

PAST AND PRESENT EXPERIENCES IN DROUGHT MONITORING IN ITALY

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Rome, Italy

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ISPRA – Institute for Environmental Protection and Research

- National Institute that acts under the vigilance and policy guidance of the Italian Ministry of Environment (APAT + ICRAM + INFS)
 - Research Institute + National Environment Agency
 - Coordinate the SNPA – National System for Environmental Protection (established by Italian Law No. 132/2016)
 - National focal point for EIONet of EEA
 - Coordinate the Italian National Committee for Operational Hydrology Services and the Italian National Climate Services Network
 - **Supports policies implementation (incl. EU policy)**
 - ☐ Define strategies
 - ☐ Produce standards and methodologies for monitoring and evaluation of environmental status
 - ☐ Make methodologies applicable
 - ☐ Organize training activity
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SNPA (territorial Environmental Agencies + ISPRA)

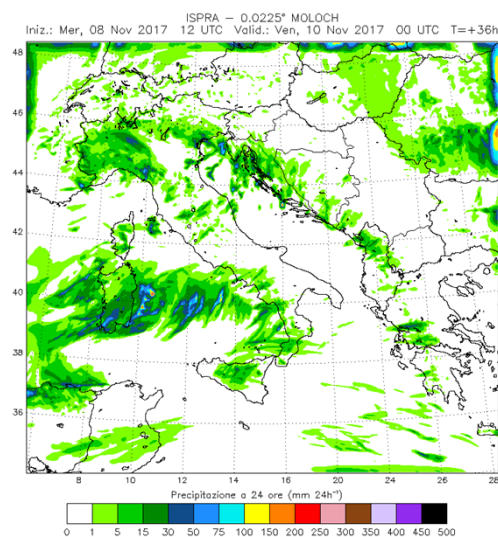
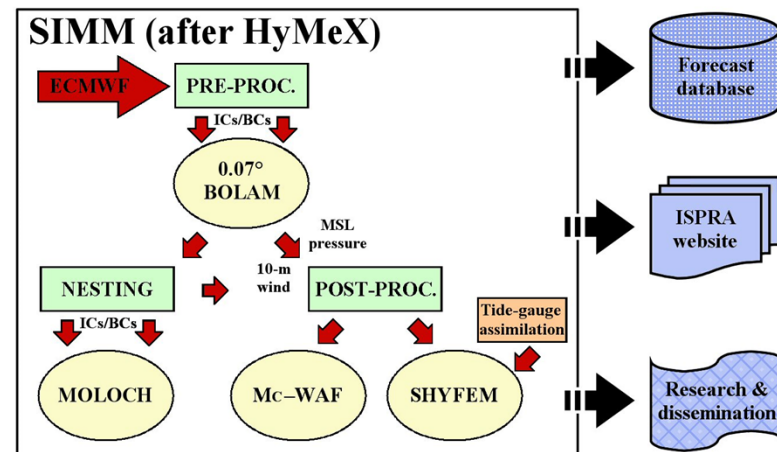
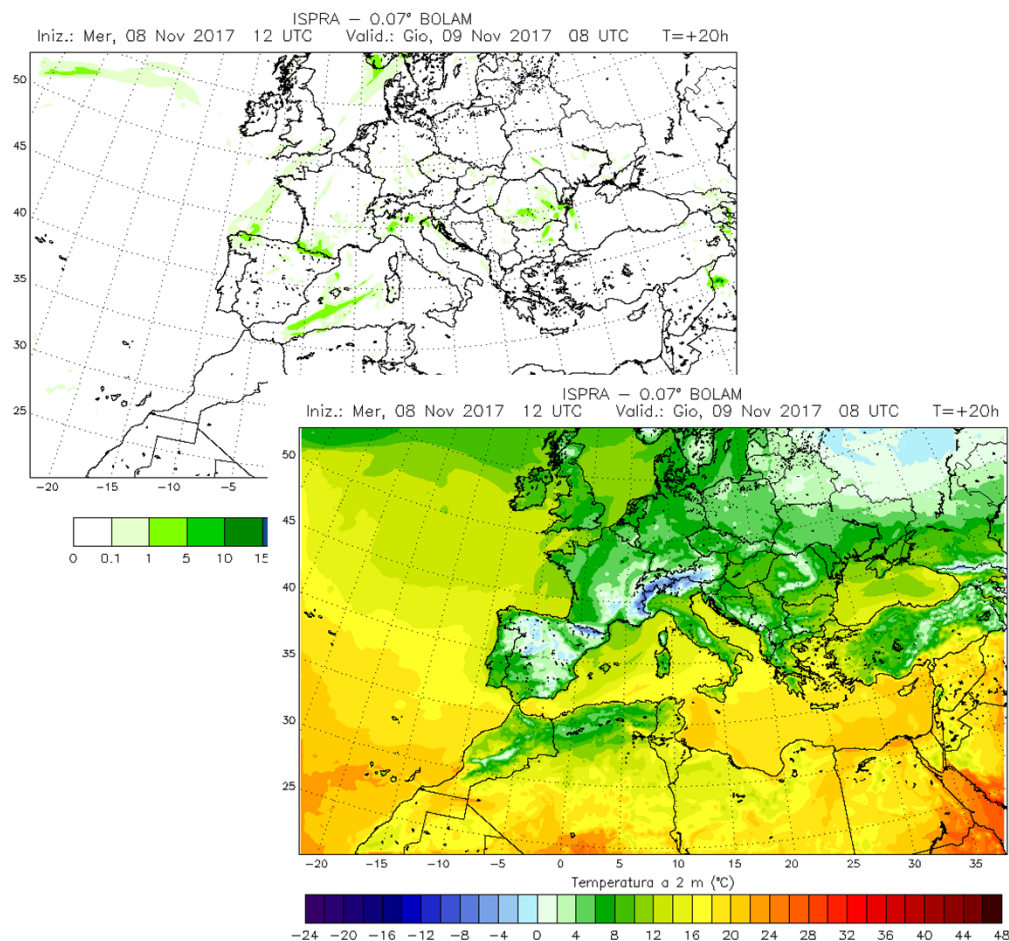
- Responsible for the WFD implementation
- Qualitative monitoring of water resources
- Not all the SNPA regional Institutions are responsible for the hydro-meteorological (quantitative) monitoring



