Advancing Renewable Energy with Climate Services (ARECS)

Seasonal to Decadal Global Climate Forecasting

Climate Forecasting Unit (CFU), Catalan Institute of Climate Sciences (IC3)

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The ARECS initiative helps renewable energy stakeholders understand and manage climate related risks and opportunities, using climate-forecast information.

SOLAR ENERGY

as a function of surface downward Global Horizontal Irradiance (GHI)

WIND ENERGY

as a function of wind speed at 10m above surface

REGIONAL **SPATIAL SCALE** LOCAL

All seasonal forecasts are produced with a 1 month lead time, which corresponds to the length of time elapsed from the start of the climate prediction e.g. a prediction started on the 1st of February, for a spring climate forecast (the average of March, April and May) of the same year. Generally speaking, the longer the lead time, the lower the expected climate skill. The anomaly correlation (AC) of the mean climate forecast system data compared with the observational climate estimate is shown at the top left corner, where AC 1.0 is the highest attainable skill, and AC -1.0, the lowest attainable skill. Climate forecast system used: ECMWF S4.

Seasonal probability forecasts (%) of the most likely downward surface solar radiation tercile (below normal, normal or above normal) across Southern Europe and the Mediterranean for 2011 (DJF 2011/2012)

Seasonal forecasts of downward surface solar radiation (ECMWF S4) between 1981 and 2011 compared with an observational climate estimate (ERAInterim), for a specific site in Italy

Seasonal probability forecasts (%) of the most likely 10m wind speed tercile (below normal, normal or above normal) across Southern Europe and the Mediterranean for 2011 (DJF 2011/2012)

Seasonal forecasts of 10m wind speed (ECMWF S4) between 1981 and 2011 compared with an observational climate estimate (ERAInterim), for a specific site in Algeria

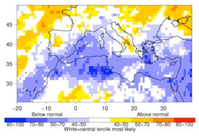
SEASONAL

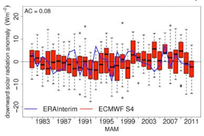
SPRING March, April, May (MAM)

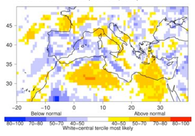
SUMMER June, July, August (JJA)

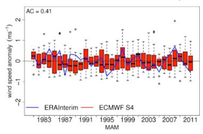
AUTUMN September, October, November (SON)

WINTER December, January, February (DJF)









The skill of the ECMWF S4 climate forecast system is assessed by comparing the observed climate variability from past data (ERAInterim) with the simultaneous past climate predictions.
The skill of a seasonal climate forecast system to predict future climate variability is thus determined using this initial assessment of past climate predictions.

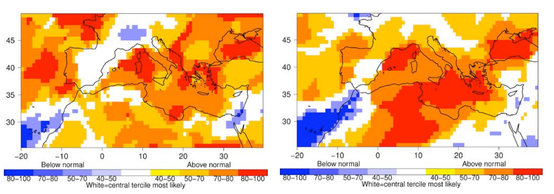
2012-2016 **FORECAST TIME** 2017-2021

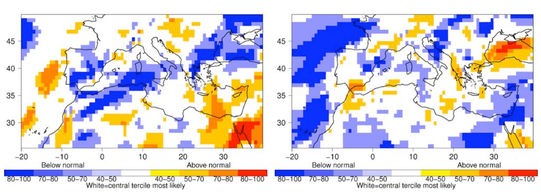
All decadal forecasts are produced with a 2 months and 6 years lead time, for the 2012-2016 and 2017-2021 forecasts respectively. The lead time corresponds to the length of time elapsed from the start of the climate prediction, e.g. a 1 year lead time represents a prediction started on the 1st of November 2011, for a 1-5 year climate forecast (the average of the next five years) from 1st November 2012.
Generally speaking, the longer the lead time, the lower the expected climate skill. Climate forecast system used: EC-Earth v2.3.

Decadal probability forecasts (%) of the most likely downward surface solar radiation tercile (below normal, normal or above normal) across Southern Europe and the Mediterranean for 2012 – 2016 and 2017 – 2021

DECADAL

Decadal probability forecasts (%) of the most likely 10m wind speed tercile (below normal, normal or above normal) across Southern Europe and the Mediterranean for 2012 – 2016 and 2017 – 2021





The skill of the EC-Earth v2.3 climate forecast system is assessed by comparing the observed climate variability from past data (ERAInterim) with the simultaneous past climate predictions.
The skill of a decadal climate forecast system to predict future climate variability is thus determined using this initial assessment of past climates predictions.

These climate forecasts are to demonstrate examples of climate research results to date

AIMS OF THE ARECCS INITIATIVE

- Advance the ability to forecast global to local climate variations 1 month to 30 years into the future, known as seasonal to decadal timescales
- Translate climate forecasts into useful and usable information for the renewable energy sector, via impact and risk studies to highlight the effect of future climate variability on the energy yields of renewable energy projects
- Apply climate assessments to facilitate mid to long-term decision making processes related to renewable energy investment, innovation and planning
- Stimulate new business opportunities via the development and application of an operational climate service for the renewable energy sector

DRIVERS OF THE ARECCS INITIATIVE

EC
"20-20" target
20% Renewable Energy by 2020

IPCC
"strategies to overcome technical as well as non-technical obstacles to renewable energy application and diffusion"

Global Framework for Climate Services (WMO)
"renewable energy […] and mitigation actions all depend on good climate information and climate services"

Private Sector
"renewable energy technologies are dependent on weather patterns which creates uncertainty in projected revenues"
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"[…] 'significant shortfall of generation and income compared to the predicted level.' In the future, climate change may increasingly lead to such shortfalls, too'
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CFU Projects

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