Is a warmer climate a worse climate?

Dr. Gerd Weber

Is a warmer climate a worse climate?

In the climate debate it is implicitly assumed that a warmer climate is a worse climate than the present one.

This view is reflected in most climate science statements, climate impact assessments, economic impact assessments, the media hype and in political demands for immediate or accelerated action

It is the core assumption to prompt calls for a dramatic reduction of ghg emissions

Most climate and climate impact research is channelled into "proving" the detrimental impact of modelled climate change. Several reasons for this:

- self serving to keep flow of research funds intact (research will generally only be funded by tax payer's funds (eg the big national research programs) if a problem to society can be demonstrated)
- promotion of ideological and personal convictions, use of science to convince society of a grave problem and stimulate action to deal with it
- promotion of a hidden agenda (not averting climate change is the main motivation for proving the detrimental impact of climate change, but the desire to change society using climate change as a transmission belt)

- The role of the media in “hyping the hype” is more straightforward, the general principle of “only bad news is good news” holds, so the media is only interested in portraying potential detrimental impacts of climate change.
- This results in a public perception that a warmer climate will be dramatically worse (“climate catastrophe”)
- In a democratic society, policy makers generally react to the public’s perception of any given problem, not to the problem itself
- As a result, there is a disconnect between the “real” problem, public perception and policy makers response
- Bottom line: Because of the intrinsic workings of “real life” scientific process, its interaction with various - on the surface - unrelated agendas and the media world, a heavily biased view of climate change is almost sure to be created in the perception of the public

Several examples for this:

- Climate science: Tendencies of IPCC SPMs to over-dramatize the science (negative impacts) contained in the body of the IPCC reports in order to justify climate policy measures, well documented in 1996, 2001 and also notable in 2007.

- Climate and economic impact studies: Noteworthy is the Stern Review published in October of 2006, which claimed climate change by the year 2200 would cause up to 25 percent of damage to the world economy.

- The climate and economic science assumptions made in this report are somewhere between the absurd and the bizarre, the results are accordingly.

- For example, one of the assumptions is that impacts of a warmer climate can by design only be negative (also made in some German economic impact studies). This is preposterous and short circuits the true scientific process of searching for truth.
  Another one is the assumption of a zero percent discount rate in the economic assessments of future damages, which alone accounts for most of the projected dramatic detrimental impacts. This assumption is clearly rejected by most environmental economists.

- The climate science assumptions are equally biased towards the dramatic, but highly improbable end of projections.

- The report is therefore unsuited to portray the most likely impacts of a warming climate

Other economic impact studies – for political effect – point in a similar direction (see eg those used by the EU Commission to formulate its climate strategy of 10 January 2007 and others, as eg published by German economic research institutes)

The real question, insufficiently answered by the IPCC reports, most economic impact studies, the media hype and policy makers is: Is a warmer climate a worse climate?

1. How much will climate likely warm by 2100 even if the most recent warming since 1975 is entirely due to ghg (not very likely)?
2. How will other climate parameters change in a warmer climate?
3. What does historic precedence tells us about warmer periods in the earth's climate history?

Beginning with the last point the public may be surprised to learn that in climate history books periods warmer than today are labelled “Climate Optima". A warmer climate was considered better, not worse than the today’s climate because warmer conditions were better for nature and most human activities.