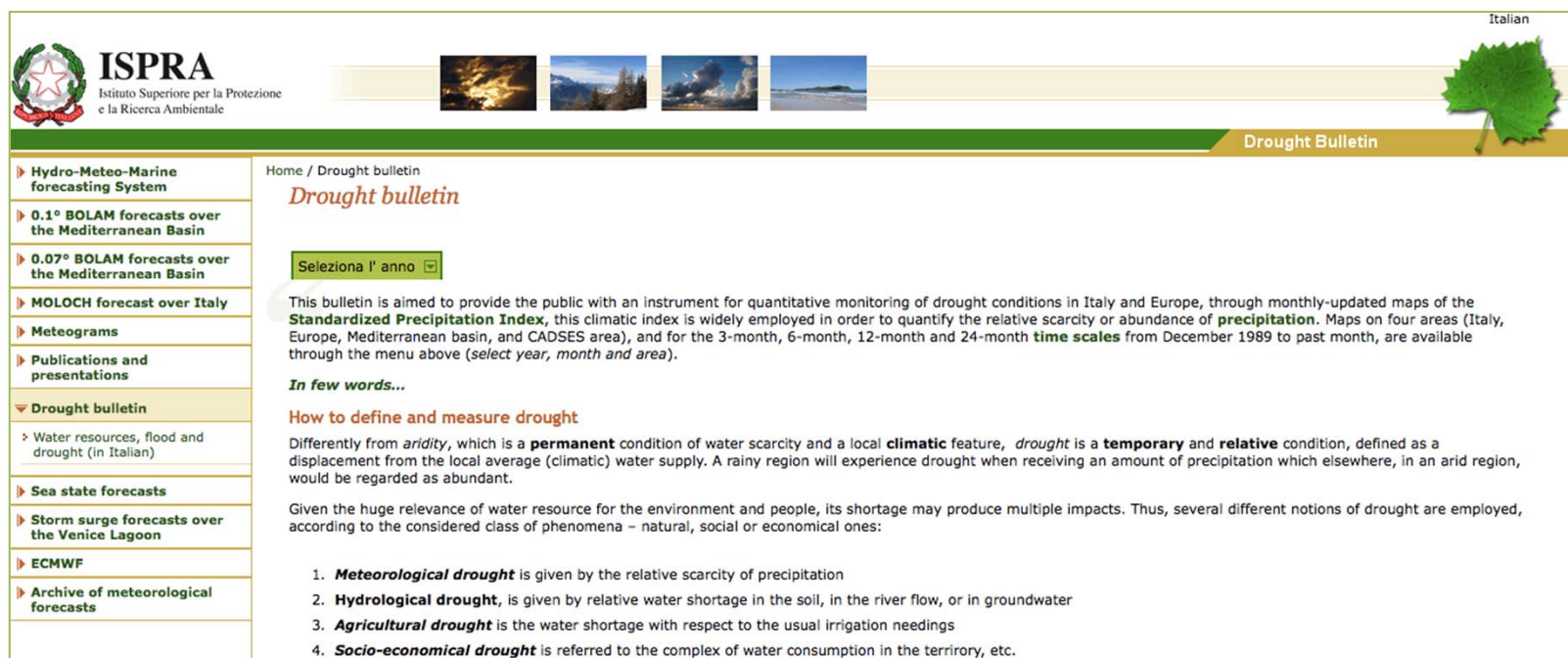
Italian National Committee for Operational Hydrological Services

