



Assimilation and hindcast experiments of reactive trace gases during the 2010 Russian fires

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During August 2010 more than 100,000 ha of forest burned in Western Russia as a result of the extreme heat and drought conditions. These fires were accompanied by extreme levels of air pollutants affecting the population of Moscow and surroundings for several weeks. Large enhancements of carbon monoxide (CO) in the free troposphere were observed from the MOPITT and IASII satellite instruments. As part of the European MACC (Monitoring Atmospheric Composition and Climate) project a forecast system for reactive trace gases has been created which makes use of the assimilation system in ECMWF's Integrated Forecast System (IFS) coupled to a chemistry transport model such as TM5. This system is designed to provide forecasts of reactive tracer concentrations, especially during this type of events. Recently this system has been extended by adopting estimates from a near-real time system for fire emissions, the GFAS system. GFAS provided emission estimates for various trace gases during the Russian fires period.

Based on the coupled IFS-TM5 system which use the GFAS fire emissions we evaluate consecutive 3-day hindcasts of CO, nitrogen dioxide and ozone during this episode. Hindcasts are evaluated against independent observations and compared with a version that uses climatological fire emissions to illustrate the severity of this event. Also the impact of the assimilation system on various tropospheric trace gas concentrations, as well as hindcasts of elevated levels of surface ozone concentrations are presented.