

ASSESSMENT OF HEALTH RISKS FROM ALLERGENIC PLANTS, ANIMALS AND VECTOR BORNE DISEASES IN RHINELAND-PALATINATE UNDER CLIMATE CHANGE CONDITIONS

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Rhineland-Palatinate Centre of Excellence
for Climate Change Impacts



Rheinland-Pfalz

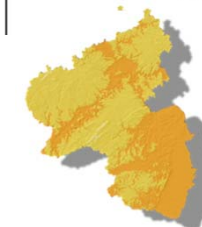


Landesforsten
Rheinland-Pfalz

Climate change in Rhineland-Palatinate

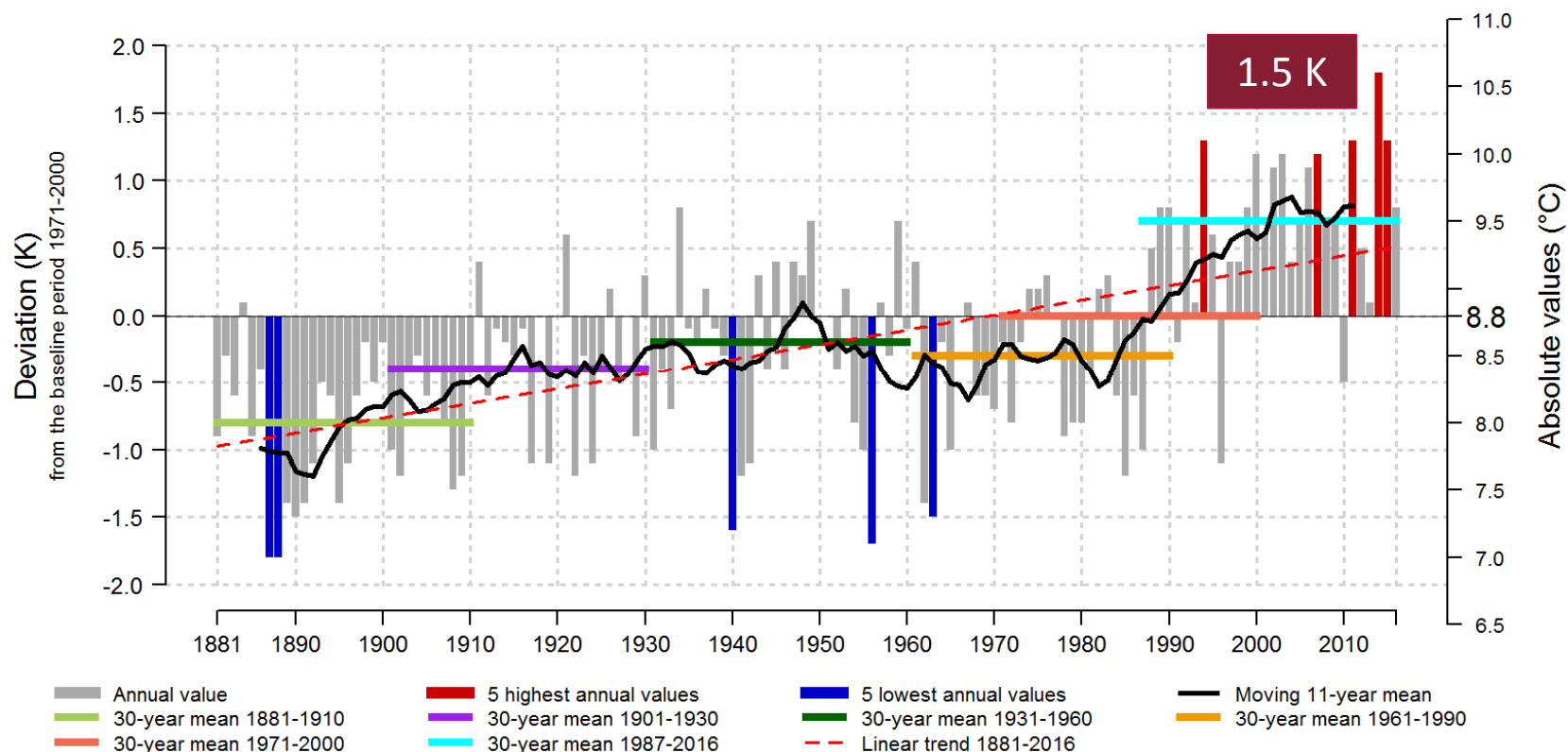


Rheinland-Pfalz



Temperature since 1881

Time series of the temperature in the calendar year in Rhineland-Palatinate



- Annual value
- 5 highest annual values
- 5 lowest annual values
- Moving 11-year mean
- 30-year mean 1881-1910
- 30-year mean 1901-1930
- 30-year mean 1931-1960
- 30-year mean 1961-1990
