Real-time processing of Direct Broadcast MODIS data in Hungary

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RECEIVING STATION AT THE EÖTVÖS LORÁND UNIVERSITY

Foundation:	2002
Location:	Budapest, Hungary
Geographical coordinates:	47.475°N, 19.062°E
Diameter of the antenna:	3.2 meters
Maintenance:	Space Research Group, Eötvös Loránd University
Real-time processing:	Department of Meteorology, Eötvös Loránd University

Data received:

DB MODIS:	Terra & Aqua
HRPT:	NOAA-15, -16, -17, -18, -19
CHRPT:	FengYun-1D
Other:	KOMPAS-2 (non-meteorological)

Number of received overpasses:

MODIS:	~11000 (since September of 2004)
NOAA-series:	~21000 (since April of 2003)

Automatic processing chain

Direct Broadcast MODIS Level0 data

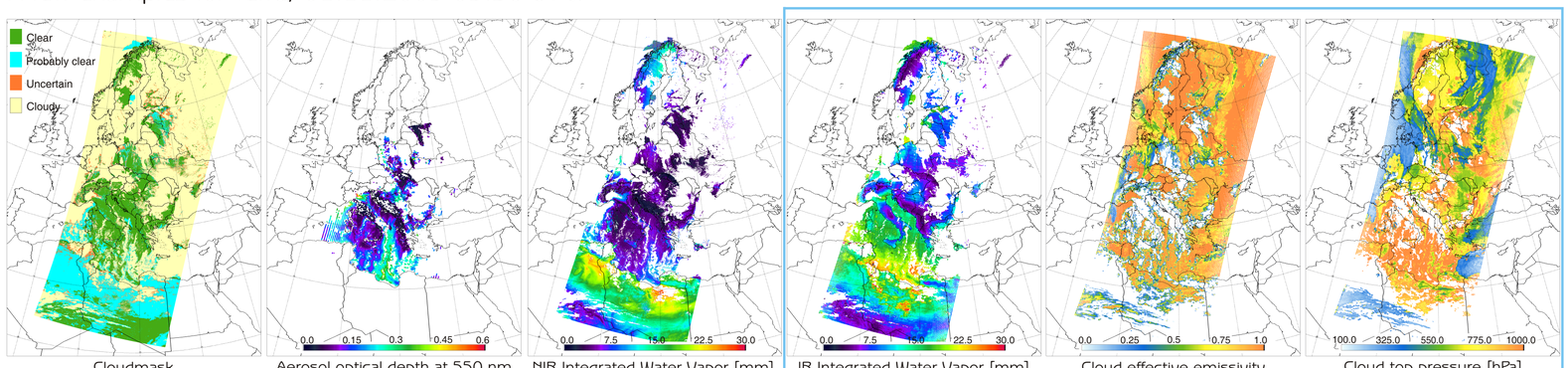
Using software #1 and #2

Step 1. Calibrated and geolocated MODIS Level1B data

Using software #3

Step 2. Atmospheric Level2 data

A few examples for Terra, 01.11.2009 09:36 UTC:



Cloudmask | Aerosol optical depth at 550 nm | NIR Integrated Water Vapor [mm] | IR Integrated Water Vapor [mm] | Cloud effective emissivity | Cloud top pressure [hPa]

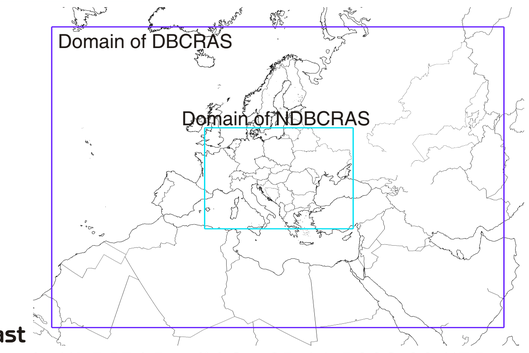
Using software #4 and #5

Step 3. DBCRAS & NDBCRAS

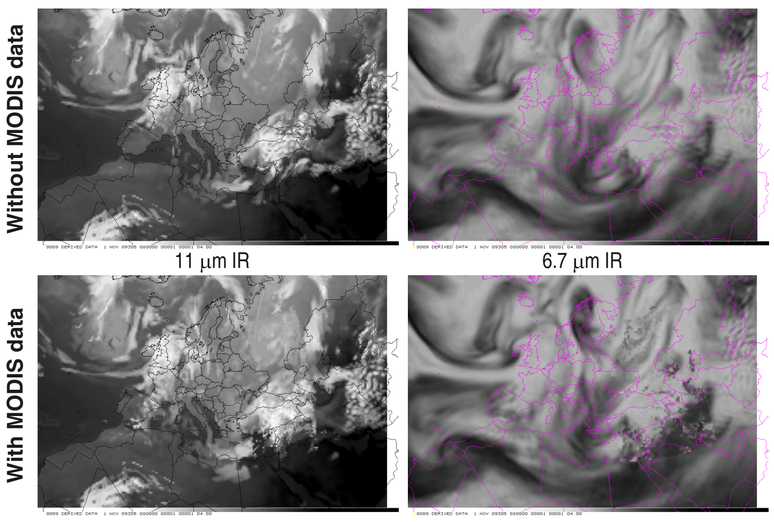
Short term weather prediction for Europe (DBCRAS) and for Central-Europe (NDBCRAS)