- Established in 2013 to coordinate at national level **regional Institutions** that are responsible for the **hydro-meteorological monitoring** and provide **operational hydrology services**, according to Italian Presidential Decree of the Councils of Ministers (DPCM) on 24 July 2002.
 - The Committee includes also the National institutions that, together ISPRA, represent Italy within the WMO Commission for Hydrology, namely the Italian Air Force Meteorological Service and the Italian National Department of Civil Protection.
 - The Committee aims at reaching at national scale a homogenous quality level of the provided services, accomplishing the WMO resolutions.
 - The Committee acts in agreement with the Italian network of Functional Centers for civil protection and the hydrology scientific community.
- GIS-based tool for water budget at national scale.
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The ISPRA SIMM Hydro-Meteo-Marine Forecasting System



The ISPRA drought bulletin



ISPRA
Istituto Superiore per la Protezione
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Drought bulletin

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This bulletin is aimed to provide the public with an instrument for quantitative monitoring of drought conditions in Italy and Europe, through monthly-updated maps of the **Standardized Precipitation Index**, this climatic index is widely employed in order to quantify the relative scarcity or abundance of **precipitation**. Maps on four areas (Italy, Europe, Mediterranean basin, and CADSES area), and for the 3-month, 6-month, 12-month and 24-month **time scales** from December 1989 to past month, are available through the menu above (select year, month and area).

In few words...

How to define and measure drought

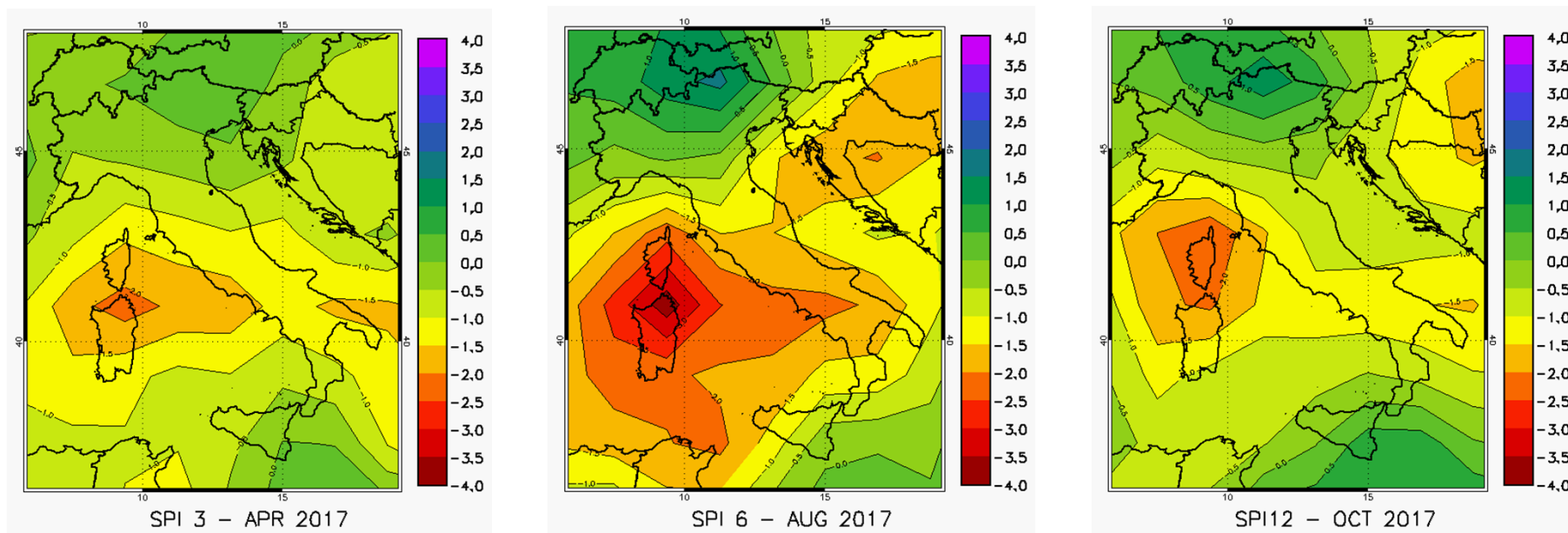
Differently from *aridity*, which is a **permanent** condition of water scarcity and a local **climatic** feature, *drought* is a **temporary** and **relative** condition, defined as a displacement from the local average (climatic) water supply. A rainy region will experience drought when receiving an amount of precipitation which elsewhere, in an arid region, would be regarded as abundant.

