



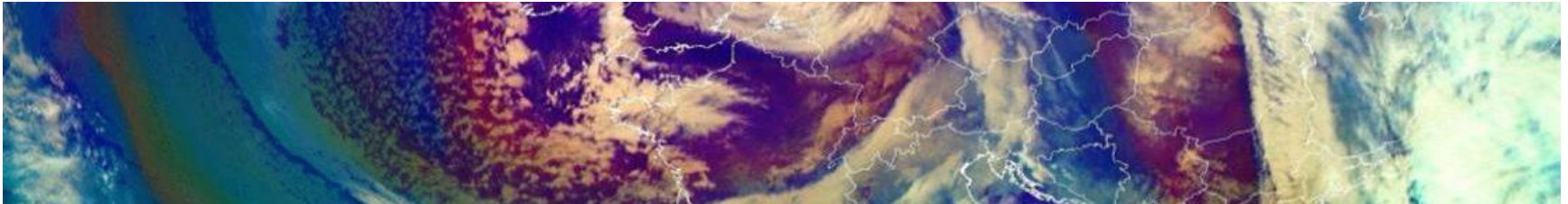
## DWD's climate services for agriculture

- Founded in 1952
- Authority under the Federal Ministry of Digital and Transport (BMDV)
- Headquarters in Offenbach am Main
- 6 branch offices in Hamburg, Potsdam, Leipzig, Essen, Stuttgart and Munich
- Around 2,200 staff members
- Provider of scientific and technical services and with a duty to undertake research
- Represents Germany in international meteorological and climatological organisations

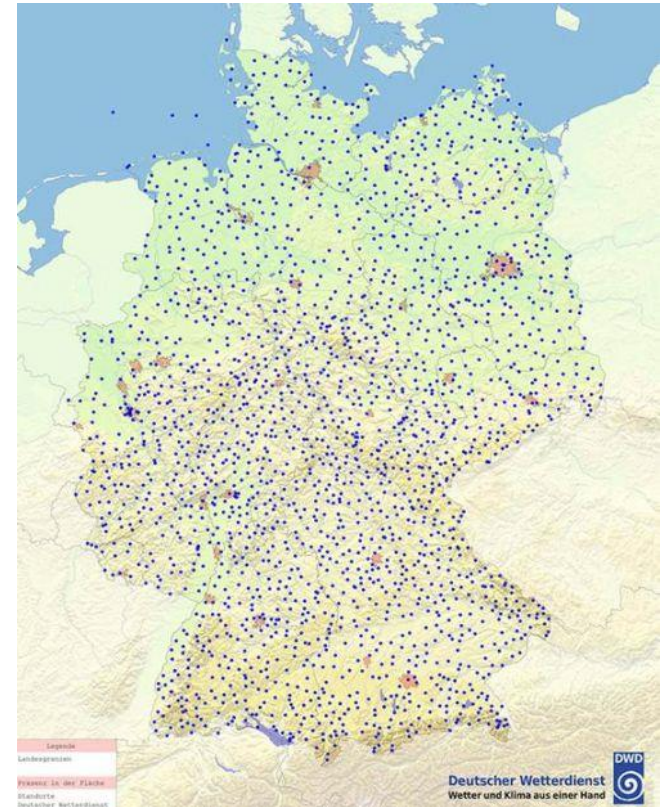


# DWD's core tasks include

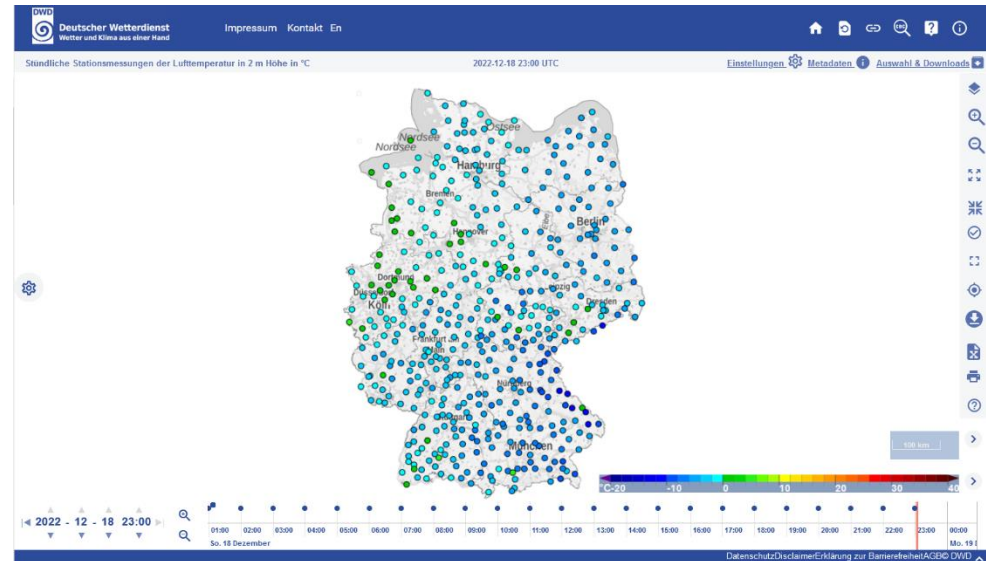
- Observing and forecasting the weather → *We observe.*
- Issuing severe weather warnings → *We warn.*
- Studying the climate in Germany → *We research.*
- Evaluating changes in the climate → *We analyse.*
- Providing climate change consultancy → *We advise.*
- Monitoring radioactivity in the atmosphere → *We measure.*
- Representing Germany in international organisations → *We network.*



