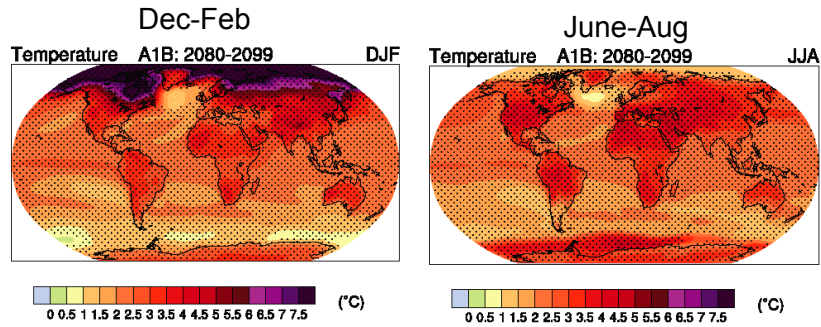


## Seasonal Cycle of Temperature Changes: “2080-2099” minus “1980-1999”

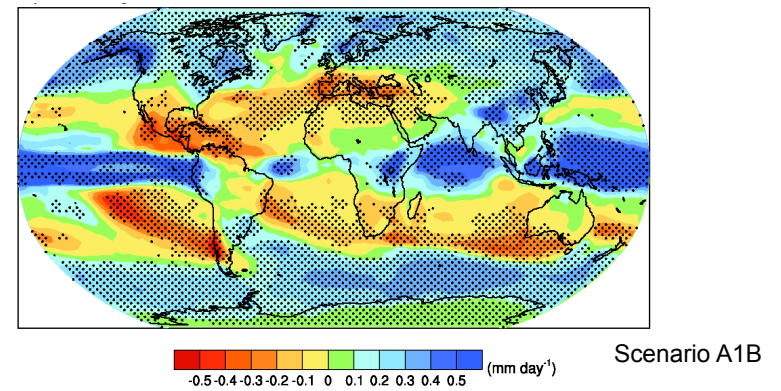


Scenario A1B

More warming in winter than summer (esp. in NH)

Stippling is where the multimodel average change exceeds the standard deviation of the models IPCC AR4, Fig 10.9

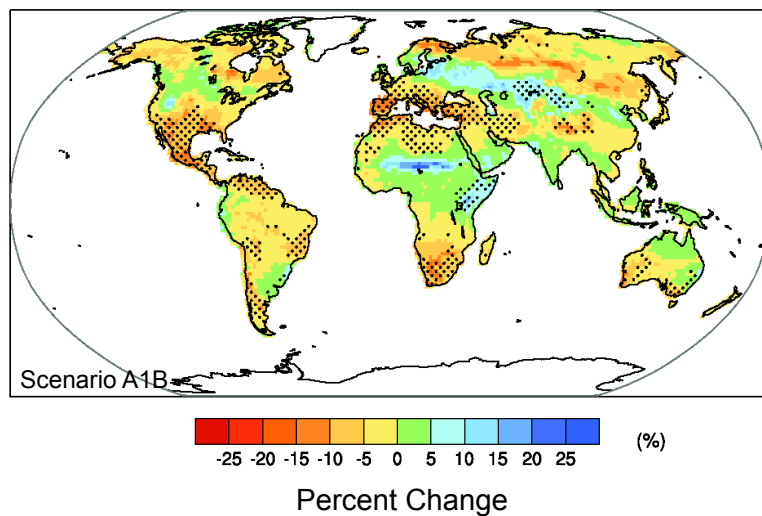
## Projected Annual Average Precipitation: “2080-2099” minus “1980-1999”



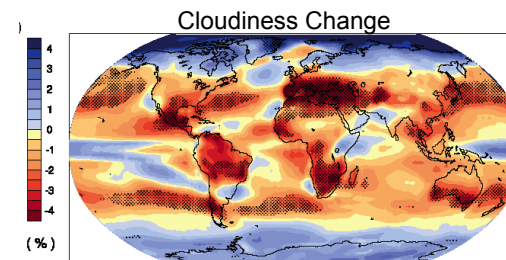
There is a *robust* drying of the subtropics, 20-35°N&S, and a robust wetting of the high latitudes, 45° to pole.

Stippling is where the multimodel average change exceeds the standard deviation of the models

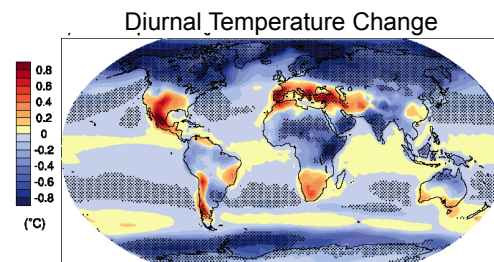
## Projected Soil Moisture Change: “2080-2099” minus “1980-1999”



