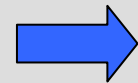
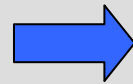


CC impact on navigation conditions

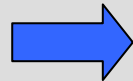


Coordination action

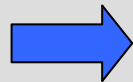
Coordination Action



Methodology



Climate Scenarios



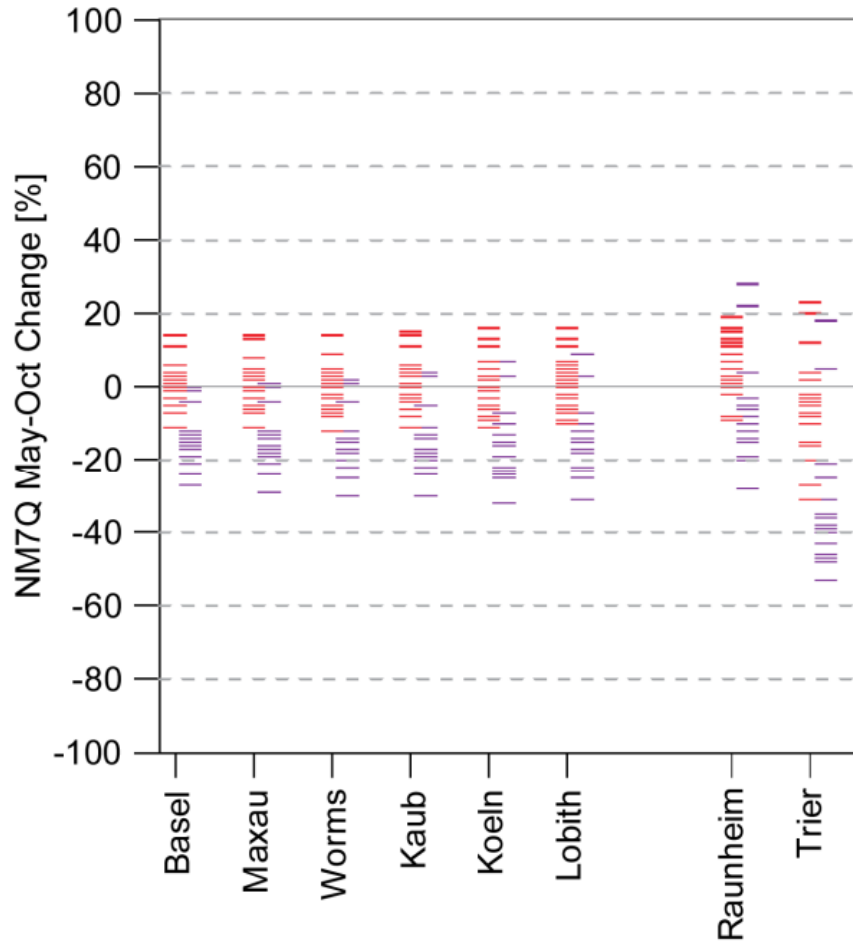
Qualitative impact on navigation

Results



1. Low water – limiting loading
2. Floods – suspension and bridge clearance
3. Ice – suspension
4. Fog – radar and extra monitoring
5. Fluctuation – predictability