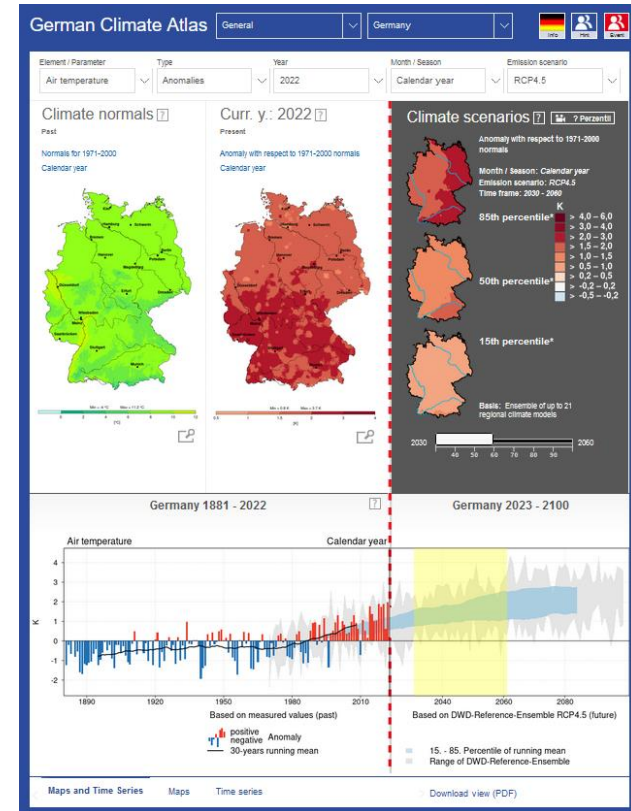
- 180 main weather stations (staffed and automatic)
- 48 stations for measuring radioactivity
- 1,734 voluntary measuring stations
- 1,065 phenological observation sites
- 18 weather radar sites
- 2 meteorological observatories
- 10 upper-air stations (with around 7,500 radiosonde launches every year)
- 2 main shipboard weather stations (staffed)
- 125 automated shipboard weather stations
- 391 ships at sea participating in the WMO Voluntary Observing Ships (VOS) programme



- ➔ DWD's Open-Data-Portal
- ➔ Provisioning of DWD's meteorological observation data to the general public
- ➔ Free text product search
- ➔ Interactive maps of available station/ raster data
- ➔ Possibility to download all station and raster data
- ➔ <https://cdc.dwd.de/portal>



- Regional time series and maps of meteorological observation data
- Climate projection data for different RCP climate scenarios
- Meteorological variables like temperature, precipitation, etc.
- Agrometeorological variables like beginning of vegetation period, fire weather index, etc.
- Includes uncertainties of the climate projection data
- <https://www.dwd.de/klimaatlas>

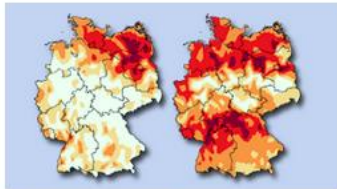


- Breaks down meteorological and climatological information to the agricultural and forestry sector
- Creation and distribution of agrometeorological products for agriculture and forestry
- Consulting of federal agencies, organizations and politics w.r.t. agrometeorological questions
- R&D for a continuous improvement of products and consulting services
- Close cooperation with universities and federal agencies
- Supervision of DWD's phenological observation network
- Four branch offices: Offenbach, Braunschweig, Leipzig, Weißenstephan

# Agrometeorological consulting

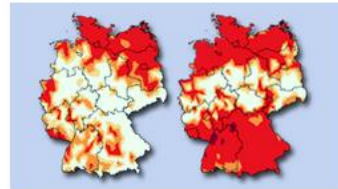


- ➔ Agrometeorological forecasts and reviews in agricultural newspapers and via DWD webportals
- ➔ Warnings related to e.g. frost, forest fires, application of pesticides, etc. (web, newsletters)



Waldbrandgefahrenindex

Index des meteorologischen Potentials für die Gefährdung durch Waldbrand



Graslandfeuerindex

Index für die Feuergefährdung von offenem Gelände



Startseite > Mein Agrarwetter > Agrarwetter

Stationsauswahl

Agrarwetter

Pflanzenbau

Tierhaltung

Rückblicke

Radar und Satellit



Mehr Informationen

Schnellzugriff

DEUTSCHLANDÜBERSICHT

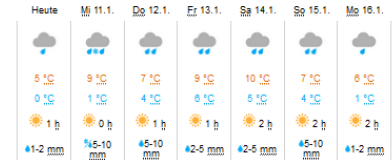
MEIN AGRARWETTER

ALLGEMEINE HINWEISE

Freising-Dürmast (477 m)

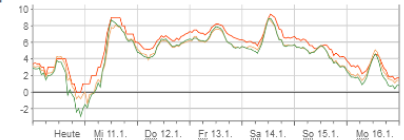
Stationsbetreiber: Deutscher Wetterdienst

Zeitangabe in UTC: 0 h UTC-MESZ-2 bzw. UTC-MEZ-1



Lufttemperatur [°C]

2 m  
5 cm, unbewachsen  
5 cm, Gras



Niederschlag und Verdunstung

Niederschlag [mm]

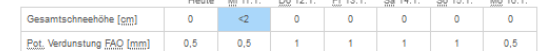


Wahrscheinlichkeit [%]

Niederschlag > 0.2 mm

Niederschlag > 5 mm

Vergangentagefehl



Gesamtsschneehöhe [cm]	0	<2	0	0	0	0	0
Pot. Verdunstung FAO [mm]	0,5	0,5	1	1	1	1	0,5
Klimat. Wasserbilanz [mm]	+1,5	+5	+5	+4	+2,5	+5,5	+0,5





# Agrometeorological information



- ➔ Meteorological variables (station + raster)
- ➔ Soil temperature/ frost
- ➔ Soil moisture
- ➔ Climatic water balance
- ➔ Sowing conditions
- ➔ Application of pestizides
- ➔ Potential occurence of pests
- ➔ ...



