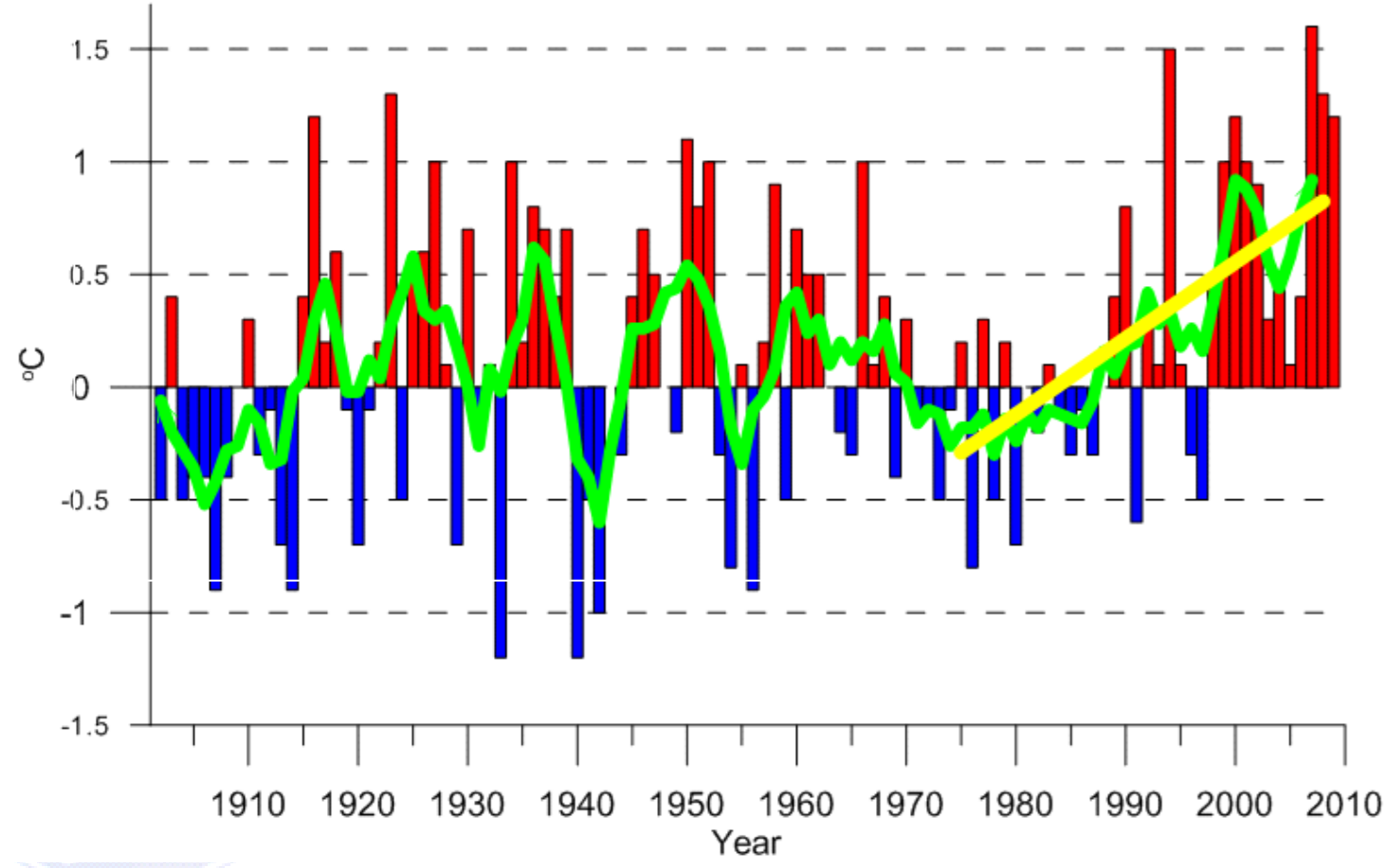


Climate variability and change in Bulgaria and related drought impacts on crops

Vesselin Alexandrov and Tihomir Denev

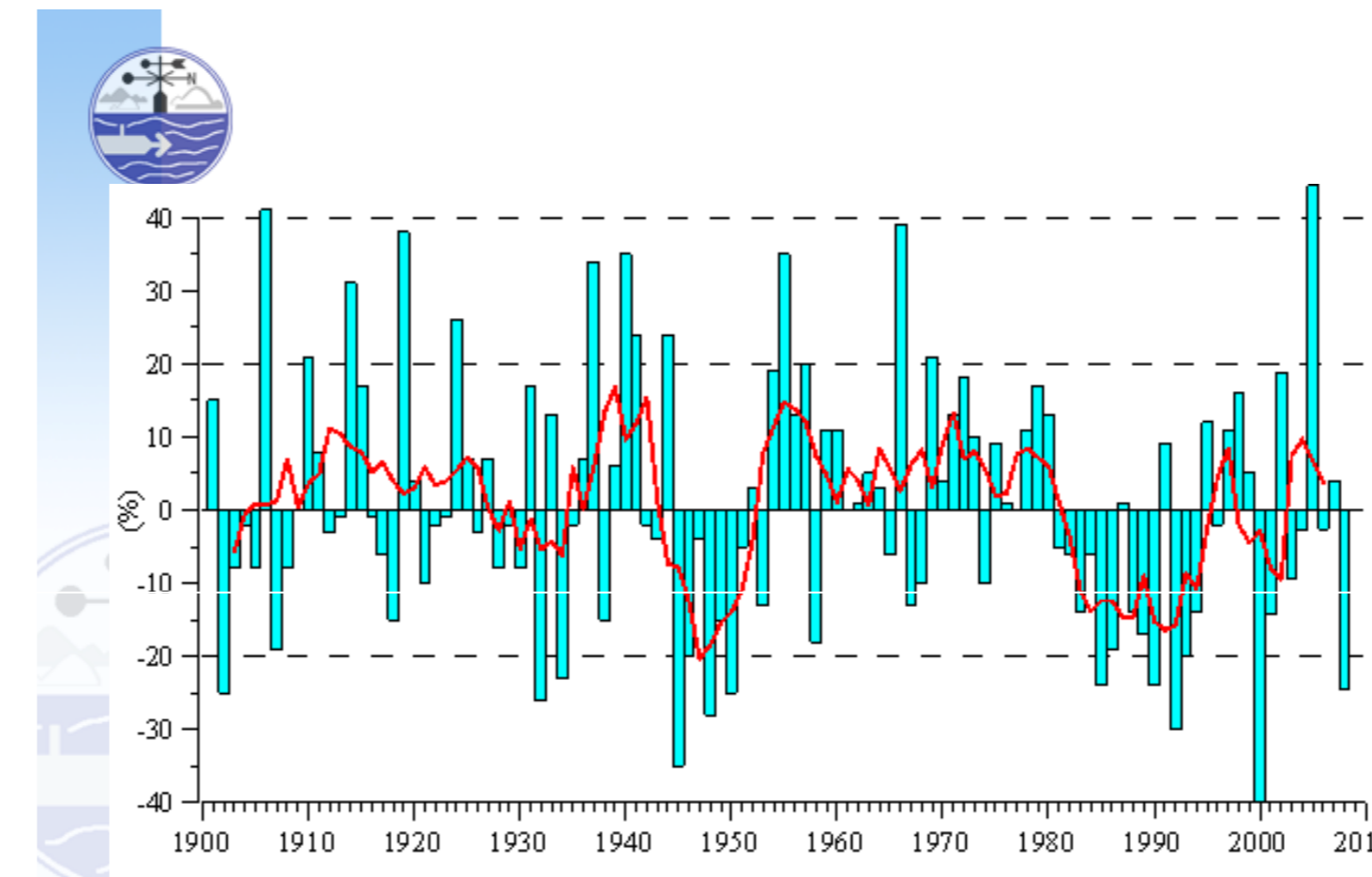
National Institute of Meteorology and Hydrology - Bulgarian Academy of Sciences



Anomalies of air temperature in Bulgaria relative to 1961-1990



Contemporary climate wake-up call: warming with increased extreme frequency



Anomalies of precipitations relative to 1961-1990

Data for Bulgaria

- The longest periods of drought have been during 1940s and the last two decades of 20th century. Most significant droughts took place in 1945 and 2000

No rain, no water for hundreds of thousands of Bulgarians

by Staff Writers
Sofia (AFP) Aug 31, 2008
Summer drought, lagging dam construction and persistent leaks and failures in old pipes have again made water rationing a part of life for hundreds of thousands of Bulgarians this summer.