- 30-year mean 1971-2000
- 30-year mean 1987-2016
- Linear trend 1881-2016

The moving mean relates to the period 5 years before until 5 years past the year indicated. The dashed red line shows the significant linear trend (5% significance level).

Data source: German Meteorological Service (DWD)

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Climate change in Rhineland-Palatinate



Long-term averages of the air temperature



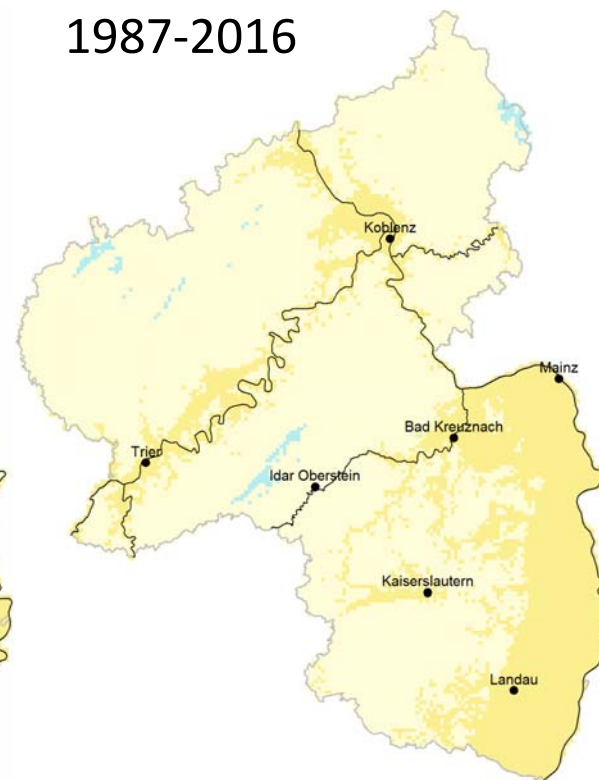
1881-1910



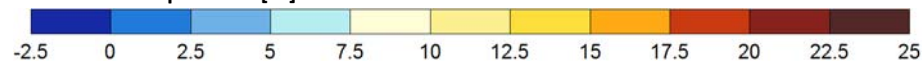
1931-1960



1987-2016



Mean air temperature [°C]



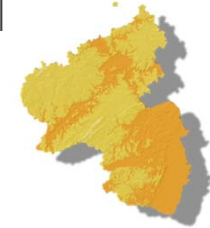
Data source: German Meteorological Service (DWD) © RLP Centre of Excellence for Climate Change Impacts (www.kwis-rlp.de)

