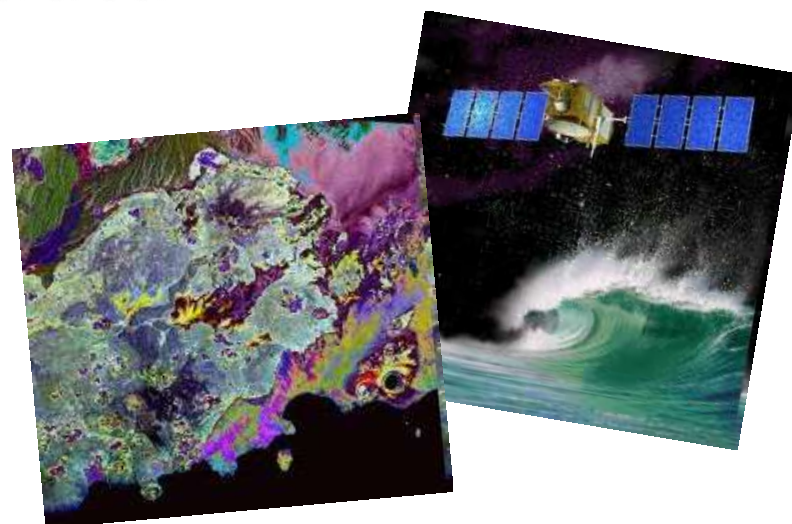


# Multiple use & Integration of satellite data

Nikos Bogonikolos, PhD  
Aratos Technologies S.A.



- Satellite data – SatEO , SatNAV - have many
  - Meteorology
  - Disaster Management
  - Land use – Land Cover -Agriculture
  - Geology
  - Forestry
  - Regional Planning
  - Education
  - Oceanography
- **Geo-intelligence Methods as New tool for integration of data**



Satellite data can be used to produce composite images of an entire hemisphere...



...or to map a small area of the Earth

- Weather & Climate Monitoring
  - Clouds and cloud systems
  - Air Pollution monitoring
  - Auroras and storms, winds direction and speed
  - Snow cover and ice mapping



*Meteosat-9 satellite image, Europe,  
18/10/2011, 10:15 UTC*

# Meteorology (2)

- Weather & Climate Monitoring
  - Boundaries of ocean currents
  - Temperature of the ground, sea and atmosphere in various heights
  - Precipitation index → Floods monitoring
  - Ozone Concentration and Ultraviolet Index



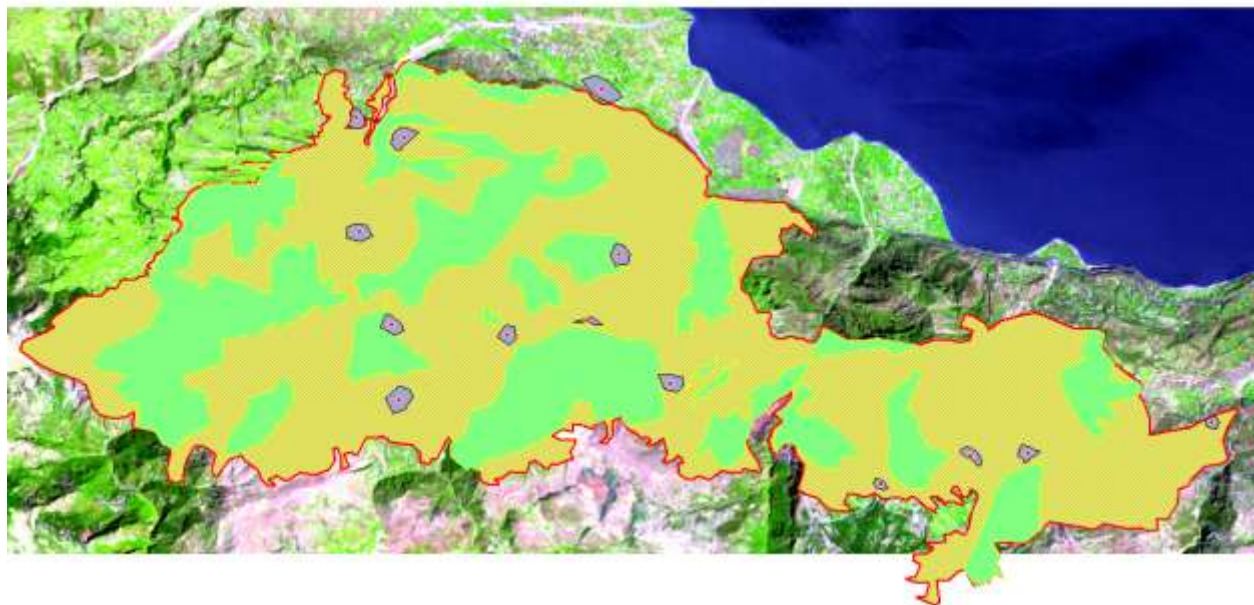
*Precipitation Index, Europe by processing of Meteosat-9 satellite data, Aratos Disaster Control*