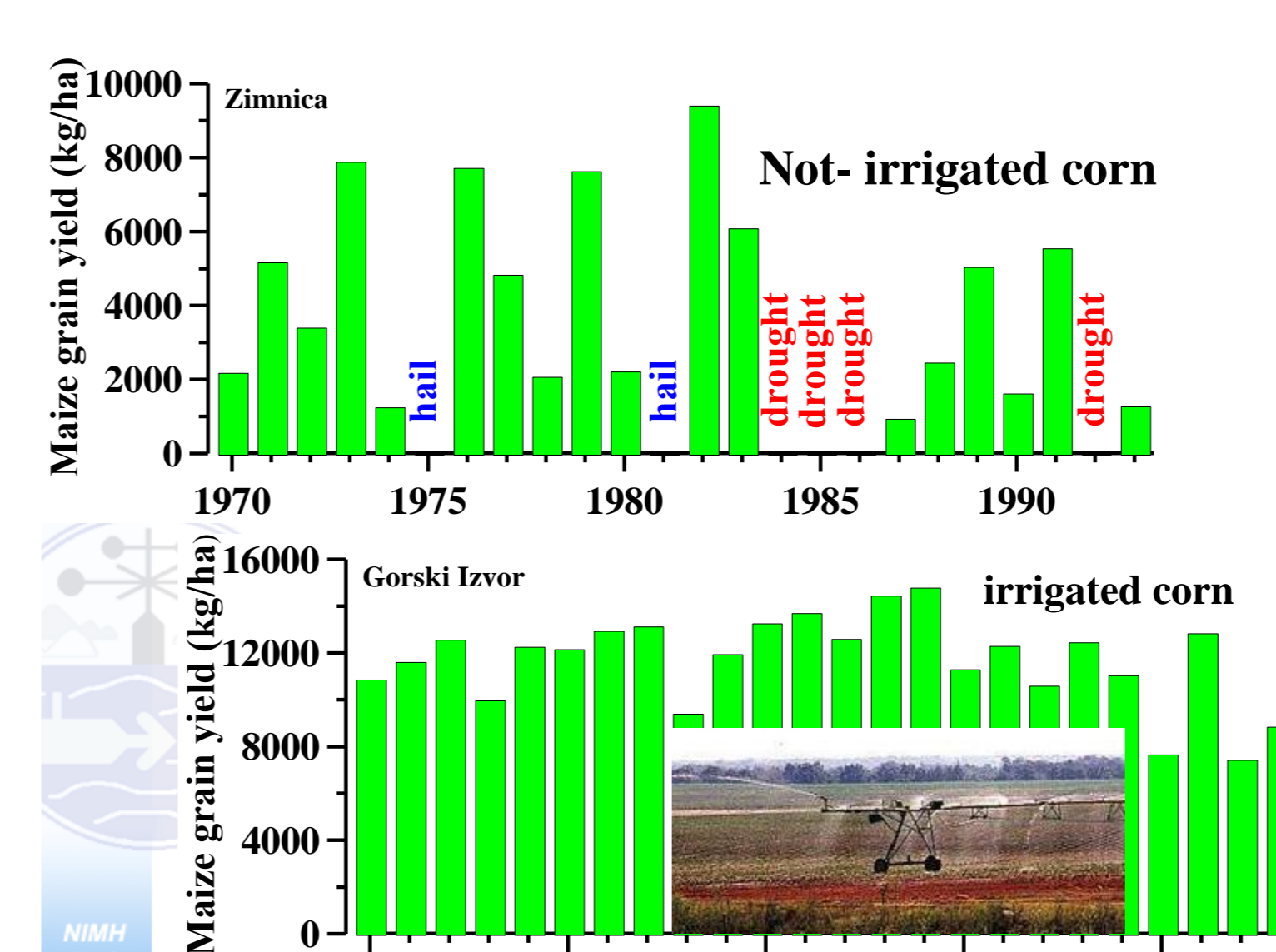
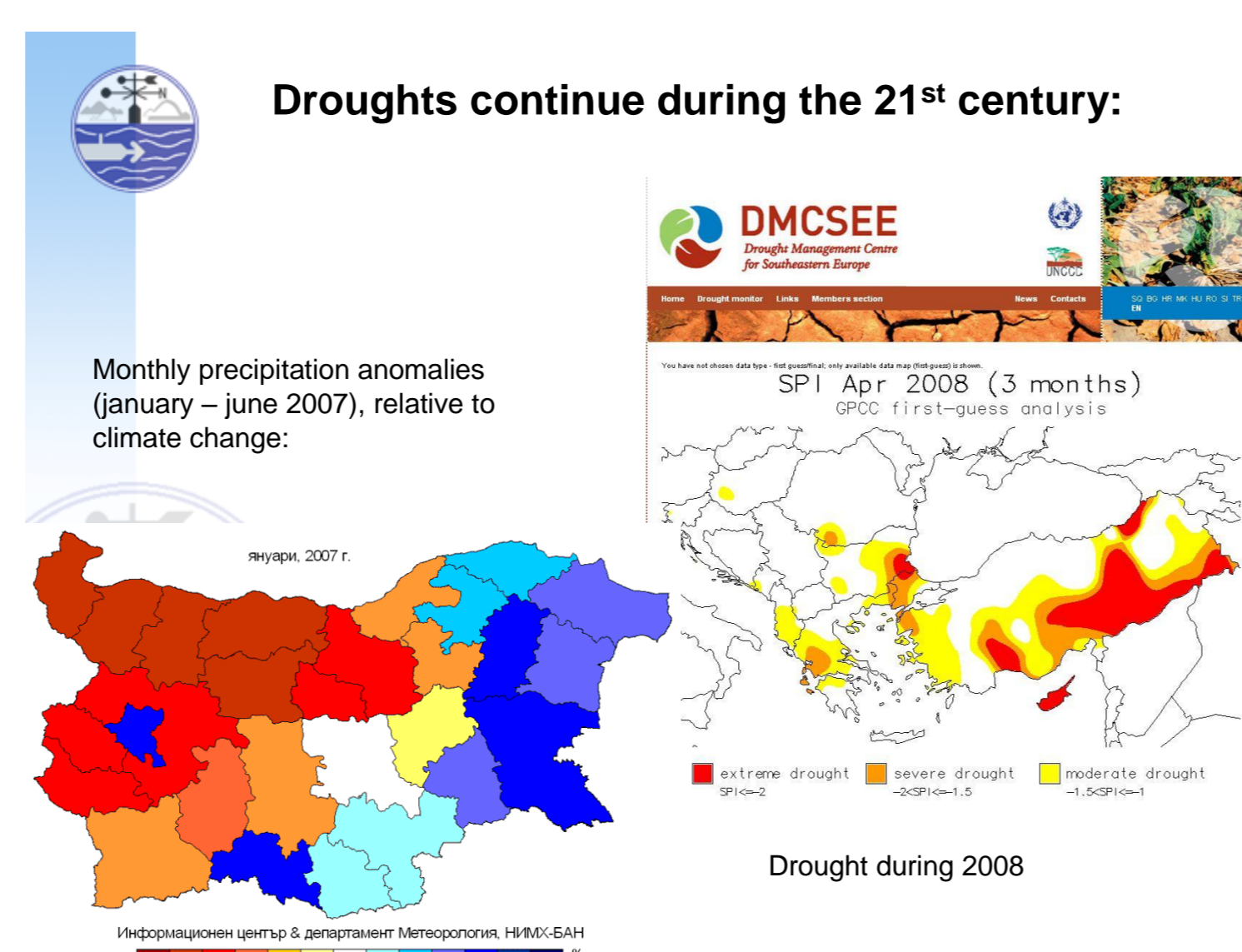
On Monday, a state of emergency was declared in the central municipality of Panagyurishte, after already three weeks of shortages.

Major breaks in the main pipe channelling water uphill from the Maritza river, over 40 kilometres (25 miles) away, had sent thick rusty water, if any, running from the taps.

And local catchments – the only other source of water in the region – had already dried out from the summer heat, forcing people, under the scorching sun, into daily queues in front of the few water tanks brought to town.



This file photo shows Bulgarian fishermen passing by fishing boats stranded on the bottom of the Danube river. Summer drought, lagging dam construction and persistent leaks and failures in old pipes have again made water rationing a part of life for hundreds of thousands of Bulgarians this summer. Photo courtesy AFP.



Bulgaria Sees Drought Slashing '09 Wheat Crop by 20% - Media

coding Jun 10, 2009 14:43 CET | Story | SeeNews - The Corporate Wire options

SOFIA (Bulgaria), June 10 (SeeNews) - Bulgaria expects wheat output to fall by 20% this year due to dry conditions, state-run news agency BTA reported on Wednesday.

The estimate is based on the assessment of crop condition by May 22. BTA (www.bta.bg) reported, quoting Deputy Agriculture Minister Svetla Bachvarova.

Bulgaria harvested 4.4 million tonnes of wheat from some 1.03 million hectares in 2008, the highest amount in four years and twice as much as the country needs to meet domestic demand.

