



Republic of Serbia
REPUBLIC HYDROMETEOROLOGICAL SERVICE OF SERBIA



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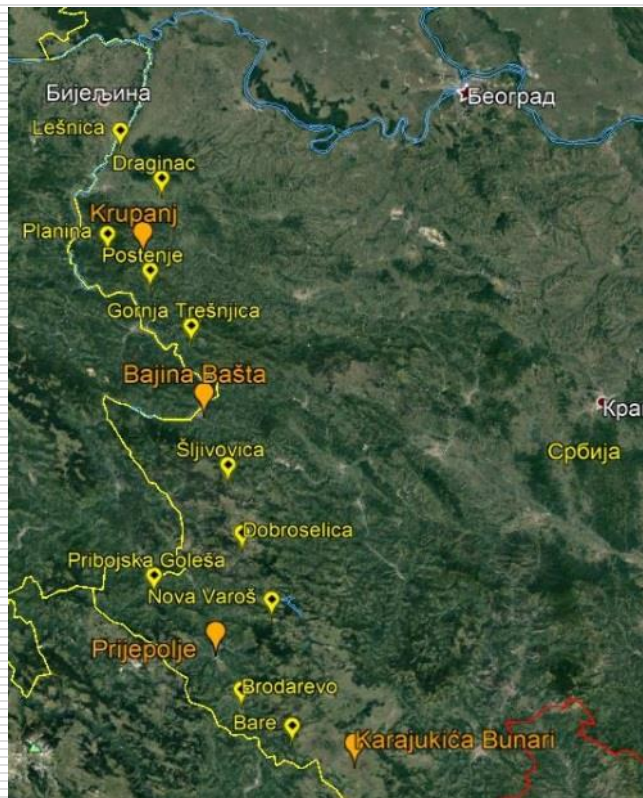


Modernization





Modernization



4 new automatic meteorological stations (Krupanj, Bajina Basta, Prijepolje and Karajukica Bunari) and 11 meteorological stations for precipitation and temperature measurements were installed in the Drina River basin.



New automatic meteorological station in Pirot



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Modernization





Modernization Aerological (Upper-air) Measurements and Analyses

PRODUCTS IMPROVEMENT:

SKEW-T – DESIGN AND CONTENT IMPROVEMENT

Thermodynamic condition of atmosphere up to 100 hPa:

- Vertical profile of temperature and dew point from the surface up to 100 hPa in full resolution (around 2500 points);
- Wind at the standard pressure levels, maximum wind to 100 hPa, surface wind / wind at 1000 hPa surface.

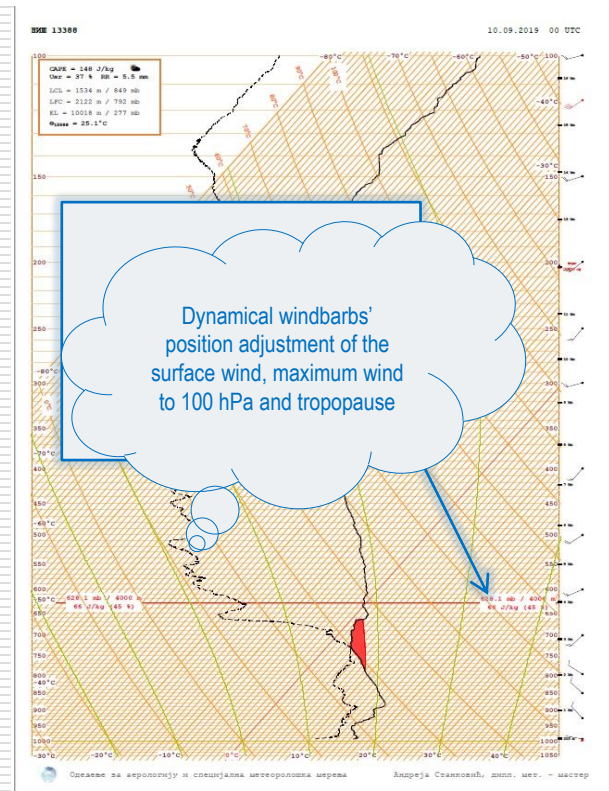
TROPOPAUSE – HEIGHT SCALE IN THE REAL ATMOSPHERE

Convective Potential in the Atmosphere:

- **CAPE** (**C**onvective **A**vailable **P**otential **E**nergy) – very detailed vertical profile;
- **LCL** (**L**ifted **C**ondensation **L**evel);
- **LFC** (**L**evel of **F**ree **C**onvection);
- **EL** (**E**quilibrium **L**evel).