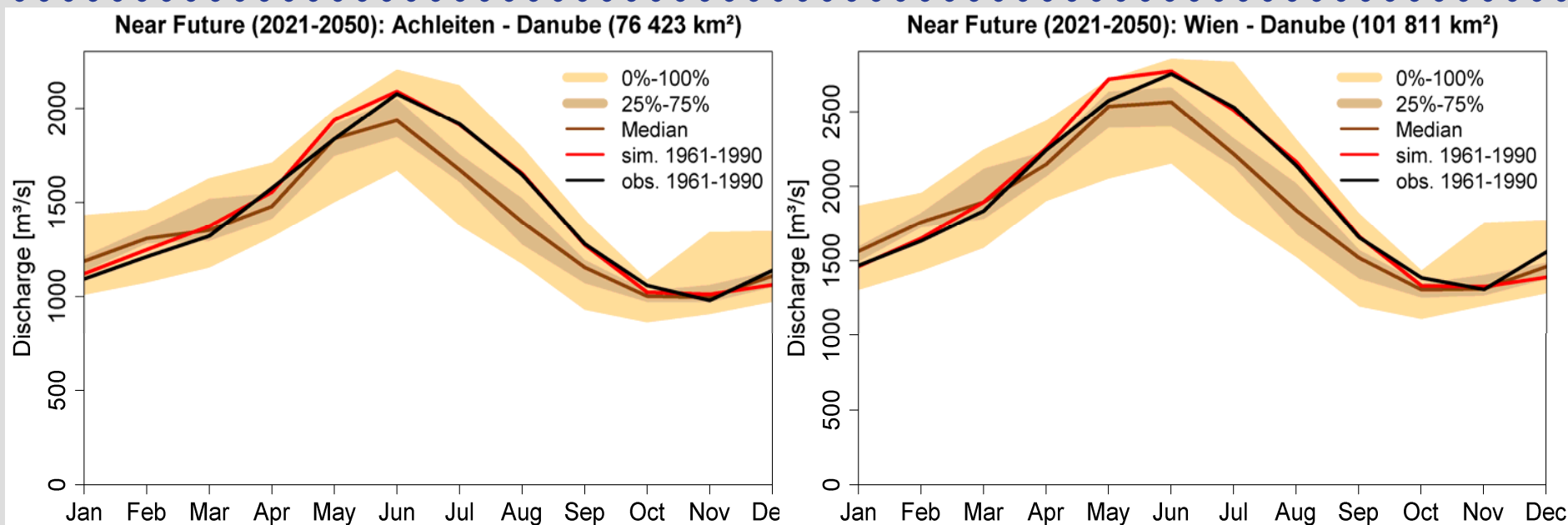
1. Low water



No significant changes (dominant tendency) can be detected for the near future.