Municipalities with a risk of drought

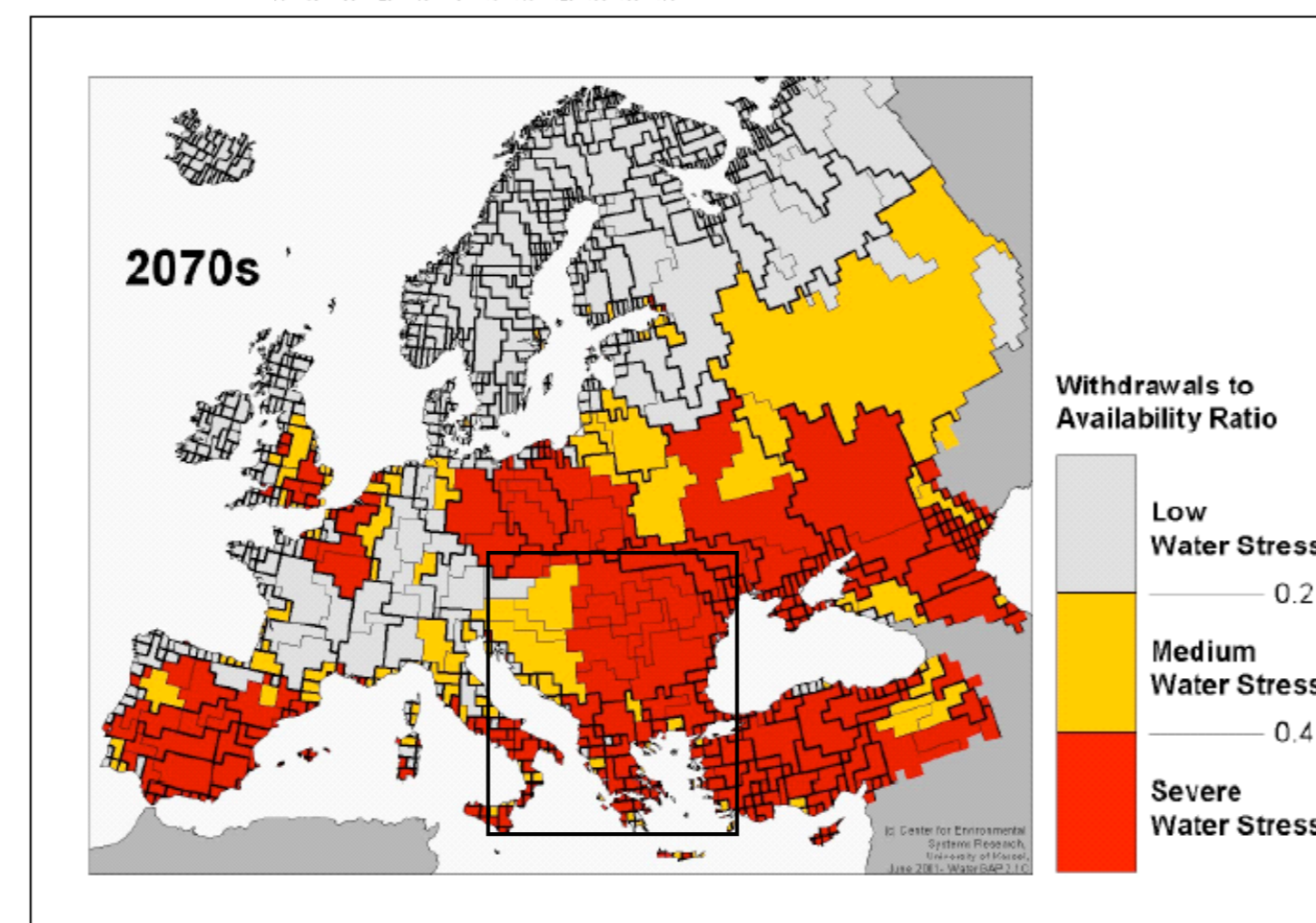
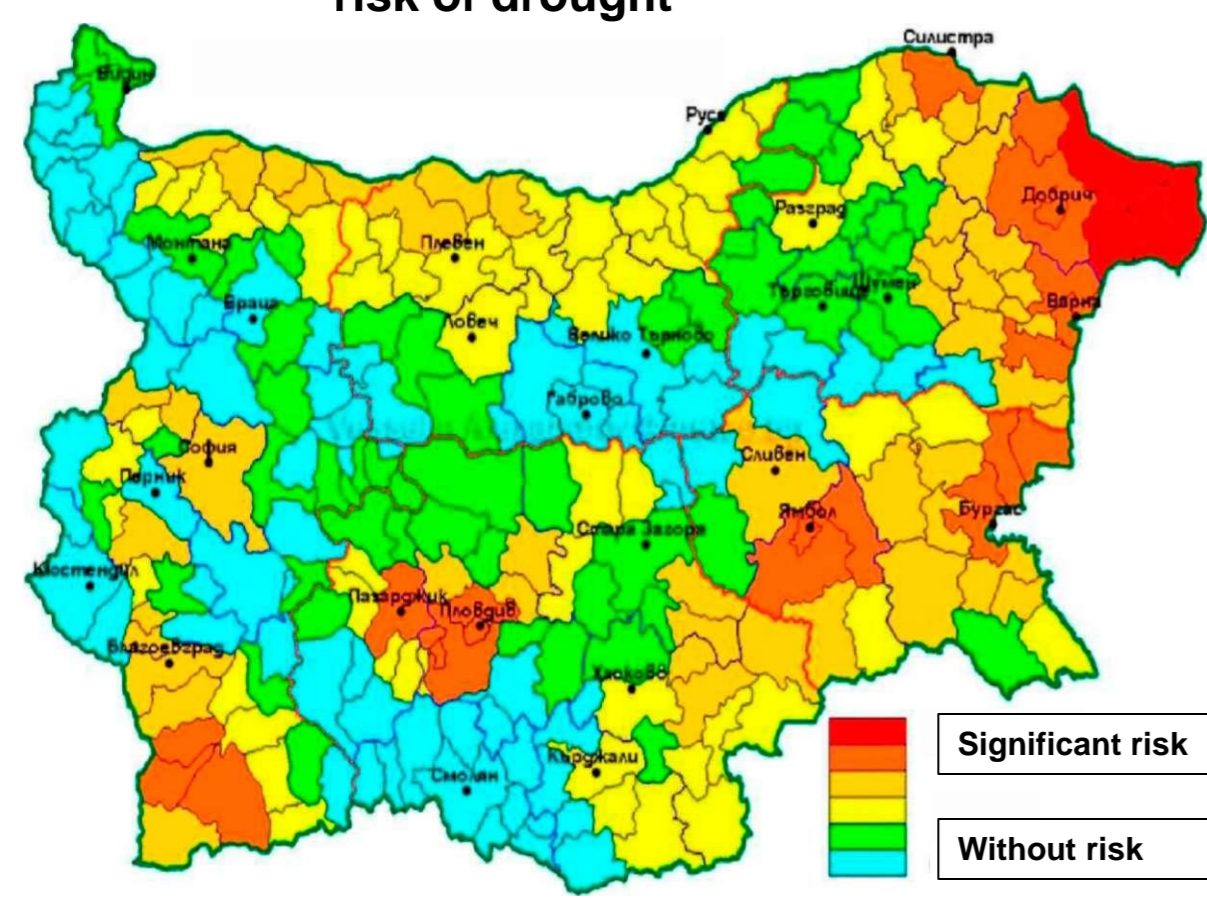
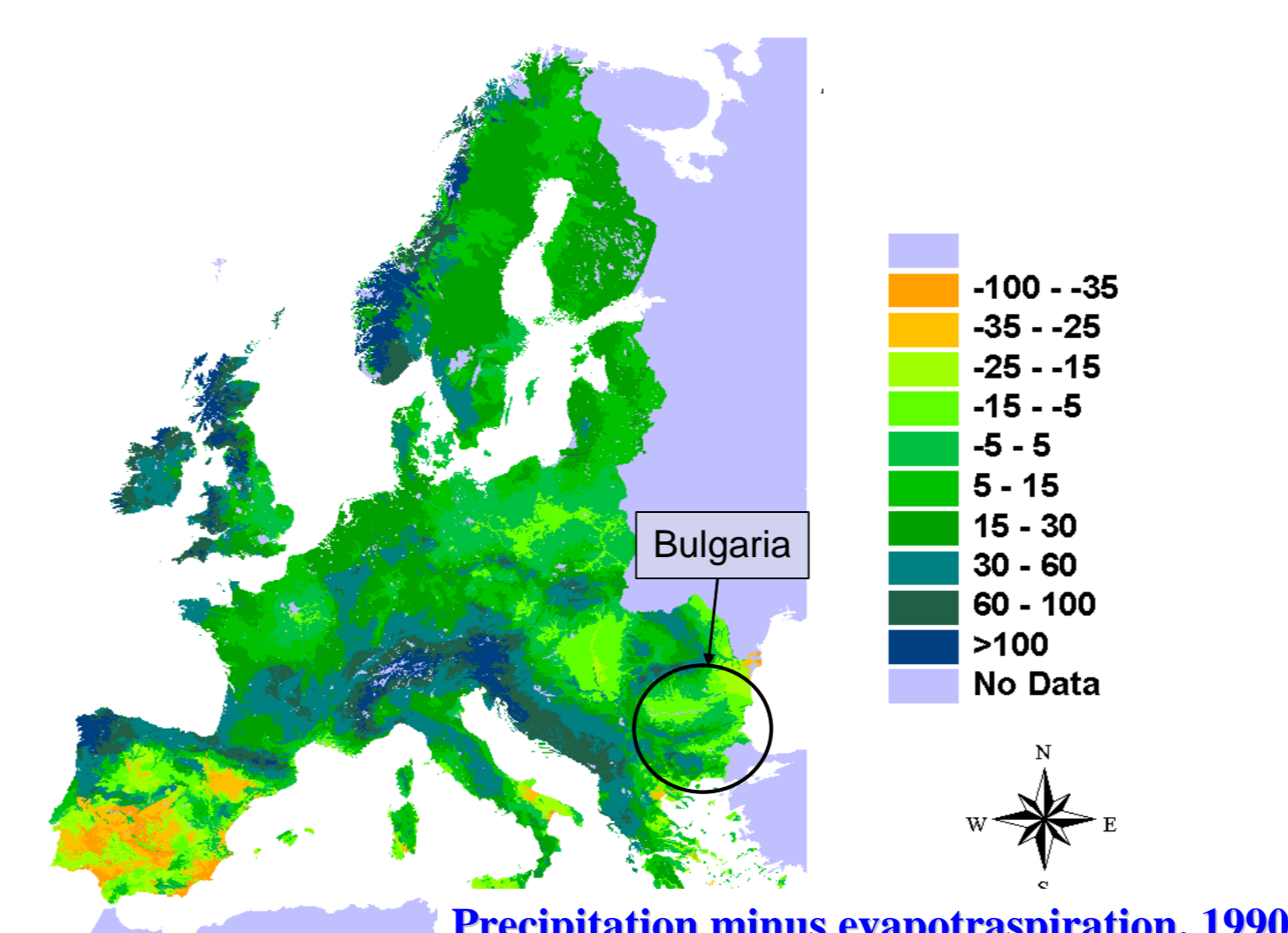
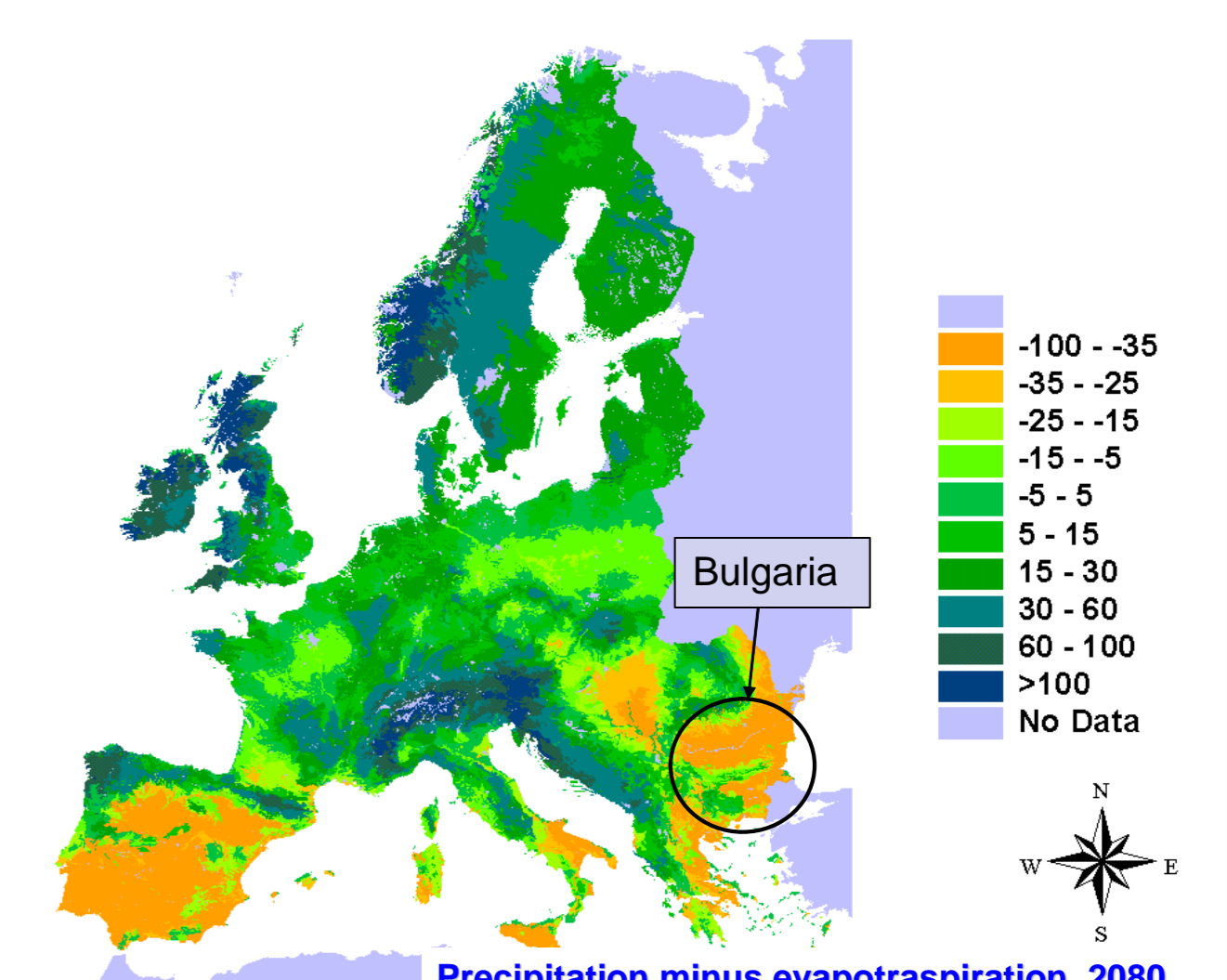


