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Numerical prediction of the atmospheric dust process: the way to reduce risks from its adverse effect

Slobodan Nickovic

Republic Hydrometeorological Service of Serbia, Belgrade, Serbia (nickovic@gmail.com)

Mineral dust, one of the most abundant aerosols in the atmosphere, can be transported by winds thousands of kilometers away from its source and deposited on land and sea. In response to growing societal interest in reducing risks from various hazardous dust effects, the World Meteorological Organization has established a long-lasting Sand and Dust Storm Warning Advisory and Assessment System, while the UN formed in 2018 the Coalition to Combat Sand and Dust Storms. Over the last twenty years, thanks to dust-related research, numerical models have been developed which today successfully predict the atmospheric dust process. Such models include dust concentration as a prognostic parameter and can now successfully assess the occurrence of most dust storms. There are numerous impacts of dust on weather, climate, marine and terrestrial ecosystems, many of them with detrimental effects, such as: adverse influence on human health; disruption of ground and aviation transport; reduced agricultural growth; disfunctioning of solar energy panels; and acceleration of snow and ice melting in high-latitudes. This study will present examples illustrating recent efforts to develop user-oriented applications based on the use of dust forecasting products to mitigate the negative impacts of this aerosol.