Given the huge relevance of water resource for the environment and people, its shortage may produce multiple impacts. Thus, several different notions of drought are employed, according to the considered class of phenomena – natural, social or economical ones:

1. **Meteorological drought** is given by the relative scarcity of precipitation
2. **Hydrological drought**, is given by relative water shortage in the soil, in the river flow, or in groundwater
3. **Agricultural drought** is the water shortage with respect to the usual irrigation needs
4. **Socio-economical drought** is referred to the complex of water consumption in the territory, etc.

- Prototype developed in the framework of INTERREG IIC Drought project.
- Online version developed in the framework EU project HYDROCARE.
- **Monthly maps of SPI** at 3, 6, 12 and 24 months based on 2.5° NCEP reanalysis, from Dec. 1989 for Italy, Europe, Med Basin & CADSES area.
- http://www.isprambiente.gov.it/pre_meteo/siccitas/index_en.html

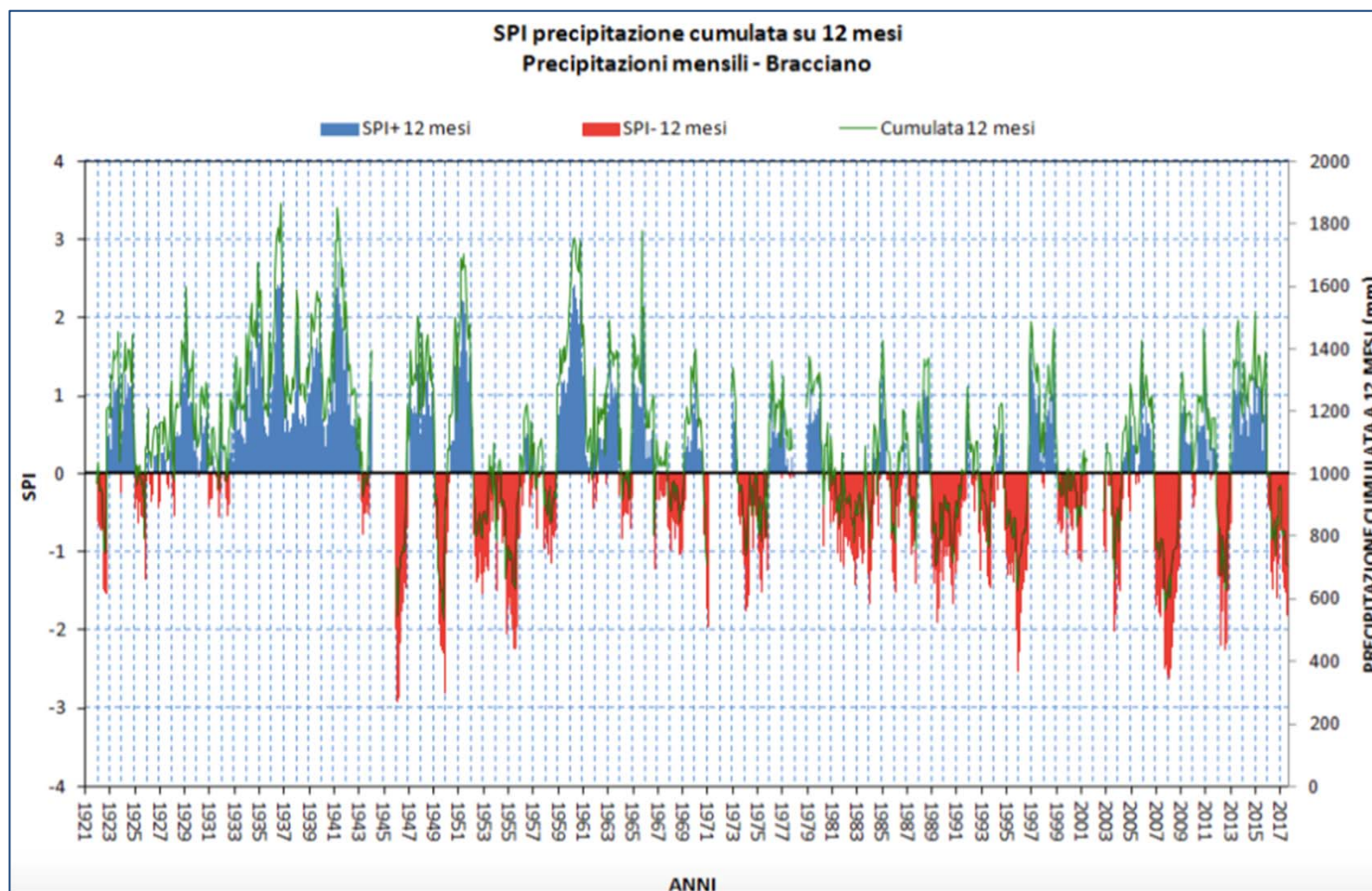
The ISPRA drought bulletin



- Provided a useful basis for monitoring drought situations a national scale and for evaluating their magnitude and severity.
- The 12-m SPI over Italy is one of the “Indicators for water resources” published each year in the **ISPRA Environmental Data Yearbook**.
- The **analysis** of the drought events is performed by considering also the **drought indicators provided at regional level** and the **EDO indicators**.

Example of an SPI-based analysis for the Bracciano lake

Tool: ANABASI by ISPRA – Data: Bracciano monthly precipitation by CF Lazio



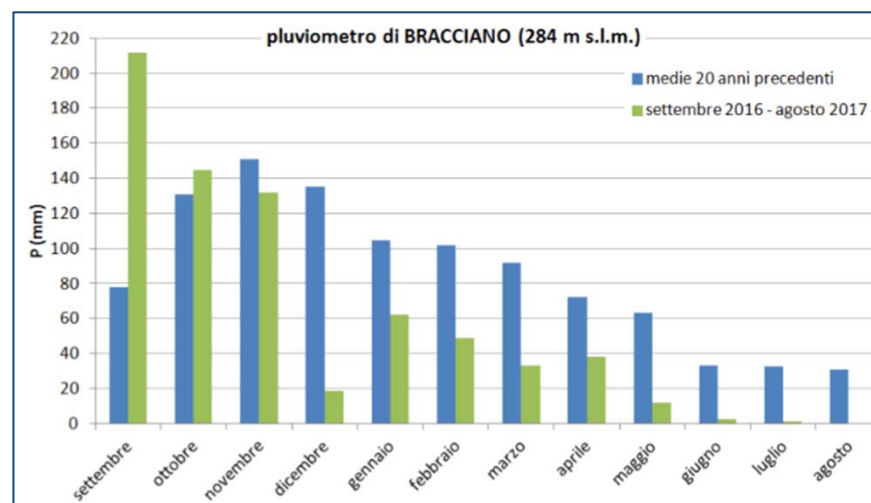
Example of an SPI-based analysis for the Bracciano lake