Low water in the far future will be lower by decreasing between -5% to -25%

1. Low water



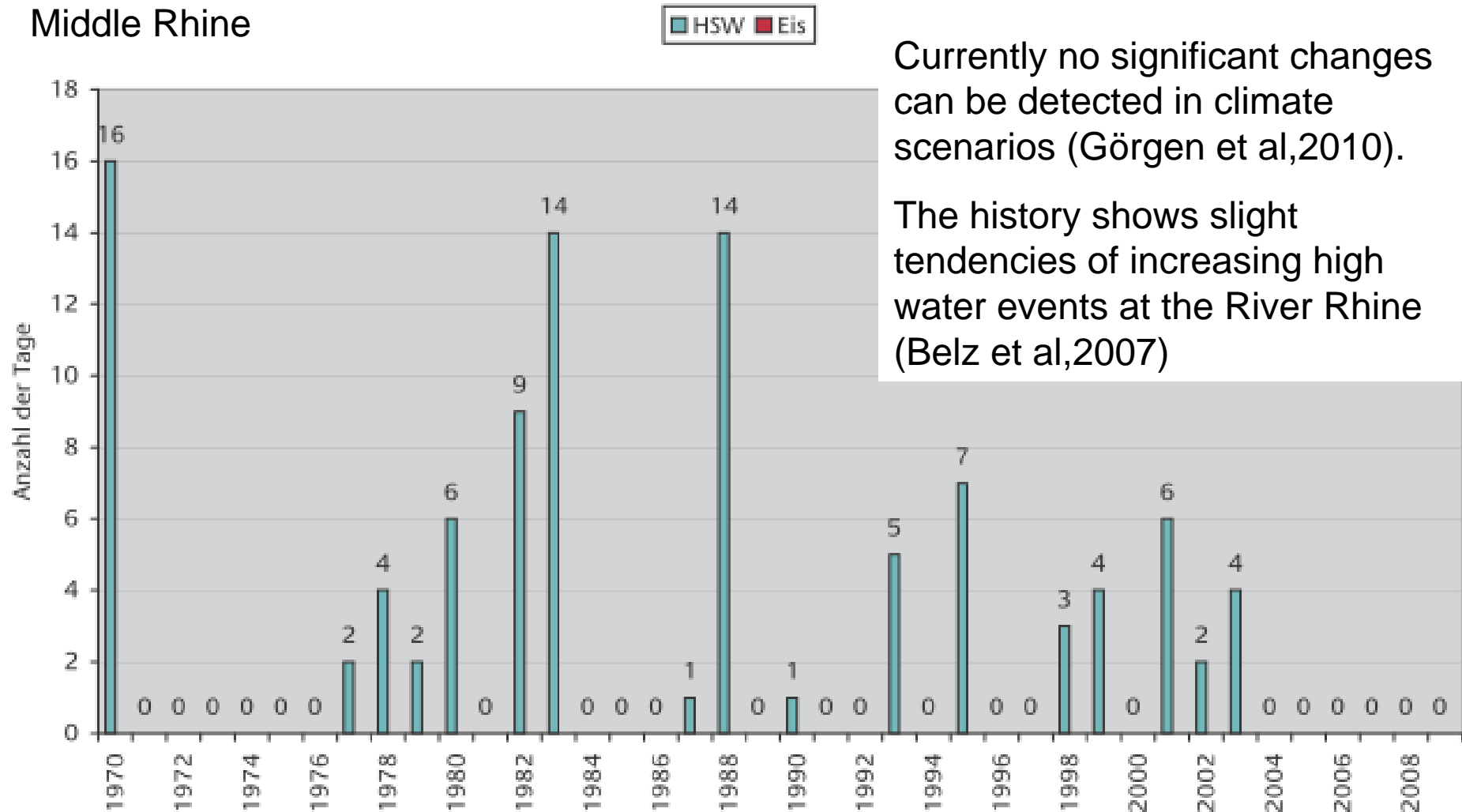
A shift from snow dominated regime towards a rain dominated regime is expected.

- There will be lower discharges in June to September.
- No loss in current low water situation is expected.
- Higher discharges in winter time.

2. Floods



Middle Rhine



Currently no significant changes can be detected in climate scenarios (Görger et al,2010).

The history shows slight tendencies of increasing high water events at the River Rhine (Belz et al,2007)

