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New products for a better characterization of smoke plume and gas/aerosol dispersion from Boreal Eurasian forest fires - The ALANIS Smoke Plume project

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Boreal forests play a vital role in curbing global warming by storing billions of tons of carbon in forest and peat ecosystems. However, this important carbon sink can be significantly perturbed by forest fires, especially as global warming may increase the number and extent of fires, as well as the length of the fire periods. The equilibrium of these boreal regions appears to be becoming more and more vulnerable and requires thorough attention in order to be able to forecast future trends.
Satellite remote sensing provides useful information on the variation and coverage of widespread boreal fires and may be used to monitor regional to global dispersion of fire-related aerosols and trace gases. In this context, ESA/ESRIN launched in 2010 following recommendations of the ILEAPS IPO, the ALANIS smoke plumes project, whose main objective is to exploit the complementary capabilities offered by multi-mission EO data for improving current large-scale dispersion forecasts of emitted compounds. In particular, three novel products will be developed and validated: i) a smoke-plume injection height product based on a recent technique combining Envisat AATSR and ERS-2 ATSR-2 stereo retrievals (Fisher et al., this session) with plume-height information extracted from the Envisat MERIS O_2-A band, ii) a burnt areas and emission product based on MERIS reflectance images, and iii) a large scale plume-dispersion tracking product derived from near-real-time MetOp-A IASI retrievals. These novel products will be integrated into the TM5 land-atmosphere coupled model with 4D-var assimilation scheme capable of explicitly simulating the main processes characterizing fire-plume dispersion.
Finally, an experimental dataset will be generated including the aforementioned EO products generated for a consistent number of fire events which have occurred between April 2008 and August 2011 over the whole boreal Eurasia, as well as the corresponding emission dispersion forecasts obtained by employing the developed land-atmosphere coupled model.
The ALANIS smoke plume project is run by a consortium lead by Noveltis, including the Wageningen University Research Centre, the Institute for Environment and Sustainability of the JRC, University College London (Mullard Space Science Laboratory), and LATMOS.
A preliminary study was conducted on the Russian fire events which occurred in summer 2010 to show the potential outcomes of the project for emission estimates and plume tracking and the first results will be presented here.