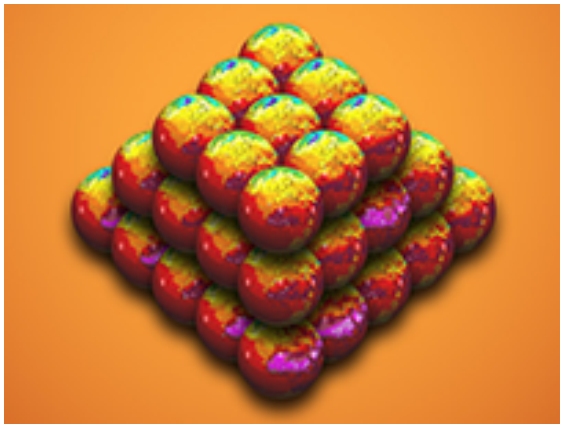
Using ECMWF's Forecasts (UEF2019)



Report of Contributions

https://events.ecmwf.int/e/UEF2019

Contribution ID: **1** Type: **Oral presentation**

Quantifying uncertainties and confidence level in ATM simulations

Thursday, 6 June 2019 10:00 (30 minutes)

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) is an international organization located in Vienna, Austria. Its main task is to establish a global verification regime to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which bans all nuclear explosions. The Commission has developed an atmospheric transport modelling (ATM) pipeline working with meteorological data in order to produce source-receptor-sensitivity (SRS) field data and plots to indicate possible source regions for potential releases of radionuclides (RN) related to hypothetical or actual detections at RN stations.

CTBTO mainly uses ATM guidance in backward mode to link a measurement from an IMS station to a possible source location. However, ATM is also used in forward mode to predict which of the IMS radionuclide stations are likely to be affected given a potential radioactive release.

Different ATM systems will generally produce different solutions because a) the input meteorological fields are different or processed differently, b) the transport and dispersion model are different or configured differently, and c) the source term is specified differently. CTBTO in collaboration with Zentralanstalt für Meteorologie und Geodynamik (ZAMG), under funding from European Union Council Decisions VII, has initiated a project to study the impact of different meteorological input coming from an EPS to better estimate the source location and to quantify the level of confidence. This presentation will describe the project and present initial results.

Primary authors: BOURGOUIN, Pierre (CTBTO); Mr MAURER, Christian (ZAMG); Dr ARNOLD, Delia (ZAMG)

Presenter: Mr MAURER, Christian (ZAMG)

Session Classification: Morning session - Chair: Julia Wagemann

Track Classification: UEF2019

Contribution ID: **2** Type: **Poster presentation**

Evaluating current convection-permitting ensembles for past high-impact weather events in Italy: results from the SPITCAPE Special Project

The main goal of the ECMWF Special Project SPITCAPE 2016-2018 is to understand the information content of the current ensemble systems both at global and meso scales in re-forecasting past high-impact weather events. In particular one of the main questions addressed in the project is: what is the added value of running a high-resolution (namely convection-permitting) ensemble for high-impact weather events with respect to global ones?
Running operational Ensemble Prediction Systems (EPS) at the convection-permitting (CP) scale is currently on the agenda at a number of European weather forecasting services and research centres: UK Met Office, Météo France and DWD to mention a few. Moreover, in the framework of the activities of the forthcoming ItaliaMeteo agency, it is foreseen the development of a regional EPS at CP scale for the Italian domain.
Recently, it has been demonstrated that the baseline approach of dynamical downscaling using CP models nested in a global ensemble with a coarser horizontal resolution (e.g. 20 km) provides valuable information.
Since the introduction of the IFS model cycle 41r2 in March 2016, the horizontal resolution of the ECMWF ensemble forecasts (ENS) is about 18 km. Thus, these higher-resolution global ENS data allows us to estimate the technical feasibility and value of the simple dynamical downscaling method to initialise a limited-area and CP model (the WRF model in the present case) directly nested in the new ECMWF global ensemble.
We applied this pragmatic approach in re-forecasting three high-impact weather events occurred in Italy in recent years (the Cinque Terre flooding in October 2011 and two flash floods occurred in Genoa in November 2011 and October 2014) with both the ENS and the WRF-ENS forecasts. The skills of the forecasts in the short-range are evaluated in terms of Probability of Precipitation exceeding predefined rainfall thresholds. In the medium-range we report and discuss the forecast uncertainty (i.e. ensemble spread) of ENS at different starting dates. Besides the fact that both ENS and WRF-ENS data under-estimate rainfall maxima in the area of interest, results demonstrate that CP ensemble forecasts provide better prediction regarding the occurrence of extreme precipitations and the area most likely affected. We present also the activities planned for the years 2019-2021 in the framework of the SPITCAPE continuation.

Primary authors: Mr CAPECCHI, Valerio (LaMMA); Mr GOZZINI, Bernardo (LaMMA)

Presenter: Mr CAPECCHI, Valerio (LaMMA)

Track Classification: UEF2019

Contribution ID: **3** Type: **Poster presentation**

CTBTO experience in visualisation of ensembles and derived products

The Atmospheric Transport Modelling (ATM) operational system deployed and used at CTBTO produces source receptor sensitivity (SRS) fields, which specify the location of the air masses prior to their arrival at any radionuclide station of the International Monitoring System (IMS) network. Currently the ATM operational system is based on a Lagrangian Particle Dispersion Model, FLEXPART, driven by the global meteorological fields provided by the European Centre for Medium-Range Weather Forecasts (ECMWF) and the US National Centers for Environmental Prediction (NCEP) at a resolution of 0.5 degree. World Meteorological Organization (WMO) supports CTBTO with the ATM computations performed on request in the framework of the joint CTBTO-WMO Level 5 support system. Each detection identified by the IMS particulate network as level 5 gives rise to a request for support issued to the Regional Specialised Meteorological Centres (RSMCs) of the WMO.

Based on the SRS fields several products are calculated. They are made accessible via the Web connected Graphic Engine (Web-Grape) and its online version: Web-Grape Internet Based Service (Web-Grape-IBS). One of the functionalities is called MMFOR (i.e. the multiple model (MM) FOR selector), and it allows to calculate, overlap and inter-compare the FOR products for an ensemble of models. A related functionality, called MMPSR (i.e. multiple model (MM) possible source region (PSR) calculator) is derived from the overlapping or simple averaging of an ensemble of single model PSR results.

This presentation will give an overview of the functionalities and demonstrate the most interesting cases.

Primary authors: Dr KUSMIERCZYK-MICHULEC, Jolanta (CTBTO); Dr KALINOWSKI, Martin (CTBTO); Dr SOMMERER, Wolfgang (CTBTO)

Presenter: Dr KUSMIERCZYK-MICHULEC, Jolanta (CTBTO)

Track Classification: UEF2019

Contribution ID: **4** Type: **Poster presentation**

The operational use of ensemble forecasts at MeteoSwiss

We present the way MeteoSwiss'forecasters use ECMWF's ensemble forecast on daily base. We show, how medium and long range weather forecasts are developed, which products are used and according to which criteria a guidance or a monthly outlook is written.

Primary author: STOCKER, Claudia

Presenter: STOCKER, Claudia

Track Classification: UEF2019

Contribution ID: **5** Type: **Poster presentation**

Evaluation des prévisions d'ensemble d'ECMWF et GEFS sur le Sénégal dans la période du 27 au 31 août 2018

Cette étude est une évaluation sommaire de la prévision d'ensemble du modèle ECMWF et de GEFS pour la période humide du 27 au 31 août 2018 afin de déceler le meilleur modèle. Pour ce faire, nous avons fait appel aux météogrammes d'ensemble d'ECMWF sur onze (11) régions du Sénégal et pour le modèle GEFS de faire recours aux probabilités de dépassement des seuils de 5mm et 10mm. Ces sorties de modèle sont alors comparés aux données de pluviométrie observées sur chaque région.

Des résultats obtenus, on peut dire que le modèle ECMWF montre une bonne performance. Sur les 11 régions testées, le modèle parvient à faire d'assez bonnes prévisions dans 9 régions. Sur les 5 jours de prévisions, il réussit au moins 3 dans 9 régions (2/5jours sur 2 régions, 3/5 sur 4 régions, 4/5 sur 3 régions et 5/5 sur 2 régions). Les prévisions de pluies et PW de MISVA apportent une valeur ajoutée en précisions de zone cible.

Le modèle GEFS révèle une fiabilité moyenne avec des seuils de précipitation prévus qui ne sont souvent pas atteints. Dans les 11 régions, GEFS réalise des prévisions supérieures ou égales à la moyenne dans 9 régions. Sur les 4 jours (du 28 au 31 aout), le modèle réussit: 0/4 jours sur 2 régions, ¼ sur 1 région, 2/4 sur 8 régions, ¾ sur une région.

Au vu des résultats, ECMWF fournit de meilleures prévisions donc est plus fiable que GEFS. L'incertitude d'ECMWF est plus facile à quantifier (EPSgrams exploitable). Prévision par localité réside également un atout majeur. Toutefois, il incombe de signaler que les deux modèles n'ont pas parvenu à bien simuler les précipitations de la journée du 31 août qui n'était pas trop pluvieuse, alors que les modèles avaient prévu beaucoup de pluies à l'instar des jours précédents.