3. Ice



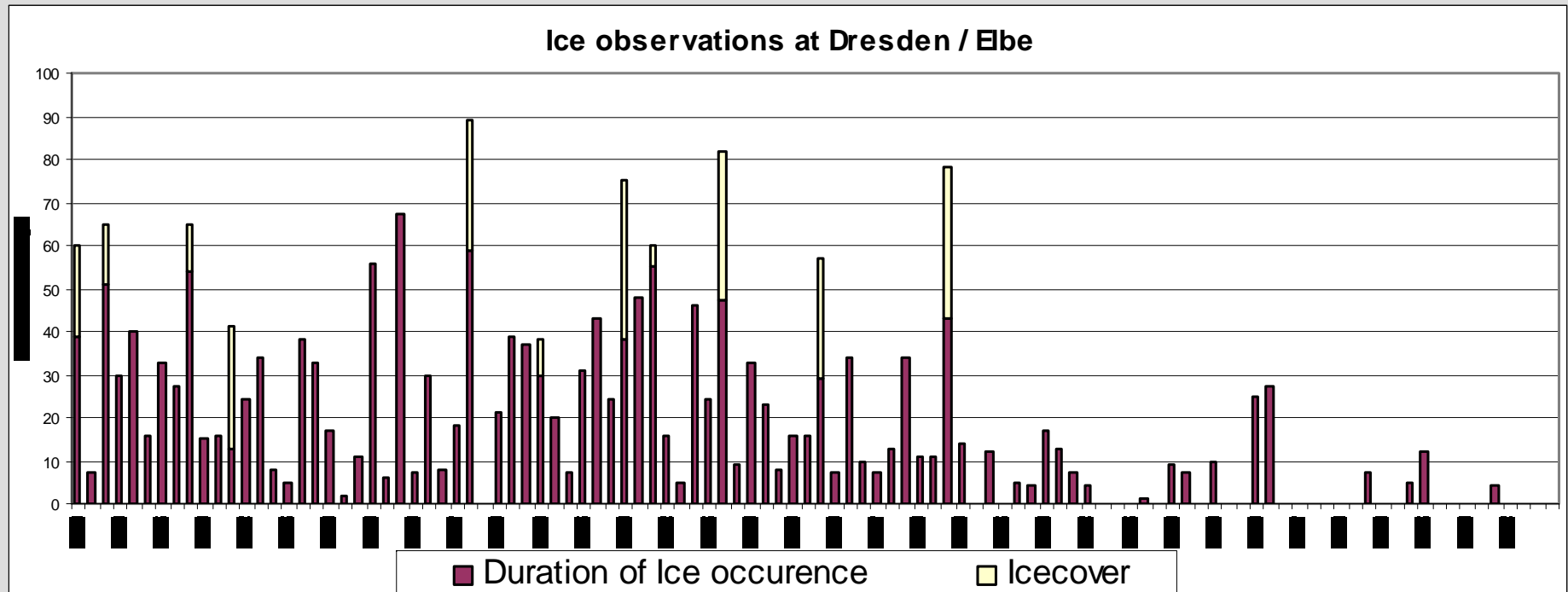
Location	$\leq 0^{\circ}\text{C}$	$\leq -7^{\circ}\text{C}$
Basel	-8.1	-1.3
Mannheim	-7.3	-1.5
Koblenz	-8.2	-1.6
Duisburg	-6.4	-1.5
Rotterdam	-3.7	-0.3

Days of temperatures lower than 0° or lower than -7° .

=> Less ice

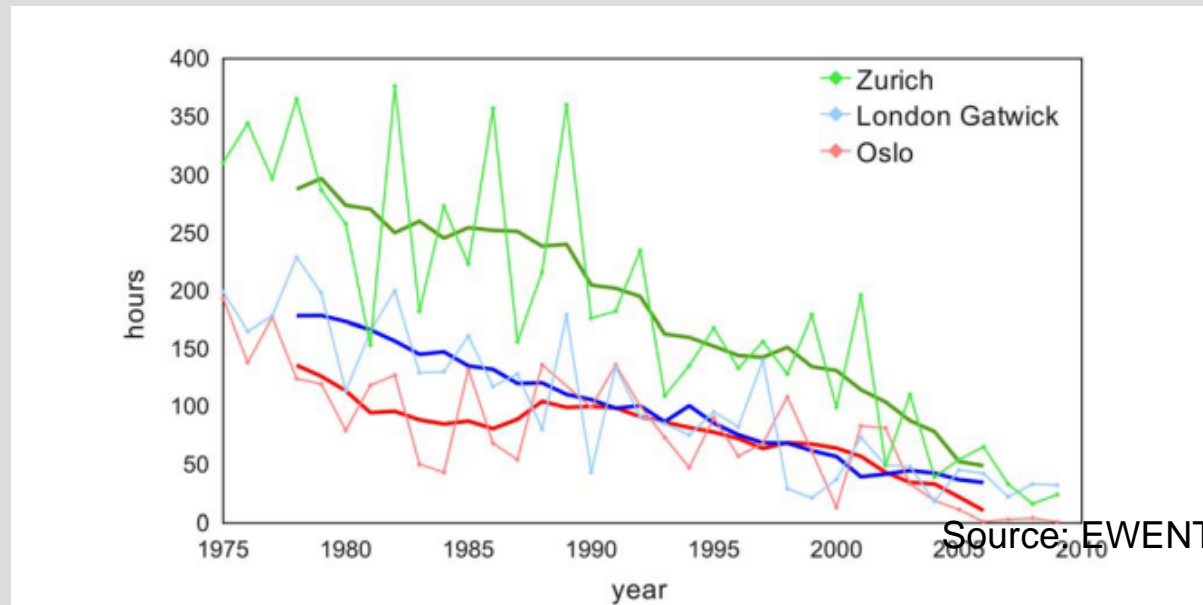
Location	$\leq 0^{\circ}\text{C}$	$\leq -7^{\circ}\text{C}$
Achleiten	-12.0	-2.7
Vienna	-8.2	-2.4
Budapest	-7.2	-1.9
Mohacs	-5.9	-1.3
Belgrad	-5.3	-1.2
Bucharest	-7.7	-1.4
Izmail	-7.1	-1.6

