ITC CONFERENCE GRANT
SCIENTIFIC REPORT

This report is submitted for approval by the grantee to the MC Chair.

Action number: CA16202
Conference title: European Ceophysical Union General Asembly 2018
Conference start and end date: 08/04/2018 to 13/04/2018
Conference attendance start and end date: 08/04/2018 to 13/04/2018
Grantee name: Bojan Cvetkovic

ACTIVITIES DURING YOUR ATTENDANCE AT THIS CONFERENCE:

First day activities were mainly related to visiting the conference center, registration and gathering useful information.
On the second day of the EGU2018 conference, I had a PICO (oral) presentation.
Details:

- Date: 09 Apr 2018
- Session: S3.5/CL5.19/GM10.2 - Aeolian dust: Initiator, Player, and Recorder of Environmental Change
- Presentation title: **Modeling heterogeneous ice nucleation due to mineral dust using Dust Regional Atmospheric Model (DREAM-NMME), (Bojan Cvetkovic et al.)**
- Download link: http://www.seevccc.rs/EGU2018/Bojan_Cvetkovic_EGU2018_PICO.pptx
- Abstract: https://meetingorganizer.copernicus.org/EGU2018/EGU2018-10050.pdf

The session started with so-called „*2-minute madness"*, a 2 minute period in which I presented the essence of my work. The second part of the session was „PICO viewing time", lasting for more than one hour. During this time I presented to the interested attendees in details results and ongoing work.About 50 people visited the session, and about 15 of them actively participated in discussion. The main topics of discussion were:

- Model structure, operational running, case studies, validation etc. (mainly with Dr. Pavel Kishcha, Tel Aviv University);
- Theoretical discussion about soil and dust aerosol properties, programming techniques etc.(with Dr. Paul Ginoux from the NOAA GFDL);
- Cloud radar, lidar and satellite measurements and comparison with the modeled data (mainly with Prof Gregory Okin, Department of Geography, University of California);
- Heterogeneous ice nucleation, ice nucleating particles etc. (PhD students from Goethe-University, Frankfurt, Agricultural University of Iceland , University of Leeds);
- High resolution dust modelling with data assimilation

On the third day, I participated in the session at which Dr. Slobodan Nickovic, on my behalf, held the oral presentation.
Details:

- Date: 10 Apr 2018
- Session: IE2.7/AS3.6/BG1.10/CL2.24/CR8.7 - Atmosphere – Cryosphere interaction with focus on transport, deposition and effects of dust, black carbon, and other aerosols
- Presentation title: **Predicting atmospheric dust process from Icelandic soil sources**
- Download link: http://www.seevccc.rs/EGU2018/Slobodan_Nickovic_EGU2018.pptx
- Abstract: https://meetingorganizer.copernicus.org/EGU2018/EGU2018-10338.pdf

After the session, I and Dr. Nickovic had a discussion with attendees, exchaning information, knowledge and making contacts for future scientific cooperation. We also had a very constructive meeting with Dr. Pavla Dagsson Waldhauserov from the Agricultural University of Iceland. During this contact, I presented recently established system of the operational dust forecast for the Iceland. We also discussed various scientific information, available data sets and technical details for the operational verification and upgrade of the modelling system.
On the fourth day I visited a poster session AS3.3 - Atmospheric Ice Particles, where I met a number of colleagues from different countries/institutions with whom I closely collaborate.We had a talk on different topics, mainly focused on ongoing work, available data sets and next steps in already established collaboration. I would like to mention colleagues from the following organisations, with wich I had productive discussions:

- The INUIT Research Unit (Ice Nuclei Research Unit), Institute for Atmospheric and Environmental Sciences, Goethe University, Frankfurt, Germany ;
- National Observatory of Athens, Greece ;
- Institute for Atmospheric and Climate Science, ETH Zurich, Switzerland.

During the conference I attended sessions focusing on atmospheric dust and ice particles, numerical weather prediction and remote sensing.

IMPACT ON YOUR RESEARCH AND FUTURE COLLABORATIONS (if applicable)
(**max**.500 words)

Republic Hydrometeorological Service of Serbia, under the activities of the South East European Virtual Climate Change Center, is working on research projects focusing on atmospheric dust cycle modeling and aerosol remote sensing. Dust Regional Atmospheric Model (DREAM) (Nickovic et al., 2001; Nickovic, 2005; Pejanovic et al., 2011; Vukovic et al. 2014) was developed to predict the atmospheric dust process, including dust emission, dust horizontal and vertical turbulent mixing, long-range transport and dust deposition.