Tool: ANABASI by ISPRA – Data: Bracciano monthly precipitation by CF Lazio

Mese di riferimento	SPI a 1 mese	SPI a 2 mesi	SPI a 3 mesi	SPI a 6 mesi	SPI a 9 mesi	SPI a 12 mesi	SPI a 24 mesi
settembre 2016	1.5	1.1	0.9	0.2	0.1	-1.0	-0.2
ottobre 2016	0.3	1.1	0.8	0.7	0.3	-1.2	0.0
novembre 2016	-0.1	-0.1	0.7	0.5	-0.2	-0.7	-0.3
dicembre 2016	-2.1	-1.1	-0.9	-0.4	-0.7	-0.6	-0.8
gennaio 2017	-0.5	-1.8	-1.3	-0.5	-0.6	-0.7	-0.8
febbraio 2017	-0.8	-1.0	-2.0	-0.6	-0.8	-1.3	-1.2
marzo 2017	-0.8	-1.4	-1.6	-1.7	-1.2	-1.5	-1.8
aprile 2017	-1.0	-1.5	-1.7	-2.1	-1.3	-1.3	-1.9
maggio 2017	-1.5	-1.8	-2.1	-2.9	-1.4	-1.5	-2.0
giugno 2017	-1.5	-2.6	-2.5	-2.6	-2.3	-1.8	-2.0
luglio 2017	-0.8	-1.9	-2.9	-2.7	-2.7	-1.8	-2.0
agosto 2017	-1.1	-1.8	-2.6	-3.1	-3.6	-1.8	-2.4

Legenda

Valori SPI	Classe
$SPI > 2$	umidità estrema
$1.5 < SPI \leq 2.0$	umidità severa
$1.0 < SPI \leq 1.5$	umidità moderata
$-1.0 \leq SPI \leq 1.0$	nella norma
$-1.5 \leq SPI < -1.0$	siccità moderata
$-2.0 \leq SPI < -1.5$	siccità severa
$SPI < -2.0$	siccità estrema



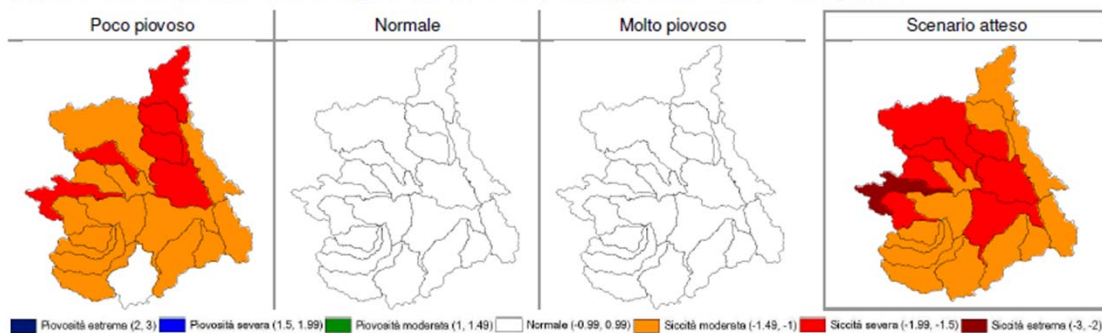
After “Analisi e valutazione dello stato ambientale del Lago di Bracciano riferito all’estate 2017”, ISPRA report, Oct. 2017