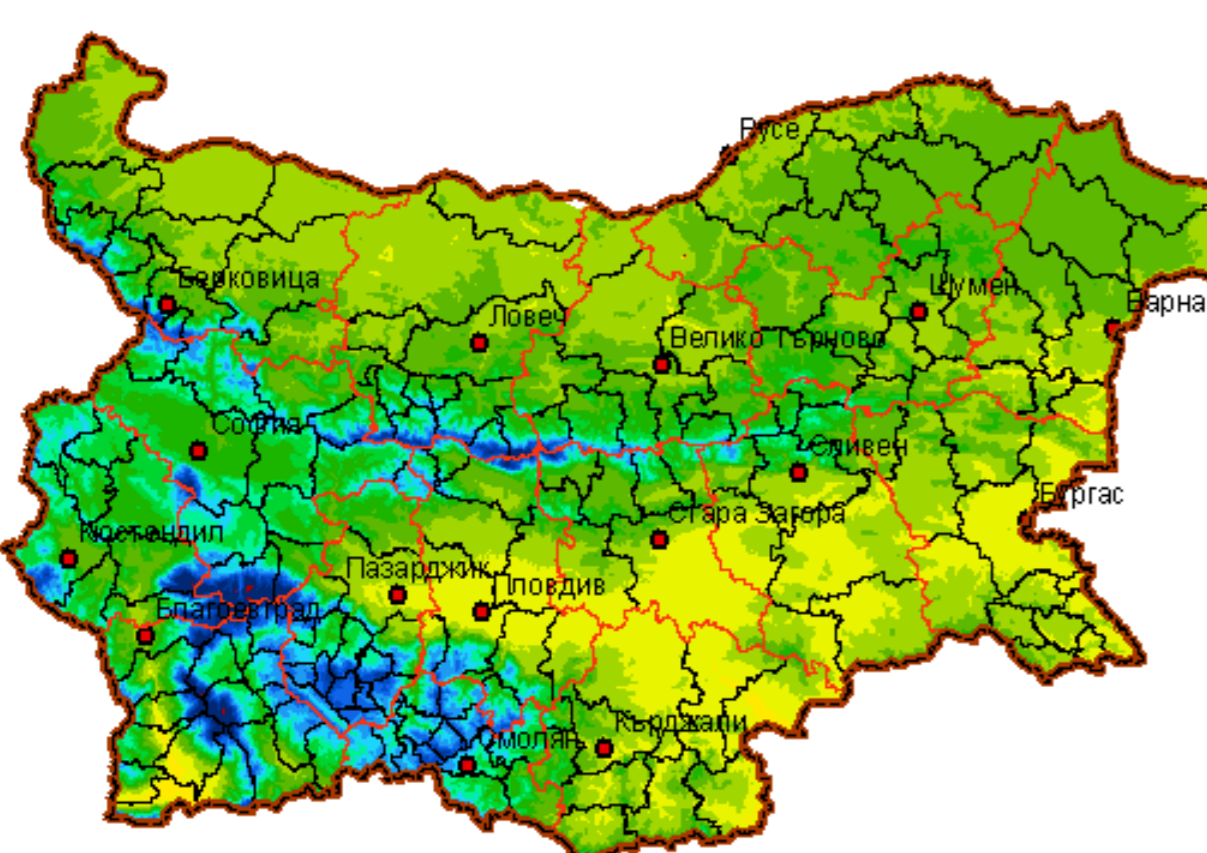
Figure 5.6: Water stress in Europe in the 2070s under the Baseline-A scenario (with climate data of HadCM3). Water stress is defined by the withdrawals-to-availability ratio.