Primary author: Mr DIOUF, Abdoulaye (prévisionniste)

Presenter: Mr DIOUF, Abdoulaye (prévisionniste)

Track Classification: UEF2019

Contribution ID: **6** Type: **Poster presentation**

ECMWF Ensemble Forecast Application in Wind Energy Forecast

51 members ECMWF ensemble forecast were widely applied into more than 500 wind farm energy forecast over different kinds of terrain in China. A proper post-processing of 51 members were found to be a key for improving the wind forecast accuracy. A new classification method were developed for post-processing of ensemble forecast. The new method performance were verified using wind turbine observation.

Primary authors: Dr SONG, Guiting (Envision Digital International); Dr ZHONG, Xiaohui (Envision Digital International)

Presenter: Dr SONG, Guiting (Envision Digital International)

Track Classification: UEF2019

Contribution ID: **7** Type: **Oral presentation**

Using ensemble weather forecasts in agronomy modelling

Tuesday, 4 June 2019 11:30 (30 minutes)

Since crop diseases and pests are highly dependent on weather conditions, various decision support systems are proposed to take into account these meteorological conditions in the modeling of epidemic dynamics and assist farmers in their decision-making. Nevertheless, the atmospheric flow is a chaotic phenomenon and weather forecasts remain uncertain. In recent years, several weather prediction centers have implemented probabilistic prediction systems that provide an estimate of the uncertainty of weather forecasts. We propose to demonstrate the potential of these probabilistic predictions for decision support tools regarding the protection of crops and applications for wheat.

For this work three ensemble prediction systems (EPS) have been used, that cover different time and length scales : the regional and global EPS operated at Météo France (the AROME-EPS and ARPEGE-EPS respectively) and the ECMWF-EPS. Since the agronomy sector makes decisions in advance about crop protection, the first step of the method consists in answering the scientific research question : " How to combine the three systems in order to provide an ensemble of « consistent » forecast scenarios from very short to intra-seasonal lead times ?"

For that purpose, we chose the high-resolution AROME-EPS for the first two days of simulation and then we extend each AROME-EPS member with an ARPEGE-EPS member up to four days and with an ECMWF-EPS member for longer lead times. We will present different strategies to perform the connection between EPS members, a key point being the metric used to measure the distance between forecasts over last two common days. We will also show how these ensembles can be used in practice to determine the processing date.

Primary authors: Mr BRUN, François (ACTA); Mrs ALEKSOVSKA, Ivana (Météo-France); Mrs RAYNAUD, Laure (Météo-France); Dr FAIVRE, Robert (INRA)

Presenter: Mrs ALEKSOVSKA, Ivana (Météo-France)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **8** Type: **Poster presentation**

Operational assessment of the skill and consistency of ECMWF and COSMO numerical weather models – The case of severe weather in Greece on 16 and 17 July 2017

Nowadays there is a profound increase in the number of natural disasters attributed to extreme weather events which is significantly impeding progress towards sustainable development. In dealing with a risk of an emergency threatening life or property, a weather-forecast office would use a range of forecast tools to assess the threat and provide the necessary forecasts and warnings. In this paper, using as case study the severe weather occurred in Greece on 16 and 17 July 2017, we discuss the capability of the ECMWF/EPS and the COSMO-LEPS forecasts as also the ECMWF/HRES and COSMO.GR7 deterministic forecasts to provide forecasters with reliable prognostic guidance. To do so we used these models'consecutive runs from Friday 14-7-2017 (two days before the event) until Monday 17-7-2017 (last day of the event). The effectiveness of these forecasts (rainfall spatiotemporal distribution and intensity) was then evaluated with the accumulated precipitation at ground (H-SAF/PR-OBS-5), with MSG products (RGB Airmass, Cloud Top Height) provided by EUMETSAT, with lightning / metar data and also with weather radar products.

Primary authors: Mrs PAPAKRIVOU, Anastasia (Hellenic National Meteorological Service); Mr LAMARIS, Christos (HNMS/Regional Meteorological Center of Hellenic Tactical Air Force HeadQuarters); Mr SKRIMIZEAS, Panagiotis (Hellenic National Meteorological Service); Mr TSIOUGKOS, Sotirios (HNMS/Regional Meteorological Center of Hellenic Tactical Air Force HeadQuarters); Mr GEROGIANNIS, Vasileios (HNMS/Regional Meteorological Center of Hellenic Tactical Air Force HeadQuarters)

Presenters: Mr LAMARIS, Christos (HNMS/Regional Meteorological Center of Hellenic Tactical Air Force HeadQuarters); Mr SKRIMIZEAS, Panagiotis (Hellenic National Meteorological Service)

Track Classification: UEF2019

Contribution ID: **9** Type: **Oral presentation**

Agricultural applications of ECMWF ensemble forecasts in Africa

Tuesday, 4 June 2019 11:00 (30 minutes)

Weather Impact is specialised in translating meteorological and climate data into user-friendly services. In several countries in Africa and Asia we have developed agricultural applications that use the ensemble forecasts of ECMWF as one of the inputs. One of our main challenges is to translate ensemble forecast data to actable information. Services include:
• Weather forecasts and extreme weather alerts
• Agricultural activity planning
• Pest and disease warnings

In Africa most small-scale agriculture is rain-fed. Reliable rainfall information can help farmers to better plan their agricultural activities and as a result they are supported in increasing their crop yield. As most of our forecasts are sent through SMS, the wealth of information from the ensemble forecast must be reduced to 160 characters. A number of case studies show the decisions we make for generating rainfall forecasts and extreme rainfall alerts.

To advise farmers on planning their agricultural activities, we combine agronomical and meteorological knowledge and warn them when the risk for plant pests and diseases is high. These advisories are based on the likelihood of different weather conditions that are important for farming activities or influence the risk for pest and diseases. Two case studies, one in Burundi and one in Ghana, show how ensemble forecast can be used for agricultural planning and migratory pest warnings.

Primary author: Ms STELLINGWERF, Sippora (Weather Impact)

Presenter: Ms STELLINGWERF, Sippora (Weather Impact)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **10** Type: **Poster presentation**

The new Extreme Weather Index as a possible tool to predict high impact weather

An accurate prediction of severe and high-impact weather events is the core task of the DWD. Public authorities (Home ministry, Flood response agencies, Civil defence) as well as internal DWD units are vital interested to get tailored related alerts already for the medium range time scale. For relief organisations (Emergency management, the Red Cross etc.) forecasts on a global scale are desired.
A key role for these predictions plays the ENS of the ECMWF. To condense the outcome of the ENS the Extreme Forecast Index (EFI) has been established. Because of the systematic weakness of the EFI that supresses the part of the ENS distribution beyond the model climate maximum the "Shift of Tails"(SOT) has been introduced. EFI and SOT are designed to alert forecasters and other well-skilled users. But a large value of the EFI does not necessarily mean that an extreme event will happen. On the other hand, the SOT analyses leads to very uncertain predictions. Therefore, users outside of the meteorological community may have difficulties to interpret these products.
To create a single quantity which gives an indication of severe weather, the development of the Extreme Weather Index (EWI) has been started at DWD. The idea is to blend EFI and SOT with the 90th Percentiles of the ECMWF- as well as the ICON-EPS by applying well-proven severe weather thresholds. Comparing the EWI to observed historical extreme weather events allows its calibration. The result is a product in a traffic-light style which provides absolute values for the severity of the expected events.

Primary author: Mr SCHUMANN, Thomas (Deutscher Wetterdienst)

Co-authors: Dr DENHARD, Michael (Deutscher Wetterdienst); Mr KIRCHHUEBEL, Lars (Deutscher Wetterdienst)

Presenter: Mr SCHUMANN, Thomas (Deutscher Wetterdienst)

Track Classification: UEF2019

Contribution ID: **11** Type: **Poster presentation**

Recent developments in the use and visualisation of ECMWF EPS products at OMSZ

The use of EPS products has a long history at the Hungarian Meteorological Service (OMSZ).
New products have been developed for forecasters even in recent months. Yet, the probability approach has not been introduced in the online and offline media forecasts in Hungary, hence these outputs only rarely reach the public in a direct way. Although there would be a demand for ensemble forecasts by many of our customers.
To change this approach, weather videos are produced daily on our website and on our facebook page since the autumn of 2018. Here we present EPS products as well, even if only on a basic level. Firstly, only animations of products were shown, since March 2019 these videos include the presentation of a meteorologist, resembling the usual TV weather broadcasts. With this opportunity, we can introduce new, innovative products and visualisation modes.

