



ESSL research on severe storms in Europe

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Abstract

The European Severe Storms Laboratory is a research institute with focus on severe storms. By maintaining the extensive European Severe Weather Database (eswd.eu) of nearly 500,000 individual severe weather reports, organizing a wide range of workshops and conferences, ESSL supports severe weather research in close collaboration with Europe's weather services and several academic institutions. ESSL operates its Research and Training Centre in Wiener Neustadt, south of Vienna, Austria, with ESSL personnel working across Europe on topics related to severe storms and their impacts, as well as their relation to climate change. Projections by ESSL's AR-CHaMo models for severe weather occurrence, which use the reports database and an atmospheric reanalysis as training data, show that a significant increasing trend of thunderstorm related severe weather is ongoing with its focus across South-central Europe. In 2023, ESSL published the International Fujita scale for rating tornado and wind damage, a successor to Fujita's original scale for tornadoes, developed in collaboration with a number of European weather services and academics. Since August 2023, the IF-scale is operationally used. In addition to the above, ESSL has developed tools to better forecast thunderstorm hazards, such as tornadoes, severe winds, and large hail several days in advance in a collaborative project with the European Centre for Medium-Range Weather Forecasts (ECMWF). Furthermore, the ESSL Testbed is a platform for the evaluation of new tools, often still under development, to assist forecasters with issuing weather warnings and forecasts. Such tools include numerical weather prediction, radar, and satellite-based applications. Given the recent launch of the first of a new generation of geostationary satellites for weather and climate monitoring, the Meteosat Third Generation by its operator EUMETSAT, a number of important new features are becoming available, including lightning detection data from the onboard Lightning Imager instrument. Currently, ESSL is leading a European initiative to organize a large multi-year field campaign on severe thunderstorms, called TIM "Thunderstorm Intensification near Mountains".

Short CV

Pieter Groenemeijer is Director of the European Severe Storms Laboratory. After completing his pre-doctoral degree at Utrecht University in the Netherlands, he obtained a Ph.D. in Physics from the University of Karlsruhe 2009 for his analytical work on the development of thunderstorms in contrasting thermodynamic and kinematic environments. After working taking a postdoctoral research position at Ludwig-Maximilians University of Munich, he became Director of ESSL in 2011. Pieter co-initiated the European Storm Forecast Experiment (estofex.org) in 2002, and designed the European Severe Weather Database in 2004. He initiated the development of the Additive Regression Convective Hazard Models that are used by risk modellers, reinsurers, academics, and, increasingly, weather forecasters to model the occurrence of severe weather. He furthermore was a driving force behind the ESSL Testbed and programmer of its Displayer interface for weather data visualisation. At ESSL, he has led a range of projects funded by the German government and was involved in several projects funded by the Austrian Science fund, the Land of Lower Austria, the European Union, as well as in several smaller projects funded by the private sector.