Climate change in Rhineland-Palatinate

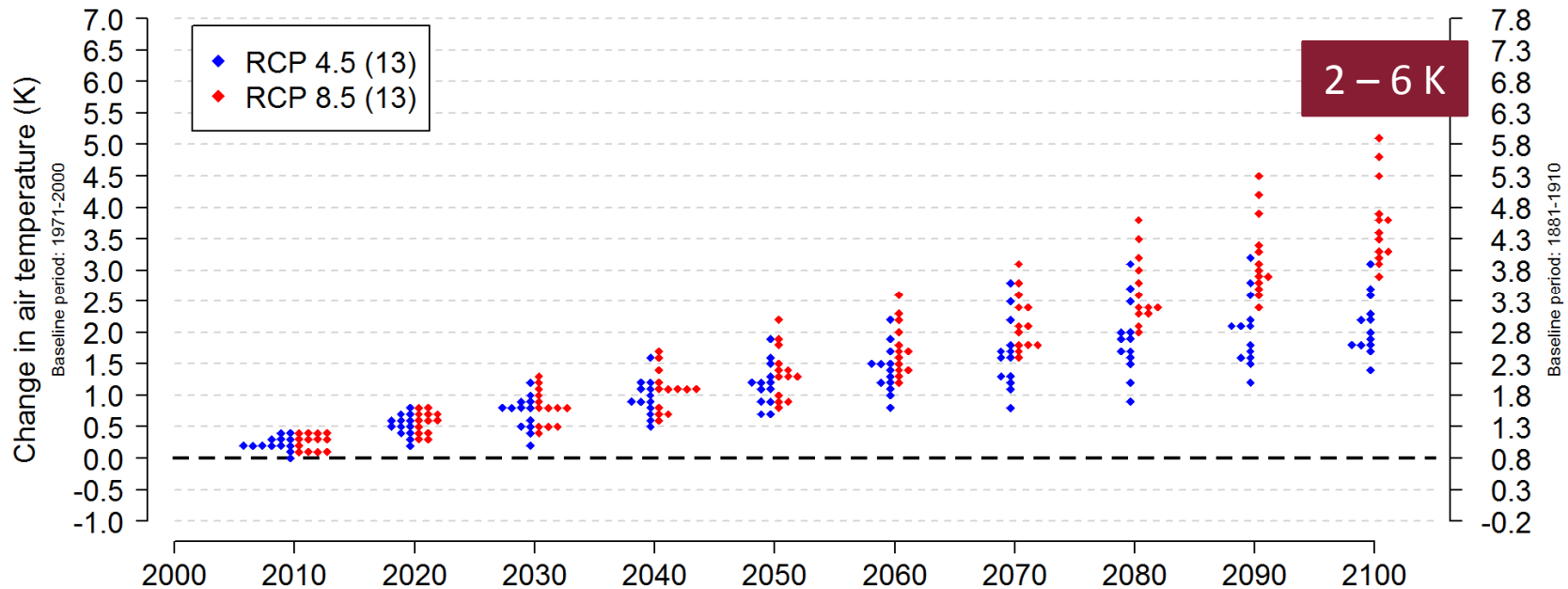


Rheinland-Pfalz

Temperature projections



Ensemble of projected change in air temperature of the calendar year for Rhineland-Palatinate



Shown are 30-year means of the deviation from the mean 1971-2000. They refer to the period up to the year printed.
An ensemble is a multiplicity of climate projections (the number indicates the number of climate projections).

Data sources: German Meteorological Service (DWD), CORDEX

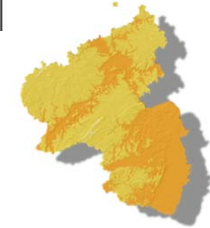
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Climate change in Rhineland-Palatinate

