7th European Windstorm Workshop
10-12 October 2018
Karlsruhe Institute of Technology

Oral presentations

Session 1: Dynamics of European windstorms

KEYNOTE Linking extreme precipitation, atmospheric rivers and extratropical cyclone airflows

Main Author: Helen Dacre
Institution: University of Reading
Co-Authors: Oscar Alvarado-Martinez, Cheikh Mbengue

Extreme precipitation accumulations associated with extratropical cyclones can lead to flooding if cyclones track over land. In this study we analyse the airflows within a climatology of cyclones in order to understand how cyclones redistribute the moisture stored in the atmosphere to create persistent precipitation features. This analysis shows that within a cyclones' warm sector the cyclone-relative airflow is rearwards relative to the cyclone propagation direction. This low-level airflow (termed the feeder stream) slows down when it reaches the cold front resulting moisture convergence and the formation of a band of high moisture content. One branch of the feeder stream turns towards the cyclone centre supplying moisture to the base of the warm conveyor belt. The other branch of the feeder stream turns away from the cyclone centre exporting moisture from the cyclone. As the cyclone travels, this export results in a filament of high moisture content marking the track of the cyclone, known as an atmospheric river. We find that cyclone precipitation totals increase when moisture in the feeder stream increases thus explaining the link between atmospheric rivers and flooding. Atmospheric moisture budgets calculated as cyclones pass over a fixed location show that continuous evaporation of moisture in the pre-cyclone environment maintains the moisture supply to the feeder stream. This leads to persistent precipitation features and allows continuous filaments of high moisture content to form ahead of the cold front. Evaporation behind the cold front also acts to moisten the atmosphere in the wake of the cyclone passage, potentially helping to pre-condition the environment for subsequent cyclone development.

The role of latent heating for extratropical cyclone dynamics in a warmer climate

Main Author: Dominik Büeler
Institution: Institute for Atmospheric and Climate Science, ETH Zurich / Now at Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology
Co-Authors: Stephan Pfahl

Latent heating (LH) due to cloud formation can substantially amplify the intensification of extratropical cyclones. The expected increase of the atmospheric moisture content due to ongoing emissions of anthropogenic greenhouse gases is going to increase the potential for LH in cyclones. How this increase may affect both individual cyclones and the storm track as a whole is still unclear. Here, we investigate the role of LH for cyclones in two conceptually different sets of idealized climate change simulations. To this end, we use a diagnostic method that explicitly quantifies the contribution of LH to the lower-tropospheric potential vorticity (PV) anomaly of a cyclone, which is strongly coupled to cyclone intensity and the associated impacts in terms of surface weather. First, we apply this PV diagnostic to regional surrogate climate change simulations of 12 Northern Hemisphere cyclones in a spatially homogeneously warmer climate, in which only the atmospheric moisture content increases but no changes in baroclinicity occur. We demonstrate that enhanced LH can largely but not fully explain the substantially varying changes in the dynamics, intensity, and impacts of these cyclones. Second, we use a set of idealized aquaplanet GCM simulations of very cold to very warm climates, in which changes in the atmospheric moisture content are accompanied by changes in the meridional and vertical temperature structure. Applying our PV diagnostic to the cyclones from these simulations shows that enhanced LH in the warmer climates has the most pronounced effect on the most intense cyclones.

Dynamic of a Sting Jet case study over continental Europe

Main Author: Lea Eisenstein
Institution: Institute of Meteorology and Climate Research - Department Troposphere Research, Karlsruhe Institute of Technology, Karlsruhe, Germany
Co-Authors: Florian Pantillon, Peter Knippertz, Joaquim Pinto