PARAMETERES OF PARTICULAR INTEREST FOR DEEP CONVECTION ANALYSIS:

- U_{sr} – average rel. humidity in the instable layers;
- Θ_{13iii} – critical temperature on the surface for the initiation of convection (iii = 275/388).





Modernization Meteorological laboratory

RESULTS:

- A total of 771 classical and digital instruments were calibrated, both within the RHMSS station network, and for the needs of other users (IHSM, SMATSA, BHANSA, SEPA, etc.)
- Interlaboratory comparison for p, T and RH was conducted with the Ljubljana WMO RIC.
- A regular supervisory assessment related to the SRPS ISO/IEC 17025:2006 was successfully performed by the relevant accreditation authority for the 2018-2019 period.
- The scope of accreditation has been broadened to include the methods for the calibration of ultrasound anemometers and mechanical hygrometers and hygrographs.
- It is planned to carry out the transition to the new version of the standard 17025 from 2017, to further broaden the accreditation scope by including the method for the calibration of 3D ultrasound anemometers and to develop the method for the calibration of transmissometers and balometers.





Modernization

Improvement of the system:

- 99 automatic launching stations at the Valjevo Radar Center
- Operationalization running in parallel with installation
- A total of 635 anti-hail rockets fired from automatic remote-controlled launching stations during 21 hail suppression activity days

Automation of the Fruska Gora Radar Center

- Feasibility study produced
- Detailed survey completed of the necessary telecommunication and construction works
- Project to be financed by the Government of the Vojvodina Autonomous Province





Modernization

Automation of the Podrinje region of the Republic of Srpska

- Feasibility study produced, in line with the Agreement between the governments of the Republic of Serbia and the Republic of Srpska
- Protocol on cooperation signed between RHMSS and the "Hail Prevention" Public Company of the Republic of Srpska
- Required survey completed; construction phase to ensue as the next step
- Financed by the Government of the Republic of Serbia



Automation of the Uzice Radar Center

- Feasibility study produced
- Detailed survey of the necessary telecommunication and construction works under development

Automation of the Bukulja Radar Center

- Feasibility study under development
- Detailed survey of the necessary telecommunication and construction works under development
- Projects to be financed by the Ministry of Agriculture, Forestry and Water Management



Република Србија
РЕПУБЛИЧКИ ХИДРОМЕТЕОРОЛОШКИ ЗАВОД



Modernization
Weather modification





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Modernization





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Modernization

West Balkans Drina River Basin Management (DRBM) Project



Hydro. staton Zavlaka
The Jadar River



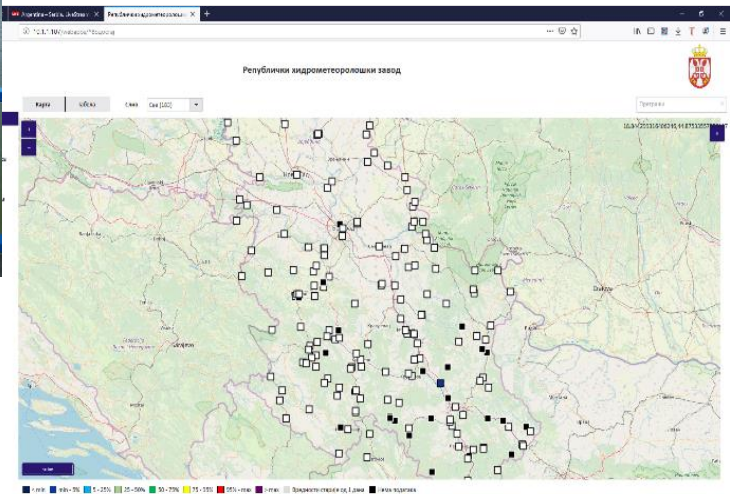
Hydro. station Priboj
The Lim River



Hydro. station Badovinci
The Drina River

New hydrological equipment installed at six hydrological stations located in the Drina River Basin – a workshop was organized in Foca in March 2019

Procurement of the WISKI WEB PUBLIC application: web-based environment for visualization of metadata in real time, and historical data





Research activities

Icelandic sand: Following the interest of the international community to better understand atmospheric processes in high latitudes related to the accelerated melting of the Arctic ice caused by climate change, RHMSS added in its DREAM aerosol model the largest source of mineral aerosols in Europe - Icelandic aerosols. This is the first application of this kind in the international community.