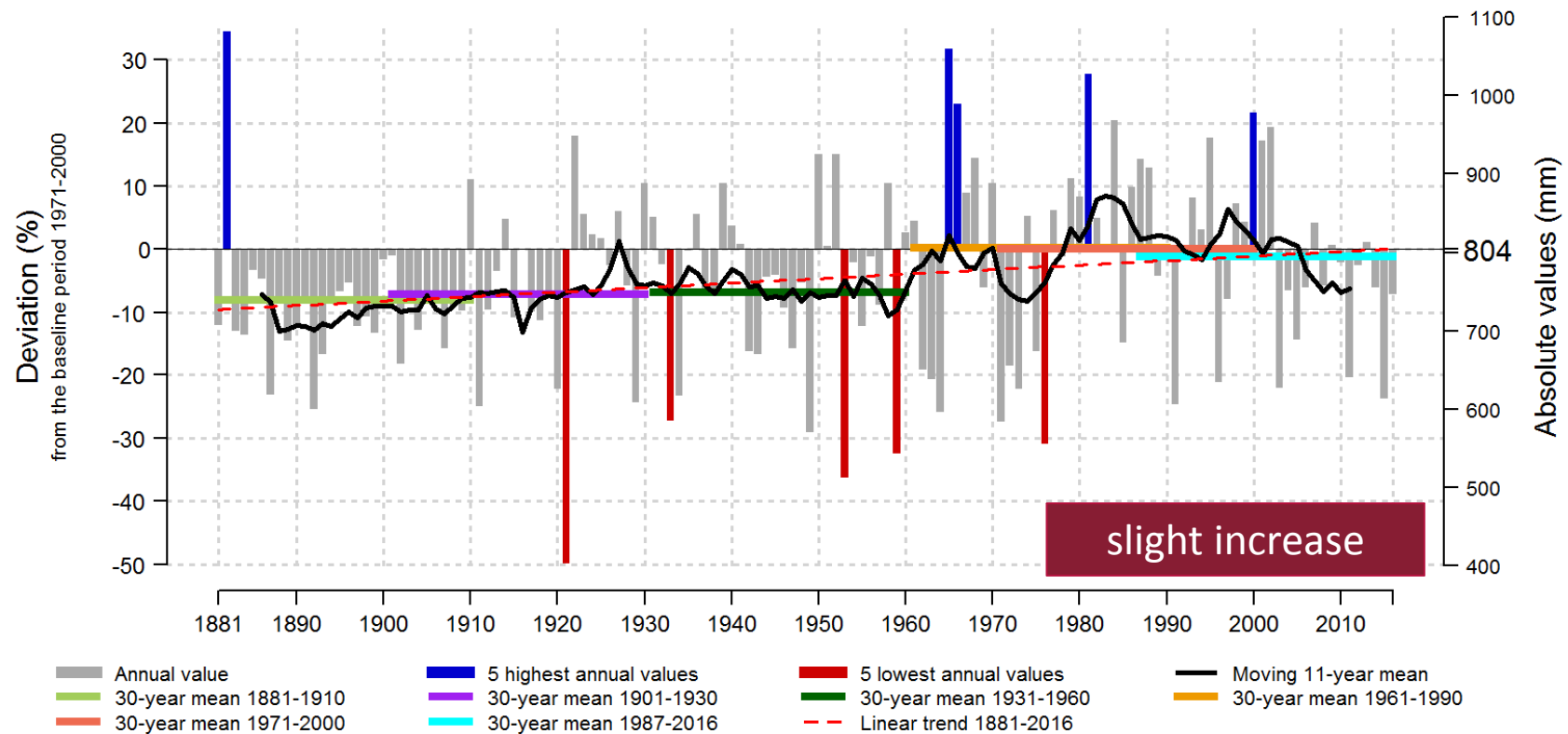


Rheinland-Pfalz

Precipitation since 1881



Time series of the precipitation sum in the calendar year in Rhineland-Palatinate

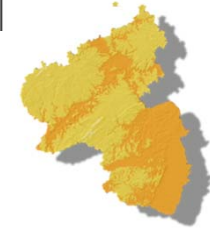


The moving mean relates to the period 5 years before until 5 years past the year indicated. The dashed red line shows the significant linear trend (5% significance level).

Data source: German Meteorological Service (DWD)

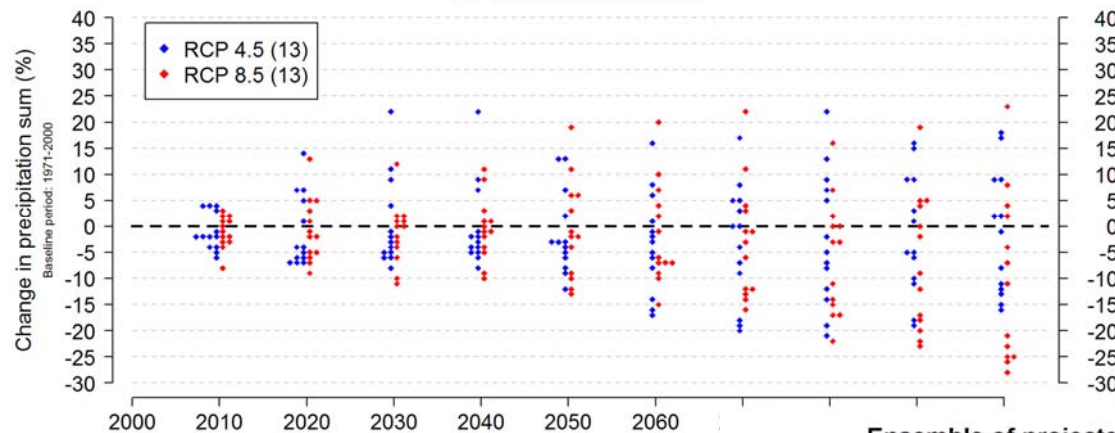
© RLP Centre of Excellence for Climate Change Impacts (www.kwis-rlp.de)