Heavy windgusts in cyclones are often associated with the Cold Conveyer Belt. In recent years, another wind phenomenon, the so-called Sting Jet, was discussed accompanying Shapiro-Keyser cyclones. This is an airstream which descends from the cloud head in the mid-troposphere into the frontal-fracture region of the cyclone and causes strong near-surface gusts. The literature is almost entirely focused on Sting Jet case studies over the North Atlantic, the British Isles, and the North Sea. This work, on the other hand, chose with windstorm Egon (12-13 January 2017) a case study with an assumed Sting Jet over France and Germany, thus over continental Europe. To analyse the storm, the ICON-LAM (limited area mode) model is used for simulations with horizontal grid spacings down to 1.6 km and different vertical resolution. With such a high grid spacing also small-scale processes can be resolved and a convection parametrisation is dispensable. Besides calculating points of conditional symmetric instability (CSI) to see if mesoscale instabilities played a role in the development of the Sting Jet, lagrangian trajectories are calculated using LAGRANTO. First trajectory results confirm the presence of a descending airmass into the frontal-fracture region in Egon in all simulations. The affected region is similar to the gust footprint which is more distinct in the 1.6 km grid spacing. Furthermore CSI was present in the cloud head with a larger magnitude in the highest resolution. Future work will focus on the consistence of various variables along trajectories and the presence of mesoscale instabilities with the behaviour of previous case studies. Thereto it will also be investigated if a Sting Jet over a continent with higher mountain chains behaves differently and hence depends on orography by e.g. making Europe flat or benefit from the more detailed resolved orography in higher resolutions.

The Impact of Stratospheric Waves on the Deepening of North Atlantic Winter Cyclones

Main Author: Gregor Pante
Institution: Institute of Meteorology and Climate Research (IMK), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
Co-Authors: Seraphine Hauser, Peter Knippertz

The development and intensity of cyclones in the North Atlantic storm track during northern hemispheric winter are subject to many tropospheric factors such as upper-level jet characteristics or the distribution of moisture. Case studies of some of the strongest cyclones with regard to mean sea level pressure have shown that changes in stratospheric geopotential related to stratospheric waves can also contribute considerably to cyclone deepening.

Here we present the first systematic analysis of this impact of stratospheric waves on the 100 deepest North Atlantic winter cyclones in the ERA-Interim re-analysis data set between 1979 and 2015. Tropospheric cyclones and stratospheric waves are identified using objective cyclone tracking and trough identification tools, respectively. The contribution of the change in stratospheric geopotential to changes in mean sea-level pressure is diagnosed using the pressure tendency equation (PTE). For an objective analysis of the connection between stratospheric waves and cyclone deepening, we define ”trough objects”.

Characteristics of the trough objects and their relation to the cyclone tracks allow us to cluster the 100 storms into different groups: (i) track east of trough, (ii) track west of trough, (iii) track far away from trough or (iv) no trough present in study domain. This clustering reveals that conditions for a positive influence of the stratosphere on cyclone deepening are good when the trough is west of the cyclone track at a distance between 0° and 50° and exists for at least 40% of the cyclone’s life time. It is also conducive when waves are mobile and move eastwards together with the cyclone track. There are, however, deep cyclones without or even with a negative impact of the stratosphere on its core pressure. The latter occurs when the track is west of a through beneath a stratospheric ridge or if the trough is moving westwards.

The intensity and motion of hybrid cyclones in the Australian region in a composite potential vorticity framework

Main Author: Julian Quinting
Institution: Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany
Co-Authors: Jennifer Catto, Michael Reeder

Hybrid cyclones in the Australian region have been linked to heavy rain and extreme winds causing damage to the coastal areas of south and southeastern Australia. To better understand the dynamics of these systems, this study quantifies the effect of distinct upper-level potential vorticity (PV) anomalies on the intensity and motion through the piecewise PV inversion of a set of 573 hybrid cyclones. In their mature stage, the cyclones are typically associated with either an upper-level south-north elongated trough, a PV cut-off or a cyclonically breaking trough. The maximum intensity of the cyclones associated with an elongated trough is dominated by a corresponding upper-tropospheric cyclonic PV anomaly. In contrast, diabatically generated PV anomalies dominate the intensity of cyclones that are associated with a cyclonically breaking trough. The cyclonically breaking trough and a downstream ridge induce an anomalous northeasterly low-level flow across the cyclone centre, steering the cyclones further poleward than those cyclones associated with an elongated trough or a PV cut-off. In the latter case, the upper-level PV anomaly primarily slows the eastward motion of the cyclones. Though this study focuses on the Australian region, it is an intriguing research opportunity to apply the same diagnostics to winter storms in the Atlantic-European region.