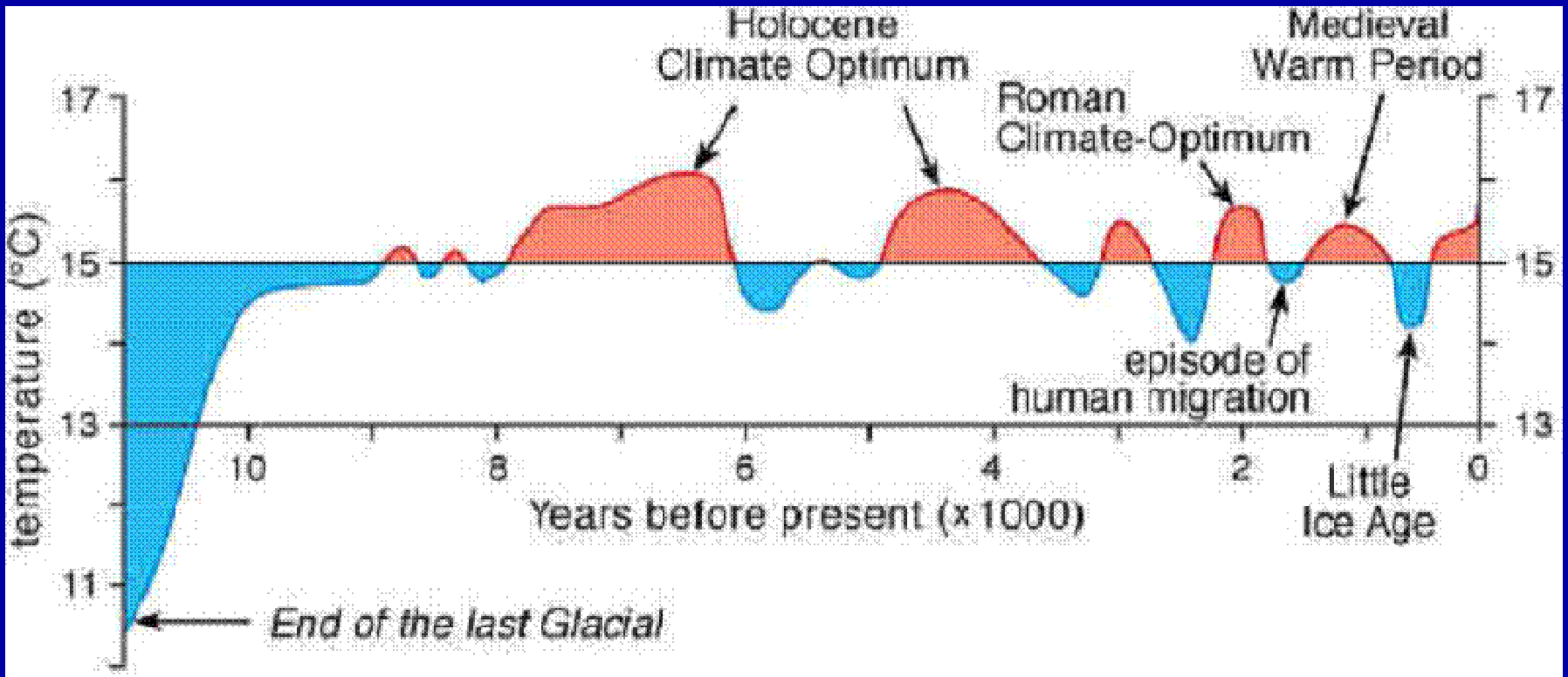
Climate history identifies two such periods in the last 6000 years, namely the medieval climate optimum from about 1000 to 1200 AD, when global climate was about .5 – 1.0 degrees warmer than 1960 – 1990, the last standard climate period. Global temperatures are presently approaching those seen in the medieval optimum, even though the present warm period would not classify as a full 30 year period yet (warming beyond the peak seen around 1940 has only occurred in the last 10 years or so). Temperatures for the medieval climate optimum are derived indirectly from various so-called proxy-data, because direct thermometer measurements were not available yet.

The second period occurred between 2000 and 4000 BC, when global temperatures were about 2 degrees warmer than at present. Then, particularly the continents at mid and higher latitudes were about 3 degrees warmer than today, whereas sub-tropical regions, as today's hyper-arid areas like the Saharan desert, were significantly cooler and wetter.
Incidential evidence tells us that the Cyrenaika, located in Libya, used to be the corn chamber of the Roman Empire, and Palestine, a rather dry and deserted region today, was once heavily wooded.

Therefore, from climate history it is not immediately apparent that a warmer climate is a worse climate: On the contrary, it is termed a climate optimum.

The indications from climate history are therefore that we are headed for another climate optimum, rather than for a climate catastrophe – at least for temperatures within the range up to about 2 degrees above the present.

Paleo-Climatic Temperature Variations



Average near-surface temperatures of the northern hemispere during the past 11.000 years (after Dansgaard et al., 1969, and Schönwiese, 1995)

What temperatures should we expect for the next 100 years? Climate models tell us temperatures will roughly increase by 1.5 to 4.5 ℃ for a CO_2 doubling, 1.4 – 3.8 in their most likely IPCC scenario A1T (30 Gt C in 2100, 1992 IS92a BaU: 20 Gt C)

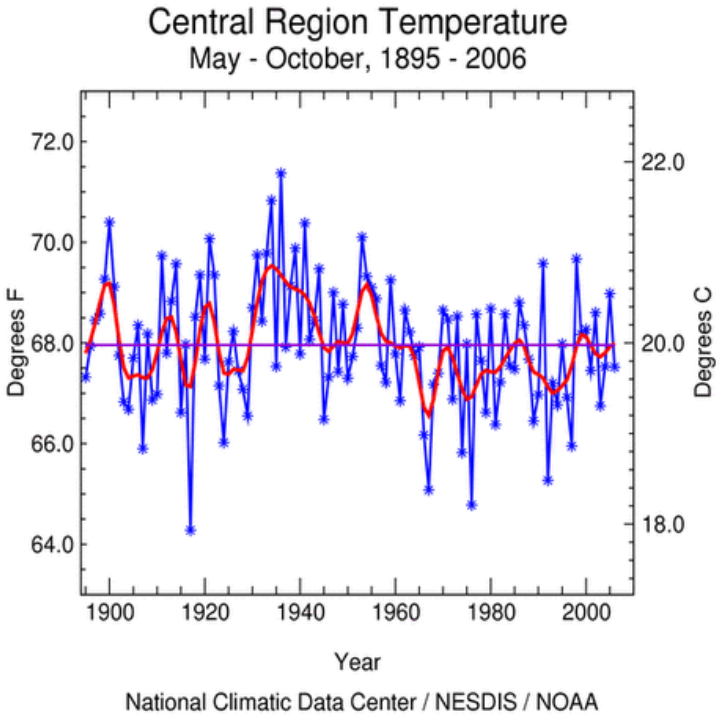
An extension of presently (that is the average over the past 30 years) observed rates of ghg increase, ghg forcing and global temperature increase would lead to a temperature increase of about 1.4 – 1.8 degrees assuming all of the increase observed in the last 30 years is due to ghg. This is even the case if one assumes a continuous exponential atmospheric CO_2 increase, because temperature increases with the logarithm of CO_2 concentration. This would be within the lower range of modelled climate change.