3. Ice



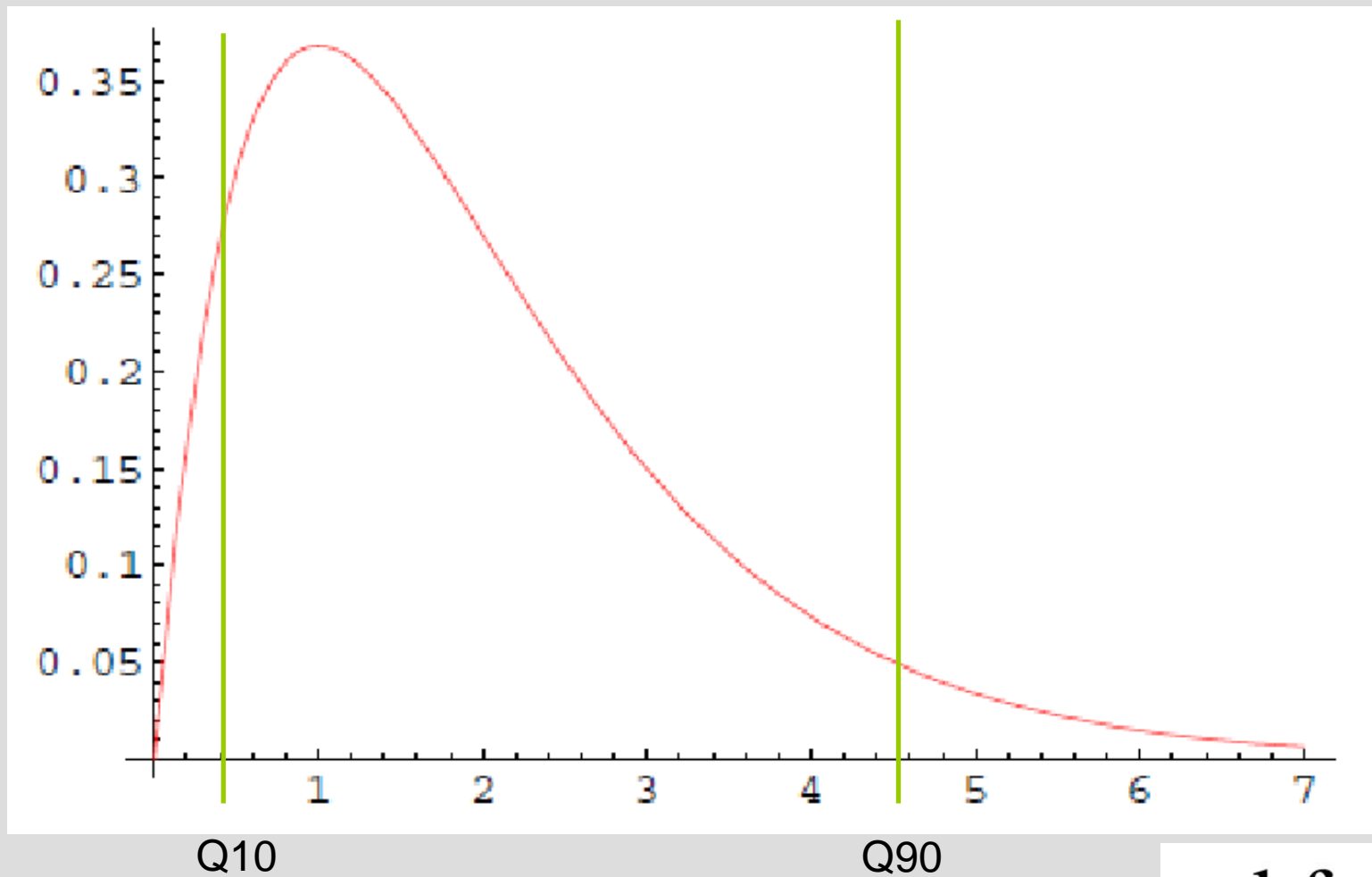
- There is no sufficient ice modelling for the European waterway network.
- The antropogen impact on this phenomena is huge.
- Temperature changes indicate an improvement for IWT in respect to ice.