DBCRAS: in every 3 hours for 72 hours with a horizontal resolution of 48 x 48 km based on several ancillary data (e.g. NCEP GFS) and MODIS level2 products (mod07 integrated water wapor, mod06 cloud effective emissivity and cloud top pressure)

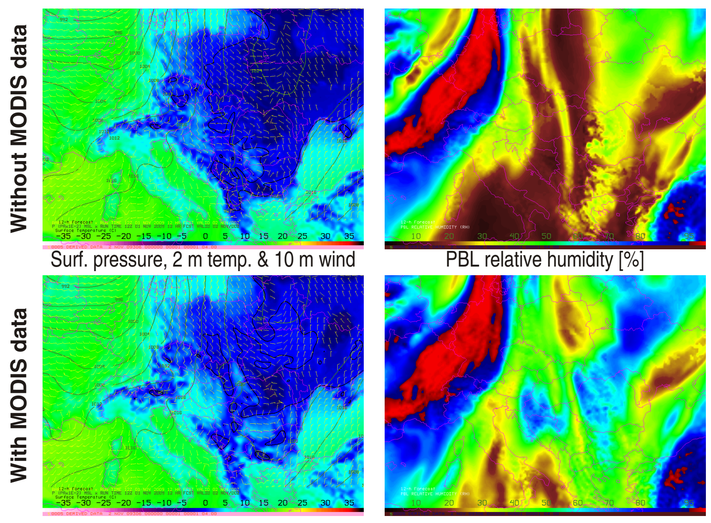
NDBCRAS: in every 3 hours for 48 hours with a horizontal resolution of 16 x 16 km, based on the output data of DBCRAS.

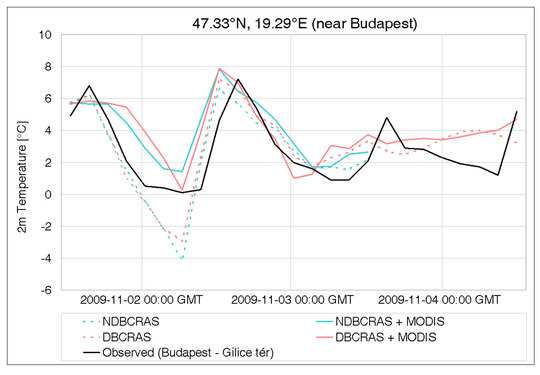


Spin up forecast of DBCRAS valid for 01.11.2009 12 UTC based on the data of two Aqua and three Terra overpasses



Weather forecast of the smaller scale NDBCRAS valid for 02.11.2009 00 UTC

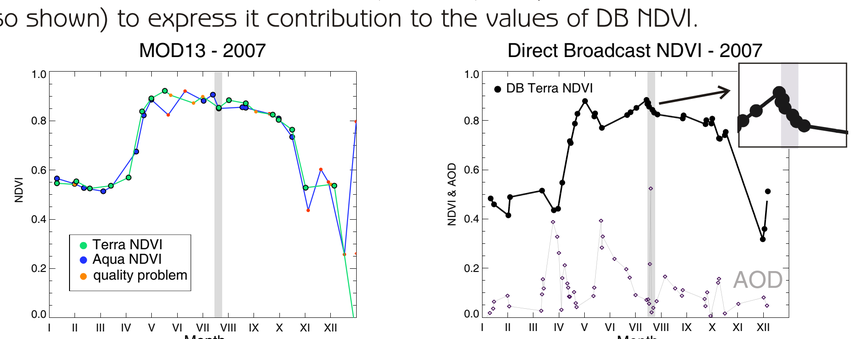




Time series of 2 m temperature derived from the outputs of DBCRAS & NDBCRAS models with and without assimilating the DB MODIS level2 data for the nearest gridpoint of Budapest, starting from 02.11.2009 00 UTC. The surface observation of one of Budapest's SYNOP station is also shown.

Example for other applications of the real-time received data

NDVI time series for a deciduous broadleaf forest for 2007 (when a remarkable heat wave occurred without any precipitation in July) based on the official MOD13 (vegetation indices) products, and the NDVI derived from the DB MODIS data. Aerosol optical depths (AOD, for 550 nm are also shown) to express it contribution to the values of DB NDVI.