Primary author: MESTERHAZY, Andras

Presenter: MESTERHAZY, Andras

Track Classification: UEF2019

Contribution ID: **12** Type: **Oral presentation**

Strategies for optimising operational decisions using ensemble marine forecasts

Tuesday, 4 June 2019 12:00 (30 minutes)

Marine forecasts are essential to operational planning, with decisions able to be guided by a host of different weather products spanning a period of days, weeks and even months ahead. The correct selection and subsequent application of these different types of weather products has the potential to save many thousands of dollars per day in operational downtime, however this is only possible when the uncertainty information contained within the ensemble predictions are properly translated into actionable insight. In the current economic context, this is especially relevant to the offshore industry –whose use of forecasting technology is traditionally very conservative, and therefore whose planning is often more reactive –allowing large savings (e.g. mobilisation/demobilisation or vessel sequencing costs) if robust decisions are made as early as possible. Here, two methods for the interpretation of ensemble data, based on cost-loss and weather pattern analysis, respectively, are described and applied to ocean wave forecasting. The selection of methods is dependent on the lead time of interest, with cost-loss analysis optimised for supporting decisions days to weeks ahead, and weather pattern analysis optimised for supporting decisions weeks to months ahead. Based on the results of a research collaboration with Shell U.K. Ltd, the application of these techniques are illustrated from the point of view of a North Sea asset manager planning the deployment of equipment/personnel under conditions of calm weather, and the protection of equipment/personnel under conditions of severe weather. For such a user, it is shown that more efficient operational planning may be facilitated by properly-processed ensemble marine forecasts across all timescales, with their use enabling more informed decision-making, and helping reduce operational costs, by promoting increased confidence in longer-range forecasts than are typically used by the offshore oil & gas and marine renewable energy sector at present.

Primary author: Dr STEELE, Edward (Met Office)

Co-authors: NEAL, Robert (Met Office); Mr BUNNEY, Chris (Met Office); Dr GILL, Philip (Met Office); MYLNE, Ken (Met Office); Mr NEWELL, Paul (Met Office); Dr SAULTER, Andy (Met Office); Mr UPTON, Jon (Shell U.K. Ltd)

Presenter: MYLNE, Ken (Met Office)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **13** Type: **Poster presentation**

Elaboration of the Recorded Highest Daily Total Precipitation in Ovacık with ECMWF Products (Antalya, Turkey, 17th of December 2018)

On the 17th of December 2018, excessive rainfall was severe in Ovacık (Kemer) district of Antalya, which caused material damage only. The system was effective especially in western parts of Antalya, while the rainfall amount of 490.8 kg/m2 was measured in Ovacık AWOS at 1131 m altitude in between 24 hours. This value has been recorded as the highest daily total value measured in Turkey so far. The previous record was belonging to Marmaris (Muğla) in 1992 with the amount of 466 kg/m2. In our study; this extreme event is considered to be elaborated by using ECMWF ensemble products.

Primary authors: Mr TEKIN, Fevzi Burak (Turkish State Meteorological Service); Mrs ÖZMUTLU, Elif Müdrike (Turkish State Meteorological Service); Mr ACAR, Murat (Turkish State Meteorological Service); Mr YAVUZ, Yusuf Ziya (Turkish State Meteorological Service)

Presenters: Mrs ÖZMUTLU, Elif Müdrike (Turkish State Meteorological Service); Mr ACAR, Murat (Turkish State Meteorological Service)

Track Classification: UEF2019

Contribution ID: **14** Type: **Poster presentation**

Prediction of Overrunning Snowfall in Ankara on the 14th of December 2018 with ECMWF Ensemble Products

Central Mediterranean cyclones which are originated in North Atlantic and reach to the Mediterranean Sea or form in the Gulf of Genoa affect western and southwestern parts of Turkey. These cyclones cause strong winds, heavy showers and strong thunderstorms with torrential rain storms in southwest coasts. In winter, Central Mediterranean cyclones cause heavy snow showers in the central parts of Turkey as the warm front rises above the cold air parcel. In this study, the overrunning snowfall in Ankara on the 14th of December 2018 will be discussed with the ECMWF ensemble products.

Primary authors: Mr TEKIN, Fevzi Burak (Turkish State Meteorological Service); Mr YAVUZ, Yusuf Ziya (Turkish State Meteorological Service); OZMUTLU, Elif Mudrike (Turkish State Meteorological Service); Mr ACAR, Murat (Turkish State Meteorological Service)

Presenters: Mr TEKIN, Fevzi Burak (Turkish State Meteorological Service); Mr YAVUZ, Yusuf Ziya (Turkish State Meteorological Service)

Track Classification: UEF2019

Contribution ID: **16** Type: **Oral presentation**

Probabilistic fire spread prediction: The case of the deadly wildfire in Mati, Greece

Thursday, 6 June 2019 09:30 (30 minutes)

On July 23 2018, Greece experienced the second deadliest natural disaster of its modern history. Early in the afternoon, a wildfire broke up in the region of Ntaou on Penteli Mountain, approximately 20 km northeast of the city of Athens and 5 km off the Eastern Attica coast. Assisted by the prevailing meteorological conditions, characterized by high temperature, very low humidity and locally gale force surface winds, the wildfire spread erratically and within a couple of hours it almost literally wiped out the coastal settlement of Mati. The aftermath of the event included a record-high 101 civilian fatalities and innumerable destroyed properties. Such tragedies urgently call for raising awareness and preparedness for the occurrence of extreme fire weather and behaviour, as was the case of the Mati wildfire. Focusing on the side of preparedness, this work presents the assessment of the potential usefulness of probabilistic fire spread predictions. For that purpose, we use the operational ensemble forecasts of ECMWF's EPS to drive the advanced coupled fire-atmosphere WRF-SFIRE modelling system for retrospectively forecasting fire spread during the Mati wildfire. Two forecast horizons, covering the period of the wildfire, are considered, namely t0+36h (initialized July 22 at 12UTC), t0+24h (initialized July 23 at 00UTC). The set of forecasts used includes the control forecast of the EPS and the 50-member ensemble, all at 16 km spatial resolution. Actual fire perimeter data, provided by Copernicus Emergency Mapping Service, are used for assessing the added-value of the probabilistic fire spread predictions, focusing particularly on the provision of timely and accurate forecast guidance.

Primary authors: Dr GIANNAROS, Theodore (National Observatory of Athens); Dr KOTRONI, Vassiliki (NOA (National Observatory of Athens), Institute for Environmental Research and Sustainable Development); Dr LAGOUVARDOS, Konstantinos (NOA (National Observatory of Athens), Institute for Environmental Research and Sustainable Development); PETROLIAGKIS, Thomas (Joint Research Center, Ispra, Italy)

Presenter: Dr GIANNAROS, Theodore (National Observatory of Athens)

Session Classification: Morning session - Chair: Julia Wagemann

Track Classification: UEF2019

Contribution ID: **17** Type: **Poster presentation**

Using the ECMWF Probability of precipitation type product during severe winter situations in February 2019

The road meteorology is a regular and one of the crucial parts of winter weather forecasting at the Czech Hydrometeorological Institute. In order to properly predict road weather conditions, an accurate precipitation type forecast is essential. During February 2019, we focused on the ECMWF Probability of precipitation type product (ecCharts) aiming to determine its reliability during two selected severe winter situations - heavy snowfall on 3rd February and glaze on 7th February. We monitored how the forecast changed with the shortening lead time and how it reflected the real situation according to surface synoptic observations. The probability forecast was compared with standard deterministic model outputs as well. It seems that the ECMWF Probability of precipitation type product could successfully predict heavy snowfall already 4 days in advance, even before detailed regional model outputs are available. On the other hand, the forecast was not satisfactory in general for the whole region. Although the probability forecast managed to depict the high risk of freezing rain in the northwest Bohemia, the forecast was not accurate in other parts of Bohemia, which could be associated with the lower spatial resolution of the global model. Nevertheless, the probability forecast of the precipitation type has great potential, mainly for early weather warnings for glaze and significant falls of snow, as well as for improving general weather forecasts.

Primary authors: Ms GVOŽDÍKOVÁ, Blanka (Czech Hydrometeorological Institute); Ms SYKOROVA, Petra (Czech Hydrometeorological Institute)

Presenters: Ms GVOŽDÍKOVÁ, Blanka (Czech Hydrometeorological Institute); Ms SYKOROVA, Petra (Czech Hydrometeorological Institute)

Track Classification: UEF2019

Contribution ID: **18** Type: **Poster presentation**

EFI based forecasting of extreme bora event - operational view

Bora is a gusty downslope northeast wind that blows at the eastern Adriatic coast and similar winds exist at many other places on all continents. At coastal mountain lee areas, hurricane speeds of Bora are not unusual, but the event that occurred on February 23rd 2019. breaks several records, with maximum gust of 103 knots observed in Makarska.
There has been substantial progress in Bora observations and measurements, understanding and modeling over the past 25 years but complete understanding is still not completed and therefore every case of forecasting Bora is a challenge. Since autumn 2017 EcCharts are commonly used in Croatia control as a forecasting tool and this poster gives a brief overview how the uses of ECMWF ensemble products were valuable additional ingredients in successful forecast of this extreme event. Encouraged with EFI values, additional warnings, beside standard aviation ones, were performed and according to users reaction the question was raised, is there an extreme weather procedures needed.