Consistent catalogues of extreme and high-impact winter storms in Portugal

Main Author: Margarida L. R. Liberato
Institution: Instituto Dom Luiz, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal and Escola de Ciências e Tecnologia, Universidade de Trás-os-Montes e Alto Douro, UTAD, Vila Real, Portugal.

Extra-tropical cyclones dominate autumn and winter weather over western Europe and particularly over the Iberian Peninsula. Intense, high-impact storms are one of the major weather risks in the mid-latitudes. High winds and extreme precipitation from extra-tropical cyclones can result in windstorm damage, flooding and coastal storm surges, having large socio-economic impacts. In Portugal, due to the extensive human use of coastal areas, the natural and built coastal environments have been amongst the most affected.

The analysis of the North Atlantic cyclone characteristics, namely track, cyclogenesis, deepening rate and cyclolysis – based on the cyclone detecting and tracking algorithm developed for the Euro-Atlantic region (Trigo, 2006) – as well as meteorological and socioeconomic impacts, have been extensively evaluated for case studies occurring during recent winters (e.g. Liberato et al. 2011; 2012; 2014). Nevertheless a consistent catalogue of historical high-impact winter storms for Portugal is still missing. Here the objective algorithm, which identifies and follows individual lows, is applied to 6-hourly geopotential data at 1000-hPa from the ERA-Interim Reanalysis datasets for the Euro-Atlantic sector and resulting cyclones datasets are compared. Additionally reanalysis allow the assessment of the synoptic evolution, dynamical characteristics and the main impacts of the top storms that provoked extreme impacts and considerable economical losses over Portugal.

Acknowledgements: This work is partly supported by Fundação para a Ciência e a Tecnologia (FCT), Portugal through the project WEx-Atlantic (02/SAICT/2017/029233).

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Session 2: Predictability and variability from weather to climate timescales

KEYNOTE Clouds, radiation, weather and climate

Main Author: Aiko Voigt
Institution: Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany

Clouds are an intrinsic part of the atmospheric circulation and its response to climate change. In this talk, I will review some of the recent work that has identified the importance of clouds and their radiative interactions. This includes the impact of the presence of cloud-radiative interactions on the present-day midlatitude jet stream and idealized cyclones, which are conveniently studied by making clouds transparent to radiation (the so-called COOKIE approach). Such work has demonstrated that cloud-radiative interactions weaken idealized cyclones, and that tropical and midlatitude clouds have opposing impacts on the jet latitude. I will further cover the role of changes in cloud-radiative interactions for the response of the midlatitude circulation to increasing carbon dioxide. Such work typically uses the cloud-locking approach, and has identified high-level tropical and midlatitude clouds as well as low-level extratropical clouds as important drivers of poleward jet shifts due to the cloud-radiative impact on the atmospheric and surface energy balances. Overall, a growing body of literature points to an important but often model-dependent role of clouds for the midlatitude circulation, calling for a better understanding of the cloud-radiation-circulation coupling.

Forecasting wind gusts in winter storms using a calibrated convection-permitting ensemble

Main Author: Florian Pantillon
Institution: Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany
Co-Authors: Sebastian Lerch, Peter Knippertz, Ulrich Corsmeier

Windstorms associated with low-pressure systems from the North Atlantic are the most important natural hazards for central Europe. Although their predictability has generally improved over the last decades, forecasting wind gusts is still challenging due to the multiple scales involved. One of the first ensemble prediction systems at convection-permitting resolution, COSMO-DE-EPS offers a novel 2.8-km dataset over Germany for the 2011–2016 period. The high resolution allows representing mesoscale features that are hardly captured by global models, while the long period allows both investigating rare storms and applying statistical post-processing. Ensemble model output statistics based on a truncated logistic distribution substantially improve forecasts of wind gusts in the whole dataset. However, some winter storms exhibit uncharacteristic forecast errors that cannot be reduced by post-processing. During the passage of the most severe storm, gusts related to a cold jet are relatively well predicted at the time of maximum intensity whereas those related to a warm jet are poorly predicted at an early phase. Wind gusts are overestimated during two cases of frontal convection, which suggests that even higher resolution is needed to fully resolve the downward mixing of momentum and the stabilization resulting from convective dynamics. In contrast, extreme gusts are underestimated during a rare case involving a possible sting jet but this arises from the representation of the synoptic rather than the mesoscale. The synoptic scale also controls the ensemble spread, which is inherited from the initial and boundary conditions mostly. This is unsurprising but leads to high forecast uncertainty in a case of small, fast-moving cyclone crossing the model domain. These results illustrate how statistical post-processing can help identify the limits of predictability across scales in convection-permitting ensemble forecasts. They may guide the development of regime-dependent statistical methods to further improve forecasts of wind gusts in winter storms.