## Changes in Cloudiness and the Diurnal Cycle in Temperature



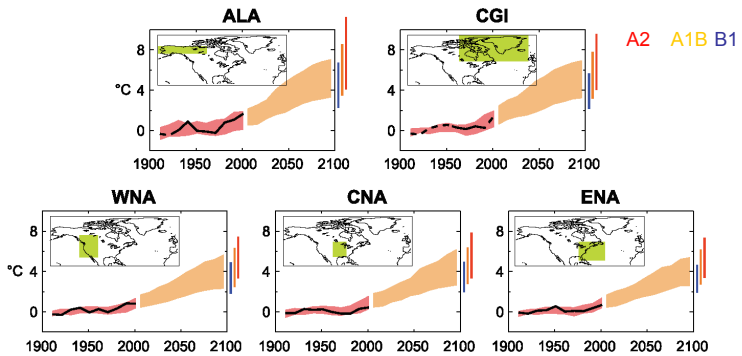
Most models show increasing clouds in high latitudes (cooling negative feedback) and less clouds in tropics



Most models show more warming at night than during day (a decrease in the diurnal temperature range)

Scenario A1B  
IPCC AR4, Fig 10.10,11

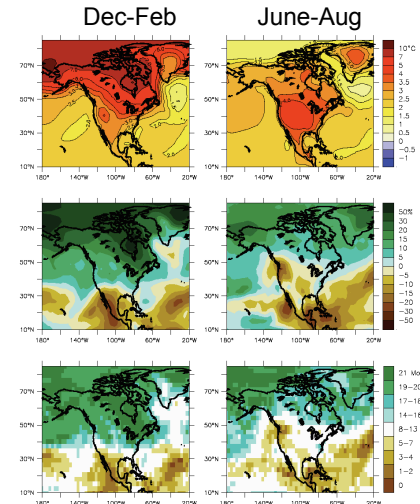
## Changes in North American Climate: 2100 minus 2000 AD



Black line = observed  
 Red shading = model 20<sup>th</sup> Century w/ observed emissions  
 Orange shading = 21<sup>st</sup> Century w/ A1B emissions scenario

IPCC 2007 Fig 11

## Changes in North American Climate: 2100 minus 2000 AD



Temperature  
(deg C)

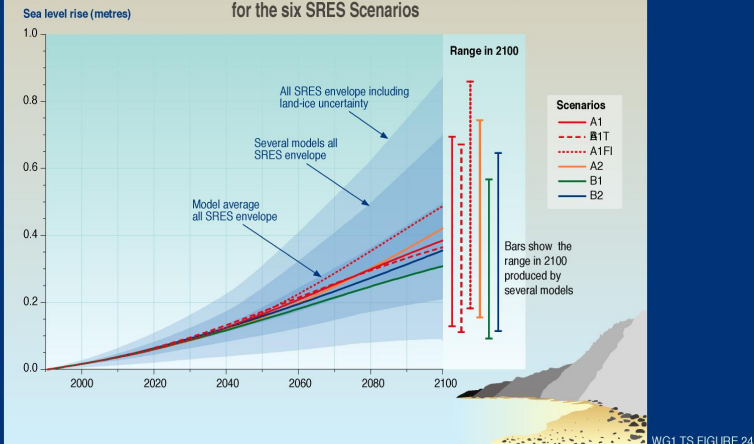
Precipitation  
(percent)

# of models  
that agree  
on sign of  
precip

Scenario A1B

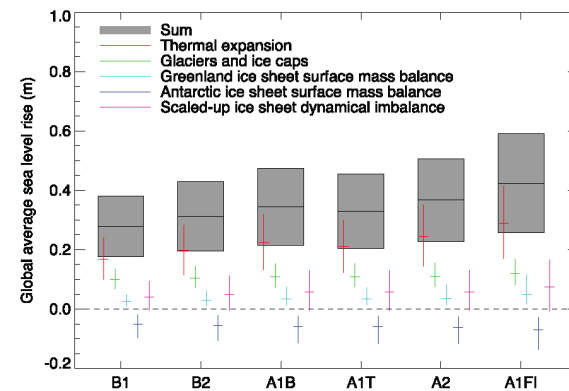
IPCC 2007 Fig 12

## Global average sea level rise (1990 - 2100) for the six SRES Scenarios



WG1 TS FIGURE 24

## Projected Sea Level Rise: All sources “2080-2100” minus “1980-2000”

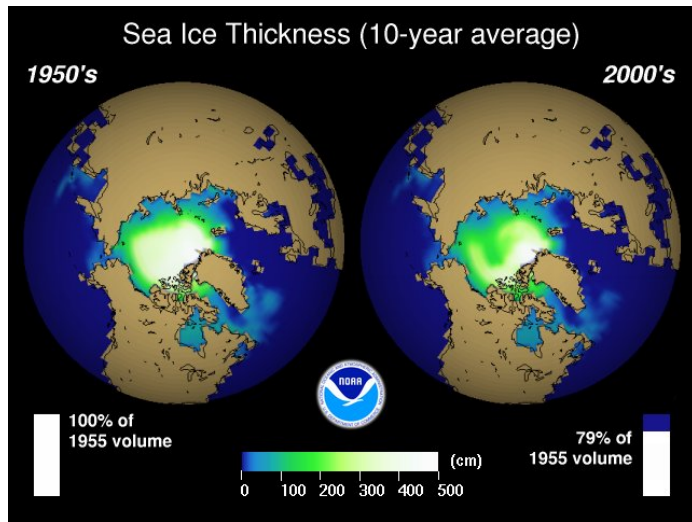


For reference,  
the sea level  
rise from 1961  
to 2003 was  
7.6cm (3 in)