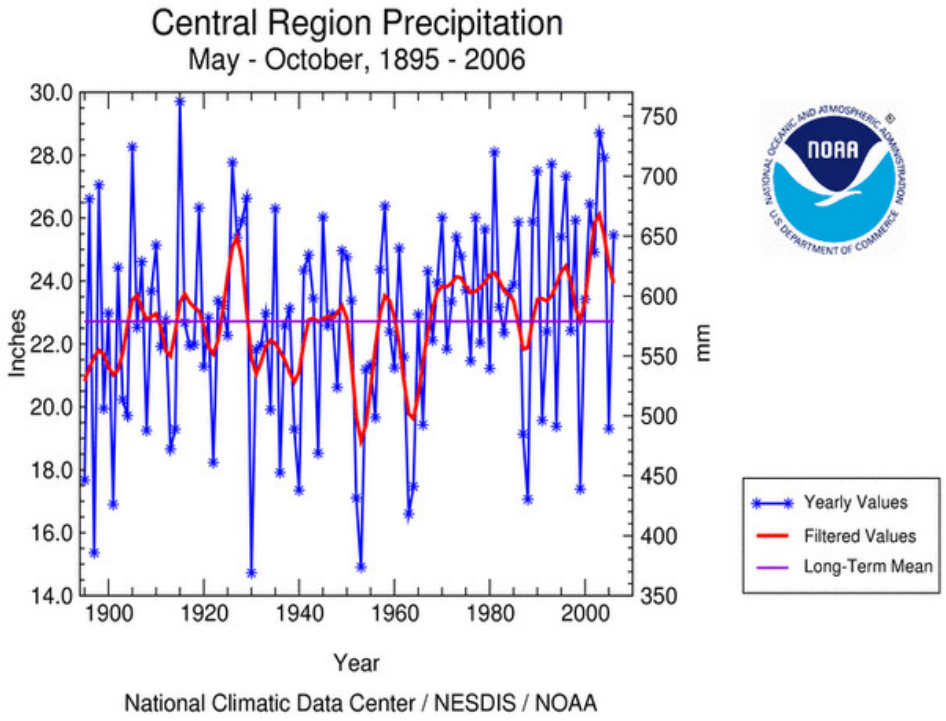
Therefore, a case can be made that warming in the next 100 years will not exceed the warming of a climate optimum, if emission rates follow generally assumed BaU scenarios.

Important factor of the impact of a warmer climate are changes in precipitation:

- Models generally assume increasing precipitation with warming
- Warming accompanied by precipitation increase will counteract some possible negative effects associated with warming, eg summer drying and drought increase in continental interiors
- Regional patterns of modelled precipitation change are rather uncertain
- Very little congruence between modelled and observed precipitation patterns particularly in summer (eg continental interior of US, wetter not warmer; Germany: warmer, not wetter)

Temperature and precipitation over the Central U.S.