Observed cloud anomalies associated with the North Atlantic Oscillation and their radiative feedback

Main Author: Georgios Papavasileiou
Institution: Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
Co-Authors: Aiko Voigt, Peter Knippertz

The importance of the North Atlantic Oscillation (NAO) for European weather and associated socioeconomic impacts has been highlighted and extensively investigated in previous literature. The NAO regulates cyclonic activity over the North Atlantic Ocean and western/northern Europe. However, little research has been done regarding the impact of cloud-radiative effects (CRE) on the internal variability of the NAO on synoptic to subseasonal timescales. Here, we analyse how clouds change with, and potentially in turn affect, NAO on timescales of days to weeks. An analysis of 5-day mean cloud incidence retrievals from CloudSat/CALIPSO for 2006 to 2011 shows that a positive NAO is accompanied by increased upper-tropospheric cloud incidence of 4 to 7 % along the storm track and in the subpolar Atlantic, as well as a decrease of 2 to 4 % equatorward of the storm track and 7 to 10 % in the Labrador Sea. These correlations are most pronounced during Northern Hemisphere winter. Vertically-integrated atmospheric CRE calculated from CERES-SYN1deg reveal a dipole of heating of 10 to 14 W/m2 to the north and cooling of -10 to -15 W/m2 to the south of the storm track. The heating dipole suggests a potential cloud-radiative feedback on the NAO that we discuss from the perspective of vertical profiles of atmospheric heating and their impact on the surface pressure tendency. An analysis of ERA-Interim reanalysis and short-term forecasts data for the region around Iceland reveals that diabatic processes contribute to a negative pressure tendency when the NAO is in a positive state, with CRE accounting for around 10 % of the diabatic contribution. This indicates that diabatic processes, including CRE, can modulate the NAO persistence and thus impact on cyclonic activity over the North Atlantic and Europe.

Large scale drivers and seasonal predictability of extreme wind speeds over the North Atlantic and Europe

Main Author: Michael A. Walz
Institution: University of Birmingham, UK
Co-Authors: Markus G. Donat, Gregor C. Leckebusch

As extreme wind speeds are responsible for large socio-economic losses in the European domain, a skilful prediction would be of great benefit for disaster prevention as well as the actuarial community. Here we evaluate the patterns of atmospheric variability and the seasonal predictability of extreme wind speeds (e.g. >95th percentile) in the European domain in the dynamical seasonal forecast system ECMWF System 4 and compare to the predictability using a statistical prediction model. Further we compare the seasonal forecast system with ERA-Interim in order to advance the understanding of the large-scale conditions that generate extreme winds. The dominant mean sea level pressure (MSLP) patterns of atmospheric variability show distinct differences between reanalysis and System 4 as most patterns in System 4 are extended downstream in comparison to ERA-Interim. This dissimilar manifestation of the patterns across the two models leads to substantially different drivers associated with the generation of extreme winds: While the prominent pattern of the North Atlantic Oscillation (NAO) could be identified as the main driver in the reanalysis, extreme winds in System 4 appear to be related to different large-scale atmospheric pressure patterns. Thus, our results suggest that System 4 does not seem to fully capture the potential predictability of extreme winds that exists in the real world. This is in contrast to Befort et al. (2018, under review) who find significant skill for tracked windstorm systems, thus on basis of events. The circumstance of finding reduced skill for extreme wind speeds (without regarding the generating windstorm event) is likely related to the unrealistic representation of the atmospheric patterns driving these extreme winds. Hence our study points to potential improvements of dynamical prediction skill by improving the simulation of large-scale atmospheric variability.