Primary author: Mrs FRANKOVIC, Biserka (forecaster)

Co-authors: Mr JURKOVIC, Jadran (MET specialist); Mr KOS, Igor (MET specialist)

Presenter: Mrs FRANKOVIC, Biserka (forecaster)

Track Classification: UEF2019

Contribution ID: **19** Type: **Poster presentation**

Irish Regional Ensemble Prediction System (IREPS)

A poster demonstrating the use of the Harmonie-Arome short-range ensemble forecasting system at Met Éireann to improve short range prediction of high-impact weather events in Ireland using case studies.IREPS was initially inspired by experimentation with high resolution ensemble prediction at ECMWF.

Primary author: Ms WALSH, Liz (Met Éireann)

Co-author: Mr HALLY, Alan (Met Éireann, REA)

Presenter: Ms WALSH, Liz (Met Éireann)

Track Classification: UEF2019

Contribution ID: **20** Type: **Oral presentation**

Progressive warnings with conservative forecasting

Wednesday, 5 June 2019 11:00 (30 minutes)

Progressive warnings with conservative forecasting
Elín Björk Jónasdóttir, Group leader of Weather Services
Icelandic Meteorological Office

At the Icelandic Meteorological Office the use of Ensemble forecasts had a relatively slow start. The original resolution of the ENS system, along with limited resources was at first the main reason for IMO forecasters not to dive into the world of ensamble prediction. Within the past few years there has been a change in the way forecasters at IMO produce forecasts. We are still quite conservative in our day to day medium range forecasts, but when it comes to high impact weather forecasts and warnings, products such as SOT and EFI for precipitation or wind, the strike probability of cyclones and frontal systems have become a staple in our forecasting routine.
A new warning system, based on likelihood and societal impact was launched in 2017, and in the past year these products have become even more important as we learn to estimate predictability and communicate it to the public and stakeholders.
In this lecture I will briefly discuss the use of ENS products from the ECMWF in correlation with warnings issued by the Icelandic Meteorological Office and how the warnings have changed as forecasters learn to use new tools and visualization from the ECMWF.

Primary author: Mrs BJÖRK JÓNASDÓTTIR, Elín (Icelandic Met Office)

Presenter: Mrs BJÖRK JÓNASDÓTTIR, Elín (Icelandic Met Office)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **21** Type: **Poster presentation**

Predictability of heavy rainfall events in Japan in early July 2018 on medium-rage timescales

Extremely heavy rainfall events occurred over western Japan in early July 2018. This study assesses the predictability of these events for the period 5th–7th July using three operational medium-range ensemble forecasts available from the European Centre for Medium-range Weather Forecasts (ECMWF), the Japan Meteorological Agency (JMA), and the National Centers for Environmental Prediction (NCEP), and ensemble simulations conducted with an ECMWF model and NCEP operational ensemble initial conditions. All three operational ensembles predicted extreme rainfall on 5th–6th July at lead times of ≤ 6 days, indicating the high predictability of this event. However, the extreme rainfall event of 6th–7th July was less predictable. The NCEP forecasts, initialised on 30th June, performed better at predicting this event than the other operational forecasts. The JMA forecasts initialised on 1st July showed improved predictability; however, the ECMWF forecasts initialised after 30th June showed only gradual improvements as the initialisation time progressed. The ensemble simulations revealed that the lower predictability of the rainfall in the ECMWF forecasts on 6th–7th July can be attributed to the model rather than to the initial conditions. Accurate prediction of the North Pacific Subtropical High is a prerequisite for accurate prediction of such extreme rainfall events.

Primary author: MATSUNOBU, Takumi (Graduate School of Life and Environmental Sciences,University of Tsukuba)

Co-author: MATSUEDA, Mio (Center for Computational Sciences, University of Tsukuba)

Presenter: MATSUNOBU, Takumi (Graduate School of Life and Environmental Sciences,University of Tsukuba)

Track Classification: UEF2019

Contribution ID: **24** Type: **Poster presentation**

Strength of ensembles in application forecasting: from hourly through to sub-seasonal forecasts

Ensembles can provide additional information on a variety of time frames when forecasting for applications. Hourly ECMWF ensemble data became available in October 2018: we take a look at how its affected short-term wind power generation forecasting. Seasonal forecasts for Europe seem often increase in skill between a lead time of front month and month ahead: at what lead time does that skill first appear, and how reliable is it for gas demand forecasting?

Primary author: FINNEY, Isla (Lake Street Consulting Ltd)

Presenter: FINNEY, Isla (Lake Street Consulting Ltd)

Track Classification: UEF2019

Contribution ID: **25** Type: **Poster presentation**

IMPROVER - the new probabilistic post processing system at the Met Office

The effective construction and use of ensembles along with the need to provide seamless continuity across spatial scales and temporal evolution have become major challenges for weather forecasting through to climate prediction in recent years. Real tangible benefits are expected if we get this right. In terms of ensemble forecasting, the Met Office has invested hugely in the development of the convection-permitting ensemble for the UK (MOGREPS-UK) and the global ensemble MOGREPS-G, as well as in exploiting the ECMWF ENS. The challenge now is how to use all this information, along with forecasts from elsewhere, in a way that doesn't overwhelm Operational Meteorologists, provides useful automated outputs that contain meaningful uncertainty and produces seamless continuity between different models or forecast systems. To this end a new post processing system called IMPROVER is being developed which will run in an operational framework from 2020. It ingests both deterministic and ensemble forecasts at a variety of resolutions and converts to probabilities using "neighbourhood"methods. This then allows the construction of a seamless probabilistic blend and the capability to generate a wide variety of probability-based outputs and condensed information about serious weather conditions. At present IMPROVER only incorporates Met Office forecasts, but is about to include ECMWF-EPS in the blend to extend out to 14 days. This presentation will describe the rationale behind IMPROVER, what it does currently and where it is going in the context of ensemble forecasts.

Primary authors: Mr ROBERTS, Nigel (Met Office); Mr MYLNE, Ken (Met Office)

Presenter: Mr ROBERTS, Nigel (Met Office)

Track Classification: UEF2019

Contribution ID: **26** Type: **Poster presentation**

Ensemble Postprocessing at MeteoSwiss

MeteoSwiss as a national met service commits itself to provide weather forecasts for arbitrary locations in Switzerland and also to adequately communicate forecast uncertainty. While in the past such information has been communicated mostly in text form, MeteoSwiss tries to increasingly use such uncertainty information in all products. We rely on ensemble predictions as a data source, both on the IFS-ENS from ECMWF and on our local area ensemble model COSMO-E. While both of these numerical weather prediction (NWP) models are run at increasingly high resolutions, raw ensemble forecasts still tend to be biased and underdispersed. Hence, statistical postprocessing is expected to improve forecast skill and may help to condense the forecast information. At MeteoSwiss, a project on postprocessing of relevant variables for public weather forecasts, i.e. near surface temperature, precipitation, 10 meters wind speed, and cloud cover, has recently been launched. The project's goal is the introduction of an operational suite providing spatial fields of calibrated probabilistic multi-model consensus predictions integrating the available NWPs. The focus on introduction into operations implies that performance in terms of skill improvement is not the only requirement for the postprocessing suite, but also its data demand and ability to cope with model updates or the flexibility to incorporate additional NWP models are equally relevant. This poster will present an overview of the project, summarize the challenges and show our approach and first results towards seamless probabilistic forecasts from hours to weeks ahead.

Primary author: Dr SPIRIG, Christoph (MeteoSwiss)

Co-author: POSTPROCVERI TEAM

Presenter: Dr SPIRIG, Christoph (MeteoSwiss)

Track Classification: UEF2019

Contribution ID: **27** Type: **Oral presentation**

Ensemble based seven day high impact weather outlook

Wednesday, 5 June 2019 10:00 (30 minutes)

DWD is planning to launch a new product which provides warning information summarized in a graphical seven day outlook for high impact weather in Germany. The outlook comprises daily charts for the various hazard types –e.g. severe rainfall, wind gusts or snow fall. In the initial phase, forecasters will generate these maps by hand with the meteorological workstation system NinJo. In parallel an automatic product –the Daily Model Guidance (DMG) - is being developed that is supposed to support forecasters generating the charts or even to automate parts of the process. In the initial phase this is based on the ICON-EU ensemble as well as the IFS ensemble. This work shows how the DMG charts are generated automatically and how the uncertainty information of the ensemble is used.

The main features of DMG are smoothing algorithms that preserve the significant meteorological signal and take into account uncertainty increasing with lead time. A rough estimate of the timing is provided as well.

Preliminary verification results for wind gusts for December 2018/January 2019 show that the ICON ensemble performs similarly well as the IFS-Ensemble for the first few days, while for larger leadtimes the IFS ensemble is superior.