Climate change in Rhineland-Palatinate



Precipitation projections

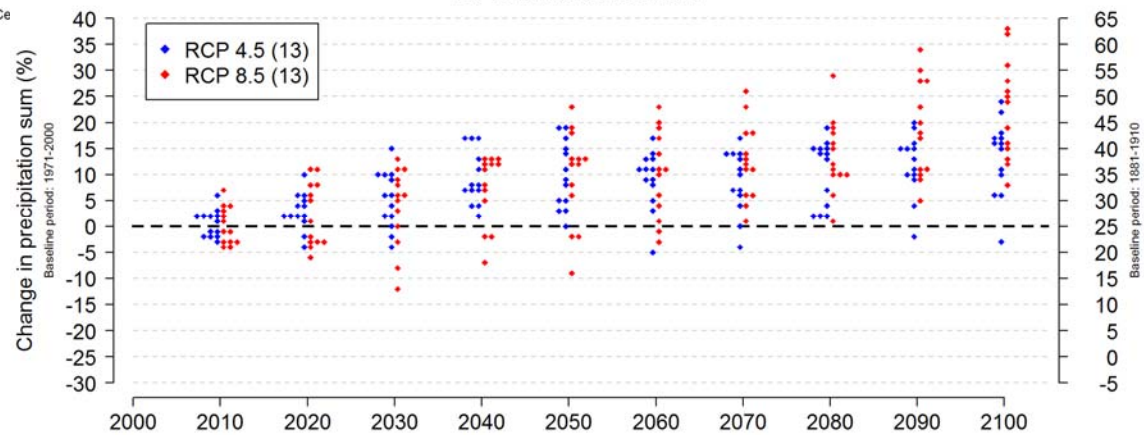
Ensemble of projected change in precipitation sum during summer (JJA)
for Rhineland-Palatinate



summer
tendency unclear

winter
increase is likely

Ensemble of projected change in precipitation sum during winter (DJF)
for Rhineland-Palatinate



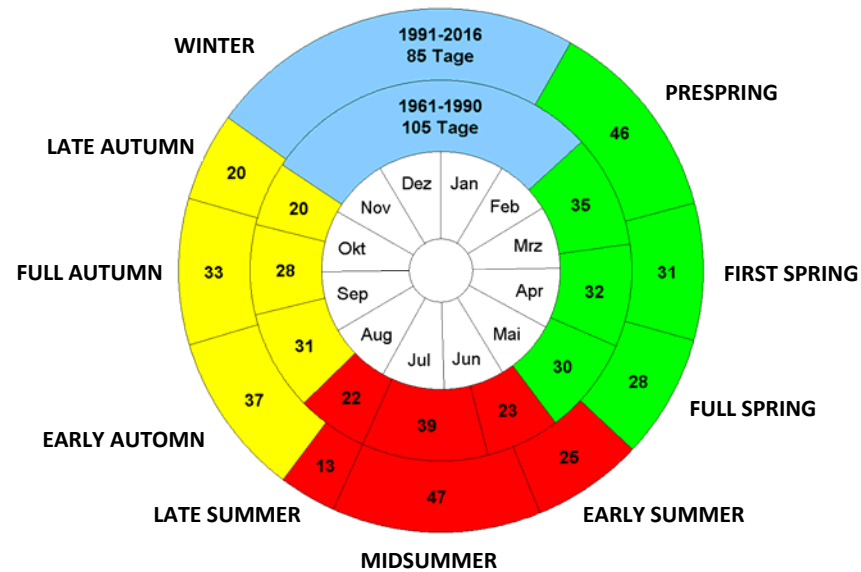
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Data sources: German Meteorological Service (DWD), CORDEX © RLP Ce