A critical assessment of the long term changes in the wintertime surface Arctic Oscillation and Northern Hemisphere storminess in the ERA20C reanalysis

Main Author: Len Shaffrey
Institution: National Centre for Atmospheric Science, University of Reading
Co-Authors: Hannah Bloomfield, Kevin Hodges, Pier Luigi Vidale

This study investigates the robustness of the long-term changes in the wintertime surface Arctic Oscillation (AO) in the ERA20C reanalysis. A statistically significant trend in the AO is found in ERA20C over the period 1900-2010. These long-term changes in the AO are not found in two other observational datasets. The long term change in the AO in ERA20C is associated with statistically significant negative trend (approximately -6hPa per century) in mean-sea level pressure (MSLP) over the Northern Hemisphere (NH) polar regions. This is not seen in the HADSLP2 observational dataset, suggesting that the trends in the ERA20C AO index may be spurious.

The spurious long term changes in MSLP and the AO index in ERA20C result in a strengthening of the meridional MSLP gradient in ERA20C. The strengthening of the meridional MSLP gradient is consistent with increases in wintertime storminess in Northern Europe and the NH high latitudes seen in ERA20C.

Long-term variability regional changes in precipitation since 850 and the role of the water vapor transport

Main Author: Alexandre M. Ramos
Institution: Instituto Dom Luiz (IDL), University of Lisbon, Portugal
Co-Authors: Pedro M. Sousa, Ricardo M. Trigo, Christoph C. Raible, Martina Messmer, Joaquim G. Pinto

The vertically integrated horizontal water vapor transport (IVT) is a key contributor to extreme winter precipitation in Western Europe (e.g. Iberian Peninsula and the UK), particularly in the form of an Atmospheric River (AR) associated with an extratropical cyclone. We use a long-term climatic simulation (between 850-2100 A.D.) to analyze the variability in precipitation regimes in Western Europe and their links to the IVT activity. This simulation relies on the Community Earth System Model (CESM 1.0.1), using a modified reconstruction of total solar irradiance, volcanic forcing and the RCP8.5 forcing scenario for the 21st century. IVT fluxes along the Iberian and UK coastlines were compared against precipitation series (large scale, convective and total) and mean surface temperature in oceanic boxes west of those coastlines. A steady increase in the mean IVT (superimposed to the inter-annual and inter-decadal variabilities) started after the Industrial Period. Increased moisture transport towards Western Europe is in line with the concurrent surface warming. However, while in the UK recent and projected rainfall changes follow the warming trend, in Iberia the link between the IVT and precipitation in the Pre-Industrial period (R=0.75) is lost afterwards, particularly for the 21st century projections. Accordingly, drying trends in this region are projected to exacerbate, in unprecedented magnitude when compared with inter-annual and inter-decadal time-scales. This reduction is substantial in autumn and spring months, showing a shortening of the rainy season. Finally, despite the expected rises in evaporative processes and moisture availability in a warming climate, AR frequency is only expected to increase at higher latitudes, essentially due to increasing anticyclonic conditions further south (e.g. Iberia).

This work was supported by the project IMDROFLOOD (WaterJPI/0004/2014) funded by Fundação para a Ciência e a Tecnologia, Portugal (FCT). A.M.Ramos was supported by a FCT postdoctoral grant (FCT/DFRH/ SFRH/BPD/84328/2012).