Icing in aviation: RHMSS has continued to work on the development of numerical models related to the cold cloud formation under the impact of different aerosols such as mineral dust, pollen particles, etc. One of the development topics is the influence of mineral aerosol on cloud ice formation and its possible impact on air traffic. The developed methodology was tested using the example of the Air France accident of 1 June 2009.

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EGU General Assembly 2019
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Numerical modeling of the Icelandic mineral dust transport and processes - towards the operational forecasting system

Bojan Cvetkovic¹, Slobodan Nickovic¹, Ana Vukovic^{2,3}, Slavko Petkovic¹, Goran Pejanovic¹, Pavla Dagsson Waldhauserova³, O'lafur Arnalds³, Lenka Lisa⁴, Sigmundur Helgi Brink³, and Jugoslav Nikolic¹

⁽¹⁾ Republic Hydrometeorological Service of Serbia, Department of National Center for Climate Change, Belgrade, Serbia (bojan.cvetkovic@hidmet.gov.rs), ⁽²⁾ Faculty of Agriculture, University of Belgrade, Belgrade, Serbia, ⁽³⁾ Agricultural University of Iceland, Reykjavik, Iceland, ⁽⁴⁾ Institute of Geology, Czech Acad. Sci., Prague, Czech Republic

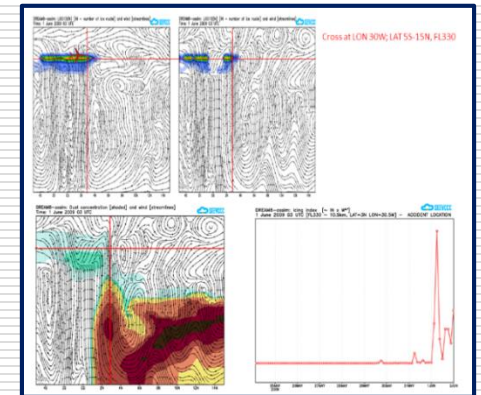
Numerous scientific studies and reports indicate that the Icelandic topsoil sediments are the largest and the most important European sources of the mineral dust, representing also one of the best-studied high-latitude dust areas. The majority of the dust particles in this region are sediments of volcanic origin, either deposited as volcanic ash or reworked by physical weathering of volcanic rocks by glaciers and other physical factors. Located in the North

DREAM atmospheric dust transport model simulations – case study results of Icelandic mineral dust transport

Bojan Cvetkovic¹, Slobodan Nickovic¹, Ana Vukovic^{2,3}, Slavko Petkovic¹, Goran Pejanovic¹, Pavla Dagsson Waldhauserova³, O'lafur Arnalds³, Sigmundur Helgi Brink³, Lenka Lisa⁴ and Jugoslav Nikolic¹

Forecast of the Icelandic sand by the DREAM model

Research participants

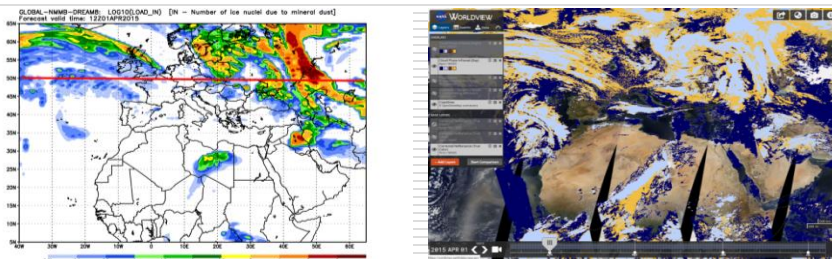


Simulation of the occurrence of icing conditions due to the presence of sand on the Air France route of 1 June 2009

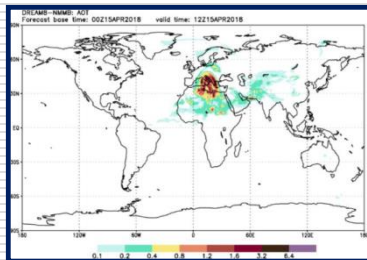


Research activities

Aerosols and cloud formation: Within an ECMWF special project, RHSS has developed a global version of the NMM-DREAM aerosol model. The project has explored the possibility of extending weather predictability to the period of above two weeks when aerosols are included in the model.



Comparison of the cold cloud formation forecast by the global NMM-DREAM model (left) and cold clouds observed by satellites (right)



Global NMM-DREAM forecast of mineral aerosol

COST InDust Workshop on Extremes and Effects of High Latitude Dust, Reykjavik, Iceland, 14–15 March 2019

Numerical modelling of the aerosol particles transport. The aim of the research is to improve numerical weather and climate prediction models.