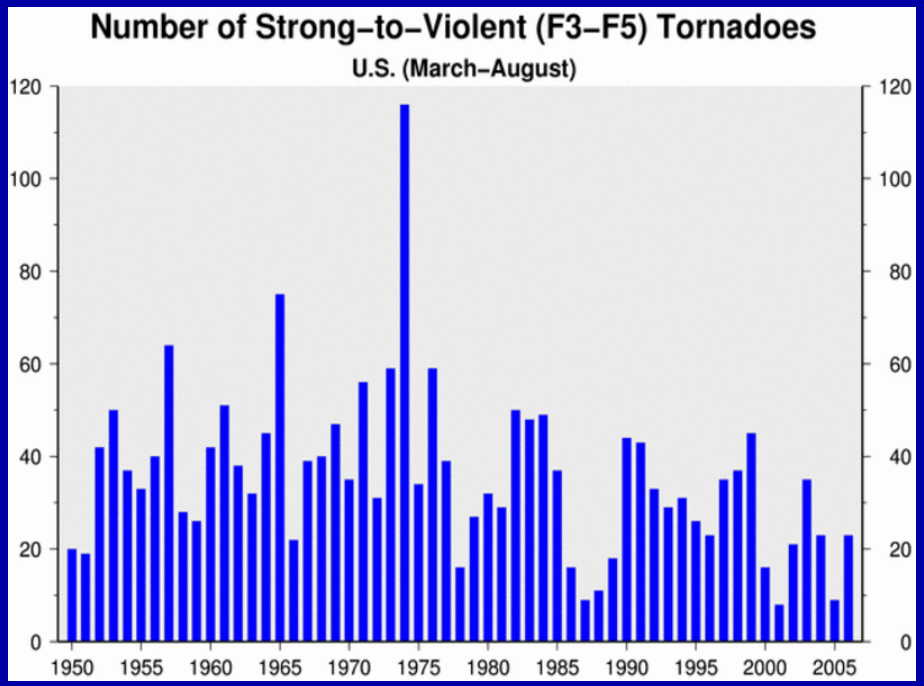


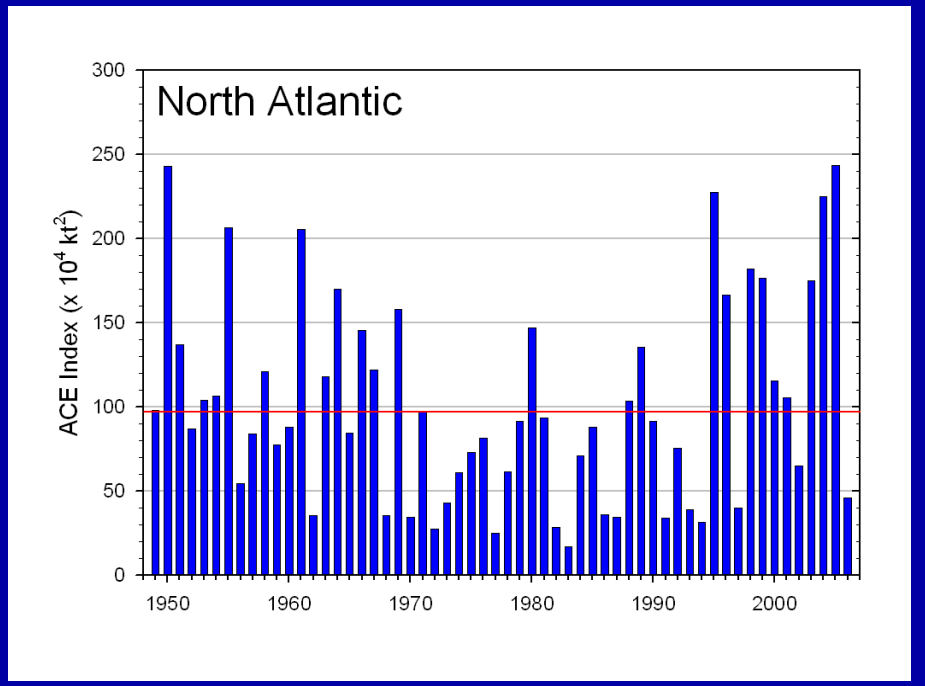


Extreme events (observations):

- There is a general statistical problem with detecting trends of extreme events in a limited time series (50 – 150 years); parameter dependent
- Despite many media pronouncements to the contrary, there has been no general increase in the frequency and intensity of extreme climate (or rather weather events) in the last 30 – 50 years
- Hurricane intensity over the Atlantic increased during the last 20 years, but no long-term increase 1945 – 2006
- No increase in Tropical storm intensity world-wide in the last 20 years
- No increase in severe tornado frequency over the US during the last 50 years

Extreme events (observations): Tornados and Hurricanes





Source: US NOAA

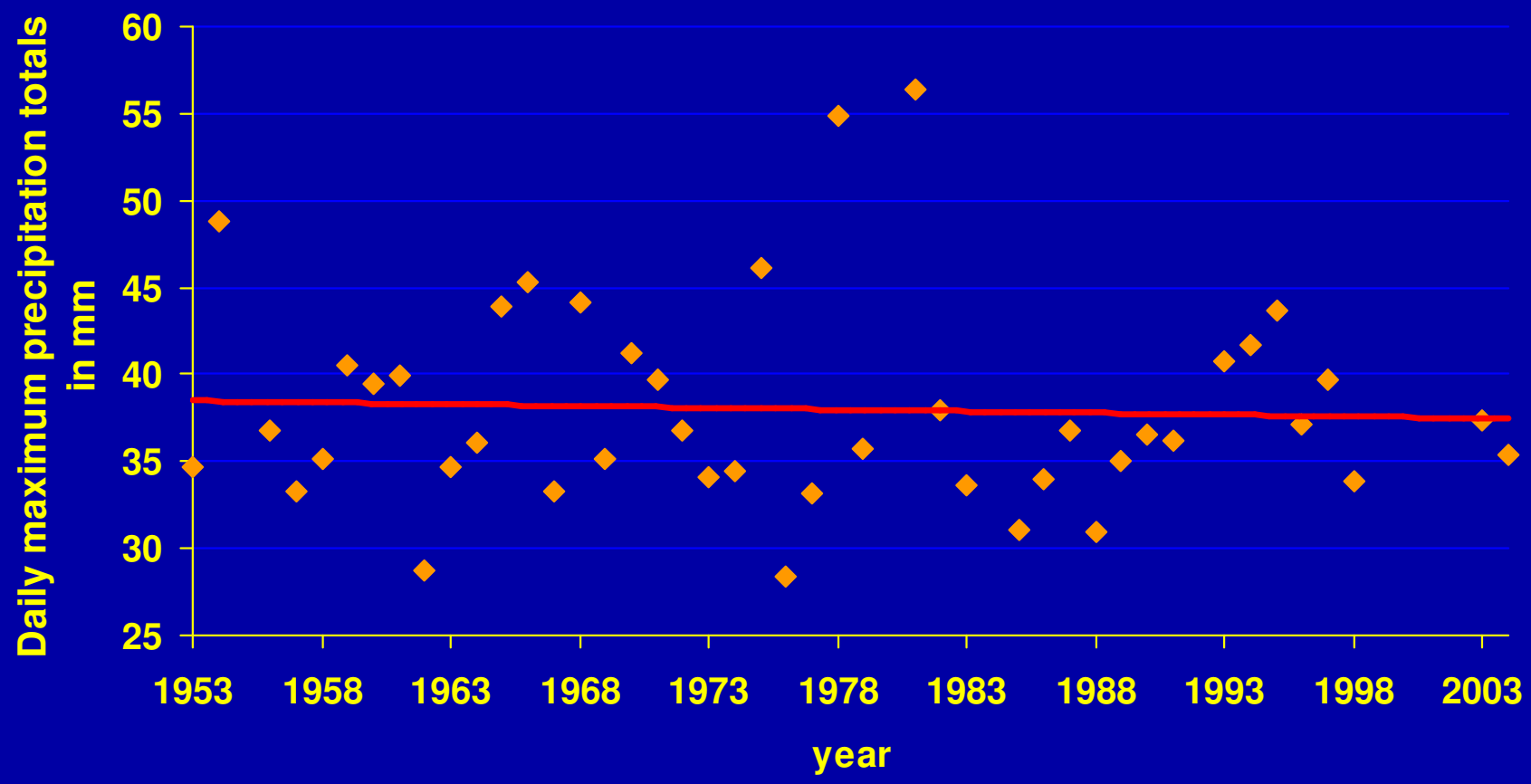
- Slight increase of intense precipitation events over the US 1900 – 2000, but unrelated to temperature increase

