

SNS project 108 Satellite-based mapping of the growing season in northern Fennoscandia and neighbouring parts of NW Russia

Articles in international scientific peer reviewed journals 2009-2012

Bennie, J., Kubin, E., Wiltshire, A., Huntley, B., and Baxter, R., 2010. A thermal time method for predicting spatial and temporal patterns of bud-burst in north-west Europe based on evolutionary trade-offs. *Global Change Biology* 16: 1503-1514.

Eklundh L., Jin H., Schubert P., Guzinski R., Heliasz M., 2011, An optical sensor network for vegetation phenology monitoring and satellite data calibration, *Sensors*, 11, 7678-7709.

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Karlsen, S.R., Høgda, K.A., Tolvanen, A., Johansen, B. & Elvebakk, A. 2010. New satellite-based maps of the growing season north of 50°N. *Proceedings of SPIE* 7840(23). 8 p.

Karlsen, S.R., Høgda, K.A., Wielgolaski, F.E., Tolvanen, A., Tømmervik, H., Poikolainen, J. & Kubin, E. 2009. Growing-season trends in Fennoscandia 1982-2006, determined from satellite and phenology data. *Climate Research* 39: 275-286.

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Ranta, E., Lindström, J., Kaitala, V., Crone, E., Lundberg, P., Hokkanen, T. & Kubin, E. 2010. Life history mediated responses to weather, phenology and large-scale population patterns. In: Hudson, I. L & Keatley, M. R. (eds.). *Phenological Research*. Springer, Dordrecht Heidelberg London New York, Netherlands. p. 321-338. ISBN 978-90-481-3335-2 ISBN 978-90-481-3334-5

Rautiainen, M., Heiskanen, J., Eklundh, L., Möttus, M., Lukes, P. and Stenberg, P, 2010, Ecological applications of physically-based remote sensing methods, *Scandinavian Journal of Forest Research*, 25, 325-339 .

Rinnan, R., Stark, S. & Tolvanen, A. 2009. Responses of vegetation and soil microbial communities to warming and simulated herbivory in a subarctic heath. *Journal of Ecology* 97:788-800.

Sarala, M., Taulavuori, E., Karhu, J., Savonen, E.-M., Laine, K., Kubin, E. & Taulavuori, K. 2009. Improved elongation of Scots pine seedlings under blue light depletion is not depended on resource acquisition. *Functional Plant Biology* 36: 742-751.

Schubert P., Lagergren F., Aurela M., Christensen T., Grelle A., Heliasz M., Klemetsson L., Lindroth A., Pilegaard K., Vesala T., Eklundh L., 2012, Modeling GPP in the Nordic forest landscape with MODIS time series data - comparison with the MODIS GPP product, *Remote Sensing of Environment*, Accepted for publication.

Tagesson T., Mastepanov M., Tamstorf M.P., Eklundh L., Schubert P., Ekberg A., Sigsgaard C., Christensen T.R., Ström L., 2012, High-resolution satellite data reveal an increase in peak growing season gross primary production in a high-Arctic wet tundra ecosystem 1992-2008, *International Journal of Applied Earth Observations and Geoinformation*, 18, 407-416.

Wielgolaski, F.E, Ø. Nordli, S.R. Karlsen & B. O'Neill. 2011. Plant phenological variation in Norway during the 1928-1977 period related to temperature. *International Journal of Biometereology*, 55:819–830. DOI 10.1007/s00484-011-0467-9 (Erratum: DOI 10.1007/s00484-011-0480-z).

Other Scientific publications 2009-2012

Eklundh, L., Ardö, J., Sjöström, M., Jönsson, P., 2012, High-resolution mapping of vegetation dynamics from Sentinel-2. *Proceedings of the ESA Sentinel-2 Preparatory Symposium, Frascati, Italy, April 23-27, 2012.*

Jin, H., Schubert, P., and Eklundh, L., Use of near-ground spectral measurements to observe vegetation phenology and productivity in the Fennoscandian region. *Fluxnet Workshop, June 7-9, 2011, Berkeley, USA.*

Karlsen, S.R. & K.A. Høgda. 2010. Satellite-based mapping of the growing season in mainland Norway and on Svalbard. *Abstracts for the Phenology 2010: Climate Change Impacts and Adaptation, conference. Trinity College Dublin, Ireland 14 - 17 June 2010.* p. 51.

Karlsen, S.R., Høgda, K. A., Tolvanen, A., Johansen, B. & Elvebakk, A. 2009. New satellite-based maps of the growing season north of 50°N. In: *Proceedings of the 6th Symposium of Digital Earth. Beijing, China.* p. 9 p.