Primary author: Dr SCHROEDER, Guido (DWD)

Co-author: Mr HEIZENREDER, Dirk (DWD)

Presenter: Dr SCHROEDER, Guido (DWD)

Session Classification: Morning session - Chair: Fatima Pillosu

Track Classification: UEF2019

Contribution ID: **28** Type: **Poster presentation**

Feature-based diagnostics for understanding surface extremes

The weather in the midlatitudes and its extremes are governed by the passage of extratropical cyclones. The conceptual model developed through inspecting specific case studies related three main features to cyclones: 1. Fronts, 2. Dry-air intrusions (DIs), and (3) the Warm conveyor belts (WCBs).

A climatological study quantifying the co-occurrence of fronts and DIs (Raveh-Rubin and Catto, 2018?) found it to cause more extreme surface weather. Our goal is to extend the climatological study of the relationship between cyclones, fronts and DIs to a time evolution perspective of weather systems. We focus on the climatological relationship between extratropical cyclone characteristics, DIs and cold fronts, their co-evolution throughout the lifetime of a cyclone, and consequently their impact on the surface weather. The main challenge in doing so is to accurately identify and track the cyclones, and to properly associate the fronts and DIs related to the tracked weather system.

Tracking and identification is strongly dependent upon the spatial and temporal resolution of the data. Using the new ERA-5 reanalysis we assess the sensitivity of the identification and tracking tools of fronts, cyclones, and DIs, to the spatial and temporal data resolution. Furthermore, we analyze the surface impact of these key meteorological features using surface parameters from the improved reanalysis model.

In our study we will present specific case studies to demonstrate how the ERA5 reanalysis can improve the automatic identification and tracking of cyclones (Wernli and Schwierz, 2006), fronts (using a thermal front parameter, Hewson 1998), and DIs (LAGRANTO v2.0, Sprenger and Wernli, 2015), in comparison to ERA-Interim. Then, we will use the ensemble forecast data to better understand the physical processes which influence the development of the weather system by focusing on "forecast bust"events and analyze the differences in the model forecasts among ensemble members.

Primary author: Mrs SILVERMAN, Vered (Department of Earth and Planetary Sciences, Weizmann Institute)

Co-author: Dr RAVEH-RUBIN, Shira (Department of Earth and Planetary Sciences, Weizmann Institute)

Presenter: Mrs SILVERMAN, Vered (Department of Earth and Planetary Sciences, Weizmann Institute)

Track Classification: UEF2019

Contribution ID: **29** Type: **Poster presentation**

Performance of ECMWF ENS and COSMO-based ensemble systems for cases of high-impact weather over Italy

The deterministic approach to weather prediction does not allow to establish a-priori the degree of skill of an individual forecast; instead, probabilistic forecasts provide a more complete, reliable and accurate view of what could happen in the future, ideally providing information on the relative frequency of an event occurring. Therefore, they bring definite benefits for decision-makers. Forecast users can exploit such information, for example, when they want to weight the losses associated with adverse weather events against the costs of taking precautionary actions.
The aim of this work is to assess the added value of enhanced horizontal resolution in the probabilistic prediction of upper-level and surface fields.
In particular, the performances of three different ensemble systems were compared: ECMWF-ENS (51 members, 18 km horizontal resolution), COSMO-LEPS (20 members, 7 km horizontal resolution) and COSMO-2I-EPS (20 members, 2.2 km horizontal resolution).
While the first 2 ensemble systems are operational, COSMO-2I-EPS is still in a development phase.
The intercomparison window covers two separate periods, characterised by different weather types:
- the former one (20-27 June 2016) presents convective precipitation events with weak synoptic forcing,
- the latter one (15 October-15 November 2018) is mainly dominated by large-scale forcing, with stratiform precipitation.

In both cases, high-impact weather events affected different areas of Italy.

In this work, both upper-level and surface variables are analysed.
As for the surface, 2-metre temperature and precipitation cumulated over six hours were verified against the non-conventional station network provided by the National Civil Protection Department.
The ensemble spread and the root mean square error of 2-metre temperature were computed, while a number of probabilistic scores (Brier Skill Score, Ranked Probability Score, ROC-Area, Outliers Percentage and others) were considered for precipitation.
The best scores were mainly obtained by the COSMO-based ensemble systems which have higher horizontal resolution and lower ensemble size; in particular, the newly implemented COSMO-2I-EPS often achieved the best performances.

Although these results are based over two relatively short periods, they show the added value of high resolution in mesoscale ensembles, which turn out to be more skillful in the probabilistic prediction of atmospheric fields at all levels.

Primary author: PINCINI, Giacomo (Arpae - SIMC)

Co-authors: MONTANI, Andrea (ECMWF); Dr PACCAGNELLA , Tiziana (Arpae - SIMC); Dr TESINI, Maria Stefania (Arpae - SIMC); Dr MARSIGLI, Chiara (DWD)

Presenters: PINCINI, Giacomo (Arpae - SIMC); MONTANI, Andrea (ECMWF)

Track Classification: UEF2019

Contribution ID: **30** Type: **Poster presentation**

Seamless Probabilistic Forecasts from IMPROVER

IMPROVER is a new post-processing system under development by the Met Office to provide seamless probabilistic forecasts from 1h to 2 weeks ahead blending different NWP inputs including convective-scale UK models and ensembles and the ECMWF ENS (Roberts and Mylne, 2019 –UEF presentation). These forecasts are updated hourly to incorporate frequent model update cycles into the blend and present forecasters and users with a single blended forecast picture at all times incorporating the latest data. IMPROVER software is open source and available for other centres to use and contribute to, and data are managed on standard grid formats (Global and UK) stored in NetCDF format to facilitate model blending and to decouple end users from multiple model grids. IMPROVER forecast outputs are presented as probability distributions, as probabilities or percentiles depending on the variable, on standard grids or as site extractions. This poster will describe aspects of these standard presentations and the delivery of the data through the Met Office's cloud-based Service Hub with a view to stimulating discussion on wider data sharing and blending approaches.

Primary authors: MYLNE, Ken (Met Office); ROBERTS, Nigel (Met Office UK)

Presenter: MYLNE, Ken (Met Office)

Track Classification: UEF2019

Contribution ID: **31** Type: **Oral presentation**

GloFAS extended range flood forecast skill for the major river basins in Bangladesh

Tuesday, 4 June 2019 10:00 (30 minutes)

Flooding is the most common natural hazard in Bangladesh, occurring annually and causing huge economic losses. There are several reasons that cause flooding-geographical location, topography, monsoon climate etc. The country is located at the downstream of the three big river basins-the Ganges, the Brahmaputra and the Meghna; and during the monsoon period (June to September) transboundary flow from these basins comprises the main source of flood water. Flood Forecasting is an important flood management tool that can reduce flood damage. The short-term forecast is quite useful for the emergency management. However, extended range forecast plays more important role for agricultural planning. Therefore, for better flood preparedness extended range forecast is very useful for a flood vulnerable country like Bangladesh. The GloFAS forecast is run by ECMWF as part of the Copernicus Emergency Management Service and provides 30 days flood forecast for the major river basins in the world. The GloFAS extended range forecast is also available for the Ganges, the Brahmaputra and the Meghna river basins in Bangladesh. It is important to understand the forecast bias and uncertainty associated in the extended range forecast. Therefore, the aim of the research to evaluate the forecast skill of this extended range forecast. The study applies different statistical methods such as false alarm ratio, probability of detection and reliability diagram to evaluate forecast performance. The GloFAS forecast rerun data for the period 1997 to 2017 has been used in this study. The flood forecast information such as magnitude, time to peak and duration is key for the flood preparedness action. The present study shows that extended range forecast provided by GloFAS is very consistent capturing the peak flow of the major river basins in Bangladesh. The study will help to develop an effective extended range flood early warning system based on the available GloFAS forecast for Bangladesh.

Primary author: HOSSAIN, Sazzad (University of Reading)

Co-authors: Dr STEPHENS, Elisabeth (University of Reading); Prof. CLOKE, Hannah (University of Reading); Dr FICCHI, Andrea (University of Reading); ZSOTER, Ervin (European Centre for Medium-Range Weather Forecasts)

Presenter: HOSSAIN, Sazzad (University of Reading)

Session Classification: Morning session - Chair: Andrea Montani

Track Classification: UEF2019

Contribution ID: **32** Type: **Poster presentation**

The Foreca ensemble map

Typical map based ensemble visualisations have various shortcomings. Plotting the ensemble members in separate small postage stamp maps reveals all the information about the parameters shown, but it is difficult to compare the locations of weather phenomena between the maps. Probability plots make it easy to see how many ensemble members predict a phenomenon at any map location, but require choosing a single threshold, such as temperature below zero. Choosing a threshold discards information about all the other possible values a parameter may have. It also requires mental effort to think about weather in terms of probabilities, rather than in the familiar terms of weather parameters such as temperature or precipitation. We present a map visualisation, which can show multiple values of a parameter from all the ensemble members at the same time, and in addition manages to be highly intuitive. The visualisation is especially powerful when animated as a function of time and beautifully reveals the evolving uncertainties in the prediction.

Primary authors: KARANKO, Samu (Foreca Ltd); HYVÄTTI, Jaakko (Foreca Ltd)

Presenter: KARANKO, Samu (Foreca Ltd)

Track Classification: UEF2019

Contribution ID: **33** Type: **Poster presentation**

How predictable were Arctic cyclones in summer on medium-range timescales?