- Crisis Management-> Pre Crisis-> Crisis-> Post Crisis
- Fire Monitoring – Fire Rapid Damage Assessment
- Oil spills monitoring Earthquake Activity Monitoring
- Flash Floods Monitoring
- Pipeline Surveillance





# Fire Rapid Damage Assessment (1)



## Map Example

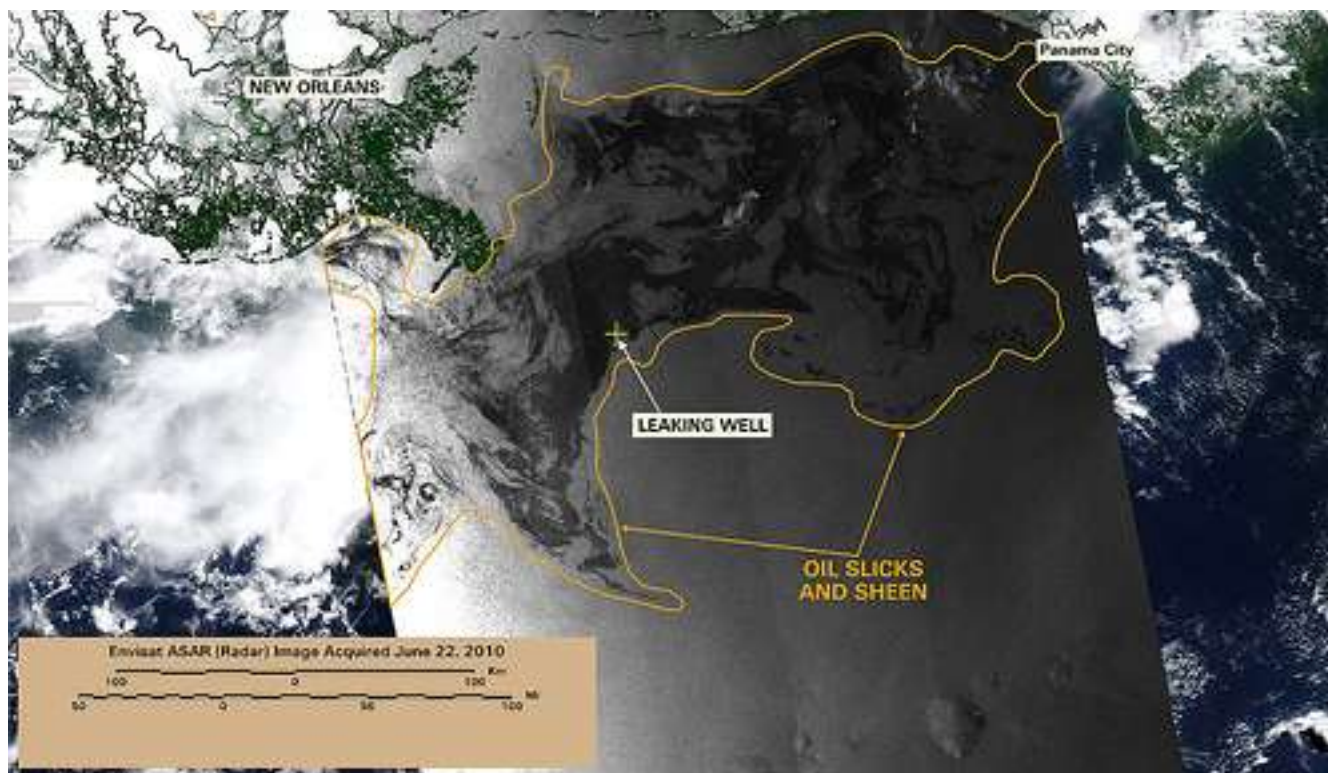
*Rapid Damage Assessment of fire in Egio, Greece, developed by Aratos Technologies S.A.*