Variability of intensification mechanisms of extra-tropical cyclones analysing ERA20C reanalysis

Main Author: Jens Grieger
Institution: Institute of Meteorology, FU Berlin, Berlin, Germany
Co-Authors: Joaquim G. Pinto, Andreas H. Fink, Uwe Ulbrich

European winter windstorms and corresponding severe extra-tropical cyclones underly strong inter-annual to decadal variability. Mechanisms leading to these variabilities are still not fully understood. Recent studies discuss the role of the state of the North Atlantic (NA), its variability of heat content and meridional temperature gradients concerning storm variations on decadal time scales. During the 20th century, changes of NA sea surface temperature can be attributed to a warming trend as well as the Atlantic multidecadal variability (AMV) with cold conditions in the 70s to 90s and warm conditions in the recent decade. These oceanic variabilities may have an influence on the governing processes for the development of severe European windstorms. This study investigates the variability of mechanisms leading to an intensification of extra-tropical cyclones in ERA20C reanalysis data from 1960 to 2010. Extra-tropical cyclones are identified with an objective tracking scheme. The pressure tendency equation is evaluated to analyse diabatic and baroclinic contributions of each individual cyclone. Climatologies of the relative development contributors are presented for the 50 year dataset.

Session 3: Windstorm risk and insurance collaborations

KEYNOTE Operational Wind Storm Service for the Insurance Sector

Main Author: Alan Whitelaw
Institution: CGI IT UK Limited

European winter wind storms are a major cause of losses to the insurance sector. To help the sector better understand this risk, a storms operational service is currently being implemented. This implementation is the successor of WISC (Windstorm Information Service - part of the Copernicus Climate Change Service (C3S)) to evolve from a Proof of Concept to an operational service. The WISC contract has successfully demonstrated the estimation of economic losses for winter storm events over Europe based on state-of-the-art numerical weather prediction models and economic loss models. This includes a chain of processes, including (i) the identification of storm events from ERA-Interim and/or ERA-20C fields and their tracks, (ii) downscaling of the relatively low resolution ERA wind fields to high resolution fields of wind gust, (iii) subsequent generation of storm footprints and (iv) the calculation of economic losses for the identified storms.

As a result, WISC has proven to be a successful Proof of Concept for an open source tool to estimate economic losses for winter storm events over Europe. The evolution of the Proof of Concept to an operational service, based on open access data, requires, among other things, free access to re-analysis data. ERA5, currently generated at ECMWF, will be used in the implementation of the service which data is indeed open access and free to download for all uses, including commercial use.

All data including ERA5 and wind storm information products are open access and will be made available through the Copernicus Climate Data Store (CDS). Technical support is provided to users. Outreach events are being scheduled to promote and gain feedback from the (re-)insurance sector.

This work is funded by the European Union under the Copernicus Climate Change programme and implemented by ECMWF under reference C3S_426 Lot 2.

Inter-comparison of Arctic storms in Reanalysis Datasets

Main Author: Alexander Vessey
Institution: University of Reading
Co-Authors: Kevin Hodges, Len Shaffrey, Jonathan Day, Tom Philp

Arctic sea ice has reduced significantly over recent decades and is projected to reduce further over this century. Reduced Arctic sea ice will open up opportunities for the expansion of business and industrial activities into the Arctic. As a result, the exposure and risk of humans and infrastructure to extreme Arctic storms will increase. In addition, Arctic storms have also been found to travel through Northern Europe, leading to hazardous weather in heavily populated areas.

Our understanding of the current risk from Arctic storms comes from analysing the past, for example by using reanalysis datasets. However, there are a number of reanalysis datasets available from different institutions that make use of different models and data assimilation systems. This can introduce uncertainty, especially in the relatively poorly observed Arctic. To quantify this uncertainty, Arctic storms have been identified and compared using data from four reanalysis datasets; ERA-Interim, JRA-55, MERRA-2 and NCEP-CFSR.

The results suggest that there are substantial differences in the spatial distribution, intensity and frequency of Arctic storms in the different reanalysis datasets. For example, the largest uncertainty in the genesis density of Arctic storms was found to occur around north Greenland. ERA-Interim shows that 365 storms had genesis around north Greenland in winter months (DJF) between 1980 and 2017, though, NCEP-CFSR shows that only 265 storms had genesis over north Greenland respectively. This has an impact on the track densities calculated from each reanalysis datasets, and the largest uncertainty in track density of Arctic storms was found to occur in the North Atlantic Ocean and the Canadian Archipelago.

How important is serial clustering in seasonal losses from severe windstorms in Europe?