4. Fog - „Unsichtiges Wetter“



Fog occurrence has a decreasing tendency during past observation periods.
No information of tendencies near rivers where is enough water to evaporate.

5. Fluctuation



TREN/FP7TR/233886/ECCONET

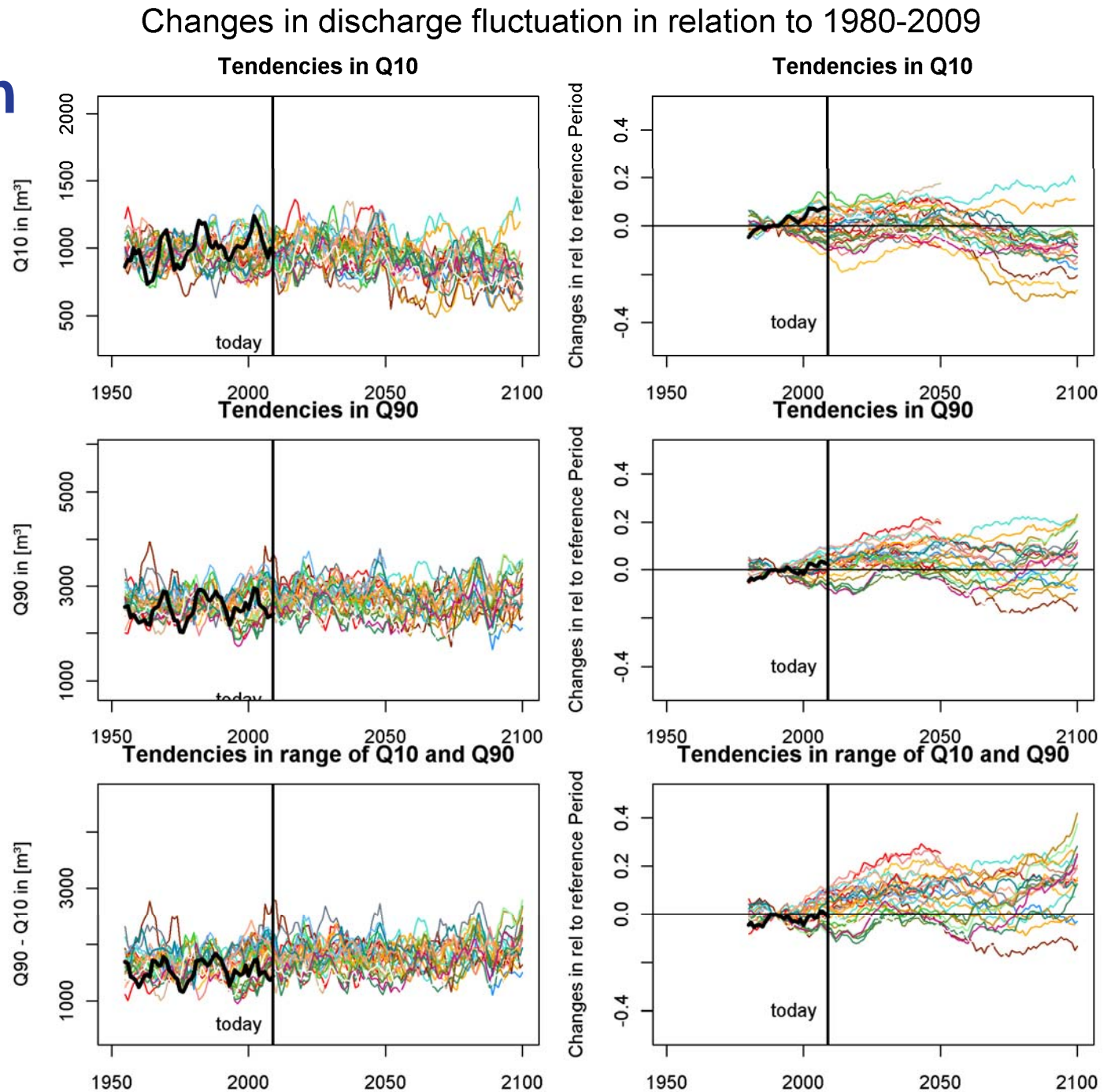


5. Fluctuation

10%-Quantile of discharges will decrease in the second half of this century.

Range of possible water levels will slightly increase at the River Rhine.

At the Danube these evaluations are still not available.



Implementation