*(23-27 of July 2007)*

- Early estimation of crisis coverage and expansion

# Fire Rapid Damage Assessment (2)

- It includes:
  - Estimation of area-in-crisis coverage
  - GIS representation and distinction of burdened, residential, rural and other areas
  - Monitoring of damage extension during the event and after its end
  - Monitoring of weather phenomena and their impacts on the crisis expansion



*Oil detection using  
space-borne data*

- Use of SAR Technology (Synthetic Aperture Radar)



- It includes:
  - Detection of oil spills
  - Overview of oil spreading
  - Prediction of oil spreading using meteorological data
  - Detection of the polluting ships (can be spotted but not identified)



*A ship discharging oil*

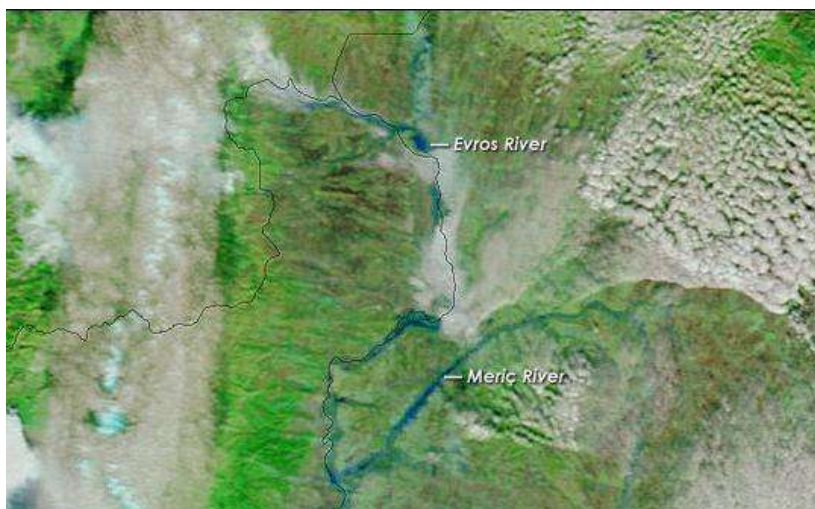
# Flash Floods Monitoring (1)

- Monitoring of floods by using satellite radiometric data and imagery
- It can be combined with:
  - Estimation of water movement
  - Monitoring of meteorological data of the area (precipitation data)
  - Potential landslides after 1, 3 and 7 days of continuous rainfall

# Flash Floods Monitoring



*Satellite images of floods in  
Evros (Meric) river, March 20,  
2006 (up) and November 22  
2007 (down)*





# Aratos Disaster Control (1)

- Aratos Disaster Control™ is an online GIS application used to graphically represent Earth Observation (EO) data and designed to deliver effective Disaster and Environmental Management Solutions