Startseite > Mein Agrarwetter > Agrarwetter

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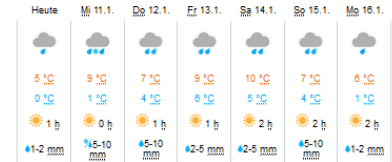
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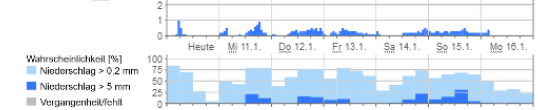
Lufttemperatur [°C]

2 m  
5 cm, unbewachsen  
5 cm, Gras



Niederschlag und Verdunstung

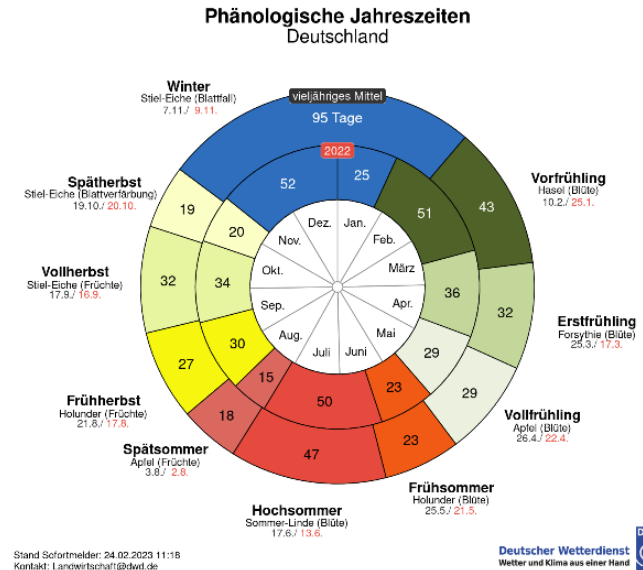
Niederschlag [mm]



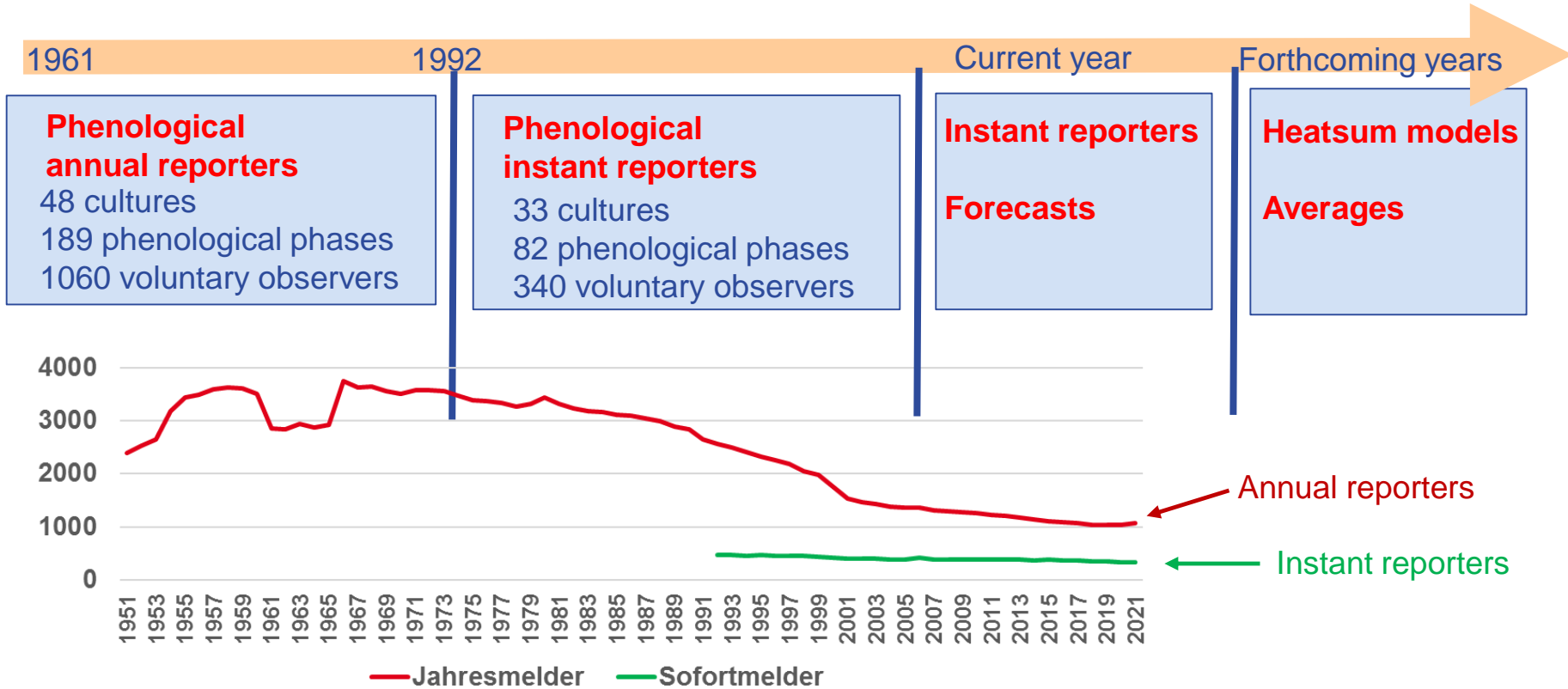
	Heute	Mi 11.1.	Do 12.1.	Fr 13.1.	Sa 14.1.	So 15.1.	Mo 16.1.
Gesamtsschneehöhe [cm]	0	<2	0	0	0	0	0
Pot. Verdunstung FAO [mm]	0,5	0,5	1	1	1	1	0,5
Klimat. Wasserbilanz [mm]	+1,5	+5	+5	+4	+2,5	+5,5	+0,5