Karlsen, S.R., A. Tolvanen, K.A. Høgda, L. Eklundh, N. Polikarpova, O. Makarova & B. U. Hansen. 2011. Use of MODIS satellite data to map the growing season in northern Fennoscandia. *Geophysical Research Abstracts. Vol. 13, EGU2011-6815, 2011.*

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Karlsen, S.R, K.A. Høgda, B. Johansen, H. Tømmervik & A. Tolvanen. 2011. Use of time series of MODIS data in mapping of biophysical properties of the vegetation during a phenological defined growing season, northern Fennoscandia. *Abstract for the Nordic Remotes Sensing Days. Tromsø 30-31 August 2011.*

Karlsen, S.R., A.Tolvanen, K.A. Høgda, L. Eklundh, N. Polikarpova, O. Makarova, B. U. Hansen & B. Johansen. 2012. Use of MODIS data to analyse spectral properties of land cover types for improved mapping of the growing season in Northern Fennoscandia. *Abstract in the 12th International Circumpolar Remote Sensing Symposium. May 14-18, 2012, Levi, Finland.* Page 68.

Kubin, E. & Poikolainen, J. 2009. Plant phenology. In: *Niemi, J. (ed.). Environmental monitoring in Finland 2009-2012. Suomen ympäristökeskus, Helsinki. The Finnish Environment 12: 19.*

Kubin, E., Kemppainen, S. & Ranta, K. 2010. Climate change and phenology in tree line ecosystems. Post-Conference Excursion. WorldDendro 2010. The 8th International Conference on Dendrochronology, June 13-18, 2010, Rovaniemi, Finland. Metla, 20 p.

Kubin, E., Poikolainen, J. & Tolvanen, A. 2010. Finnish National Phenological Network. In: Phenology 2010: Climate change impacts & adaptations. Trinity College, Dublin, Ireland, 14-18 June. Oral presentation and Book of abstracts. p. 4.

Malnes, E., S.R. Karlsen & B. Johansen. 2012. Mapping the Length of the snow free seasons 2000-2010 in Northern Fennoscandia using MODIS data. Abstract in the 12th International Circumpolar Remote Sensing Symposium. May 14-18, 2012, Levi, Finland. Page 29.

Wielgolaski, F.E., Ø. Nordli & S.R. Karlsen 2010. Plant phenological variation in Norway during 50 years related to temperature. Abstracts for the Phenology 2010: Climate Change Impacts and Adaptation, conference. Trinity College Dublin, Ireland 14 - 17 June 2010. p. 49.

Wielgolaski, F.E., Ø. Nordli & S.R. Karlsen. 2010. Norwegian long-term plant phenological observations 1928-1977. Abstract for the International conference on phenology: Plant ecology and diversity, 7th - 9th April 2010, Edinburgh.

Three 3 monographs "Chronicle of Nature of Pasvik Zapovednik": Book 13 (2006), Book 14 (2007), Book 15 (2008), Apatity, 2011.

Six articles in Russian:

-Мошников С.А., Крутов В.И. О состоянии лесов заповедника «Пасвик»(About forest of Pasvik zapovednik)/ Ученые записки Петрозаводского государственного университета. № 6(119), сентябрь, 2011. С 61-64.

-Берлина Н.Г., Макарова О.А., Поликарпова Н.В., Москвичева Л.А., Зануздаева Н.В. Мониторинг орхидных в трех заповедниках Мурманской области(Monitoring of the orchids in three zapovedniks of Murmansk region)// Особо охраняемые природные территории в XXI веке: современное состояние и перспективы развития. Сб. материалов Всероссийской научно-практической конференции с международным участием, посвященной 20-летию юбилею Национального парка «Водлозерский», Петрозаводск, 2011. С. 75-78.

-Макарова О.А. Летопись природы для биологического мониторинга(Chronicle of Nature for biological monitoring)// Биологический мониторинг природно-техногенных систем. Сб. материалов Всероссийской научно-практической конференции с международным участием. Часть 2. Киров, 2011. С. 255-259.

-Макарова О.А., Аспхольм П.Э., Гюнтер М. Залеты золотистой щурки (*Merops apiaster* L.) на границе России и Норвегии (Appearing of the south species *Merops apiaster* on the border line between Russia and Norway)// Поведение, экология и эволюция животных: монографии, статьи, сообщения. Т. 2. Рязань, 2011. С. 366-368.

-Макарова О.А., Поликарпова Н.В.(Spruce refugium on the North of Green Belt Fennoscandia)// Отечественная геоботаника: основные вехи и перспективы. Сб. материалов Всероссийской научной конференции с международным участием (Санкт-Петербург, 20-24 сентября 2011 г.). Т. 1. Санкт-Петербург, 2011. С. 155-158.

