SHORT TERM SCIENTIFIC MISSION (STSM) – SCIENTIFIC REPORT

The STSM applicant submits this report for approval to the STSM coordinator

Action number: CA16202 (InDust)
STSM title:Dust from Icelandic sources: numerical prediction and assessing environmental impacts (ICEDUST)
STSM start and end date: 27/08/2018 to 31/08/2018
Grantee name: Slobodan Nickovic

PURPOSE OF THE STSM/

(max.500 words)

The purposeof the STSM was to prepare conditions for implementing a numerical model for emission/transport/deposition of mineral dust originating from Icelandic soils and make the product available to end-users (local transport, health and environmental agencies, climate research users, marine environmental researchers). Modeling approach should be used for two purposes:for operational dust forecasts, and for assessing climate and environmental effects triggered by dust, all focussed to high-latitude dust atmospheric process. Icelandic soils being the largest desert source in Europecause about 135 days/year dusty days. This dust is mainly composed of glacial sediments and volcanic material. The important fact is th at this Europe's largest desert is located in vicinity of glaciers and could have significant climate and environmental consequences. Very often, ground road transportation is stopped when intensive dust storms happen occur because of low visibility. Icelandic dust is dark, made of very fine (often submicron) particles and consists of high proportions of iron which is considered as one of major nutrient for the marine food chain.

In spite of the large interest of the local community to have information/warning on forthcoming dust storms, by now there is no operational dust prediction practice. One of major motives for the proposed STSM is to start collaborative work of the Republic Hydrometeorological Service of Serbia (RHMSS) and the Agricultural University of Iceland(AUI) on building prerequisites for establishing dust forecasts for the island. Expertises of our organizations are fully complementary. Namely, RHMSS has large and long-standing experience in performing dust forecasts based on widely used DREAM dust model applied for different geographical regions, including the Mediterranean, west Asia and SW of the US. On the other side, AUI has a top-level expertise in soil science of Iceland, including high-resolution specification of dust sources, detailed description of soil types and geochemical features of erodible lands.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(max.500 words)

During the working week of the STSM the grantee had a series of activities and discussions with the staff of AUI - Prof. Olafur Arnalds, Dr Pavla Dagsson Waldhauserová and Mr. Sigmundur Brink. The grantee also had an opportunity to meet Dr Zongbo Shi, University of Birmingham, UK, the expert in dust mineralogy and marine bio and geochemistry, during his short visit to UAI, and discuss with him mineralogy issues of the Icelandic dust to be considered within InDust. The following are the major

activities performed during the STSM visit:

- The grantee presented the concept of the DREAM dust model system, including in his talk treatment the Icelandic dust sources in the model, dust emission parameterization and simulation of the transport and downwind deposition. He presented to the staff how dust source information provided by the UAI has been incorporated in the model. Furthermore, he proposed that RHMSS and UAI initiate collaboration in introducing the atmospheric processing of the Icelandic dust Fe oxide mineralsin the model in order to explore environmental and climate effects marine response to the soluble Fe deposition.
- The grantee and Dr Dagsson Waldhauserová spent a day dedicated to field surveying, visiting the South Iceland characterized with some of the important dust sources. During this visit, a PM10 instrument is settled to a location exposed to downwind dust from one of the sources.
- We discussed a possibility to implement the DREAM model with included Fe mineralogy over Iceland and surroundings. The model implementation requires estimate of Fe oxide related parameters (such as total and free Fe, Fe soil potential solubility) to be determined from dust-productive soils. Such geochemical analysis will be performed by several groups (AUI, University of Birmingham, Czech University of Life Sciences Prague, University of Belgrade).Dr Dagsson Waldhauserová and Dr Nickovic will coordinate further work on sampling analyses and modelling.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

(max. 500 words)

The major outcomes resulted from the STSM are:

- established close collaboration relations between several organizations in the field of studying effects of Icelandic dusts on marine and cryosphere of high-latitude regions
- planned further improvement of the dust model by adding hot dust spots - AUI to prepare updated dust source maps
- agreed to seek for opportunities for possible additional funding in the future of dust modelling/observations of Icelandic dust
- identified some local authorities (such as the Icelandic Road and Coastal Administration) to be informed on available dust predictions for Iceland and surroundings and to offer collaboration
- open lecture at the AUI attended by scientists from the AUI, Marine Research Institute, University of Oxford, UK (https://icedustblog.wordpress.com/2018/08/27/short-guest-lectures-at-the-agricultural-university-of-iceland/)
- paper on Icelandic dust forecast in preparation

FUTURE COLLABORATIONS (if applicable)

(max.500 words)

Already elaborated above. A short summary on future plans include:

- continue with experimental dust forecasts and further improve treatment of dust sources in the model
- propose to the WMO SDS-WAS project to include forecast products in their web site and to further promote research and applications in the field of high-latitude dust

- work on implementing DREAM model with included mineralogy over Iceland and surroundings to explore environmental and climatic impacts of the Icelandic dust
- seek for collaboration with the local authorities as end users of the mentioned InDust products and services