- DWD operates one of the densest phenological observation networks
- >1000 voluntary observers (annual and instant)
- Observers monitor phenological stages of >33 plants
- Data are used for climate monitoring and as a driver for agrometeorological impact models

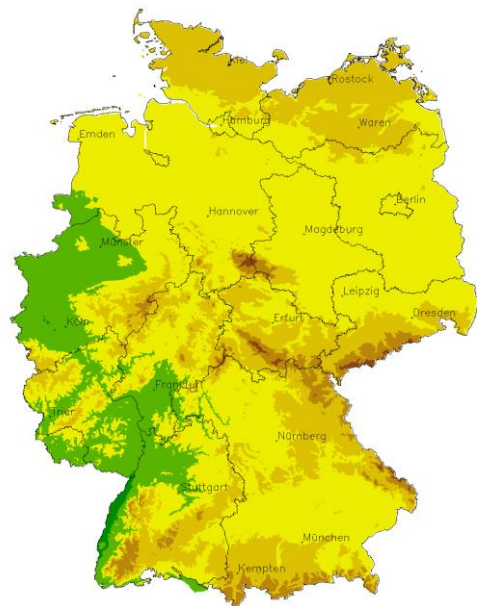


# Time scales of phenological data

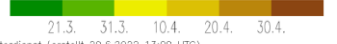
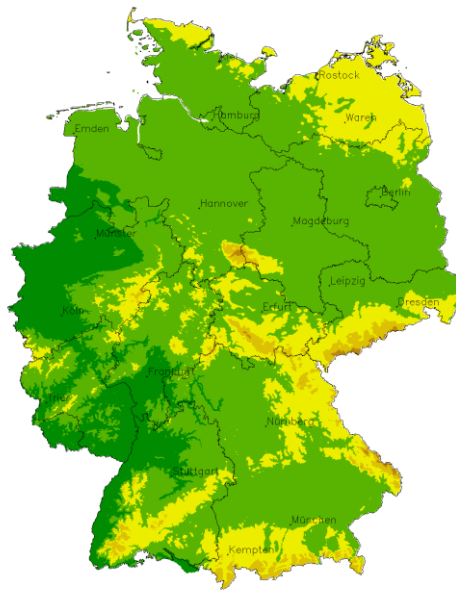


# Shifts in the start of the vegetation period

1961 - 1990 Long-year average 1991 - 2020

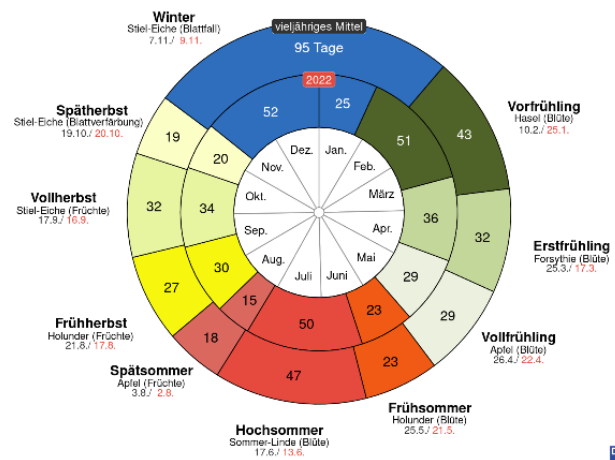


Deutscher Wetterdienst (erstellt 29.6.2022 13:07 UTC)  
 Geobasisdaten © Bundesamt für Kartographie und Geodäsie ([www.bkg.bund.de](http://www.bkg.bund.de))



Deutscher Wetterdienst (erstellt 29.6.2022 13:09 UTC)  
 Geobasisdaten © Bundesamt für Kartographie und Geodäsie ([www.bkg.bund.de](http://www.bkg.bund.de))