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Data sources: German Meteorological Service (DWD), CORDEX © RLP Centre of Excellence for Climate Change Impacts (www.kwis-rp.de)

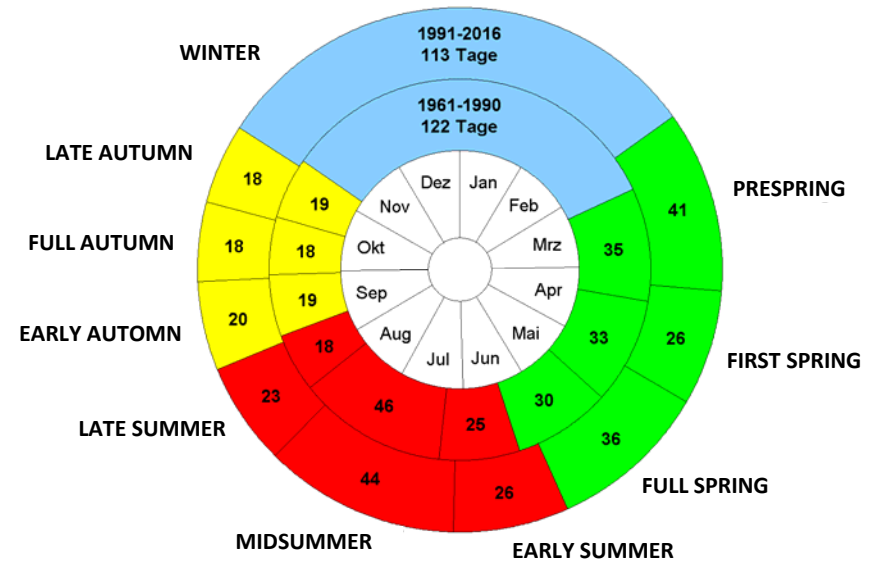
Climate change in Rhineland-Palatinate

Phenological changes

NORTHERN UPPER RHINE PLAIN



WESTERN EIFEL



Data source: German Meteorological Service © RLP Centre of Excellence for Climate Change Impacts (www.kwis-rlp.de)

Allergenic species – pollen count

Common ragweed *Ambrosia artemisiifolia*



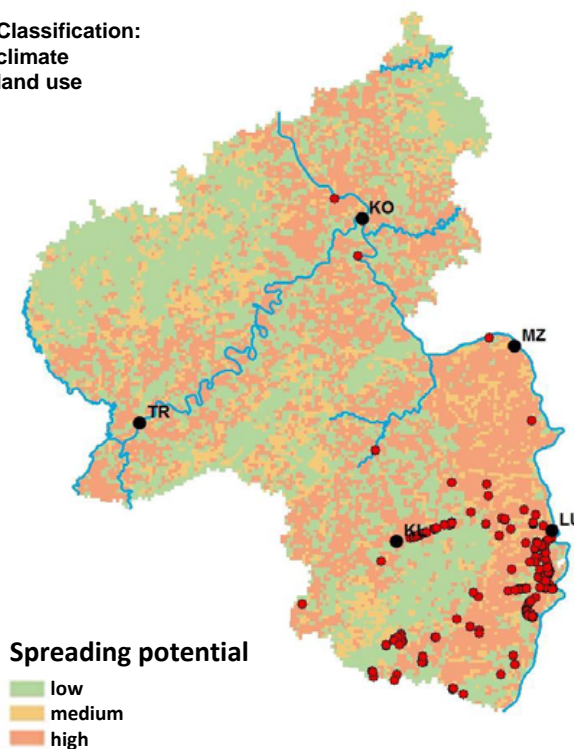
Special focus in Rhineland-Palatinate:

- Former military areas in the Haardt uplands – changes in land use
- Spread from grazing areas for game
- Dispersion by forestry and agricultural machinery
- Identification of unknown occurrences (e.g. agricultural areas)
- Public awareness

2071-2100

Actual distribution and spreading potential of
A. artemisiifolia in RLP in climate conditions
of the far future
(WETTREG2006, Scenario A1B normal, 2071-2100)