Examples of SPI maps at regional level based on rainfall data and scenarios

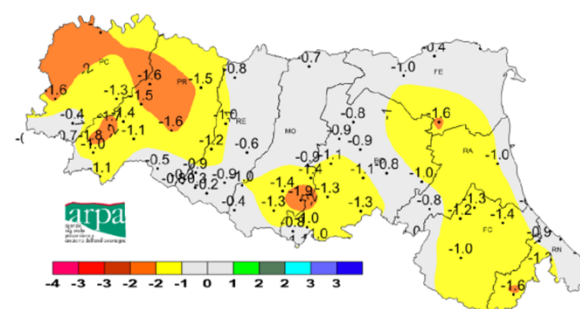


Previsione dell'indice SPI a 3 mesi per MARZO

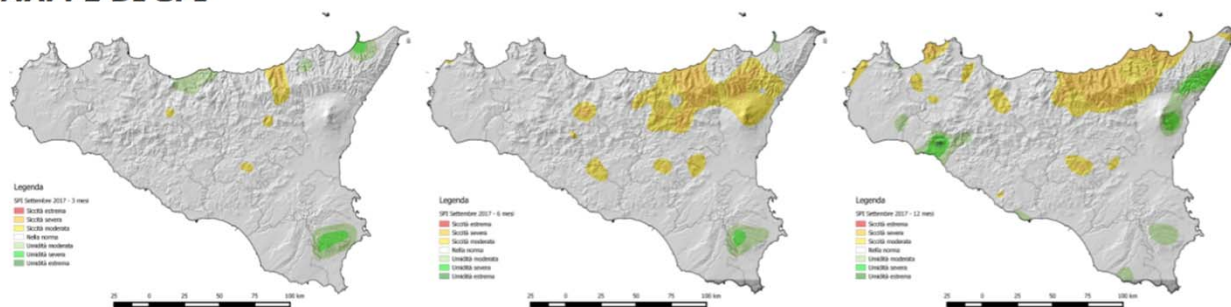
PREVISIONE CON SCENARI: Lo scenario di previsione si riferisce all'indice SPI a 3 mesi calcolato utilizzando la precipitazione climatologica del mese di previsione. Lo scenario "Poco piovoso" si riferisce al 1° decile di precipitazione mensile attesa, "Normale" si riferisce al 5° decile, mentre "Molto piovoso" al 9° decile. Lo "Scenario atteso" è calcolato utilizzando la precipitazione media mensile prevista dal modello meteorologico numerico di ECMWF Monthly Forecast, opportunamente ri-scalata a livello di singolo bacino.



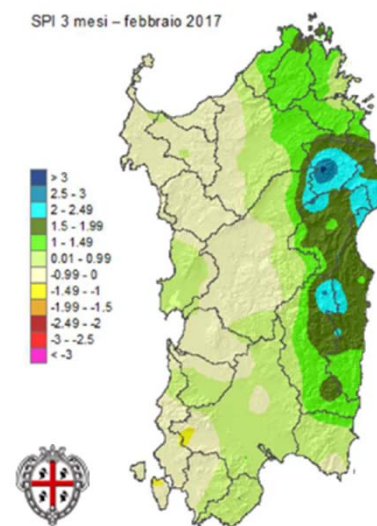
Standardized Precipitation Index - 3 months - Febbraio 2017



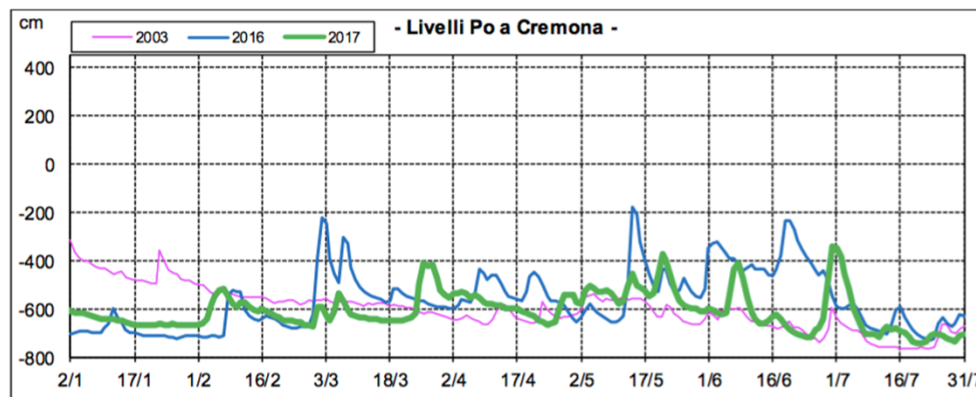
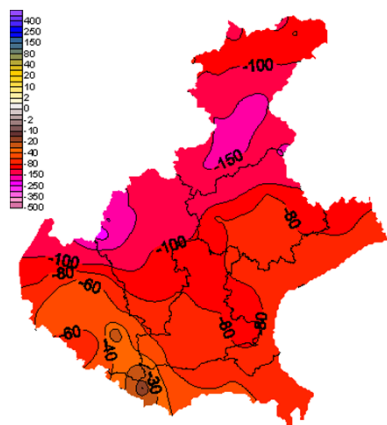
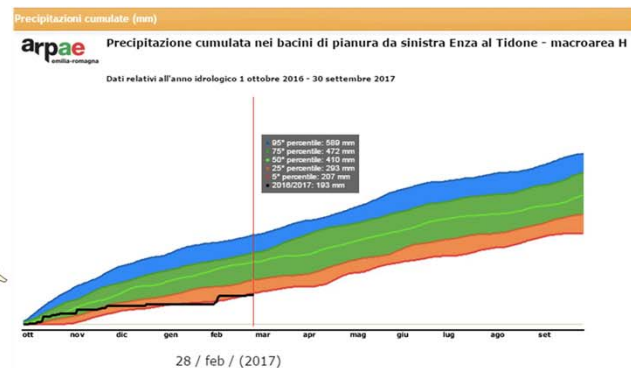
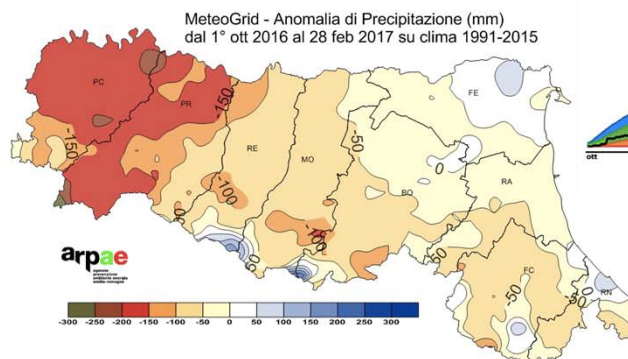
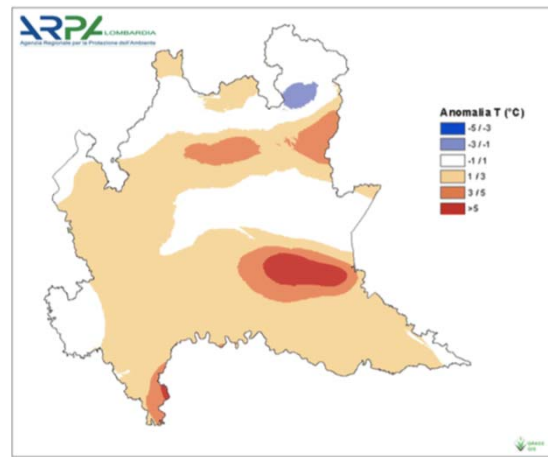
MAPPE DI SPI