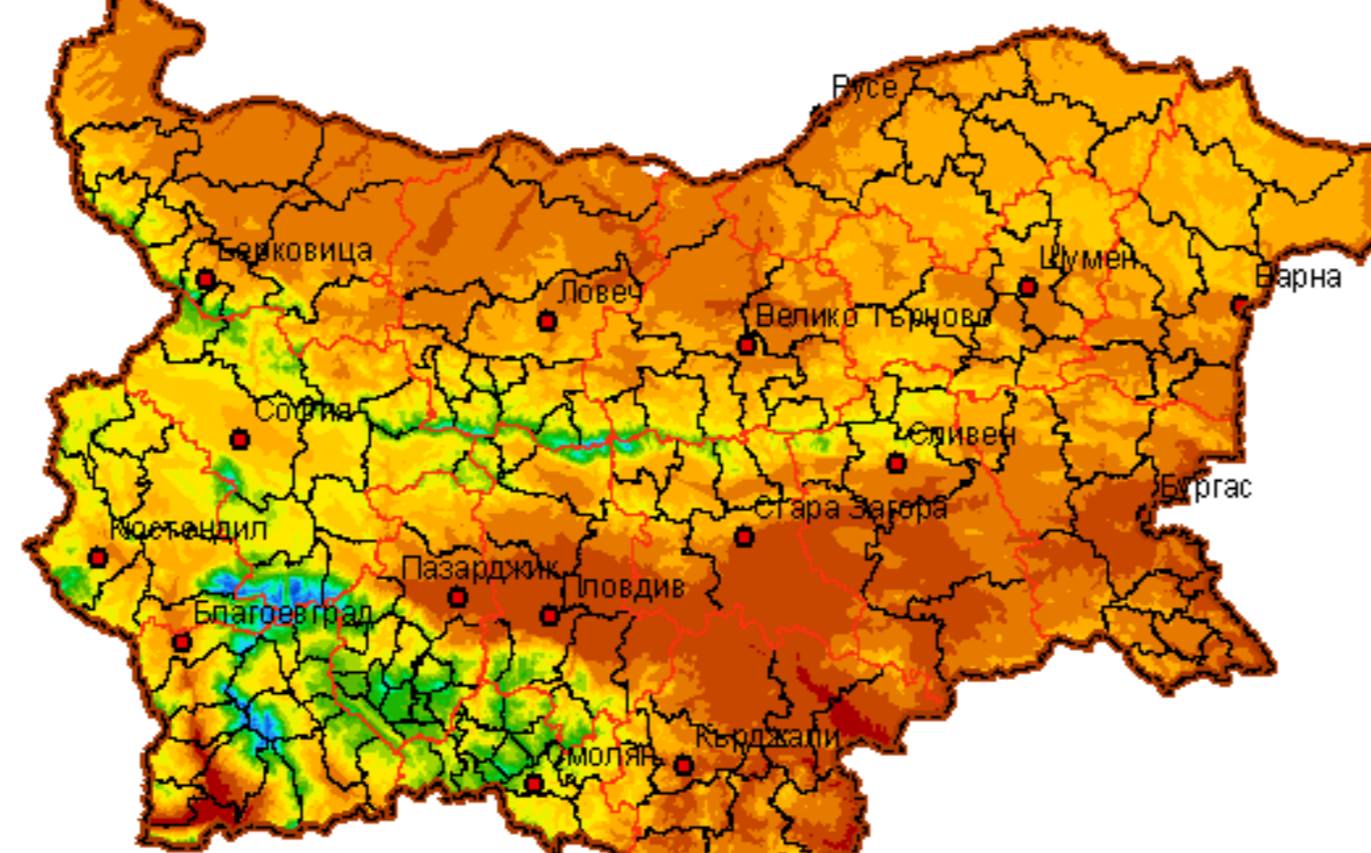
Precipitation minus evapotranspiration, 1990, HadCM2 model



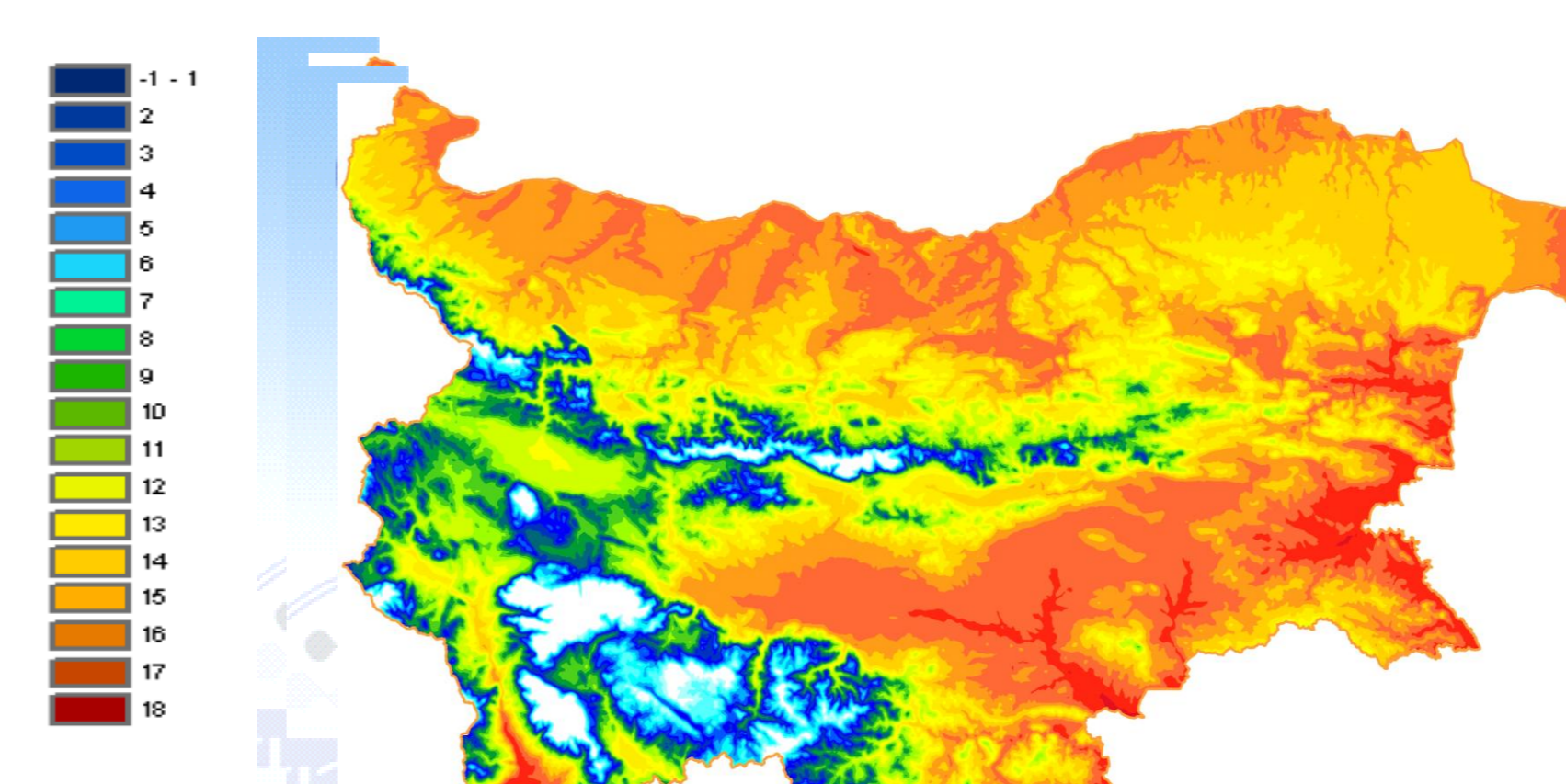
Precipitation minus evapotranspiration, 2080, HadCM2 model