Classification:
climate
land use



Factors for enhanced spreading potential

- CO₂-concentration
- temperature
- extended vegetation period

Dr. C. Buhk
Research project
University of Koblenz and Landau

Allergenic species – nettle toxins

Oak processionary *Thaumetopoea processioneae*



© M. Utsch

Survey is currently running



Occurrence

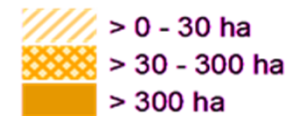


Health issues



Infested areas with harm grade 2:

„Economically perceptible harms“



© FVA Freiburg

Vector borne diseases

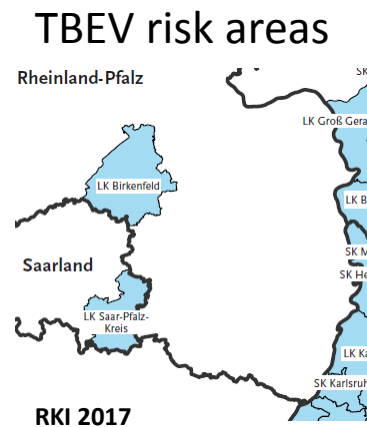
Ticks *Ixodes ricinus*, *Dermacentor reticulatus*, *D. marginatus*

Parasitol Res. 2016 Mar;115(3):1167-72. doi: 10.1007/s00436-015-4852-x. Epub 2015 Dec 8.

Tick survey for prevalent pathogens in peri-urban recreation sites in Saarland and Rhineland-Palatinate (Germany).

Mehlhorn H¹, Mehlhorn T², Müller M³, Vogt M⁴, Rissland J³.

| Mean prevalence rate in <i>Ixodes ricinus</i> | | |
|---|-----------------|-------|
| <i>Anaplasma</i> | <i>Borrelia</i> | TBEV |
| 1.3 % | 21 % | 0.1 % |

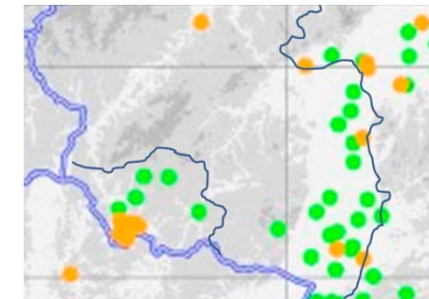


TBEV sites corresponding to risk areas

→ Local infection



Distribution of *Dermacentor*



Rubel et al., 2016, modified (doi: 10.1016/j.ttbdis.2015.10.015)

- *D. reticulatus*
- *D. marginatus*

Vector borne diseases

Ticks - *Bienwald* Survey



Bank vole



I. ricinus

Larvae, Nymphs

Taraschewski & Petney 2014
Research project
Karlsruhe Institute of Technology (KIT)

Roe deer
Boar



I. ricinus

Adults, (Nymphs)

58 % / 40 % *Rickettsia*, **no *Borrelia***

Lamb

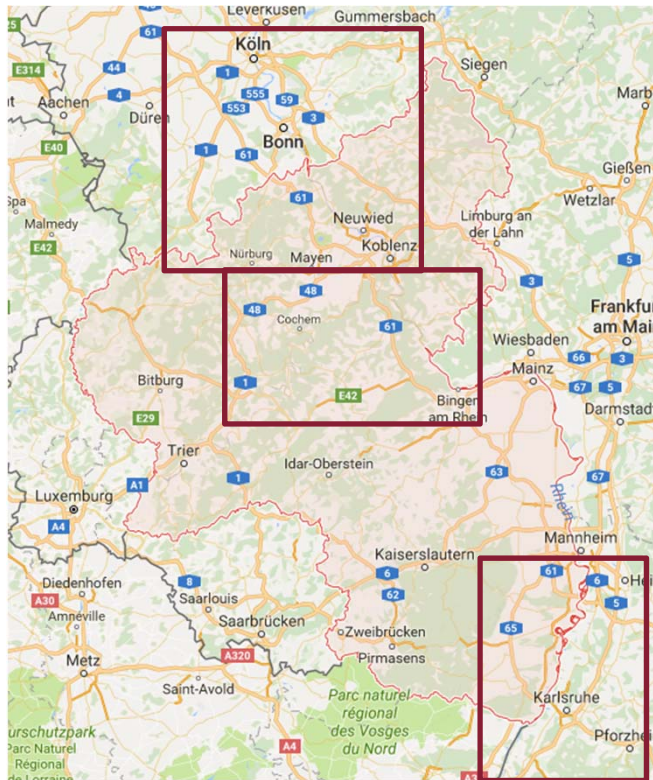


I. ricinus, *D. marginatus*, *Ixodes spec.*

Borrelia, *Rickettsia*: 18, 92 % (*Ir*) / 5, 10 % (*Dm*)

