





→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Sentinels for Science and Applications

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ESA-DEVELOPED EARTH OBSERVATION MISSIONS



Sentinels: A New Generation of Data Source



- Copernicus European space flagship programme, led by the EU
- ESA is responsible for space component, Sentinel development, operation of some Sentinels, data buy from other partners, system evolution
- Sentinels designed to monitor various elements of the Earth System in a fully operational manner
- Free, full and open data policy







Sentinel Data Access – Statistics at ESA





European Space Agency

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Sentinel Data Access – Statistics at ESA





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Sentinel-1 Results

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European Space Agency

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Monitoring of Crop Stages





Winter-Spring Rice 2015/16

- March 2015: 1.7 million ha rice
- March 2016: 1.4 million ha rice
- 16.5% loss in rice area due drought and salt water intrusion caused by El Niño
- 976,000 people affected, 67 million USD estimated damage
- Based on unprecedented Sentinel-1 time series



GEOGLAN



The Mekong Delta, Vietnam 300 km x 300 km, 20 m resolution

Subsidence Monitoring





http://insarap.org



Subsidence Monitoring





SAR Tomography

Mexico City



esa



Parallel Small BAseline Subset (P-SBAS) DInSAR algorithm: Towards national-scale DInSAR analysis



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Mean LOS

(cm/year)

Velocity





Mean LOS Velocity (cm/year)



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Pistoia, Tuscany: Subsidence due to water extraction





Maratea, Basilicata: Subsidence due to landslides



Sentinel-1 Potentially Saving Lives



Maoxian Landslides, China (24 and 27 June 2017)





Movements detected in the source area during several months before the event



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Can satellites be used as an early warning system for landslides?

Published on: 3 July 2017

Researchers are working hard to use satellite data to accurately map the movement of the earth before a landslide in a bid to develop a life-saving early warning system.





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Global Urban Footprint







standard deviation

Global Urban Footprint





Global Urban Footprint





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Global Near-Real Time Swell Tracking

Sentinel-1A and Sentinel-1B Wave Mode over 10 days





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Ice Sheet Monitoring



Routine observations of ice sheet margins



Ice Shelf Monitoring: Larsen-C



- Seemed relatively stable until January 2016
- In January 2017 alone it travelled 20 km, reaching a total length of about 175 km
- As the crack grew, it branched off towards the edge of the shelf
- On July 12 part of the ice shelf had finally broken away







Sentinel-2 Results

European Space Agency

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Global Land Cover



 Advanced land cover classification strategies to exploit the new capabilities of Sentinel-2 in view of generating global land cover maps



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Space Research Centre Polish Academy of Sciences



Mount Etna Eruption, March-April 2017





Endorsement of Copernicus for Use within the CAP

 Commissioner P. Hogan:
"...already Paying Agencies using data of the Sentinels ... In the near future satellite monitoring of parcels could replace most of the OTSC – this kind of simplification is very much in my plans..."











Dynamic National Crop Type Mapping







Sentinel-1 time series



Mali Food Security: National statistics, Crop Damage







2016 Oct 5-Nov 25

Mali: Monitoring the Growth of Cotton





Coral Reef Monitoring



Marquesas Islands, French Polynesia

February 2017

Contains modified Copernicus Sentinel data [2017], Sen2Coral project, Dr. John Hedely

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Shallow Water Bathymetry



Lizard Island, Great Barrier Reef



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Water Quality Monitoring



Lake Turkana, Ethiopia







Sentinel-3 Results



Monitoring Chlorophyll Index



1 April-27 May 2017



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Monitoring Heatwaves





Hurricane Harvey

25 August 2017





Top of atmosphere -80 brightness temperature (°C)

20 0 -20 -40

-60