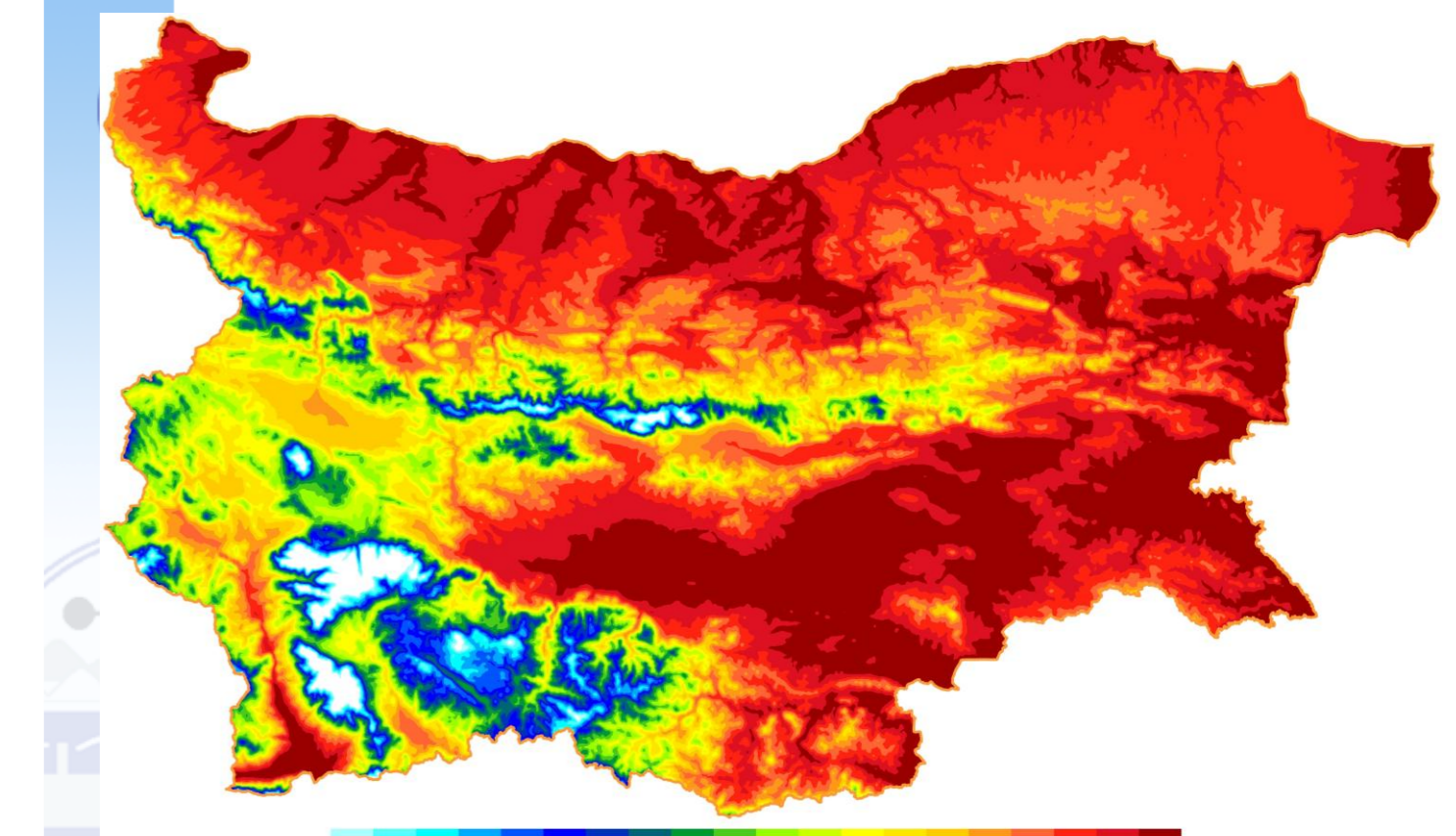
Average annual air temperature during 1961-1990



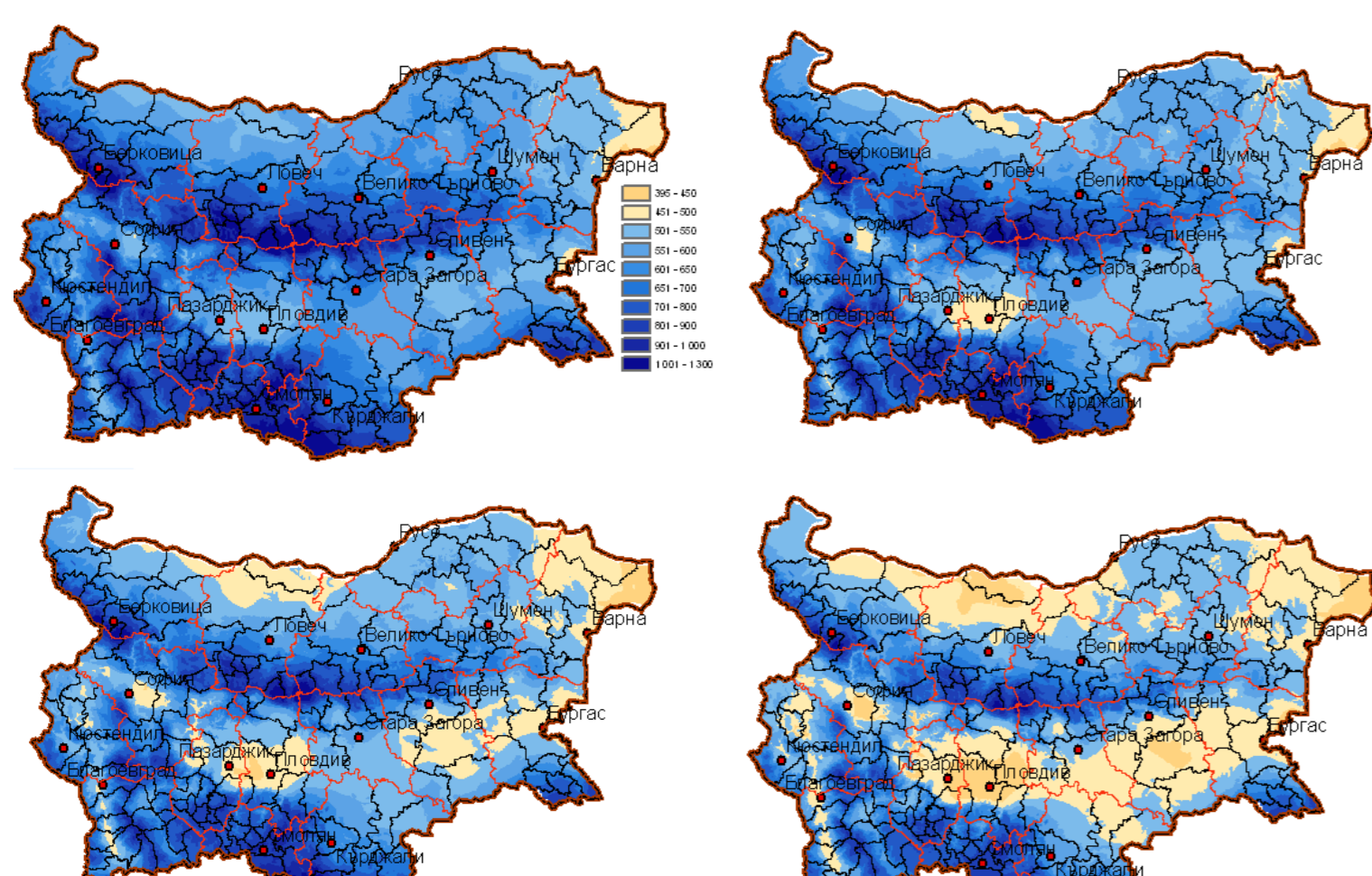
Average annual air temperature scenarios for 2080



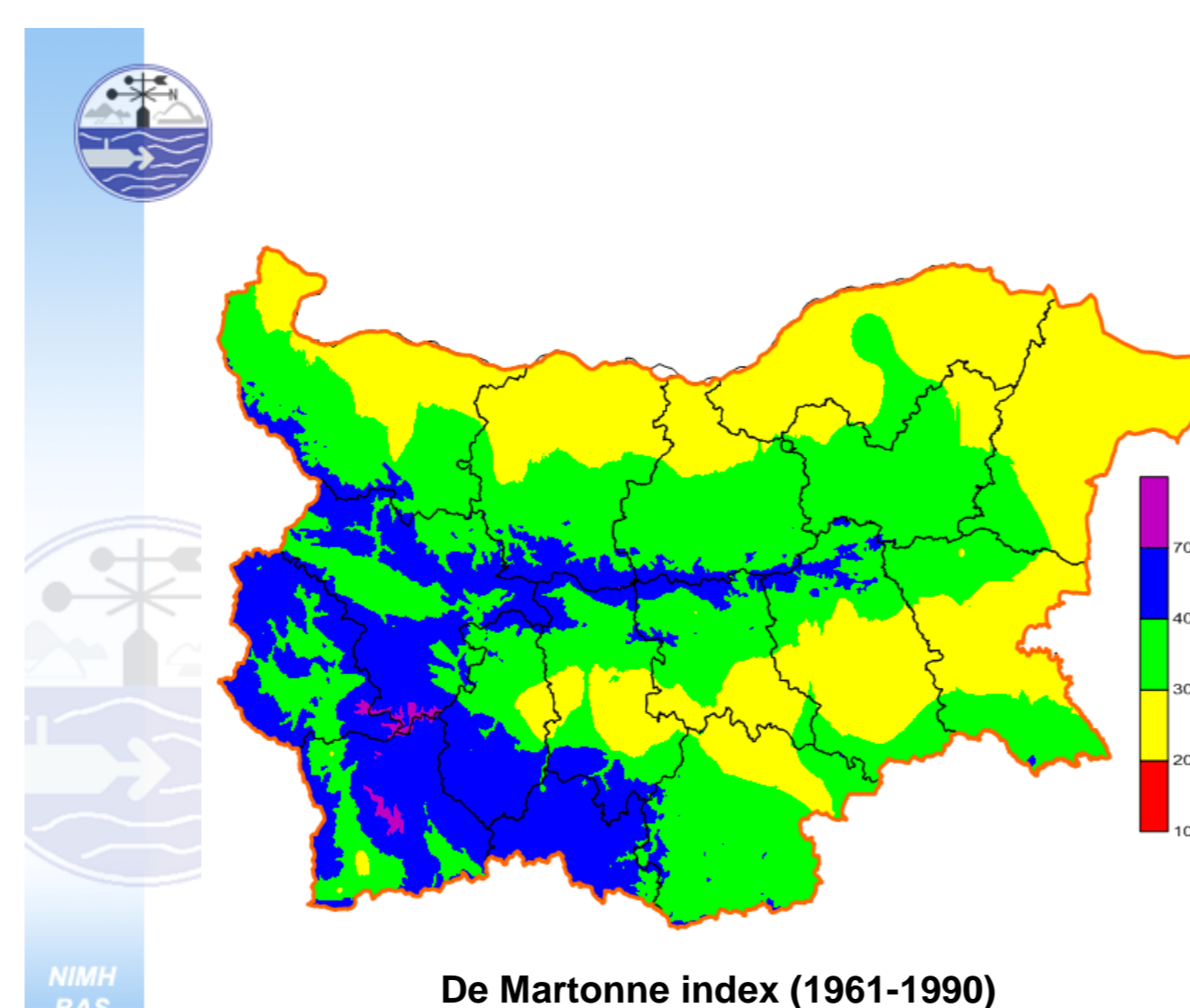
Temperature sums (in °C) > 10°C, 1961-1990