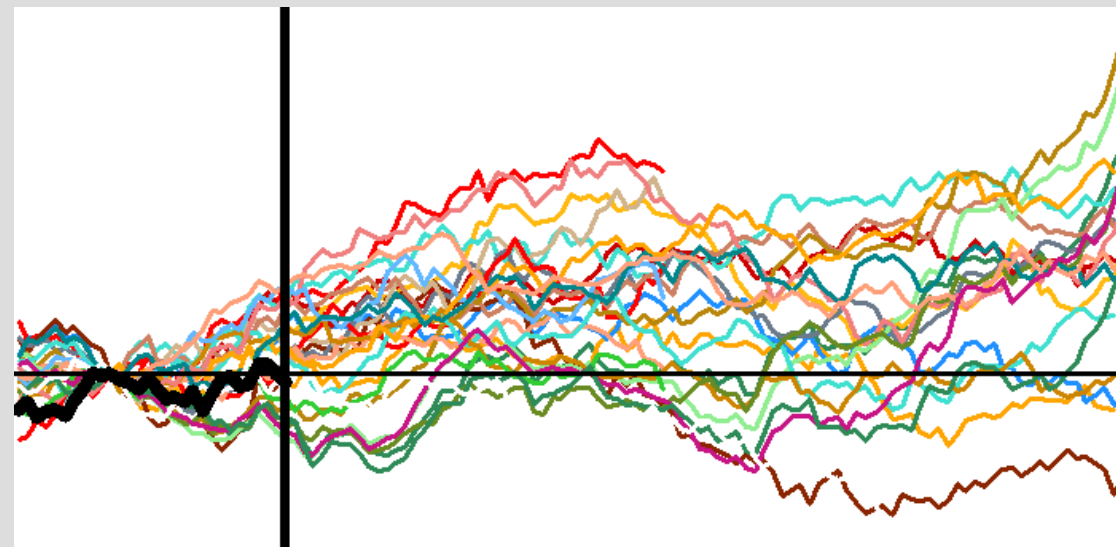
In ECCONET, only the effect of low water changes will be investigated in transport modelling.

How can this be done?

Today's Climate

Future Climate

Average year
Dry year
Very dry year



Average year
Dry year
Very dry year

Average year
Dry year
Very dry year

Questions



Which are your mayor concerns related to waterway conditions in future?

Which measure is a good indicator whether it becomes better or worse?

Would you suggest improvements for our approach?

Hope or trouble???