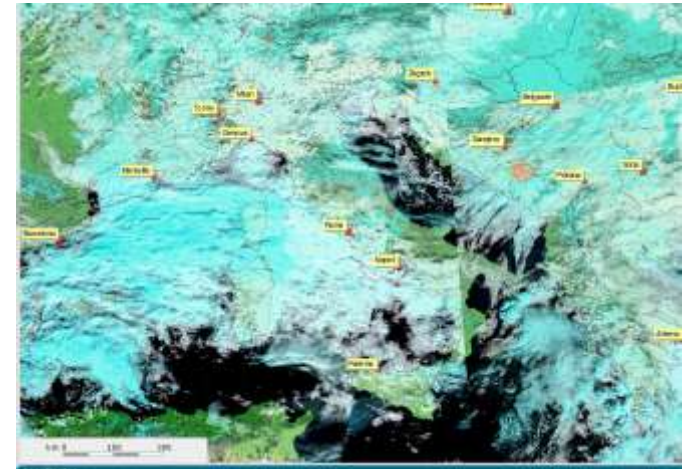


Aratos Disaster Control is composed of an amalgam of different technologies, such as GIS mapping, web applications, earth monitoring via satellites and UAVs, GNSS signals, image processing etc.



# Aratos Disaster Control (2)

- The system provides continuous monitoring on a 24/7 basis using satellite data and according instant alerts. Disaster results, forecasts and demographic data are represented on a specially designed digital map



*Cloud Cover, processed data of  
Meteosat-9*



# SEOCA Pipeline Surveillance



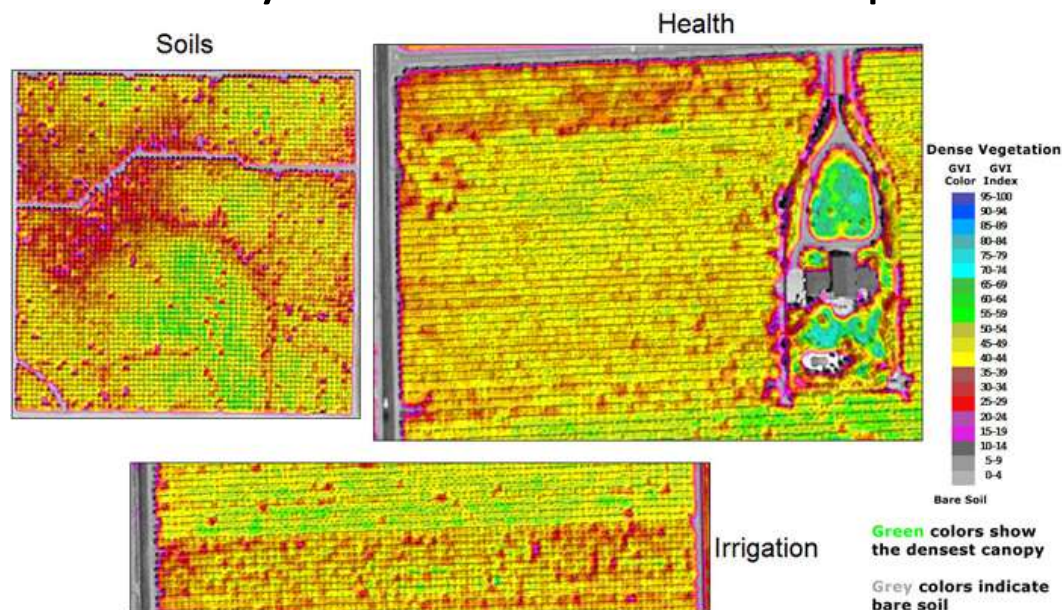
- Combination of satellite data of high and middle resolution
- Image operation in different spectral bands
- Real-Time Monitoring of the pipeline system
- GIS system for the visualization of the pipeline system

- Aratos Technologies has developed ***Aratos Pipeline Surveillance System***
- Intelligence Integration of satellite data & UAVs
- Alerts/warnings