Arctic cyclones (ACs) are a severe atmospheric phenomenon that affects the Arctic environment. This study assesses the forecast skills of 5 leading operational medium-range ensemble forecasts (CMC, ECMWF, JMA, NCEP and UKMO) and an ensemble reforecast at NOAA for extraordinary ACs that occurred in summer during 1986–2016. Twenty-six (ten) extraordinary ACs in summer during 1986–2016 (2008–2016, for which the operational forecasts are available) showed no trend in their central pressure, size, and frequency. For both the operational forecasts and the reforecast, average existence probability of the predicted ACs was >0.9 at lead times of ≤3.0–3.5 days. Average central position error was less than half of the mean radius of the ACs (433.1 km (469.1 km) for 26 (10) ACs) at lead times of 2.5–4.5 days. Average central pressure error of the predicted ACs was 5.5–10.7 hPa at such lead times. Therefore, these ensemble prediction systems generally predict the position of ACs within 433.1 km (469.1 km) 2.5–4.5 days before they mature. Besides, there is no trend of improvements in forecast skills of existence, central pressure and position of the extraordinary ACs at all lead times.

Primary authors: Dr YAMAGAMI, Akio (Center for Computational Sciences, University of Tsukuba); MATSUEDA, Mio (Center for Computational Sciences, University of Tsukuba); Prof. TANAKA, Hiroshi (Center for Computational Sciences, University of Tsukuba)

Presenter: MATSUEDA, Mio (Center for Computational Sciences, University of Tsukuba)

Track Classification: UEF2019

Contribution ID: **34** Type: **Oral presentation**

Applications of ensemble prediction systems at Météo-France

Wednesday, 5 June 2019 09:30 (30 minutes)

In this presentation, different Météo-France applications based on the main operationnal ensemble prediction systems will be presented.

On the one hand it must be stressed that french forecaster use these operational ensembles every day, from very short- to medium-range.
On the other hand several ongoing studies investigate the feasibility of using ensemble weather forecasting for applications like agriculture management, hydrology, detection of extreme weather events, etc.

For instance, for the detection of intense precipitation or wind gust, the calculation of EFI/SOT indexes based on the french global ensemble prediction system known as "Prévision d'Ensemble ARPEGE" (PEARP) or on the high-resolution limited area ensemble forecast system known as "Prévision d'Ensemble AROME" (PEAROME) is examined. The use of an object-oriented approach to extract and track precipitation features, or to provide weather scenarios is also explored. Finally, a recent paper has also shown the benefits to using PEARP for the control of satellite-based communication systems.

Primary authors: Mrs BOISSERIE, Marie (Météo-France); Mrs GIRARDOT, Nicole (Météo-France)

Presenters: Mrs BOISSERIE, Marie (Météo-France); Mrs GIRARDOT, Nicole (Météo-France)

Session Classification: Morning session - Chair: Fatima Pillosu

Track Classification: UEF2019

Contribution ID: **35** Type: **Poster presentation**

Assessing the impact of horizontal and vertical resolutions on prediction of Arctic cyclone using the OpenIFS ensemble predictions

Arctic cyclones (ACs) are low pressure systems that develop in the Arctic region. ACs developed in summer have a long lifetime and wander around the North Pole. In this study, we investigated the impact of horizontal and vertical resolutions on prediction of 13 ACs occurred in summer (June–August) from 2008 to 2018, using an ECMWF OpenIFS model. We conducted 11-member ensemble predictions for three different horizontal resolutions (T255, T511, and T1023) with a fixed vertical resolution (L137). For the low-resolution (T255) model, 10-member ensemble predictions for three different vertical resolutions (L60, L91, and L137) were also conducted. The results show that forecast skill of spatial patterns of mean sea level pressure (SLP) are highly sensitive to the horizontal resolution of the model. The high-resolution (T1023) model showed the highest spatial correlation coefficients (SCC) of SLP in the Arctic region (70°–90°N) for most of the AC events. Averaged SCC for the high-resolution model was kept over 0.6 up to lead times of +7.5 days, whereas those for the lower-resolution models dropped below 0.6 at lead times of +7 days. It is also found that the vertical resolution of the model has (little or large, under verification) impact on the forecast skill of ACs. The forecast skill of the ACs can be improved with the increase in the horizontal resolution of the model, in spite that atmospheric energy is spectrally truncated at lower resolution in initial states.

Primary author: MATSUNOBU, Takumi (University of Tsukuba)

Co-authors: MATSUEDA, Mio (Center for Computational Sciences, University of Tsukuba); YAMAGAMI, Akio (Center for Computational Sciences, University of Tsukuba); Prof. TANAKA, Hiroshi (Center for Computational Sciences, University of Tsukuba)

Presenter: MATSUNOBU, Takumi (University of Tsukuba)

Track Classification: UEF2019

Contribution ID: **36** Type: **Poster presentation**

The challenge of visualizing ensemble forecast products for non-expert users

Météo-France has launched a significant project to modernize its base-line production using ensemble forecast as input data.
This project called 3P includes three parts that adress
the constitution of the reference database (that will be used in all the production line),
the use of ensemble forecast by the forecasters in operation
the constitution of new products with a good overview of uncertainties

The presentation will focus on new products and more exactly on the issue of visualisation and comprehension of non-expert end users.

Based on user meetings and a very detailed user survey, Météo-France has a better knowledge of their comprehension of probabilistic products.
It appears that there is a huge gap between non-expert's understanding of these products and the wealth of information contained in a probabilistic product.
Visualisation of uncertainties is the main issue and a major concern that weather providers need to resolve.

Results of the survey and propositions of new ways of presenting uncertainties from ensemble forecast will be shown and discussed.

Primary author: Mrs GUIDOTTI, Sylvie (Meteo France)

Presenter: Mrs GUIDOTTI, Sylvie (Meteo France)

Track Classification: UEF2019

Contribution ID: **37** Type: **Poster presentation**

Ensemble forecast products for professionals

Météo-France provides forecast products tailored to end-users from energy, agriculture, transports, insurance and other sectors.

A number of end-users are still quite reluctant in the use of ensemble forecast and prefer to rely on a deterministic answer to manage their activities.
Though, the rise of medium and short range ensemble forecasts allow weather providers to create new diagnostics and some of the economic sectors are beginning to understand the interest of the whole information carried in the ensemble forecast.
The aim of this poster is to show through examples of impact forecast products how these products are tailored to end-users stakes.

Several examples will be presented: ensemble forecasts applied to photovoltaic production, agro-meteorological forecasts over tropical regions, road surface temperature forecasts and winter risk forecasts for the energy sector.

Primary authors: Mrs MARTINONI-LAPIERRE, Sophie (Météo-France); Mrs CASSAS, Marie (Météo-France); Dr LEGRAND, Raphaël (Météo-France); Dr BOUILLOUD, Ludovic (Météo-France); Mr REGIMBEAU, Mathieu (Météo-France)

Presenter: Mrs CASSAS, Marie (Météo-France)

Track Classification: UEF2019

Contribution ID: **38** Type: **Oral presentation**

The strength of ensembles lies not in probability forecasting

Tuesday, 4 June 2019 12:30 (30 minutes)

"The Strength of Ensembles Lies not in Probability Forecasting"
Leonard A Smith, CATS at the London School of Economics @lynyrdsmyth
How can one best use an ensemble forecast system in making decisions in the real world that are influenced by the future weather? Several actual applications will be considered, and some real-time forecasting will be required (interactively) form the audience. It will be argued that it is costly to act as if ensembles gave us useful probabilities (in any of the Bayesian senses), but that ensemble can and do yield probabilistic information and can and has been used to advantage in weather sensitive decision making. Ensembles can provide early warning that our model is sensitive to the state of the atmosphere today, but that is a somewhat different from any claim regarding the predictability of the atmosphere itself today. The search for accountable ensembles (Smith, 1995) is, I now believe, wrong-headed, given that our dynamical models are imperfect. Rather than assuming calibration where it rarely exists, one can work with practitioners to identify useful questions which can be informed in a robust and useful manner. The Forecast Direction Error approach illustrates one successful application in the electricity sector (Smith, 2016). Our approach can never be as attractive as what one could achieve given "true"(or accountable) probability forecasts, but then we are not competing against such "fantastic objects."Implications for other uses of ECMWF forecasts, and for model development, are touched on.
Smith, L.A. (1995) 'Accountability and error in ensemble forecasting', In 1995 ECMWF Seminar on Predictability. Vol. 1, 351-368. ECMWF, Reading.
Smith, L.A. (2016) 'Integrating information, misinformation and desire: improved weather-risk management for the energy sector', in Aston, P et al. (ed.) UK Success Stories in Industrial Mathematics, 289-296. Springer

Primary author: Prof. SMITH, Leonard (CATS at London School of Economics)

Presenter: Prof. SMITH, Leonard (CATS at London School of Economics)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **39** Type: **Oral presentation**