- No increase in max 24 hr precipitation sums (good indicator for extreme precipitation events) in Germany the last 50 years (despite warming)

- No increase in extreme wind events over Germany the last 50 years (despite warming)

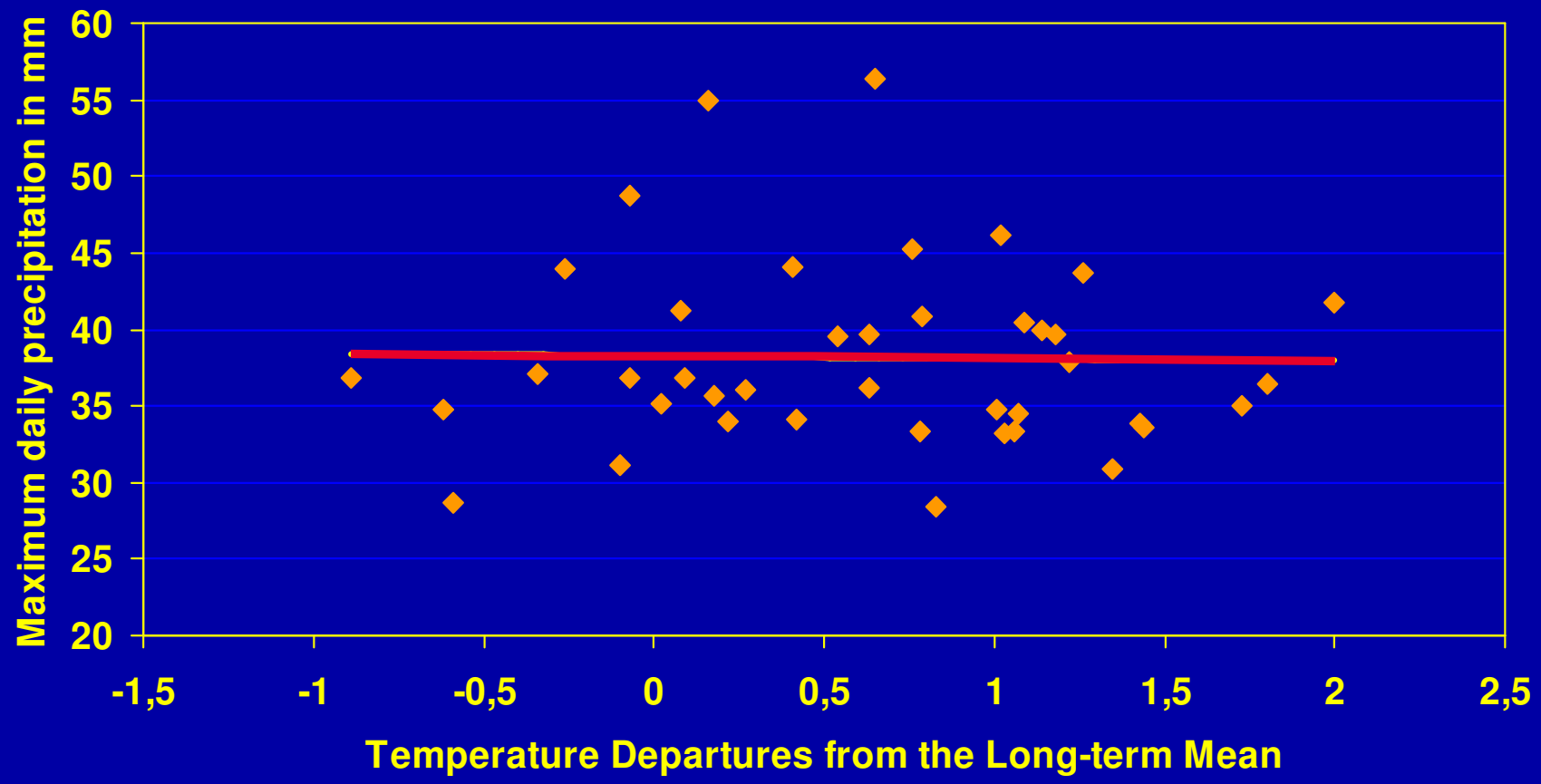
- Number of other examples from around the world (eg China, Spain etc)