Phänologische Jahreszeiten  
 Deutschland



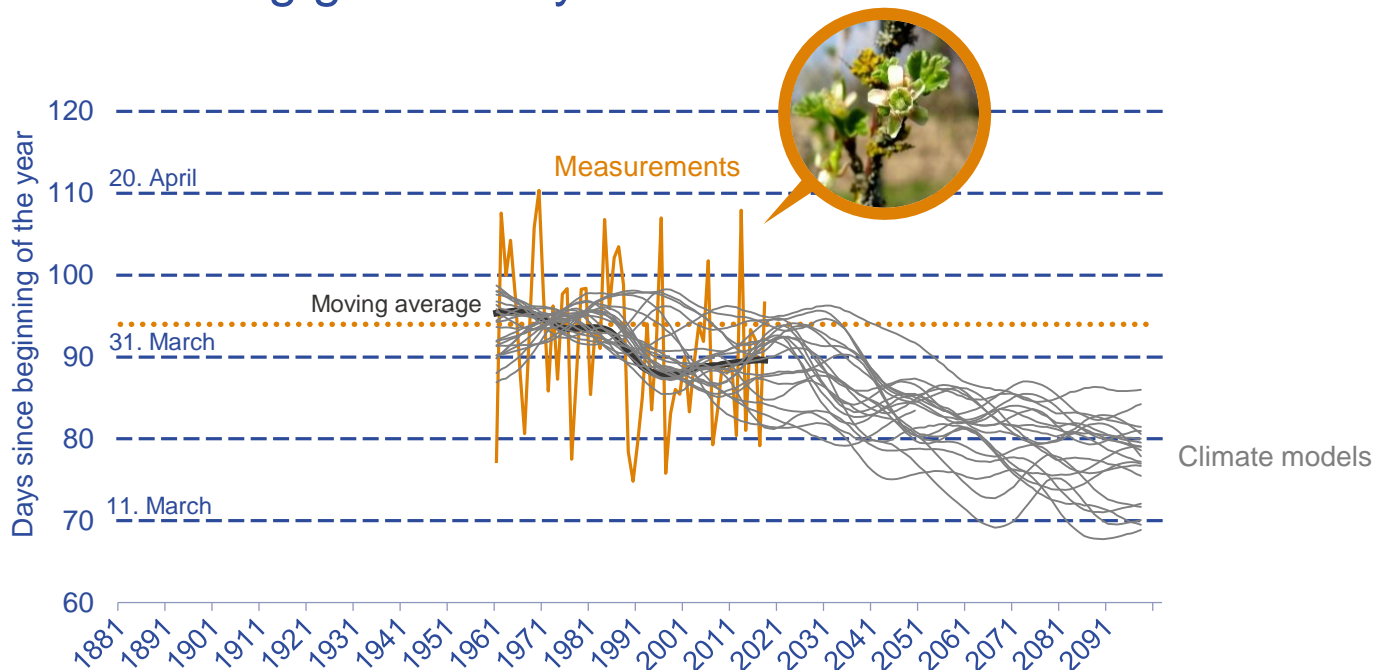
Stand Sofortmelder: 24.02.2023 11:18  
 Kontakt: [Landwirtschaft@dwd.de](mailto:Landwirtschaft@dwd.de)

Source: DWD



# Shifts in the start of the vegetation period

## Leaf unfolding gooseberry

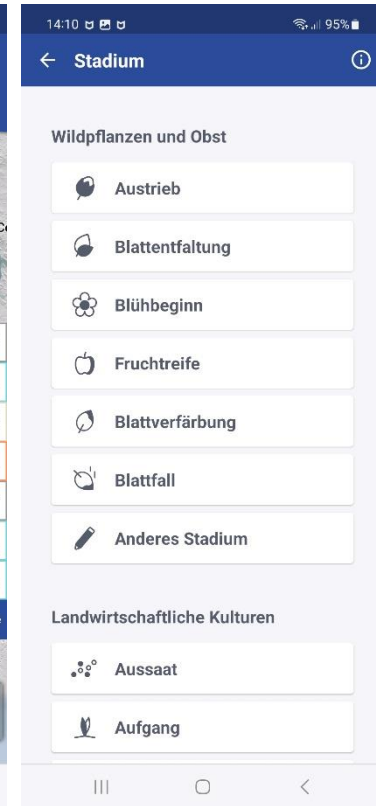
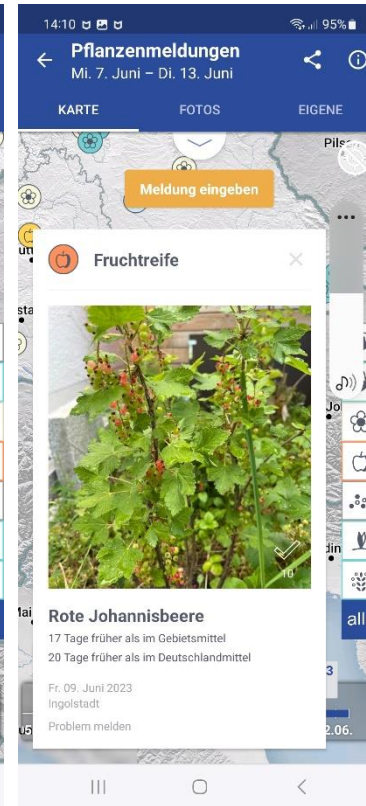
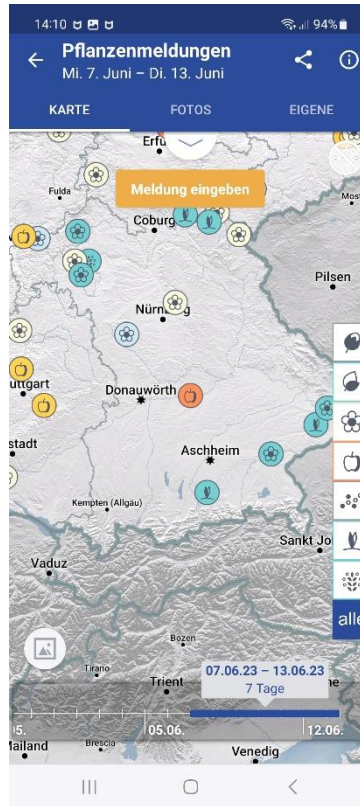


Source Graphics DWD, Picture: DWD / Hans-Richard Henkes



# Crowd-sourcing of phenological data

- ➔ „DWD-Warnwetter-App“ allows citizens to submit phenological observations (anonymously)
- ➔ Pre-selected phenological stages for agricultural and wild plants (similar to standard phenological observation program)
- ➔ Optional upload of pictures