Vector borne diseases

Asian mosquitoes *Aedes japonicus japonicus* / *Aedes albopictus*



Aedes japonicus japonicus



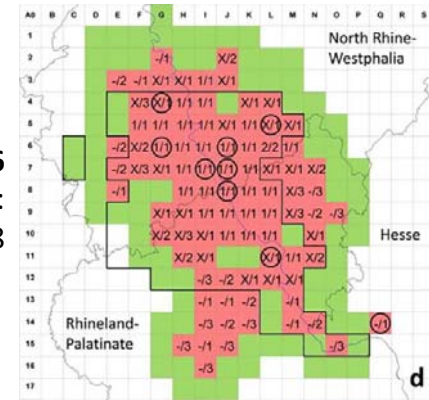
© KABS

Aedes albopictus



© KABS

Kampen *et al.* 2016
 PLoS ONE 11(12):
 e0167948



Heidelberg 2016:
larvae hatched in a rain barrel
 → **successful overwintering!**

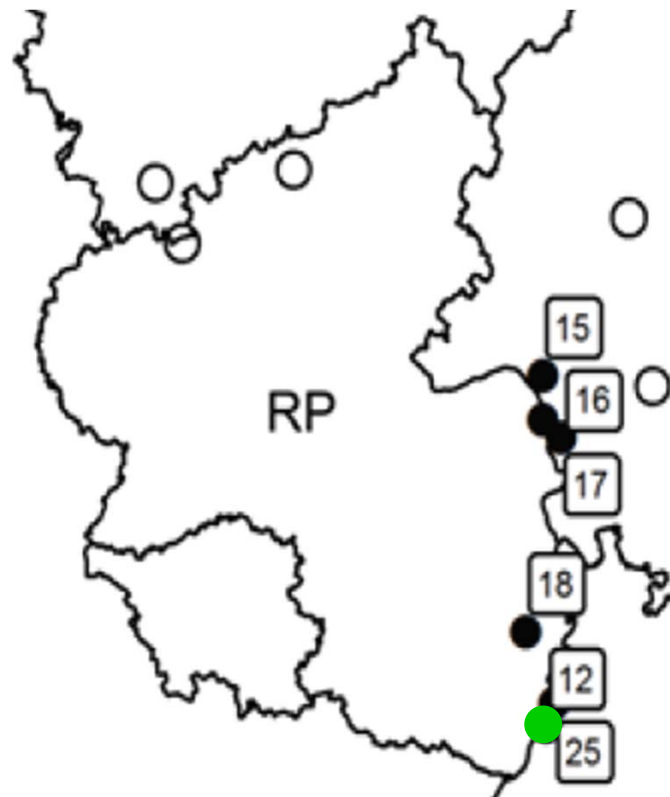
Pluskota *et al.* 2016, Parasitol Res 115: 3245.

Vector borne diseases

New mosquitoes & their pathogens *Anopheles* & *Dirofilaria*



Anopheles daciae



Schaefer (Kronefeld) 2014
Dissertation

**First record
germany 2012**



● **Karlsruhe:**
Dirofilaria repens in
Anopheles daciae

Kronefeld et al. 2014
Parasites & Vectors, 7:30

(cc) by R. Chan

Health risks in Rhineland-Palatinate by plants, animals, and pathogens



Assorted samples ...

Increased pollen count

phenological changes, ambrosia occurrence


Oak processionary

increasing prevalence, occurrence in cities, mass occurrence

Ticks

new species, new pathogens

Mosquitoes

 new species, new pathogens



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Thanks
for your
attention!