Trends of extreme precipitation in Germany since 1953



Source: German Weather Service, Annual Climatological Data

Annual Average Temperatures vs. Extreme Precipitation in Germany since 1953



Source: German Weather Service, Annual climatological data

Extreme events (Model predictions):

Despite many media pronouncements to the contrary, there is no general consensus from climate modelling that extreme events, particularly Hurricanes and extra-tropical storms will increase in frequency and severity

- Warming will reduce Equator-Pole temperature gradient, which will tend to reduce extra-tropical storm intensity

- Warming will reduce vertical temperature gradient in the Tropics and intensify subtropical upper atmospheric westerly flow, which will tend to lessen tropical storm intensity and counteract increasing intensity from rising tropical SSTs

Future changes in the frequency of tropical storms

Ratio (%) of number of storms in global warming experiment to number in control experiment

			Ocean basin					
model	reference	Global	NA	WNP	ENP	NI	SI	SWP
T106 JMA 10y	Sugi et al. 2002	**66**	**161**	**34**	33	109	**43**	**69**
T42 NCAR CCM2 10y	Tsutsui 2002	102	86	111	91	116	124	99
N144 HadAM3 15y	McDonald et al. 2005	**94**	**75**	**70**	**180**	**142**	110	**82**
T106 CCSR/NIES/FRCGC	Hasegawa and Emori 2005			96				
T106 JMA 10y	Yoshimura & Sugi 05	fewer						
T63 ECHAM5-OM	Bengtsson et al. 2006	94						
20km MRI/JMA	Oouchi et al. 2006	**70**	**134**	**62**	**66**	**48**	**72**	**57**

Red = significantly **more** tropical storms in the future simulation

Blue = significantly **fewer** tropical storms in the future simulation

Summary: fewer tropical cyclones globally in the future simulations, sign of regional changes varies between model and basin

Source: Ruth McDonald, 2006

Tropical Storms and Climate Change

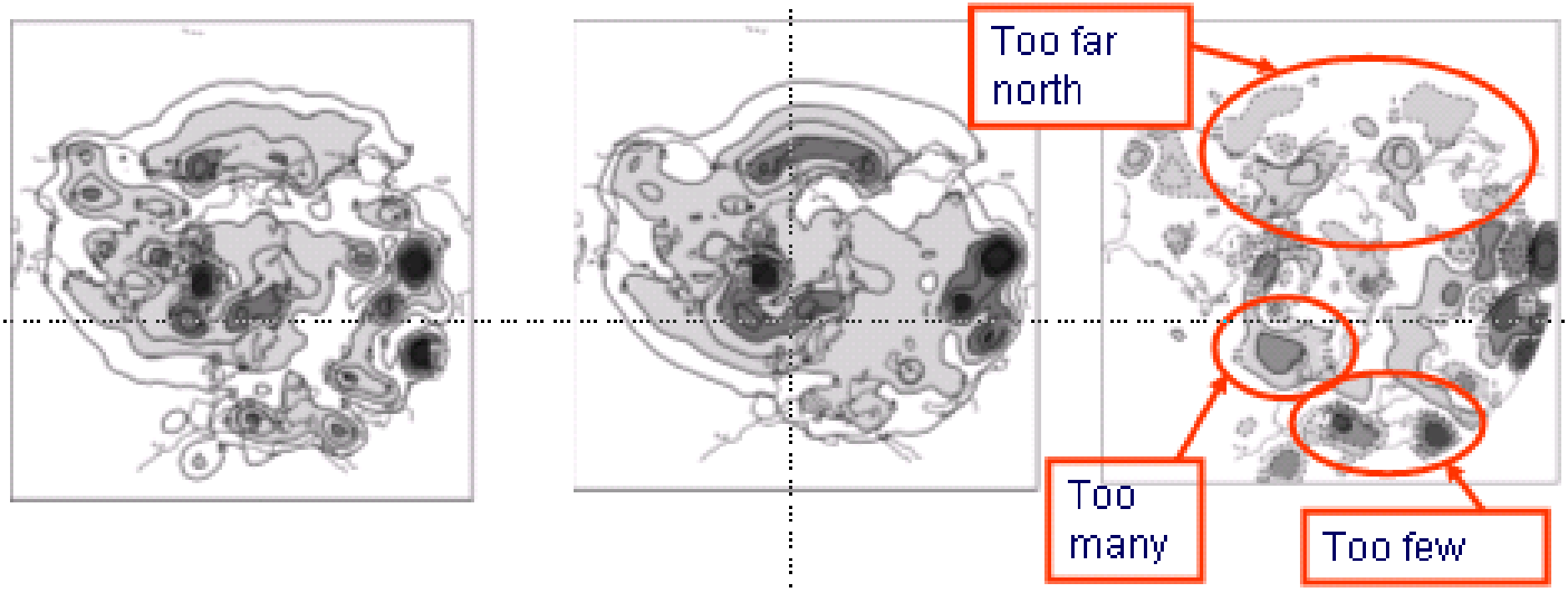
- There is a minor reduction in the number of tropical storms by some 6%
- There are no changes in the extremes of tropical storms in spite of increased tropical SST by 2-3°C
- There are marked changes in the regional tropical storm tracks which we suggest, analogues to ENSO, are driven by regional tropical SST anomalies