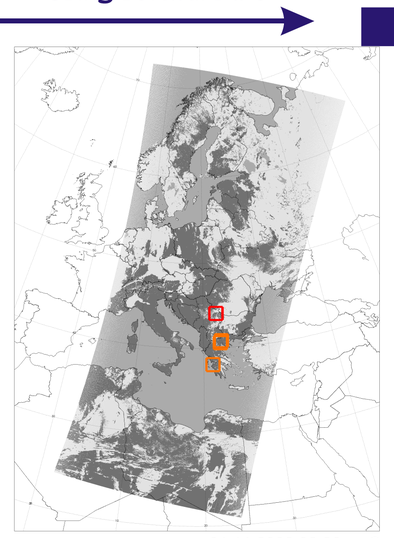


THE APPLIED MODIS RELATED SOFTWARE

1) SeaDAS MODIS Level1DB Software Package
   (developed by the SeaDAS group, NASA GSFC)
2) MODIS Destripe Direct Broadcast Software
   (developed by Liam Gumley and Kathy Strabala)
3) MODIS Level2 part of the International MODIS/AIRS Processing Package (IMAPP)
   (developed by SSEC, University of Wisconsin)
4) Direct Broadcast CIMSS Regional Assimilation System (DBCRAS) numerical weather prediction software
   (developed by Robert Aune, Kathy Strabala, Scott Lindstrom and Allen Huang)
5) Nested DBCRAS (developed by R. Aune, K. Strabala, S. Lindstrom and A. Huang)
6) MOD14 DB software, identification of fire
   (algorithm developed by Giglio and colleagues)
7) True Color software
   (developed by Liam Gumley, Jacques Descloitres and Jeffrey Schmaltz)
8) Direct Broadcast Google Earth software
   (developed by Liam Gumley and Amato Evan)

Using software #6

Step 4. Fire detection



Terra, 01.11.2009 09:36 UTC

Fire detection for every overpass.

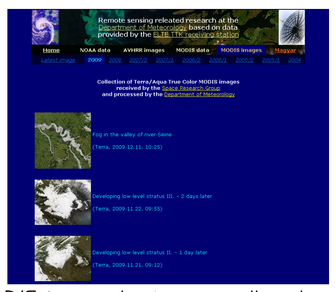
When fires are detected inside the area of Hungary, automatic notification happens with the geographical coordinates of the detected fires via e-mail.

- Fire (high confidence)
- Fire (nominal confidence)
- Fire (low confidence)
- Clouds
- Water
- Cloud-free land

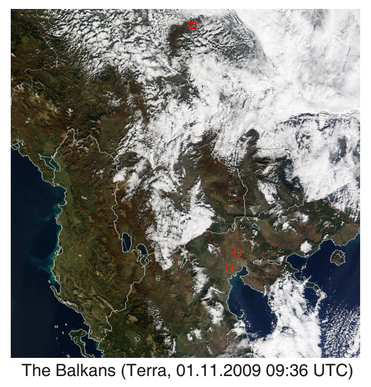
Using software #7

Step 5. True Color images

After every new daytime overpass the automatically generated true color MODIS picture is published on the Internet:
http://nimbus.elte.hu/kutatas/sat/modis-en_latest.pl



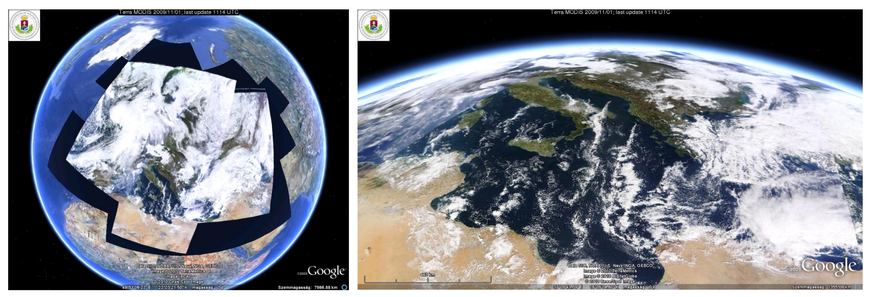
MODIS true color image gallery based on selected pictures since 2004



The Balkans (Terra, 01.11.2009 09:36 UTC)

Using software #8

Step 6. DBGE



After every new daytime overpass the Google Earth compatible images are published on the Internet:
http://nimbus.elte.hu/kutatas/sat/latest/kml/BUDAPEST_MODIS_Today.kml

Acknowledgements

The authors wish to thank the IMAPP team at the Space Science and Engineering Center, University of Wisconsin-Madison for developing and kindly providing us the applied software. Special thanks to Liam Gumley, Kathy Strabala, Robert Aune and Éva Borbás. We also thank the NASA for producing and distribution the MOD13 NDVI data via LP DAAC.

Research leading to this poster has been supported by the Hungarian Space Office and the Ministry of Informatics and Communication under grants TP 241, TP 258, TP 287 and TP 338.

We are grateful for the kind help and support of Liam Gumley, Allen Huang and Éva Borbás to make possible for us to visit the ITSC-17 and present this poster.