

IS4FIRES

Previous publications by the research team and publication plan

2 Jan 2008, JK

1. Previous recent relevant publications (mainly reviewed articles)

Publications specifically on forest fires

Sillanpää M., Saarikoski S., Hillamo R., Pennanen A., Makkonen U., Spolnik Z., Van Grieken R., Koskentalo T. and Salonen R., 2005. Chemical composition, mass size distribution and source analysis of long-range transported wildfire smokes in Helsinki. *Science of The Total Environment* 350, 119-135.

Niemi J., Tervahattu H., Vehkamäki H., Martikainen J., Laakso L., Kulmala M., Aarnio P., Koskentalo T., Sillanpää M. and Makkonen U. (2005) Characterization of PM_{2.5} episodes in Finland caused by wildfires in Eastern Europe. *Atmospheric Chemistry and Physics* 5, 2299-2310.

Saarikoski, Sanna, Markus Sillanpää, Mikhail Sofiev, Hilikka Timonen, Karri Saarnio, Kimmo Teinilä, Ari Karppinen, Jaakko Kukkonen and Risto Hillamo, 2007. Chemical composition of aerosols during a major biomass burning episode over northern Europe in spring 2006: Experimental and modelling assessments. *Atmos. Environ.* 41 (2007), 3577–3589.

Publications on models for evaluating forest fire plumes

Nikmo, J., J.-P. Tuovinen, J. Kukkonen and I. Valkama, 1999. A hybrid plume model for local-scale atmospheric dispersion. *Atmos. Environ.* 33, pp. 4389-4399.

Kukkonen, J., Nikmo, J., Ramsdale, S.A., Martin, D., Webber, D.M., Schatzmann, M. and Liedtke, J., 2000. Dispersion from strongly buoyant sources. In: Gryning, S.-E. and Batchvarova, E. (eds.), *Air Pollution Modeling and its Application XIII*, Kluwer Academic/Plenum Publishers, pp. 539-547.

Sofiev M. (2000) A model for the evaluation of long-term airborne pollution transport at regional and continental scales. *Atmos. Environ.* 34, No.15, pp. 2481-2493.

Sofiev, M., Siljamo, P. (2003) Forward and inverse simulations with Finnish emergency model SILAM. *Air Pollution Modelling and its Applications XVI*, eds. C.Borrego, S.Incecik, Kluwer Acad. / Plenum Publ. pp.417-425.

Sofiev M, P. Siljamo, I. Valkama, M. Ilvonen and J. Kukkonen, 2006. A dispersion modelling system SILAM and its evaluation against ETEX data. *Atmos. Environ.* 40 (2006) 674–685.

Publications on experimental methods for evaluating forest fire plumes

Sillanpää M., Frey A., Hillamo R., Pennanen A. and Salonen R.O. (2005) Organic, elemental and inorganic carbon in six urban environments in Europe. *Atmos. Chem. Phys.* 5, 2869-2879.

Publications on air pollution episodes (from forest fires or smthng else)

Fisher, B E A, J. Kukkonen and M. Schatzmann, 2001. Meteorology applied to urban air pollution problems COST 715. *International Journal of Environment and Pollution*, Vol. 16, Nos. 1-6.

Karppinen, Ari, Sylvain M. Joffre, Jaakko Kukkonen and Pia Bremer, 2001. Evaluation of inversion strengths and mixing heights during extremely stable atmospheric stratification, *International Journal of Environment and Pollution*, Vol. 16, Nos. 1-6.

Pohjola, M A, Rantamäki, M, Kukkonen, J, Karppinen, A, Berge, E. 2004. Meteorological evaluation of a severe air pollution episode in Helsinki on 27 - 29 December 1995. *Boreal Environment Research*, Vol. 9, No. 1, pp. 75-87.

Niemi J., Tervahattu H., Vehkamäki H., Kulmala M., Koskentalo T., Sillanpää M. ja Rantamäki M. (2004) Characterization and source identification of a fine particle episode in Finland. *Atmospheric Environment* 38, 5003-5012.

Kukkonen, Jaakko, Mia Pohjola, Ranjeet S Sokhi, Lakhu Luhana, Nutthida Kitwiroon, Minna Rantamäki, Erik Berge, Viel Odegaard, Leiv Håvard Slørdal, Bruce Denby and Sandro Finardi, 2005. Analysis and evaluation of selected local-scale PM₁₀ air pollution episodes in four European cities: Helsinki, London, Milan and Oslo. *Atmos. Environ.*, 39/15, pp. 2759-2773.

Rantamäki M., Pohjola M. A., Tisler, P., Bremer, P., Kukkonen, J. and Karppinen A., 2005. Evaluation of two versions of the HIRLAM numerical weather prediction model during an air pollution episode in southern Finland. *Atmos. Environ.* 39/15, pp. 2775-2786.

Fisher, B., J. Kukkonen, M. Piringer, M.W. Rotach and M. Schatzmann, 2006. Meteorology applied to urban air pollution problems: Concepts from COST 715. *Atmos. Chem. Phys.* 6, 555–564, www.atmos-chem-phys.net/6/555/2006/.