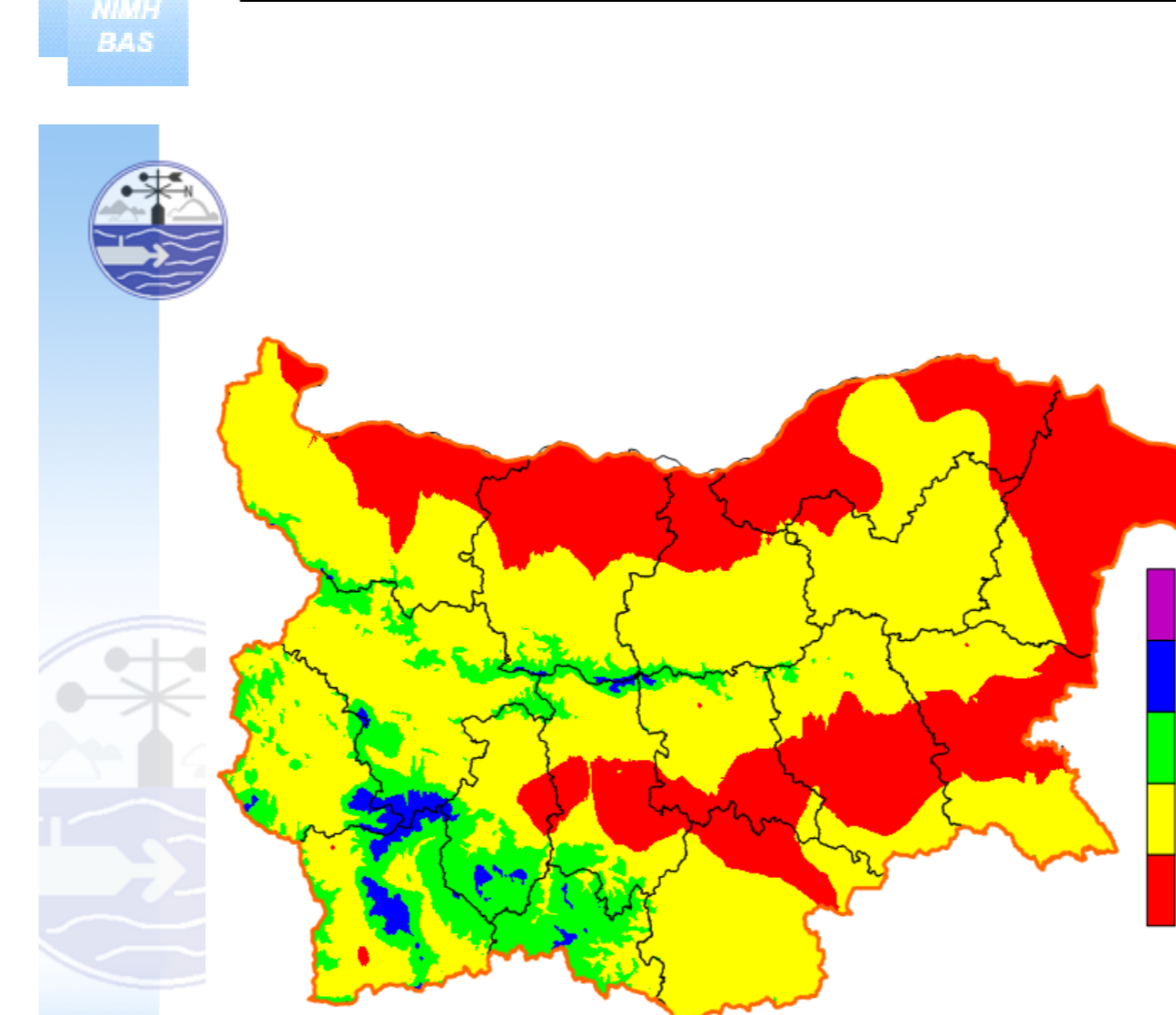
Temperature sums (in °C) > 10°C, 1961-1990 + 300°C



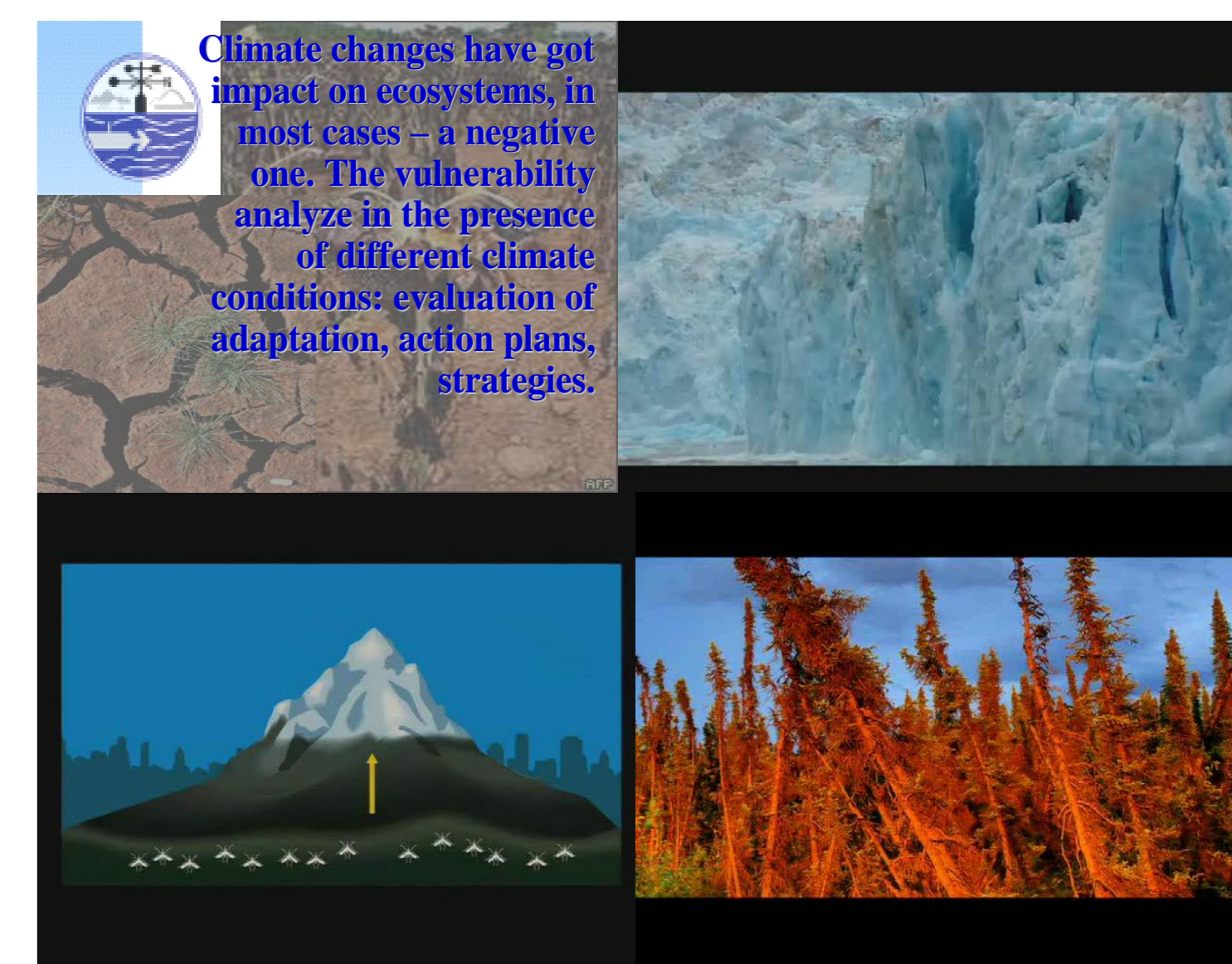
Annual precipitation 1961-1990 (a), 2020 (b), 2050 (c) and 2080 (d), under pessimistic climate change scenario