Many studies (DeMott et al., 2003; Cziczo et al., 2004;Richardson et al.,2007) have identified mineral dust particles as very efficient ice nuclei, which glaciate supercooled cloud water through a process of heterogeneous ice nucleation even in regions distant from the desert sources. During last years, mineral dust parameterization as a prerequisite for connecting it to cloud processes,has become one of the priorities in the atmospheric modeling community.

The component for parameterizing dust-induced ice nuclei concentration has been implemented as the latest upgrade of the model. Recent study (Nickovic et al., 2016), has demonstrated that the number of the ice nuclei due to dust (IN), can be successfully predicted on a routine basis.

In the study, which I've presented at EGU2018, DREAM-NMME model has been used to calculate the number of IN. These results have been compared with the corresponding observations performed at the ACTRIS in-situ and remote sensing station Jungfraujoch over a period of about one

month. The measurement campaign has been organized as a part of research within the ACTRIS project "Ice Nucleating Particles (INP) measurement by FRIDGE at Jungfraujoch during CLACE 2017, FRIDGE@CLACE2017". The results (Fig. 1) shows strong correlation between this two methods of calculating the number of activated IN due to dust.

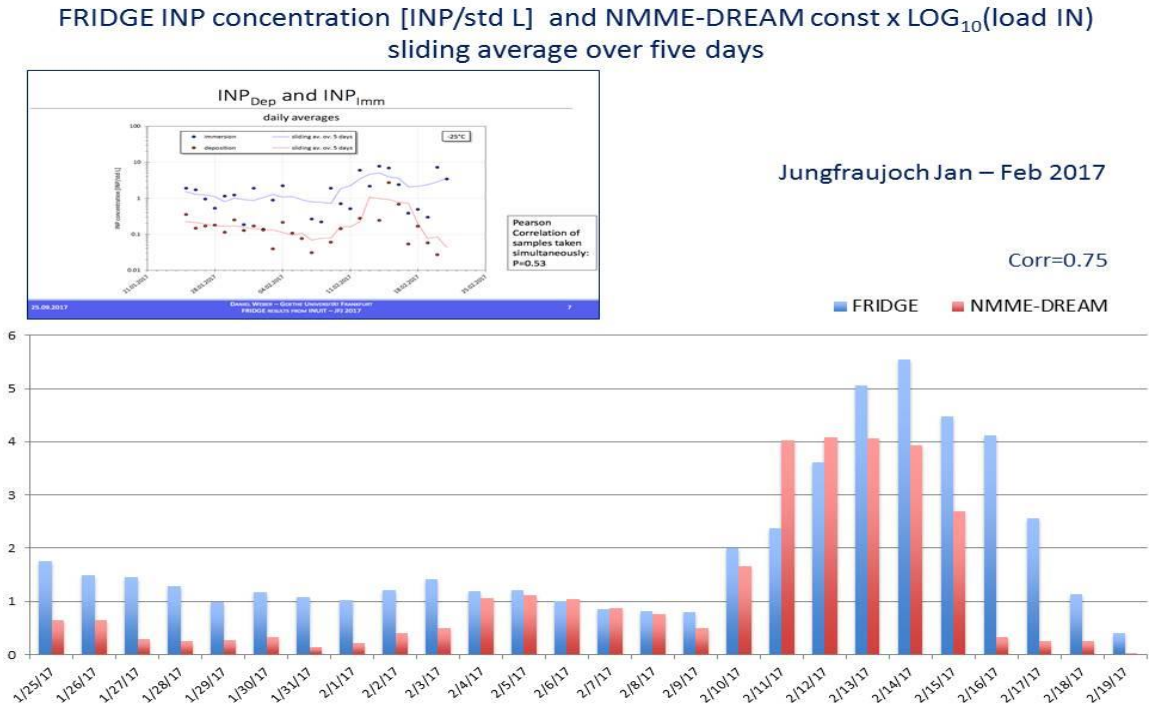
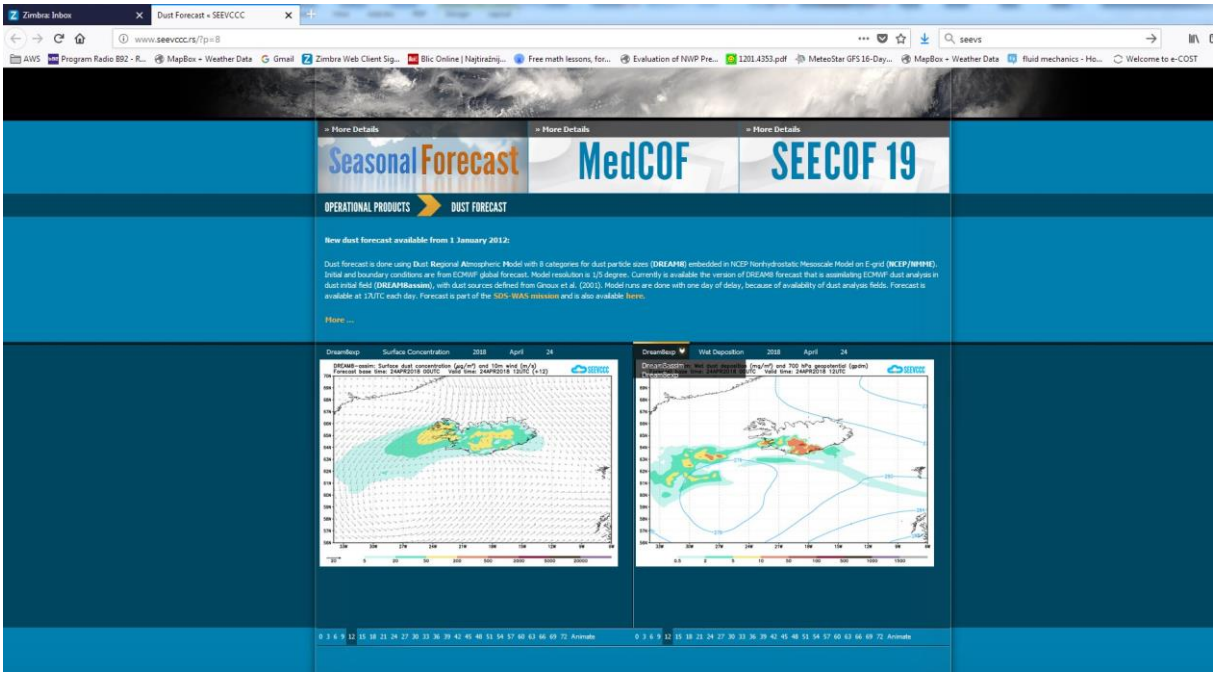