Baklanov, A., O. Hänninen, L. H. Slørdal, J. Kukkonen, N. Bjergene, B. Fay, S. Finardi, S. C. Hoe, M. Jantunen, A. Karppinen, A. Rasmussen, A. Skouloudis, R. S. Sokhi, J. H. Sørensen, and V. Ødegaard, 2007. Integrated systems for forecasting urban meteorology, air pollution and population exposure. *Atmos. Chem. Phys.*, 7, 855–874, 2007, www.atmos-chem-phys.net/7/855/2007/.

Aarnio, Päivi, Jyrki Martikainen, Tareq Hussein, Ilkka Valkama, Hanna Vehkamäki, Larisa Sogacheva, Jari Härkönen, Ari Karppinen, Tarja Koskentalo, Jaakko Kukkonen, Markku Kulmala, 2007. Analysis and evaluation of selected PM₁₀ pollution episodes in the Helsinki Metropolitan Area in 2002. *Atmos. Environ.* (in press, 14 p.) dx.doi.org/10.1016/j.atmosenv.2007.02.008.

Publications on the theory and parameterization of geophysical convection relevant to modeling forest fires

Zilitinkevich, S.S., 1991: *Turbulent Penetrative Convection*, Avebury Technical, Aldershot, 180 pp.

Zilitinkevich, S.S, Gryanik V.M., Lykossov, V.N., and Mironov, D.V., 1999: A new concept of the third-order transport and hierarchy of non-local turbulence closures for convective boundary layers. *J. Atmos. Sci.*, **56**, 3463-3477.

Mironov, D.V., Gryanik V.M., Lykossov, V.N., and Zilitinkevich, S.S., 1999: Comments on “A new second-order turbulence closure scheme for the planetary boundary layer” by K. Abdella and N. McFarlane. *J. Atmos. Sci.*, **56**, 3478-3481.

Akylas, E., Tombrou, M., Lalas, D., and Zilitinkevich. S., 2001: Surface fluxes under shear-free convection. *Quart. J. Roy. Met. Soc.*, **127**, 1-15.

Elperin, T., Kleorin, N., Rogachevskii, I., and Zilitinkevich, S., 2002: Formation of large-scale semi-organised structures in turbulent convection. *Phys. Rev. E*. **66**, 066305, 1-15.

Zilitinkevich, S. S., Hunt, J. C. R., Grachev, A. A., Esau, I. N., Lalas, D. P., Akylas, E., Tombrou, M., Fairall, C. W., Fernando, H. J. S., Baklanov, A., Joffre, S. M., 2006: The influence of large convective eddies on the surface layer turbulence. *Quart. J. Roy. Met. Soc.* **132**, 1423-1456.

Elperin T., Kleorin N., Rogachevskii I. and Zilitinkevich S., 2006: Turbulence and coherent structures in geophysical convection. *Boundary-layer Meteorol.* **119**, 449-472.

Goulart, A. G., Moreira, D. M., Vilhena, M. T., Degrazia, G. A., Zilitinkevich, S. S., 2007: A new model for the CBL growth based on the turbulent kinetic energy equation. *Environ. Fluid Mech.*, **7**, 409–419.

2. Publication plan (submitted or planned articles; mainly reviewed articles)

Anttila, P., Makkonen, U., Hellen, H., Pyy, K., Leppänen, S., Saari, H., and Hakola, H., 2007. Impact of the open biomass fires in spring and summer of 2006 on the chemical composition of background air in south-eastern Finland. Submitted to Atmospheric Environment. (the influence of spring and summer 2006 forest fire episodes at the station of Virolahti)

M. Sofiev, P. Siljamo, H. Ranta, T. Linkosalo, A. Karppinen and J. Kukkonen, 2008. Topic: Multi-component air pollution episode in Europe in April and May, 2006. (including birch pollen) Manuscript.

Sofiev, Kukkonen, ... , 2008. Topic: The dispersion of plumes from forest fires in Europe in spring and summer of 2006. Data archived and article preliminarily planned.

Rantamäki, ... 2008. AROME analyses of the episode in summer 2006.

Lehtinen, Arola, ..., 2008. PM10 and AOD.

Hillamo ..., 2008. Topic: Chemical composition of forest fire plumes during episodes in spring and summer of 2006.

Zilitinkevich, S. S., and Esau, I. N., 2008: A theoretical model and LES of the growth rate and ventilation of the convective boundary layer accounting for baroclinic shears and variable entrainment rates.

Zilitinkevich, S. S., and Esau, I. N., 2008: Revised scaling and improved surface-flux calculation scheme for atmospheric convection including forest fires.

Zilitinkevich, S. S. (with coauthors at UH and/or FMI), 2008: Non-gradient horizontal heat flux and its possible role in the counter-wind propagation of the fire front.

(The above planned work will contribute also to “MEGAPOLI”)