Geophysical Research Abstracts
Vol. 18, EGU2016-15656, 2016
EGU General Assembly 2016

Historical experience (1850-1950 and 1961-2014) of insect species responsible for forest damages in Sweden: influence of environmental and land management changes

Mihaela-Mariana Tudoran, Laurent Marquer, and Anna Maria Jönsson
LUND UNIVERSITY, Dept of Physical Geography and Ecosystem Science, LUND, Sweden (laurent.marquer@nateko.lu.se)

The ongoing climate change can influence the dynamic of insect populations and therefore the Insect species Responsible for Forest Damages ("insects-RFD" hereafter). Investigations of how much insects-RFD respond to environmental changes is necessary for control measures to prevent the spread of specific insects-RFD. These investigations are of critical importance to forestry and ecosystem services today. The present study aims at identifying the main insects-RFD in Sweden, and exploring the relationships between insects-RFD and environmental and land management changes. The recorded insect attacks based on historical reports, literature and databases, were synthesized for North, Central and South of Sweden, and for two periods at yearly time scales: 1850-1950 and 1961-2014. A series of analyses has been carried out based on this dataset: 1-Principal component analyses to assess which insect species have caused the major forest damages, 2-Ratios broadleaved versus conifer insect host trees to estimate the main types of damaged forests, and 3- Canonical correspondence analysis to evaluate how much environmental (temperature, precipitation and storms) and land management (land areas for wood production and standing volume) changes have affected insects-RFD. The results show a general increase and high diversity in insects-RFD between 1911 and 1950 in all Sweden. From 1961 insects-RFD decrease in all regions and then they become stable from 1991 to 2014, excepted in the South after 1991 when insects-RFD decrease. Conifers (pine and spruce) are the most attacked trees since at least 1850 in all Sweden. Ips typographus (spruce host tree) is confirmed to be the major insects-RFD to entire Sweden, following by Blastophagus piniperda and minor (pine host tree) before 1950 and Microdiprion pallipes (pine host tree) from 1961. Canonical correspondence analysis shows that the spread of insects-RFD might be related to environmental changes. More particularly, the temporal variation explained are increasing between 1902-1950 and 1961-2007 in all Sweden for temperatures and Central and South of Sweden for storm damages. However, the evolution of landscape management would be a dominant driver, in particular from 1961 when changes in forest management (e.g. increase in land areas for wood production and new clear-cutting systems) would have caused decreases in most of insects-RFD and increases in the compositional changes of insects-RFD. Furthermore, the type of forest attacked by insects-RFD is generally dependent on changes of landscape management. This long-term perspective of how changes in environment and land management have influenced insects-RFD is of great interest for further discussion about climate adaptation strategies in forestry and ecosystem services.