Simulation of mid-latitude storms by models:- Cyclone density

ERA

AMIP 13 Model Mean

Difference



number of cyclone events per 145,000 km² accumulated over nine 120 day winter periods for the Northern Hemisphere

Lambert et al. (2002) Climate Dynamics

Source: Ruth McDonald, 2006

Summary

- All models have systematic errors in the simulation of cyclone tracks
- Cyclones tend to be too weak
- Errors often larger than climate change signal

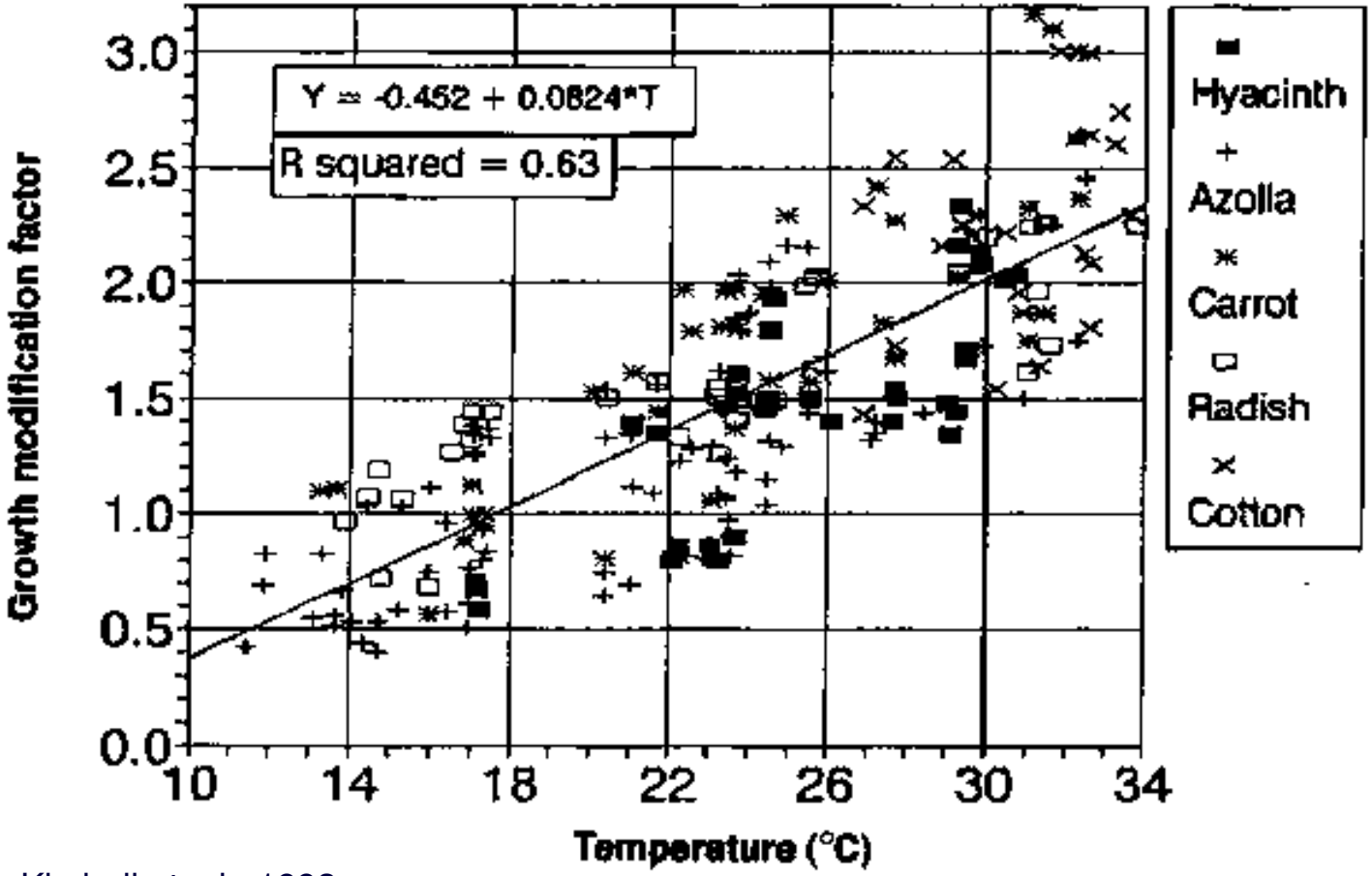
Impact on sea-level rise

- Sea level rise is modelled to be about 30 – 40 cm over the next 100 years assuming standard BaU emission scenarios; presently observed 3 mm per year
- Somewhat less than in IPCC 2001 (TAR)
- Might be serious in some regions, but not unmanageable
- Catastrophic scenarios of several meters rise presented in the media, which assume substantial melting of the Greenland and the West-Antarctic ice shields are highly speculative
- Highly unlikely for a 2 – 3 ℃ warming scenario in the next 100 years
- Sheer propaganda in the style of Al Gore's film, the objective is to scare the world into action against warming

Impacts of a warmer climate and higher CO_2 content on agriculture

- If water availability will not become a limiting factor warming of up to 2 – 3 ℃ – in combination with a rising CO_2 content – will lead to an increase of agricultural productivity, rising yields, fruit quantity and quality
- Rising CO_2 acts as a fertilizer and reduces evapo-transpiration from plants, renders plants more drought resistant
- CO_2 fertilization will counteract water stress on plants
- CO_2 fertilization increases with temperature, becomes particularly efficient in the tropics and sub-tropics