# Soil moisture viewer

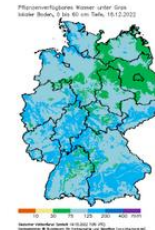
- ➔ Daily German-wide calculation of soil moisture (1km raster) based on meteorological observations and forecasts with the impact model AMBAV
- ➔ Provisioning of static and interactive maps of soil moisture distribution, water balance, etc. (up to 2m depth)
- ➔ Modelled soil moisture time series for selected DWD-stations
- ➔ Statistical evaluation of current soil moisture situation
- ➔ Data available since 1991



Bodenfeuchteanalyse



Interaktive Karten und Profile



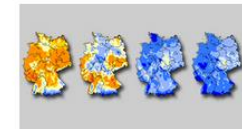
Bodenwasseranalyse



Niederschlagsanalyse



Zeitreihen der Bodenfeuchte

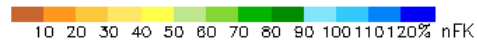
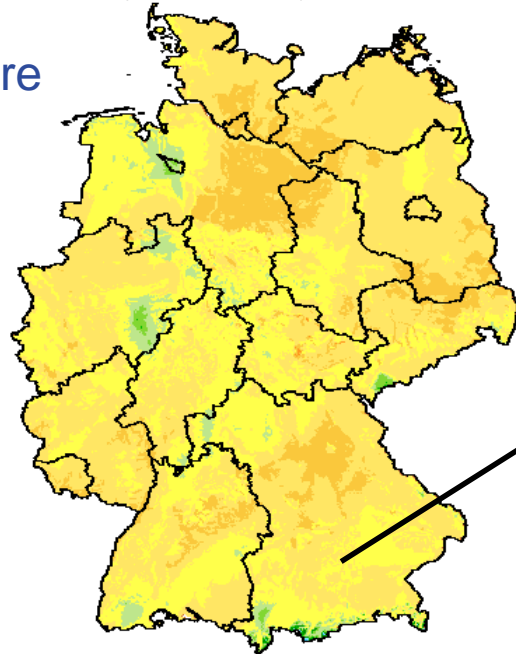


Klimatische Wasserbilanz

# Soil moisture viewer

Bodenfeuchte unter Gras (aktuell)  
lokaler Boden, 0 bis 60 cm Tiefe, 20.06.2023

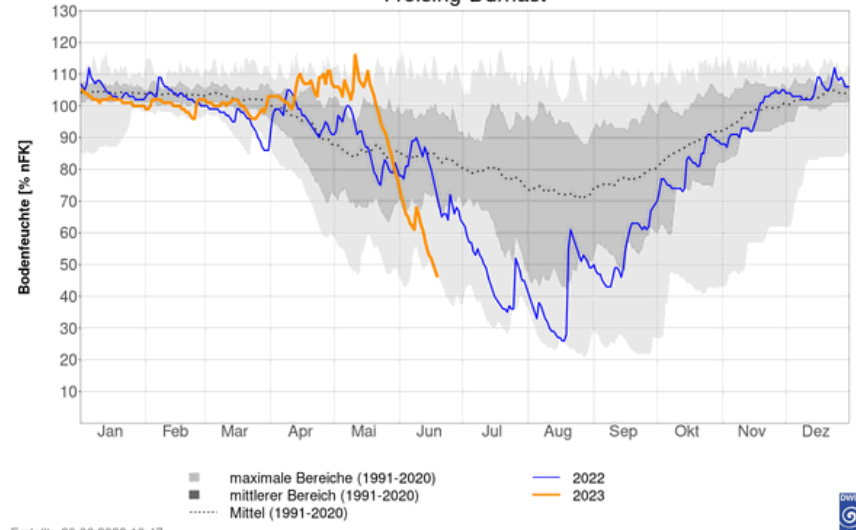
## Soil moisture



Deutscher Wetterdienst (erstellt 21.6.2023 7:18 UTC)  
Geobasisdaten © Bundesamt für Kartographie und Geodäsie ([www.bkg.bund.de](http://www.bkg.bund.de))