-Поликарпова Н.В., Шарыгина И.О., Симонова Д.О. Опыт разработки критических нагрузок и экологических нормативов качества атмосферного воздуха для заповедника «Пасвик»(Critical loading and ecological standart for the quality of air)// Биологический мониторинг природно-техногенных систем. Сб. материалов Всероссийской научно-практической конференции с международным участием. Ч. 1. Киров, 2011. С. 56-60.

Manuscripts under preparation

Makarova O.A., Polikarpova N.V. Harmonization of scientific research in the Green Belt of Fennoscandia. In magazine “ Finnish Environment”.

Manninen, O. & Tolvanen, A. 2012. Fertilization and disturbance impacts and their interaction in forest-tundra vegetation (submitted in 2012)

Manninen, O. & Tolvanen, A. 2012. Seedling recruitment of clonally regenerative species in a forest-tundra ecotone (submitted in 2012)

Polikarpova N.V., Rakovskaya E.M. Landscape-based mapping of the Russian-Norwegian Nature Reserve Pasvik. In magazine “ Finnish Environment”.

Other publications 2009-2012

- Two articles about observations in nature published in Pasvik Zapovednik newspaper “Pasvik Times” in 2009.
- Field materials of 2009 were put on chapter “Flora and vegetation” and “Nature Calendar” of annual scientific report “Chronicle of Nature of Pasvik Zapovednik” in 2009.
- Six scientific articles about phenological research in Pasvik Zapovednik 2010.
- Newspaper article about scientific research in nature in Pasvik Zapovednik newspaper “Pasvik Times” in 2010.
- Field materials of 2010 were put on chapter “Flora and vegetation” and “Nature Calendar” of annual scientific report “Chronicle of Nature of Pasvik Zapovednik”.
- Articles about scientific research in nature were published in newspaper “Pasvik Times” (in 2011 it was 3 issues, 1500 ex.).

Dissemination in 2009:

- Two national press releases on plant phenology development in Finland
- Two media interviews on autumn phenology in Finland
- Presentation on plant phenology research at the University of Oulu, Finland
- Forest hydrology and phenology in Finland. Invited lecture. Czech Technical University Prague 2009
- Planning of excursion on Climate change and phenology in tree line ecosystems, Finland
- Four hours lectures on plant phenology at the University of Oulu
- Preparation of the methodic field guide for schoolchildren observations in winter period, their approbation during ecological school camp in February 2009, Pasvik, Russia.
- Organization the seminar for the Murmansk region`s teachers “Winter nature” in March 2009 by Pasvik, Russia.
- Organization the field excursion-class for Russian schoolchildren on Korablekk Mountain in the end of August 2009 for introduction with autumn phenological period in Pasvik Valley.

Dissemination in 2010:

- Software for phenology processing was distributed to ca. 400 users via the TIMESAT web page during 2010.
- An oral presentation was given by Eklundh at a workshop of the Swedish phenological Network, Jan 20, 2010.
- Eklundh participated in the CEOS working group international workshop on the Validation of Satellite-based Land Surface Phenology Products, Trinity College, June 18, 2010.
- Eklundh made a presentation to the FP7/COCOS international workshop on forest disturbance, Braunschweig, Germany, Oct 14, 2010.
- Eklundh participated and presented in the annual COST ES903 Meeting, Monte Bondone, Italy.
- Local inhabitants and schoolchildren were informed about autumn phenology in Pasvik.

Dissemination in 2011-2012:

- One national press release on plant phenology development in Finland
- 3 web columns on plant phenology in Finland
- 7 media interviews on plant phenology development in Finland
- Kubin, E , Poikolainen, J., Karhu, J. & Terhivuo, J. Phenological observations since the Linnean time in Finland. PEP725 meeting and symposium Vienna, Austria 26 April 2012.
- Participating in seminar of the teachers (Phenology of the North Callotte). 16-18.03.2011. Svanvik, Norway, “Bioforsk Svanhovd”.
- Participating in seminar of the teachers and schoolchildren (in the frames of project “Phenology of the North Callotte”). 05-09.09.2011. Kirovsk, Murmansk region– 60 persons (Climate of Chibiny).
- Work with students (32 persons) from Moscow, Ryazan and Murmansk universities and 1 aspirant (post-graduate) from Moscow university in phenological direction.
- Field training with schoolchildren in summer period (2 ecological camps, 22+ 22 pupils).
- Some materials put on the site of Pasvik zapovednik www.pasvik51.ru.
- Eklundh presented at the annual COST ES903 meeting in Hyytiälä, Finland, 2011, COST workshop meeting in Jena 2011, and in Milano in 2012.