Impacts of higher temperatures and double CO_2 content on growth of various plants



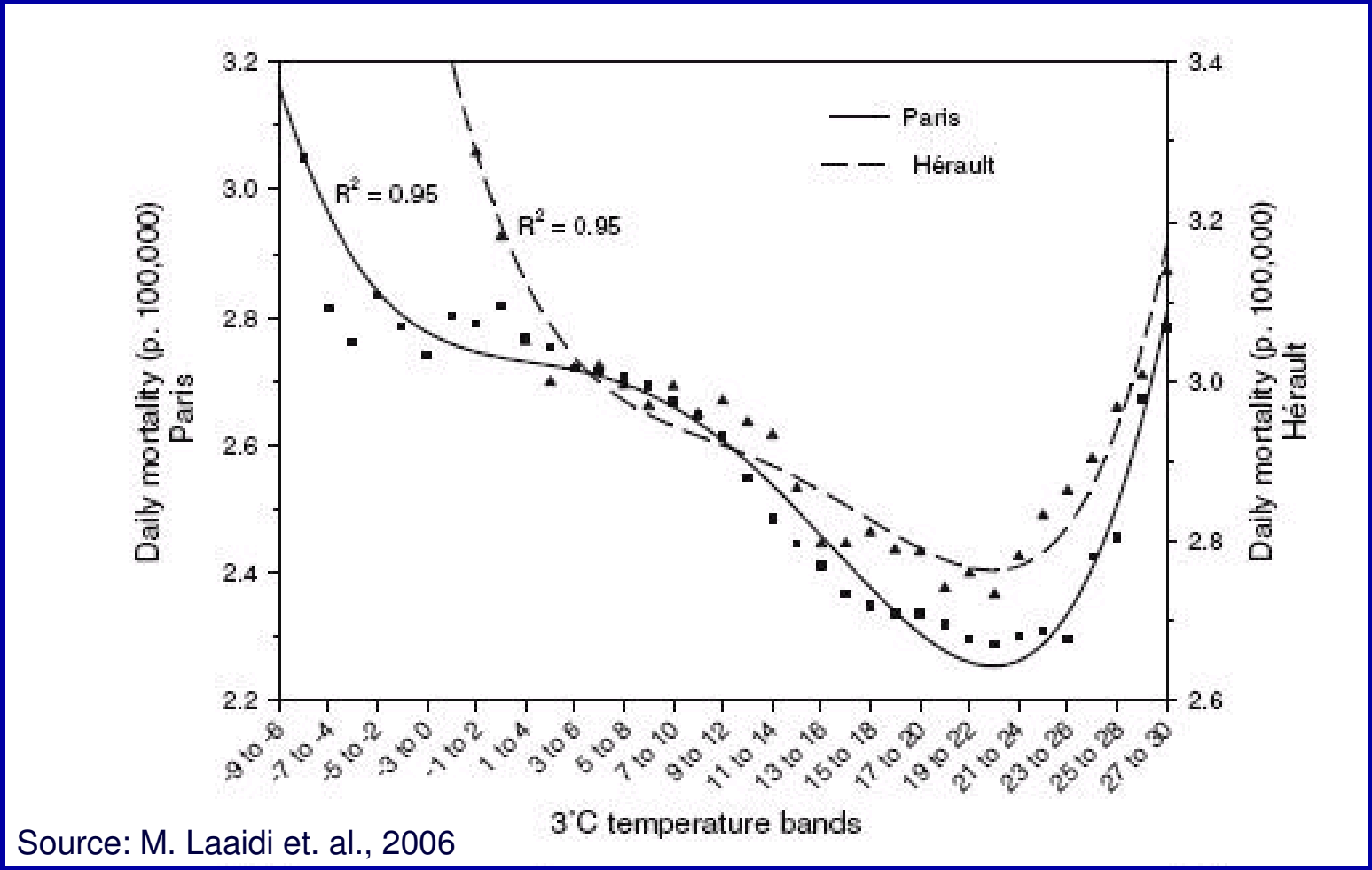
Source: Kimball et. al., 1993

Impact of a warmer climate on human health

Despite many media pronouncements to the contrary a warmer climate will generally have a positive impact on human health:

- In most climate regions mortality and morbidity have a clear maximum in the cold season and only a small secondary maximum in the summer
- 2 – 3 ℃ of warming will lead to a substantial reduction of winter mortality and only to a slight increase in summer mortality
- This holds true even for the hotter regions of southern Europe and the southern US
- The spread of Malaria and other tropical diseases with warming is – for the most part – highly questionable, hygienic conditions not temperature are the decisive factors for the incidence of Malaria and other tropical diseases.

Temperatures and Mortality in two regions of France



Source: M. Laaidi et. al., 2006

Impact of warming on other human activities:

- Warming during the cold season will substantially reduce heating requirements and fuel use
- Warmer winters and less snow will reduce damage to infrastructure (roads, buildings, trees etc), fewer traffic accidents
- Summer warming will increase cooling requirements, the net effect will likely be a reduction of fuel use, dependant on geographic region
- Lengthening of growing season will increase agricultural productivity (see above)