Informing anticipatory humanitarian action: a framework for using ECMWF forecasts effectively

Tuesday, 4 June 2019 09:30 (30 minutes)

Some humanitarian crises are due to the effects of forecastable phenomena such as heatwaves or hurricanes. In principle, it is possible to take forecast-based action in advance of the event, that can reduce the impact or simply accelerate the response. Using ECMWF forecasts effectively in this context is a balance between the timescale of useful action (more can be done to reduce impact with longer lead times) and the timescale of useful predictability (the forecast is less confident at longer lead times). We set out a framework for achieving this balance based on evaluation of past ECMWF forecasts. For heatwave in Pakistan, we showed that there is an opportunity for confident humanitarian intervention before an event occurs, saving lives and money relative to the scenario of acting only after the crisis. This was tested last summer, activating a humanitarian response to an extreme heat event in Sindh province during Ramadan 2018. In other cases, it may not be possible to make a confident enough forecast at the required lead time; in this situation, humanitarian decision-makers can save time by taking forecast information off the table. Our framework illustrates how to embed ECMWF forecasts into real-time decision-making loops to support different forms of intervention (direct release of funding, insurance-based approaches, etc), while also exploring whether or not the practitioners might benefit from changing the parameters of their decision-making process to accommodate the weakness of the forecast system. The ultimate aim is to make ECMWF forecasts more useable and increase the anticipatory disaster risk reduction applications in which they are used.

Primary authors: THOMPSON, Erica (London School of Economics); Prof. SMITH, Leonard (London School of Economics/Pembroke College Oxford)

Presenter: THOMPSON, Erica (London School of Economics)

Session Classification: Morning session - Chair: Andrea Montani

Track Classification: UEF2019

Contribution ID: **40** Type: **Poster presentation**

Improvement of ECMWF Seasonal Forecast Outputs by Using Observed Data for Turkey

The importance of seasonal forecasts especially for the developing sectors in recent years cannot be ignored. Therefore, ECMWF seasonal forecasts are used, a more useful ensemble system perspective for 15 points representing whole Turkey has been developed and the seasonal forecasts has become more convenient to be used by the various sectors, in this study. With the developed method, ECMWF seasonal prediction model outputs were corrected with the data observed by Turkish State Meteorological Service (TSMS) by using statistical methods (ME, MAE, SDE, RMSE etc.) and the characteristics of the model errors were determined for the selected 15 points. This correction is based on the first 3 month time steps of the ensembles. Following this correction, regression analysis for the same 15 points completed and intended to increase the accuracy and availability of ECMWF's seasonal ensemble prediction system, within the boundaries of Turkey.

Primary authors: OZMUTLU, Elif Mudrike (Turkish State Meteorological Service); Mr ESKIOĞLU, Osman (Turkish State Meteorological Service); Mr TEKIN, Fevzi Burak (Turkish State Meteorological Service)

Co-authors: Mr YAVUZ, Yusuf Ziya (Turkish State Meteorological Service); Mr ACAR, Murat (Turkish State Meteorological Service)

Presenters: OZMUTLU, Elif Mudrike (Turkish State Meteorological Service); Mr TEKIN, Fevzi Burak (Turkish State Meteorological Service)

Track Classification: UEF2019

Contribution ID: **41** Type: **not specified**

The impact of social media to weather related decision making processes

Contribution ID: **42** Type: **Oral presentation**

Welcome and housekeeping

Presenter: RABIER, Florence (ECMWF)

Contribution ID: **44** Type: **Oral presentation**

Welcome and housekeeping

Monday, 3 June 2019 14:00 (15 minutes)

Presenters: GHELLI, Anna (ECMWF); RABIER, Florence (ECMWF)

Contribution ID: **46** Type: **Oral presentation**

ECMWF strategic projects: an overview

Monday, 3 June 2019 14:45 (30 minutes)

This presentation will provide updates on strategic projects ECMWF is currently working on and their impact on users of the Centre's data.
An overview will be given on the move of ECMWF's computing facilities to Bologna (the BOND Programme). The building work has started, and the operating model is being finalised as well as the way in which the teams in the two locations will work seamlessly together to provide a quality service to the Centre's data users.
Another important activity that will be covered is the European Weather Cloud project which will provide cloud computing in collaboration with EUMETSAT and, later, national entities. The selected approach is a federation of cloud computing infrastructures giving access to the resources of the different entities. A pilot project of 2 years has started with four key objectives: 1) to define the governance and test the overarching technical management layer; 2) to consolidate user requirements; 3) to harmonise data access models; 4) to agree upon the offering (hosted processing ⋯). The world will be prominently based on the running of use case studies, as well as on dedicated experts working groups looking at the technical, legal and security aspects.
ECMWF currently has a fixed dissemination schedule which determines the exact time at which time individual products are released. This fixed schedule has served the Centre well and allowed the arrival time of ECMWF products to be reliably predicted. Over the years, requests have been made for the earlier release of products and ECMWF's latest plans for this will also be presented.

Presenter: PAPPENBERGER, Florian (ECMWF)

Session Classification: Afternoon session

Contribution ID: **48** Type: **Oral presentation**

ENS and art

Presenter: ARNAL, Louise (ECMWF)

Contribution ID: **49** Type: **Oral presentation**

Our research

Presenter: BROWN, Andy (ECMWF)

Contribution ID: **51** Type: **not specified**

GLOFAS and EFAS

Contribution ID: **52** Type: **Oral presentation**

Model Diagnostics

Presenter: RODWELL, Mark (ECMWF)

Contribution ID: **53** Type: **not specified**

ECMWF user survey

Presenter: WAGEMANN, Julia (ECMWF)

Contribution ID: **56** Type: **not specified**

Prizes and concluding remarks

Contribution ID: **57** Type: **not specified**

Knowledge Café - The impact of social media on weather related decision making processes

Contribution ID: **58** Type: **Oral presentation**

Users of ECMWF/Copernicus data in the spotlight –A user perspective on current and future cloud-based data systems (not live streamed)

Wednesday, 5 June 2019 16:15 (30 minutes)

ECMWF operates two Copernicus services, the Copernicus Climate Change Service (C3S) and the Copernicus Atmosphere Monitoring Service (CAMS) and due to Copernicus'open data policy, many datasets on climate, air quality, fire, or floods are available free of charge.

However, data accessibility is still one of the biggest obstacles for users of these data. Users face difficulties in downloading and processing these growing data volumes. On data services / providers side, many attempts are undertaken to make open environmental data better accessible for users, e.g. data cube technologies, standardised web services or data portals, such as the Copernicus Climate Data Store.

Future data services will probably be based on cloud services, but there are many open questions on how a reliable and scalable data service based on cloud services could be established. How much processing capacity would users need, is the geographic location of the cloud servers important for users and do users care whether the cloud is publicly-funded or the services are offered by a commercial provider?

A user requirements survey on Big Earth Data put users into the spotlight between November 2018 and January 2019. We were interested how users of large volumes of environmental data interact with the data and what challenges they currently face. One part aimed at finding out how users would like to work with future data services and what aspects of cloud services, e.g. geographic location or publicly-funded cloud vs. commercial cloud provider, play an important role for users. The presentation will provide a perspective on how users of open environmental data currently work with the data and what challenges they face. A specific focus will be put on user's expectations of future data and cloud services.

Primary author: WAGEMANN, Julia (ECMWF)

Co-authors: Ms PIDDUCK, Emma (ECMWF); Mr VENUTI, Fabio (ECMWF); Mr SIEMEN, Stephan (ECMWF)

Presenter: WAGEMANN, Julia (ECMWF)

Session Classification: Afternoon session - Chair: Estibaliz Gascon

Track Classification: UEF2019

Contribution ID: **60** Type: **Oral presentation**

ECMWF forecast performance

Monday, 3 June 2019 15:45 (30 minutes)

An update is given on the evolution of forecast skill of the IFS as seen in headline and supplementary scores, with emphasis on ensemble forecast performance. Comparison with ERA5 and with forecasts from other global models are made to distinguish the effect of model upgrades from changes in atmospheric predictability. The user-oriented supplementary headline score for 2-m temperature which measures the number of large ENS errors in the medium range is discussed, and a perspective on further reductions in 2-m temperature error is given. The increase in forecast skill expected from model cycle 46r1 is assessed, and new results on the inclusion of observation error in ensemble verification are presented.