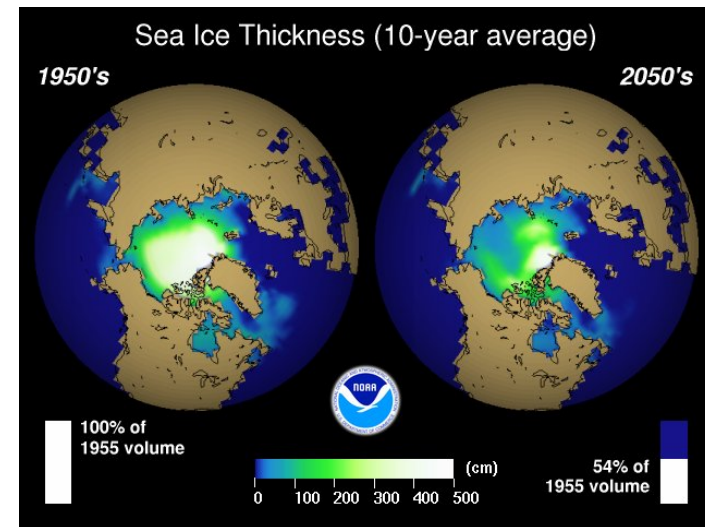
The total assumes current dynamical imbalance in the Antarctic or Greenland ice sheets scales with the temperature increase (a conservative estimate).

IPCC AR4, Fig 10.33

## Sea Ice Thickness

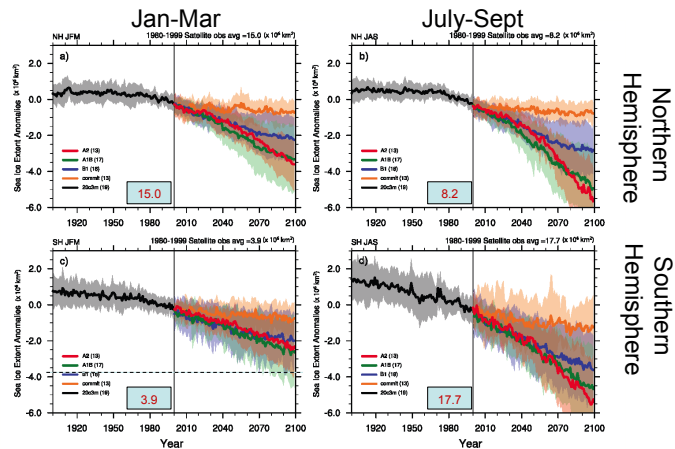


## Sea Ice Thickness



## Projected Sea Ice Extent (in $10^6 \text{ km}^2$ )

"2080-2100" minus "1980-2000"



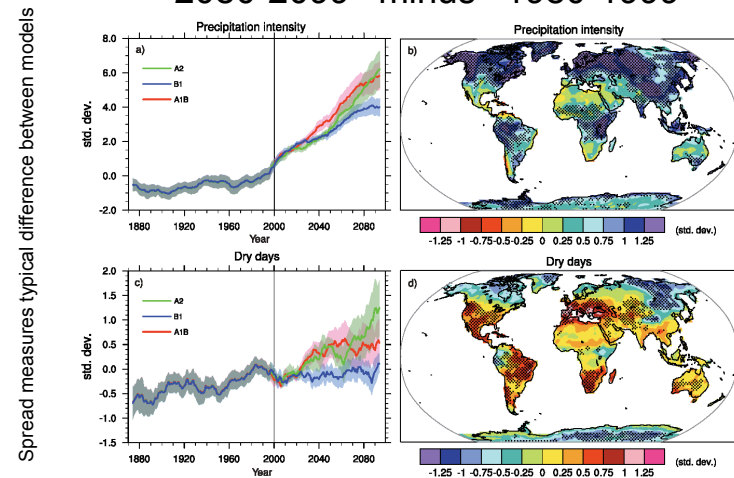
Largest decreases in northern hemisphere

Sea Ice Covered: when 15% of your neighborhood is covered by sea ice

IPCC AR4, Fig 10.13

## Projected Hydrologic Changes:

"2080-2099" minus "1980-1999"



Precip intensity = total annual precip divided by the number of wet days. Results are normalized by the typical year-to-year changes in precip intensity today. So 1 (1.7) means that a the precip intensity will be the same as that that seen only three times (once) between 1980-1999.

Scenario A1B

## More Extreme Events?

- Increase in hurricane intensity or frequency?
  - Fuel for hurricanes is heat released from condensation of moisture in the air, which increases by ~ 7% per °C of increase in global average temperature. Why?
    - water vapor feedback: there will be 20-25% more water in the air by 2100!
  - Also depend on structure of mean wind
  - In the net, it is hard to tell how hurricane intensity, frequency or paths will change
- Abrupt climate changes?
  - Greenland sliding into the sea? No. Antarctica ?
  - The ocean circulation changing? No.