Bodenfeuchte unter Gras (sandiger Lehm, 0-60 cm Tiefe)  
Freising-Dürnast



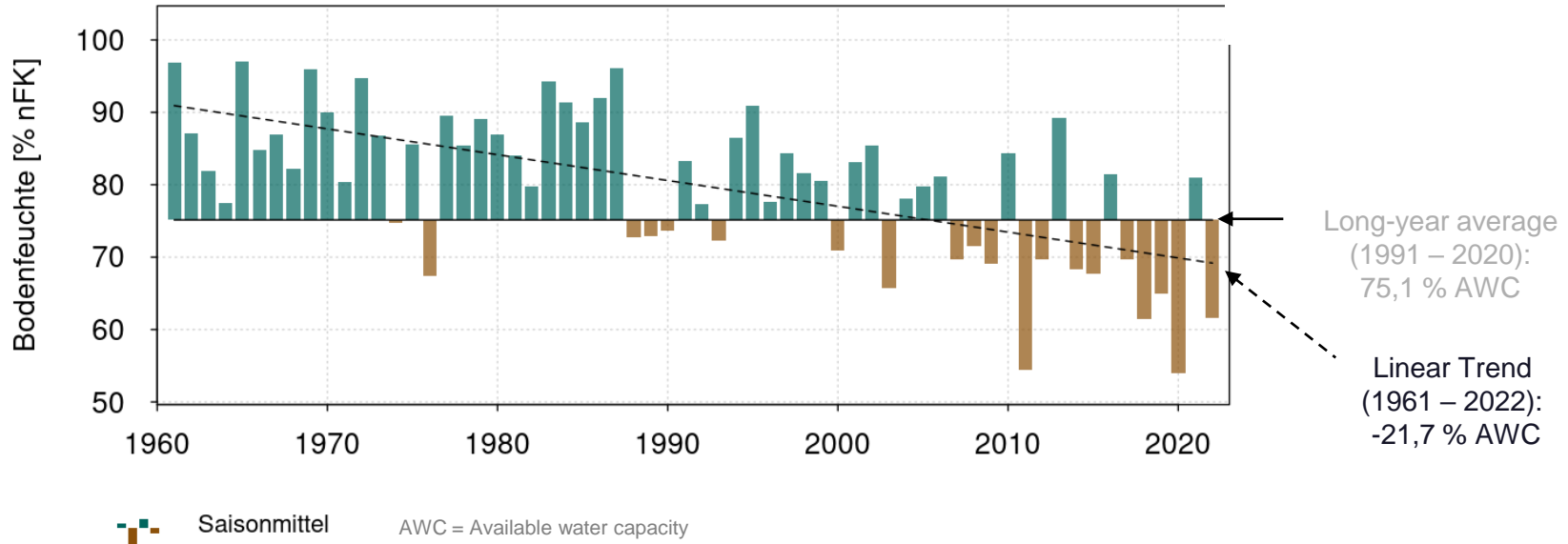


# Average soil moisture under grass



## Mittlere Bodenfeuchte unter Gras

Bodenart: lokaler Boden | Tiefe: 0 bis 60 cm  
Zeitraum: April - Juni | Gebiet: Deutschland