Main Author: Matthew Priestley
Institution: University of Reading
Co-Authors: Helen Dacre, Len Shaffrey, Kevin Hodges, Joaquim Pinto

Extratropical cyclones are the most damaging natural hazard to affect western Europe. Serial clustering occurs when many intense cyclones affect one area in a period of time which can potentially lead to large seasonal losses. Previous studies have shown that intense cyclones may be more likely to cluster than less intense cyclones. We revisit this topic using a high resolution climate model with the aim to determine how important clustering is for windstorm related losses.

The role of windstorm clustering is investigated using a quantifiable loss-based metric (storm severity index (SSI)) based on near-surface meteorological variables (10-metre wind speed) that is used to convert a wind footprint into losses for individual windstorms or seasons. 918 years of high resolution coupled climate model data from the High-Resolution Global Environment Model (HiGEM) are compared to ERA-Interim re-analysis. HiGEM is able to successfully reproduce the wintertime North Atlantic/European circulation, and represent the large-scale circulation associated with the serial clustering of European windstorms. We use two measures to identify any changes in the contribution of clustering to the overall seasonal losses for increasing return periods.

Above a return period of 3 years, the accumulated seasonal loss from HiGEM is up to 20 % larger than the accumulated seasonal loss from a set of random realisations of the HiGEM data. Seasonsal losses are increased by 10–20 % relative to randomised seasonal losses at a return period of 200 years. The relative contribution of the single largest event in a season to the accumulated seasonal loss does not change with return period.

Given the realistic dynamical representation of cyclone clustering in HiGEM, and comparable statistics to ERA-Interim, we conclude that our estimation of clustering and its dependence on the return period will be useful for informing the development of risk models for European windstorms, particularly for longer return periods.

Spatial independence of wind storm gust extremes

Main Author: David Stephenson
Institution: University of Exeter

Natural hazard loss portfolios with exposure over a region are sensitive to the dependency between extreme values of the key hazard variable at different spatial locations. It is therefore important to correctly identify and quantify dependency to avoid poor quantification of risk.

This study demonstrates how bivariate extreme value tail dependency methods can be used together in a novel way to explore and quantify extremal dependency in spatial hazard fields. A relationship between dependency and loss is obtained by deriving how the probability distribution of conceptual loss depends on the tail dependency coefficient.

The approaches are illustrated by applying them to 6103 historical European windstorm footprints (spatial maps of 3-day maximum gust speeds). We find there is little evidence of asymptotic extremal dependency in windstorm footprints. Furthermore, empirical extremal properties and conceptual loss distributions between pairs of locations are shown to be well reproduced using Gaussian copulas but not by extremally-dependent models such as Gumbel copulas.

It is conjectured that the lack of asymptotic dependence is a generic property of turbulent flows, which may extend to other spatially continuous hazards such as heat waves and air pollution. These results motivate the potential of using Gaussian process (geostatistical) models for efficient simulation of hazard fields.

Windstorm Losses in a Changing Climate

Main Author: Bernhard Reinhardt
Institution: Verisk Analytics, AIR Worldwide, Germany

Co-Authors: Eric Robinson, Shane Latchmann

Storm tracks changes derived from climate model output under various climate change scenarios inform a climate conditioned stochastic catastrophe loss model. Regional changes to key loss metrics used by the insurance industry were derived for the different scenarios.

Metaxa: Met Office and AXA collaborate on estimations of loss based on high resolution storm footprints

Main Authors: Robin Locatelli and Bernd Dieter Becker
Institutions: AXA, Paris, France and Met Office
Co-Authors: Paul Maisey, Christelle Castet

The Met Office and AXA have been working together on verifying European wind storm footprints for application in risk assessment. The footprints are based on a dynamical downscaling approach to using reanalysis data. Both historical and real-time storms have been simulated to feed a statistical model to estimate AXA insured losses. Firstly, a few examples of “real-time” estimations of AXA losses will be shown from the past winter, based on forecast and analyzed storm footprints. Accuracy of these estimations will be discussed. Then, a reanalysis of AXA losses in Europe since 1980 will be presented based on high resolution historical footprints. Moreover, the impact of reanalysis datasets used in the dynamical downscaling step on the loss estimations will be quantified.