European Geosciences Union General Assembly 2019, Vienna, Austria, 7 – 12 April 2019

The largest and most significant scientific conference in Europe. A paper from the field of numerical modelling of the aerosol particles transport was presented.

COST InDust User Workshop on Dust Products for Aviation, Cranfield University, Bedford, UK, 14–15 March 2019

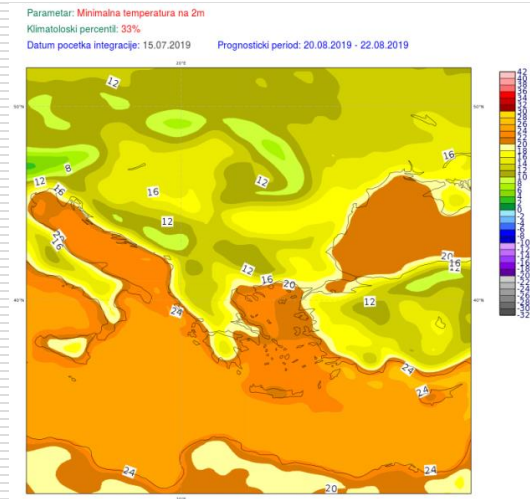
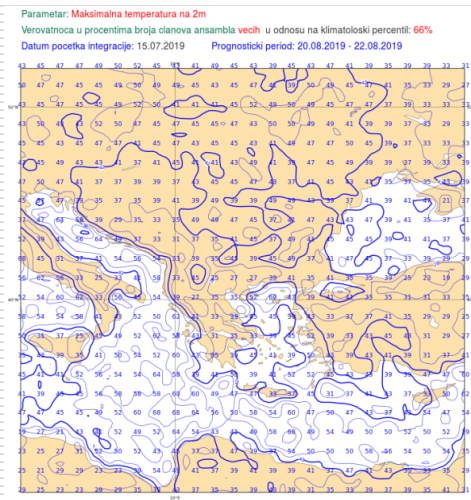
Numerical modelling of the heterogeneous ice nucleation process affected by the desert aerosol particles. Possible application in the field of air traffic safety improvement.



Recent NWP activities and development at RHMSS

A system providing support to monthly (subseasonal) forecasting has been developed:

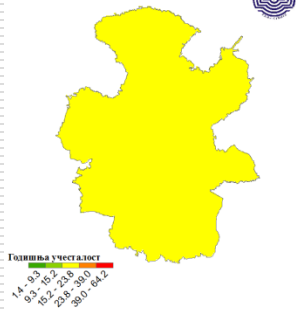
- It is based on the ECMWF data related to the monthly forecast and climatology for the relevant period, ecCode software for data processing and decoding and Magics graphic package
- The methodology for defining climatological percentiles, terciles and the probability of forecasted parameters is compatible with the methodology used by ECMWF and all major services worldwide
- The system provides the flexibility to select a forecasting period and geographic area, and to define precise percentiles and forecasting probabilities for any point in the selected area.



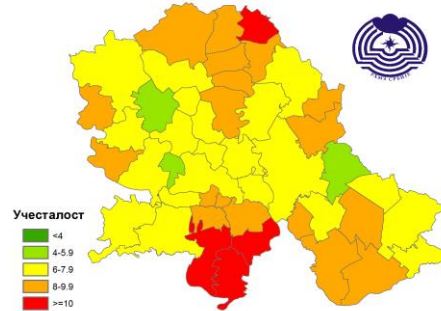


Assessment of Vulnerability to Natural Disasters

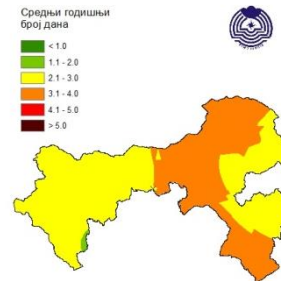
Општина Смедеревска Паланка
Олујни ветар



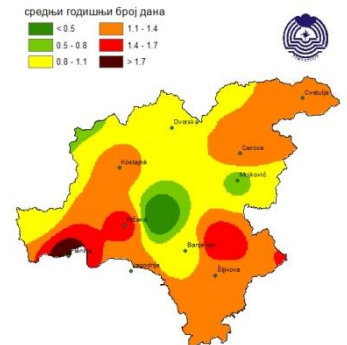
Мапа учесталости појаве суше током лета



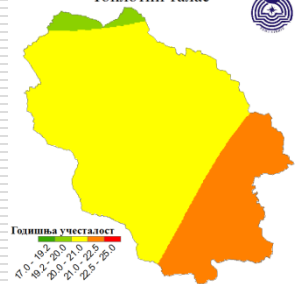
Средњи годишњи број дана са суградњом или градом
на територији Града Ужице



