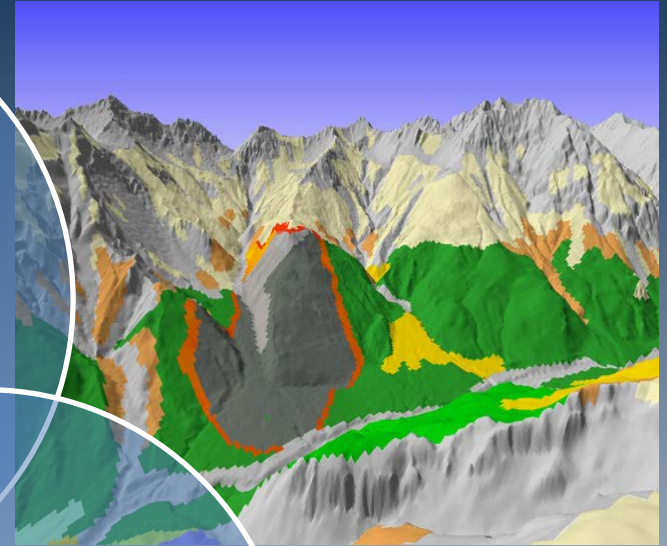
AFIS Premium Service



Future AFIS products



Tactical Fire Fighting



Fire Spread Modelling

3D Active Fire mapping

Aurora FireWatch

OpenLayers 3

AFIS TV AD