Print Screen from ***Aratos Pipeline Surveillance System*** which combines data from satellites and UAVs, sends alerts and “takes decisions” about the severity of a situation

- Creation of maps
- Changes in biodiversity
- Crop and forest growth and health
- identify and delineate landscape level food production



*Managed Canopy Assessment, Quickbird*

# Vegetation Analysis (1)

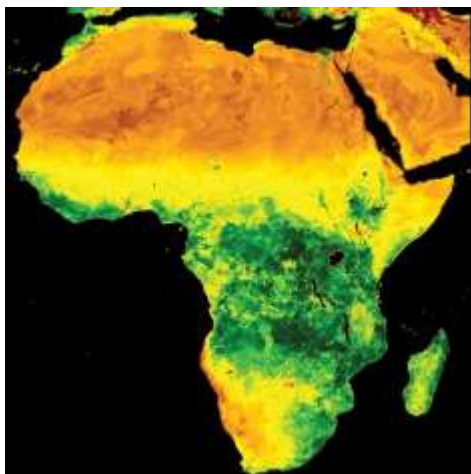
- Vegetation images - show changes as the season progresses and abnormalities such as weed patches, soil compaction, watering problems etc.
- Classifications



*Crop Health variations, Quickbird*

# Vegetation Analysis (2)

- Change detection - or studying vegetation changes by subtracting one image from another image acquired at an earlier date.
- Vegetation Indices for identifying the presence of green vegetation



*Normal Difference Vegetation Index,  
Africa*





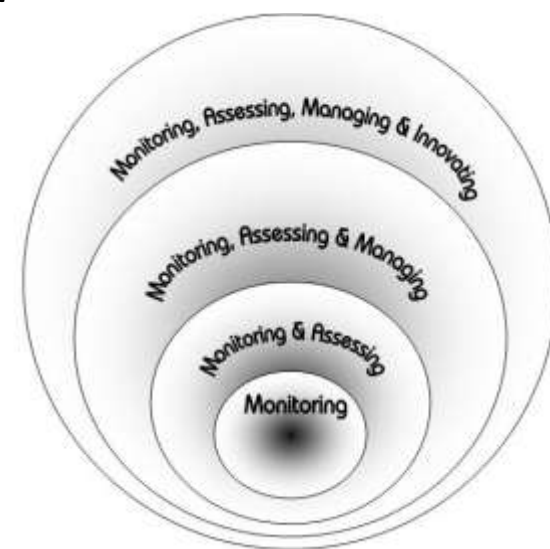
# GreenSSLM (1)

- GreenSSLM (Green Space Services for Local Monitoring) is a continuous monitoring system handling complex computing interfaces dedicated to:
  - store
  - manage
  - process and
  - assessenvironmental parameters which characterize the holistic status of an area



# GreenSSLM (2)

- GreenSSLM's services range through a scalable measure of complexity depending on the enduser's requirements. Services may vary from simply monitoring to advanced environmental theories applications



- Satellite data for:
  - **Ocean Surface Topography**, practical applications in such areas as the study of worldwide weather and climate patterns, the monitoring of sea level evolution, and the protection of our ocean fisheries
  - **Water cycle**
  - **Sea Surface Temperature**, provide the basis for prediction of climate change, ocean currents, and global climate patterns



*Alaska and the  
Bering Sea from  
SeaWiFS on April  
25, 1998*

- Satellite data for:
  - Sea Surface Winds
  - Sea Salinity, tell us about concentration of dissolved salts in the upper centimeter of the ocean surface. Even small variations in SSS can have dramatic effects on the water cycle and ocean circulation.
  - Ocean Surface Currents, only from space can the true extent of currents be tracked in real time.
  - Sea Ice

# Future Satellite Application Platform

- Open Data Base of Data
- Integration of SatEO & SatNAV data
  - Intelligence Indexing & Retrieving
  - Free Access - Sharing Data
- Social Networking Environment of users
- We starting to organise a new initiative!!Join us!