Primary author: HAIDEN, Thomas (ECMWF)

Presenter: HAIDEN, Thomas (ECMWF)

Session Classification: Afternoon session continued

Track Classification: UEF2019

Contribution ID: **61** Type: **Oral presentation**

ecPoint

Presenter: PILLOSU, Fatima (ECMWF)

Session Classification: The Speakers' Corner - Fatima Pillosu : Customise ecPoint rainfall products, Cihan Sahin : ecCharts - faster and more responsive, Ivan Tsonevsky : New ECWMF model products explained

Contribution ID: **62** Type: **not specified**

ecCharts

Presenter: SAHIN, Cihan (ECMWF)

Session Classification: The Speakers' Corner - Fatima Pillosu : Customise ecPoint rainfall products, Cihan Sahin : ecCharts - faster and more responsive, Ivan Tsonevsky : New ECWMF model products explained

Contribution ID: **63** Type: **not specified**

ECMWF products on the globe

Presenter: TSONEVSKY, Ivan (ECMWF)

Session Classification: The Speakers' Corner - Fatima Pillosu : Customise ecPoint rainfall products, Cihan Sahin : ecCharts - faster and more responsive, Ivan Tsonevsky : New ECWMF model products explained

Contribution ID: **64** Type: **Oral presentation**

ECMWF research: near and distant future plans

Tuesday, 4 June 2019 15:45 (30 minutes)

The talk will highlight what steps have been taken to 'develop an integrated global model of the Earth system to produce forecasts with increasing fidelity on time ranges up to one year ahead. This will tackle the most difficult problems in numerical weather prediction such as the currently low level of predictive skill of European weather for a month ahead.', three years on since the approval of the 2016-2025 ECMWF strategy. The research behind the key changes introduced in the IFS model cycle 46r1 (which will be operational on the 11th June 2019) and the current plans for model cycle 47r1 and beyond will be highlighted.

Moreover, the relevance of Machine Learning on both operational workflow and research activities at ECMWF will be briefly discussed, as part of the more distant future directions of work.

Primary author: BROWN, Andy (ECMWF)

Presenter: BROWN, Andy (ECMWF)

Session Classification: Afternoon session - Chair: Ivan Tsonevsky

Track Classification: UEF2019

Contribution ID: **65** Type: **Oral presentation**

Challenges and Limits in Ensemble Weather Prediction

Wednesday, 5 June 2019 15:45 (30 minutes)

Some days, the atmosphere is less predictable than on average. This is partly because the rate of growth of certainty (the result of Chaos) is dependent on the atmospheric flow itself. For example, moist processes are almost always implicated during investigations of very poor forecasts for Europe (so-called "forecast busts"). These moist processes might be associated with, for example, warm conveyor-belts along the cold-fronts of a cyclonic systems, meso-scale convective situations, or the extra-tropical transition of tropical cyclones.

Such moist situations also present a particular challenge for data assimilation. For example, satellite observation operators are highly non-linear in cloudy situations. The result is that the ensemble distribution of initial conditions is less constrained by the available observations.

Furthermore, these moist situations present challenges for the model. For example, the model's parametrized "deterministic physics" is very active in these situations, and biases are likely to have a large impact on the forecast. In order to maintain the "spread-error" relationship of the ensemble, additional "stochastic physics" is required to adequately represent the effects of sub-grid-scale uncertainty associated with these moist processes.

Hence such moist and unstable situations represent, almost literally, a "perfect storm" for forecasting. Progress can be made on some aspects, but the inherent large uncertainty growth-rates will remain.

This talk will focus on how diagnostics can help improve our understanding of these challenges and limits.

Primary author: RODWELL, Mark (ECMWF)

Presenter: RODWELL, Mark (ECMWF)

Session Classification: Afternoon session - Chair: Estibaliz Gascon

Track Classification: UEF2019

Contribution ID: **66** Type: **Oral presentation**

Seasonal forecasts from the Copernicus Climate Change Service

Thursday, 6 June 2019 11:30 (30 minutes)

The Copernicus Climate Change Service (C3S) operationally provides forecasts from state-of-the-art individual seasonal prediction systems, as well as multi-system combination products. Graphical and data products, covering a time period of six months, are free and fully available through the C3S website and Climate Data Store (CDS) on a monthly basis at 12 UTC on the 13th.
The centres currently providing forecasts to C3S are ECMWF, the UK Met Office, Météo-France, the German Weather Service (Deutscher Wetterdienst, DWD) and the Euro-Mediterranean Center on Climate Change (Centro Euro-Mediterraneo sui Cambiamenti Climatici, CMCC). During 2019, it is planned to introduce additional contributions from other non-European centres, including NCEP and JMA (currently participating in the EUROSIP system), as well as Environment and Climate Change Canada (ECCC).
A general overview of the seasonal forecast activity within the C3S will be presented. This will include detailed information about the available graphical and data products and live demonstration on how to access them on the CDS. Plans for future functionalities will also be presented.

Primary authors: PENABAD RAMOS, Eduardo (ECMWF); BRICEAG, Simona (ECMWF); BROOKSHAW, Anca (ECMWF)

Presenter: PENABAD RAMOS, Eduardo (ECMWF)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **67** Type: **Oral presentation**

Extended-range product and diagnostic developments

Tuesday, 4 June 2019 16:45 (30 minutes)

In line with its long-term Strategy, ECMWF has recently developed test products for the likelihood of regime transitions associated with the occurrence of severe cold spells, and for the probabilities of occurrence of sudden stratospheric warmings and weather regimes. The aim is to identify the main weather regimes in the Euro-Atlantic region and to predict the probability that future weather will be dominated by one or the other of these patterns. This information can provide insights into the likelihood of severe weather events often associated with specific flow circulations. Along with the new products, diagnostic and verification tools have been developed to monitor the performance. In this presentation the link between the products and evaluation will be discussed by using recent cases as examples.

Primary authors: FERRANTI, Laura (ECMWF); MAGNUSSON, Linus (ECMWF)

Presenter: MAGNUSSON, Linus (ECMWF)

Session Classification: Afternoon session - Chair: Ivan Tsonevsky

Track Classification: UEF2019

Contribution ID: **68** Type: **Oral presentation**

Goodbye ERA-Interim, hello ERA5

Thursday, 6 June 2019 11:00 (30 minutes)

As part of implementing the EU-funded Copernicus Climate Change Service (C3S), ECMWF is producing the ERA5 reanalysis of the global weather and climate. Production is complete for the period 1979 to the present, and an extension back to 1950 is currently in production. ERA5 replaces the highly successful ERA-Interim reanalysis that was started in 2006 and spans the period from 1979 to the present. ERA5 benefits from a decade of developments in model physics, core dynamics and data assimilation relative to ERA-Interim. In addition to a significantly enhanced horizontal resolution (31 km grid spacing compared to 79 km for ERA-Interim), ERA5 has a number of innovative features.

The time has now come to phase out ERA-Interim. New data covering the period to the end of August 2019 will continue to be made available with a delay of two to three months; after that, the production of ERA-Interim will stop. ERA5 on the other hand will be maintained as an operational product to at least the mid-2020s, when a replacement should be available.

This presentation will give an overview of the enhanced performance and innovative features of ERA5. It will also provide a walk-through of the available products and how to access them.

Primary author: Dr HERSBACH, Hans (ECMWF)

Presenter: Dr HERSBACH, Hans (ECMWF)

Session Classification: Morning session continued

Track Classification: UEF2019

Contribution ID: **70** Type: **Oral presentation**

The ECMWF Ensemble within the Copernicus European and Global Flood Awareness Systems (EFAS & GloFAS)

Tuesday, 4 June 2019 16:15 (30 minutes)

ECMWF is the computational centre for the European and Global Flood Awareness Systems [EFAS & GloFAS respectively], on behalf of the Copernicus Emergency Management Service. These produce flood forecasts across Europe and the globe with lead times of 10 and 30 days respectively. The aim is to provide flood forecasts at the medium range which are consistent across national boundaries.

Meteorological forecasts from the ECMWF ensemble of precipitation, temperature and wind speed are used as forcings for a hydrological model which produces ensemble estimates of river discharge. Using ensemble forecasts benefits the communication of flood risk uncertainty, especially beyond the short range. Within Europe the probabilistic information are used to decide when flood notifications are issued to EFAS partner institutions.

This presentation will explain the origin and setup of the EFAS and GloFAS systems. Use cases of how the probabilistic forecast information have been used to provide guidance on preparing and responding to flooding events will also be given.

Primary authors: ZSOTER, Ervin (ECMWF); BAUGH, Calum (ECMWF)

Presenter: ZSOTER, Ervin (ECMWF)

Session Classification: Afternoon session - Chair: Ivan Tsonevsky

Track Classification: UEF2019

Contribution ID: **71** Type: **Oral presentation**

ECMWF product development

Monday, 3 June 2019 14:15 (30 minutes)

The presentation will review forecast product development activities at ECMWF over the past year, in response to user requests and feedback. New forecast outputs include test products to help identify the risk of cold spells over Europe, and the experimental post-processed 'point rainfall'which accounts for sub-grid variability and situation- dependent bias. The next model upgrade will introduce several new forecast output fields, including wind at 200m above the ground, a new Extreme Forecast Index (EFI) for to highlight the large-scale water vapour transport in the atmosphere, together with new EFI-related products for extremes in the extended range. The new ERA5 reanalysis data is now available for 1979 onwards, and will be used as the initial conditions for the operational reforecasts. A new set of ocean forecast outputs will be introduced. Other changes, including the availability of products from the 06 and 18 UTC forecasts will also be addressed.

Primary author: RICHARDSON, David (ECMWF)

Presenter: RICHARDSON, David (ECMWF)

Session Classification: Afternoon session

Track Classification: UEF2019