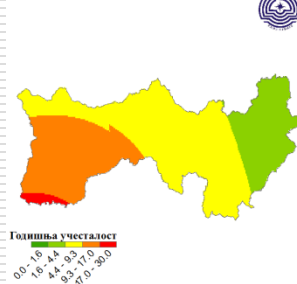
Средњи годишњи број дана са суградњом и градом
на територији општине Крупањ



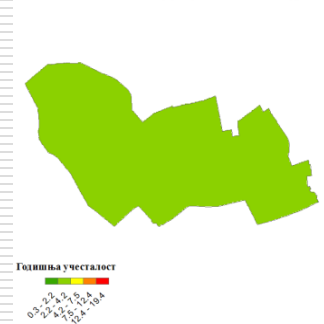
Општина Пријепоље
Топлотни талас



Општина Александровац
Међава



Општина Бачка Топола
Полеђица



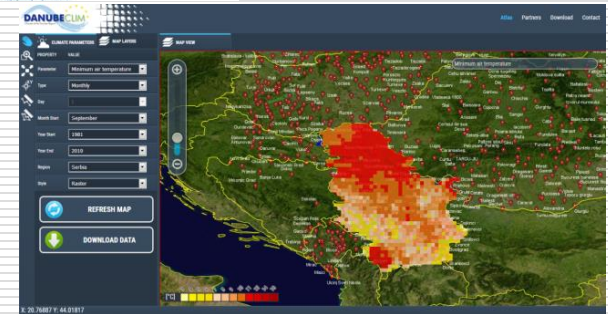
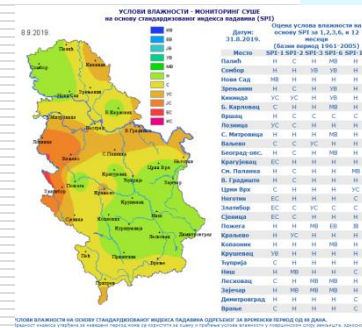
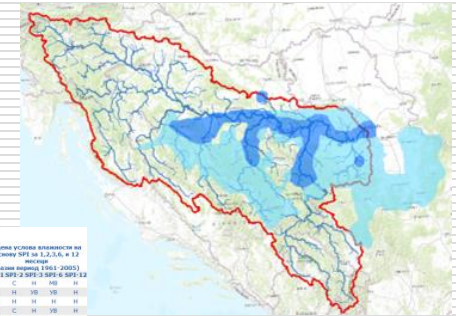


Participation in Projects

- Drina River Basin Management
- Flood Forecasting and Warning System in the Sava River Basin – Sava FFWS
- Drought Risk in the Danube Region – DriDanube (National Strategy to Combat Drought)
- Gridded Meteorological Data 1961-2010 for Serbia – DANUBECLIM

NEW

- Velika Morava Flood Forecasting System (Duration: 6 months, Project beginning: June 2019, Resources: 250,000 EUR, 7 institutions from 3 countries)





South East European Consortium for Operational Weather Prediction (SEECOP)

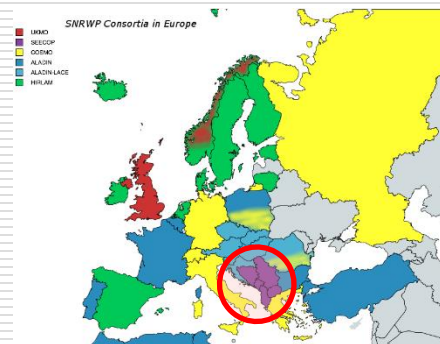
SEECOP members

- Serbia
- Bosnia and Herzegovina (both entities)
- Albania
- North Macedonia
- Montenegro
- Ukraine (2018)

Open policy for joining SEECOP

The 5th session of the SEECOP Council, Tel Aviv, Israel,
5 November 2019

Observers: Belarus, Greece, Turkey, Cyprus, Israel





International activities

Regional and bilateral cooperation - cooperation with the Republic of Bulgaria



A Memorandum of Understanding between the National Institute of Meteorology and Hydrology of Bulgaria (NIMH) and the Republic Hydrometeorological Service of Serbia (RHMSS) was signed in Sofia, on 9 July 2019, by NIMH Director-General, Professor Hristomir Branzov, and RHMSS Director, Professor Jugoslav Nikolic



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Thank you for your
attention!