

Integrated approach for the development across Europe of user oriented climate indicators for GFCS high-priority sectors: Agriculture, disaster risk reduction, energy, health, water and tourism

Work Package 5

Deliverable 5.1

# Inventory and Catalog of Indicators of Circulation Variability for Comparison with INDECIS-ISD

**A. Ossó<sup>1,2</sup>, R. Allan<sup>1</sup> and L. Shaffrey<sup>1,2</sup>**

<sup>1</sup> *Department of Meteorology, University of Reading, Reading – United Kingdom*

<sup>2</sup> *National Centre for Atmospheric Science, University of Reading, Reading – United Kingdom*



This report arises from the Project INDECIS which is part of ERA4CS, an ERA-NET initiated by JPI Climate, and funded by FORMAS (SE), DLR (DE), BMFW (AT), IFD (DK), MINECO (ES), ANR (FR), with co-funding by the European Union's Horizon 2020 research and innovation programme

**TABLE OF CONTENTS**

1. Overview ..... 2

2. Circulation Indicators Table ..... 2

## 1. Overview

The goal of WP5 is to use the data developed in WPs 2 and 3 and indices developed in WP4 to quantify the variability and change over time, and their link to atmospheric circulation patterns. In this context, the deliverable 5.1 provides a comprehensive list of indicators of circulation variability, which have the potential to influence the evolution of WP4 indices. All the indicators selected have been reported to influence European variability. The indicators have been classified as a function of their relevance for European climate and by the season at which their influence is expected. The classification follows from the experience of the authors, literature search and suggestions from other work packages INDECIS researchers. Finally, each indicator is accompanied by an URL direction from which the data can be obtained. In the cases where the data is not publically available a relevant reference indicating the contact details of data owner is provided.

## 2. Circulation Indicators Table

Atmospheric Circulation Indicators	European Relevance	Season Relevance	Source
North Atlantic Oscillation (NAO)	****	All year	<a href="https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
East Atlantic Pattern (EA)	****	All year	<a href="https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
West Pacific Pattern (WP)	*	All year	<a href="https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
EastPacific/ North Pacific Pattern (EP/NP)	**	Spring-Summer-Fall	<a href="https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
Pacific/ North American Pattern (PNA)	**	All year	<a href="https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
East Atlantic/West Russia Pattern (EA/WR)	****	All year	<a href="https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">https://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
Scandinavian Pattern (SCA)	****	All year	<a href="http://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml">http://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml</a>
Tropical/ Northern Hemisphere Pattern	**	Winter	<a href="http://www.cpc.ncep.noaa.gov/data/tele">http://www.cpc.ncep.noaa.gov/data/tele</a>

(TNH)			<a href="#">doc/telecontents.shtml</a>
Polar/ Eurasia Pattern (POL)	**	All year	<a href="http://www.cpc.ncep.noaa.gov/data/tele/doc/telecontents.shtml">http://www.cpc.ncep.noaa.gov/data/tele/doc/telecontents.shtml</a>
Pacific Transition Pattern (PT)	**	Aug-Sept	<a href="http://www.cpc.ncep.noaa.gov/data/tele/doc/telecontents.shtml">http://www.cpc.ncep.noaa.gov/data/tele/doc/telecontents.shtml</a>
ENSO	**	All year	<a href="http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml">http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml</a>
Madden-Julian Oscillation (MJO)	***	All year	<a href="http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml">http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml</a>
Indian monsoon-European teleconnection	***	Summer	e.g. Cherchi et al. 2014 <a href="https://doi.org/10.1175/JCLI-D-13-00530.1">https://doi.org/10.1175/JCLI-D-13-00530.1</a>
Summer East Atlantic Pattern (SEA)	****	Summer	Ossó et al. 2018 <a href="https://doi.org/10.1073/pnas.1713146114">https://doi.org/10.1073/pnas.1713146114</a>
Circumglobal Teleconnection Pattern (CGT)	***	Summer-Fall	Ding and Wang 2005 <a href="https://doi.org/10.1175/JCLI3473.1">https://doi.org/10.1175/JCLI3473.1</a>
Blocking or Ridge Patterns	****	All year	e.g. Sousa et al. (2017a) Clim. Dyn. <a href="https://doi.org/10.1007/s00382-016-3132-5">https://doi.org/10.1007/s00382-016-3132-5</a>
Circulation Regimes	****	All year	<a href="https://crudata.uea.ac.uk/cru/data/lwt/">https://crudata.uea.ac.uk/cru/data/lwt/</a>
Grosswetterlagen (GWL):	****	All year	<a href="https://link.springer.com/article/10.1007/s00704-006-0239-3">https://link.springer.com/article/10.1007/s00704-006-0239-3</a>
Quasi- Biennial Oscillation (QBO)	**	Winter	<a href="https://climatedataguide.ucar.edu/climate-data/qbo-quasi-biennial-oscillation">https://climatedataguide.ucar.edu/climate-data/qbo-quasi-biennial-oscillation</a>
Atlantic Multidecadal Oscillation (AMO)	***	All year	<a href="https://www.esrl.noaa.gov/psd/data/time-series/AMO/">https://www.esrl.noaa.gov/psd/data/time-series/AMO/</a>
Atlantic Meridional Mode( AMM)	**	Winter	<a href="https://www.esrl.noaa.gov/psd/data/time-series/monthly/AMM/">https://www.esrl.noaa.gov/psd/data/time-series/monthly/AMM/</a>
Western Mediterranean Oscillation	**	All year	<a href="http://www.ub.edu/gc/en/2016/06/08/wemo/">http://www.ub.edu/gc/en/2016/06/08/wemo/</a>