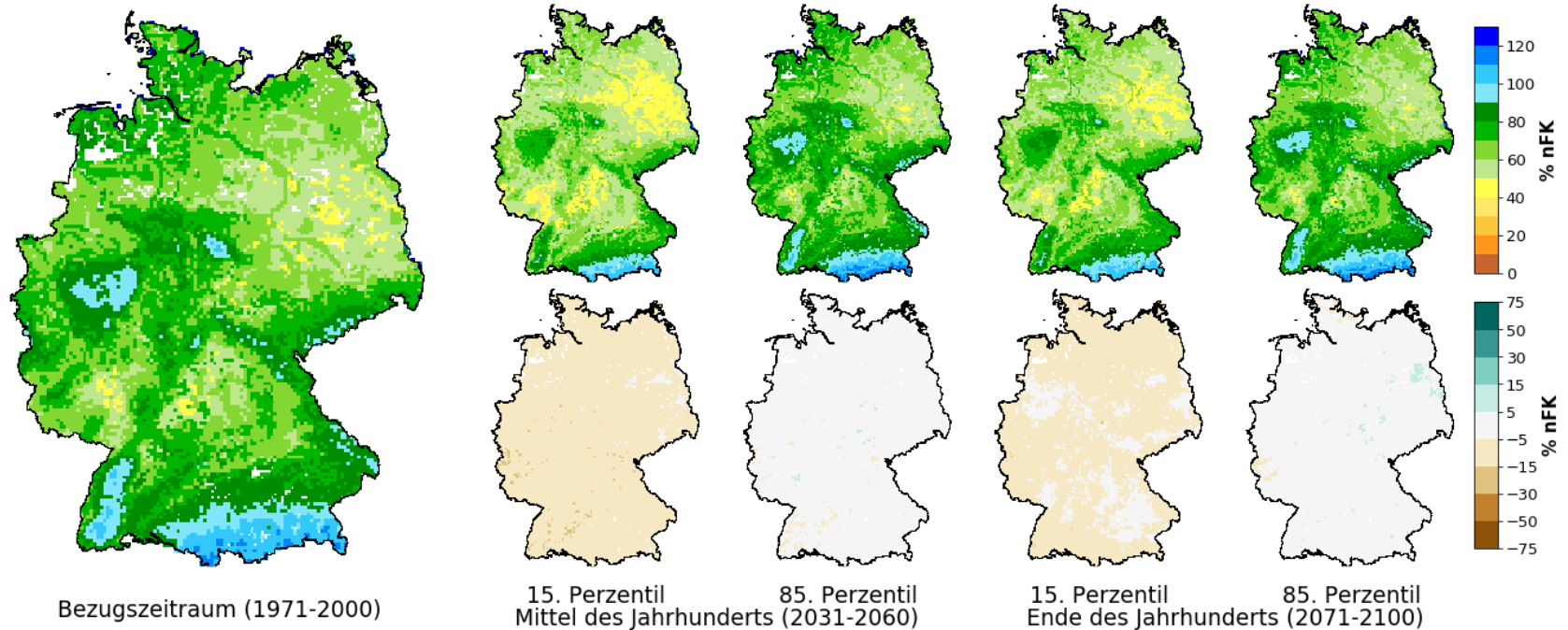
Source: DWD

Erstellt: 14.03.2023 08:28

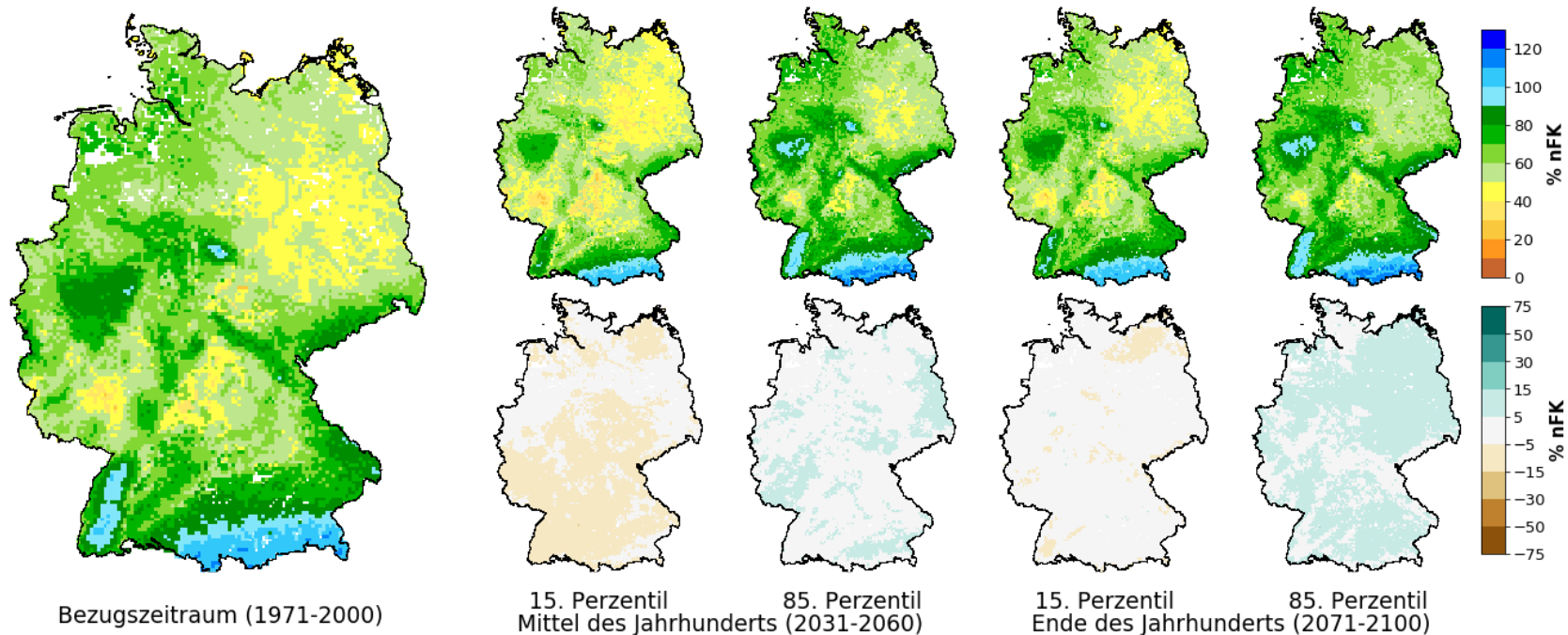


# Soil moisture under maize JJA RCP 4.5

Bodenfeuchte unter Silomais im Sommer für RCP Szenario rcp45



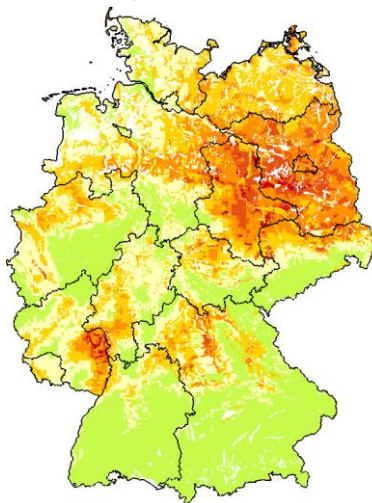
Bodenfeuchte unter Winterweizen im Sommer für RCP Szenario rcp45



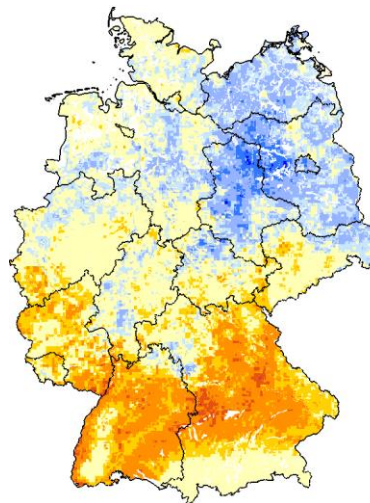
# Changes in number of days < 30% AWC

AWC < 30 % in soil layers 0-60cm under winter wheat from April until October

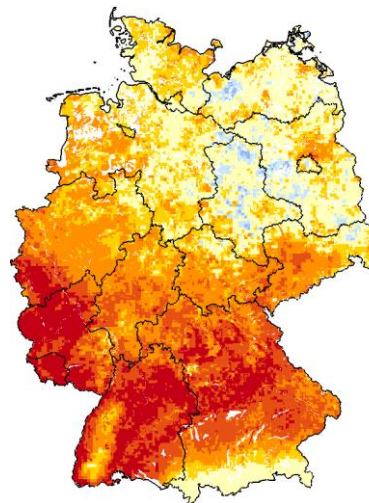
Average 1971-2000



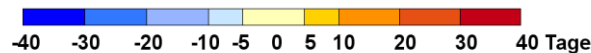
2031-2060



2071-2100



RCP 8.5  
Scenario



- Provide German-wide soil moisture projections for crops and forests
- Extrapolation/ prediction of phenological states for different time scales/ regions
- Establish a soil moisture monitoring network at selected DWD stations
- Monitoring of root distribution to improve parameterization in water balance models
- Evaluation of climate-adapted cultivation methods (e.g. catch crops, soil amendments)
- Long-term observation of climate change mitigation measures (e.g. rewetting of wetlands)

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