Fig. 1 FRIDGE INP concentration [INP/std L] and NMME-DREAM const x LOG10(load IN), sliding average over five days

In addition, ground-based remote sensing instruments and collocated cloud radar and lidar at Potenza,Italy, along with MSG-SEVIRI ice water path satellite observations have been used to evaluate horizontal and vertical distribution of modeled IN respectively.

The second, very important study, presented at EGU2018, in which I fully participated and contributed, is related to prediction of the atmospheric dust process from Icelandic soil sources. Iceland is the largest European source of the high-latitude sand and dust particles. Physical and mineralogical features of this dust and its impact to environment are in general different from dusts originating from other continental deserts. Dust outbrakes having significant impact on climate, health and enviroment, motivated us to use DREAM in order to model this transport.The model dust sources and emission intensity have been specified using the Agricultural University of Iceland soil database. Particle size distribution and threshold friction velocities have been adapted for the Icelandic dust emissions as well. The modeling system has been tested for an intense dust storm episode (September 2011). Modelled dust concentration, compared with the observed PM10 values from several stations, showed significant temporal and spatial agreement. Relying on this results, the final goal, the establishing of the fully operational prognostic system, has been achieved.

Products can be found on http://www.seevccc.rs/?p=8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OPERATIONAL PRODUCTS
DUST FORECAST
New dust forecast available from 1 January 2012:
Dust forecast is done using Dust Regional Atmospheric Model with 8 categories for dust particle sizes (DREAM8) embedded in NCEP Nonhydrostatic Mesoscale Model on E-grid (NCEP/NMME).
Initial and boundary conditions are from ECMWF global forecast. Model resolution is 1/5 degree. Currently is available the version of DREAM8 forecast that is assimilating ECMWF dust analysis in
dust initial field (DREAM8Assim), with dust sources defined from Ginoux et al. (2001). Model runs are done with one day of delay, because of availability of dust analysis fields. Forecast is
available at 17UTC each day. Forecast is part of the SDS-WAS mission and is also available here.
More ...
DreamEexp
Surface Concentration
2018
April
24
DreamEexp
Wet Deposition
2018
April
24