SPI 3 mesi - febbraio 2017



Examples of meteo-hydrological maps/indicators at regional level



Italian National Committee for Operational Hydrological Services



ISPRA HIS Sistema informativo idrologico servizio registri Web

Il monitoraggio idrologico italiano viene effettuato mediante una rete federata composta da 19 regioni amministrative e 2 province autonome, insieme con **ISPRA**, che è l'organo tecnico governativo istituito dal Ministero dell'Ambiente italiano.

Il portale fornisce l'accesso alle osservazioni idrologiche in Italia, comunemente pubblicate come Annali idrologici. In particolare, per le osservazioni in situ, fornisce ulteriori capacità operative, quali un registro nazionale di servizio dati, catalogati utilizzando le norme e le procedure della Geospatial Consortium e l'Organizzazione meteorologica mondiale.

Le interfacce pubblicate sul portale permettono di recuperare i dati idrologici regionali direttamente dai fornitori tramite abilitazione e download.



WEB SERVICE CATALOG SYSTEM

Delayed version: 20

➤ <http://www.hiscentral.isprambiente.gov.it/hiscentral/default.aspx>

Network of Observatories for the use of the water resources

- Established in July 2016, after an initiative of the Ministry of Environment and the Italian National Department of Civil Protection.
- Support the management at river basin district level, in particular during drought and water scarcity events.
- Each Observatory includes all the key players at local, regional and national level for the water resources governance that are relevant for the district.
- The Observatories aim at monitoring and forecasting drought and water scarcity situations as well as managing the consequences of such events and reducing their impact on the use and the quality of water resources
- Use consolidated data and drought indicators (incl. those proposed by the WFD CIS “Expert group on Water Scarcity and Drought”).



Network of Observatories for the use of the water resources

- Unlike it could be expected, the northern Italian regions can be also affected by droughts and water scarcity situations.
 - A clear and recent example is provided by the drought situation that has been affecting the entire territory of Italy since the end of 2016, starting from the north-eastern Italy, then the Po valley, and after that the center and the southern Italy.
 - State of emergency has been declared in several parts of Italy (in 11 out of 20 regions) that faced drought due to a shortage of rainfall and also high temperatures.
 - The management of this emergency in terms of
 - ☐ Public water supply
 - ☐ Water resources used for agriculture
 - ☐ Energy productionwas conducted by the Observatories.
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Thanks for the kind attention!