De Martonne index (1961-1990)

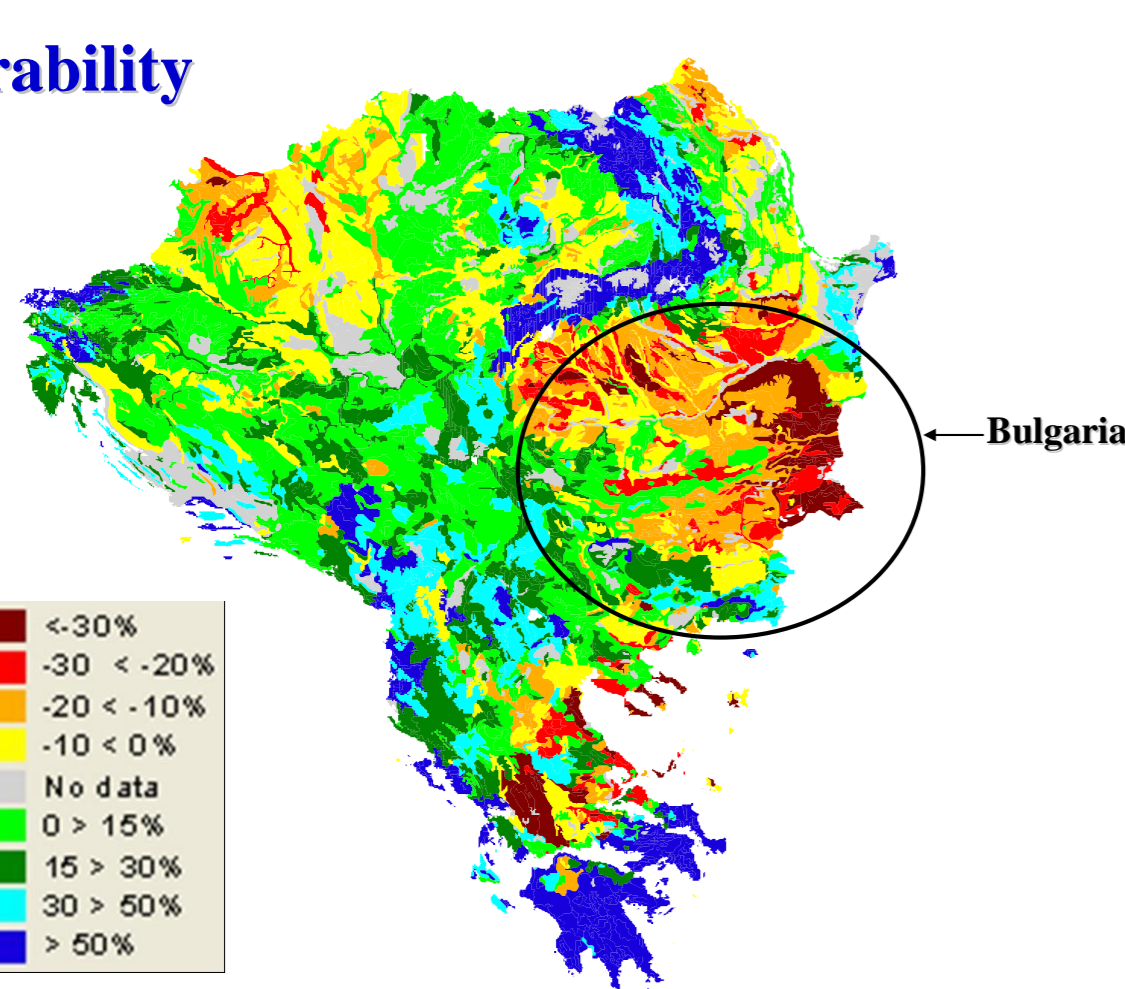


De Martonne index, 2080

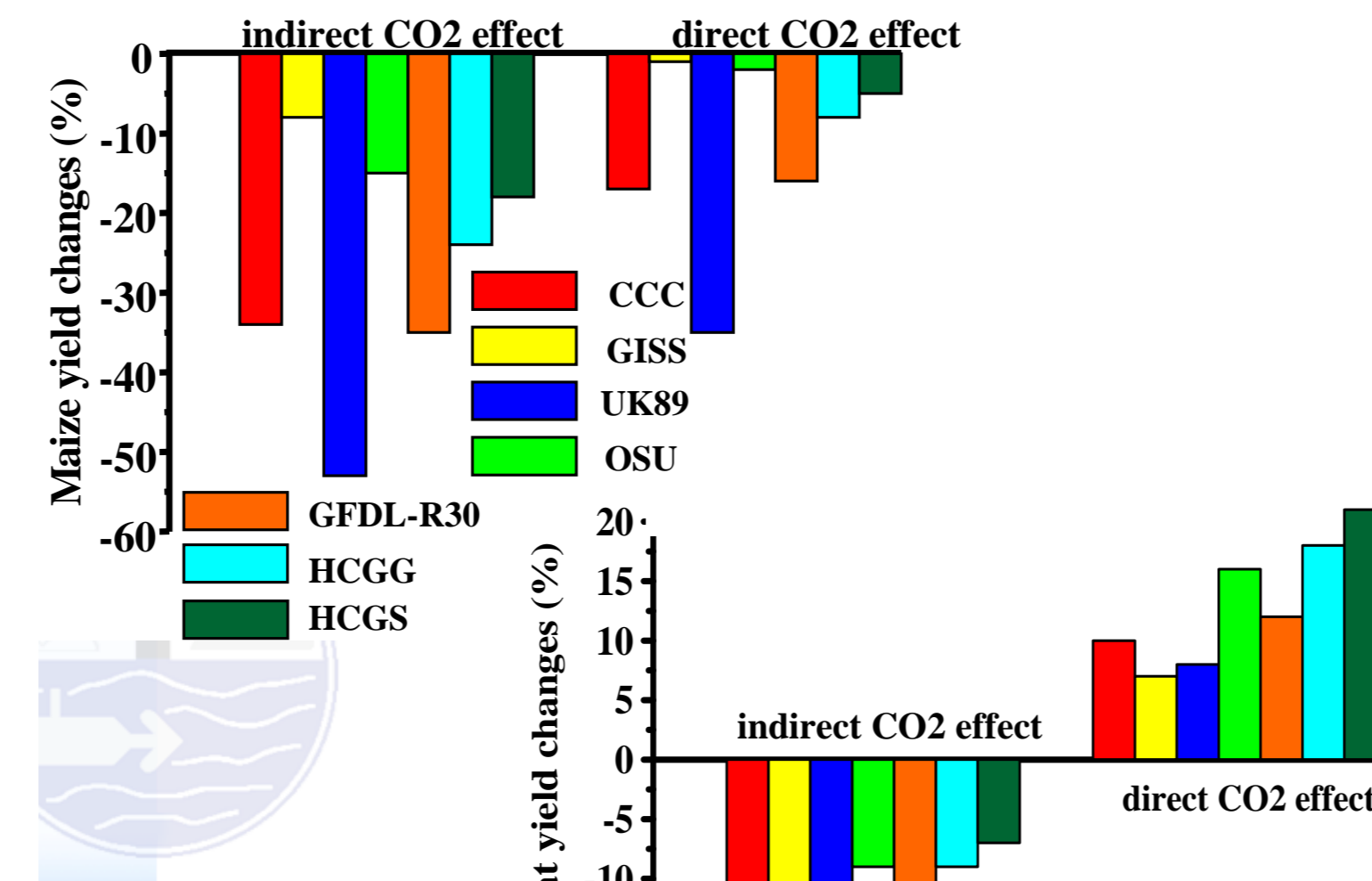


Climate changes have got impact on ecosystems, in most cases - a negative one. The vulnerability analyze in the presence of different climate conditions: evaluation of adaptation, action plans, strategies.

vulnerability



Changes (in %) sunflower yield 2071- 2080,



- ### Most vulnerable:
- Spring crops
 - Crops on light soil
 - Rainfed crops
 - Crops in southeastern Bulgaria
 - Adaptation:
 - Drought resistant crops
 - Changes in irrigation

Feasible adaptation options

- Changes in irrigation
 - As the climate warms there will likely be shifts toward greater use of irrigation systems to grow crops in Bulgaria. It is considered that available soil moisture for maize crop cultivation in the country is insufficient for normal crop growth even under current climate. Many farming technologies, such as efficient irrigation systems, provide opportunities to reduce direct dependence on natural factors such as precipitation and runoff. Improvements allow greater flexibility by reducing water consumption without reducing crop yields.

Acknowledgment :
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