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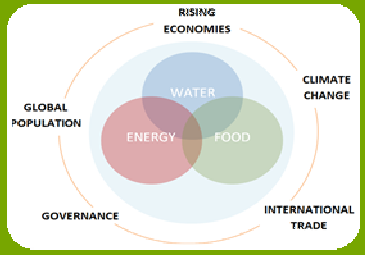
Prospects for Regional Climate Change Adaptation: Adaptation to What?



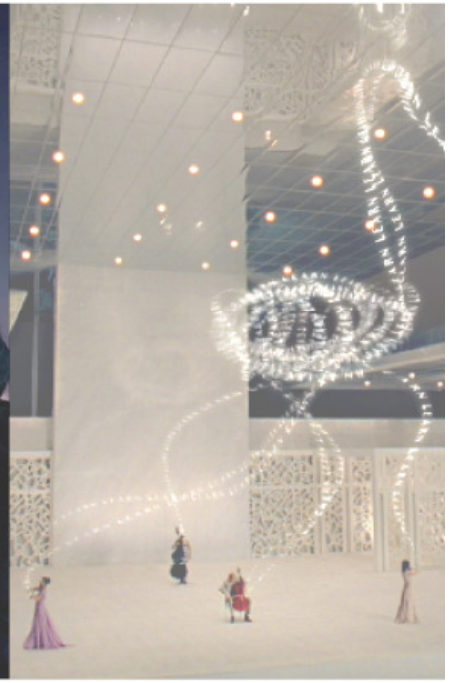
from Carbon to Creativity

QATAR FOUNDATION

THE THREE PILLARS

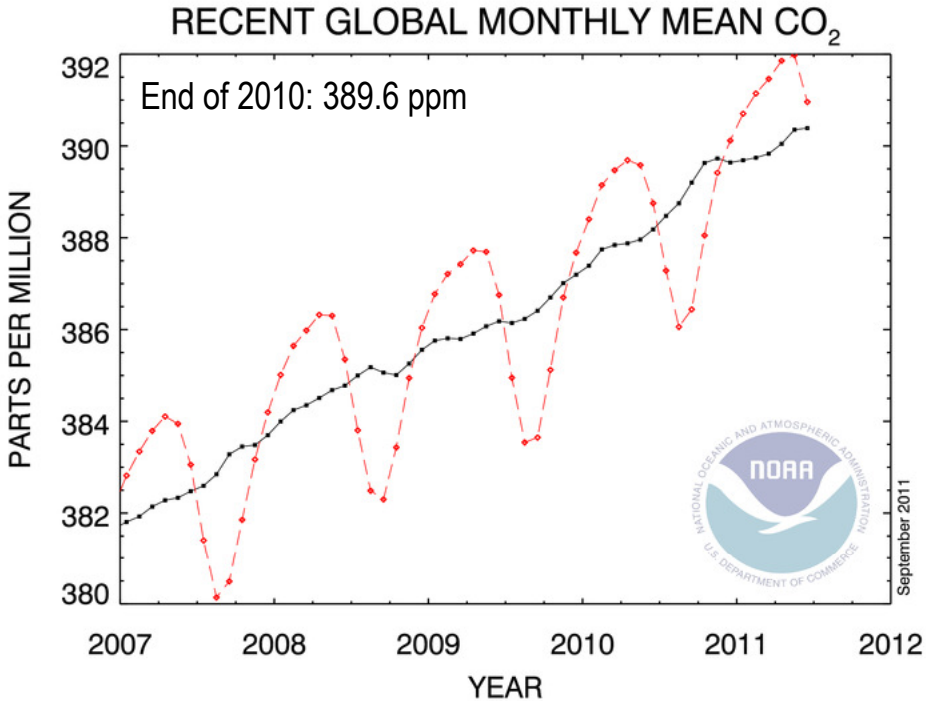
EDUCATION

SCIENCE & RESEARCH



COMMUNITY DEVELOPMENT

Atmospheric CO_2 Concentration

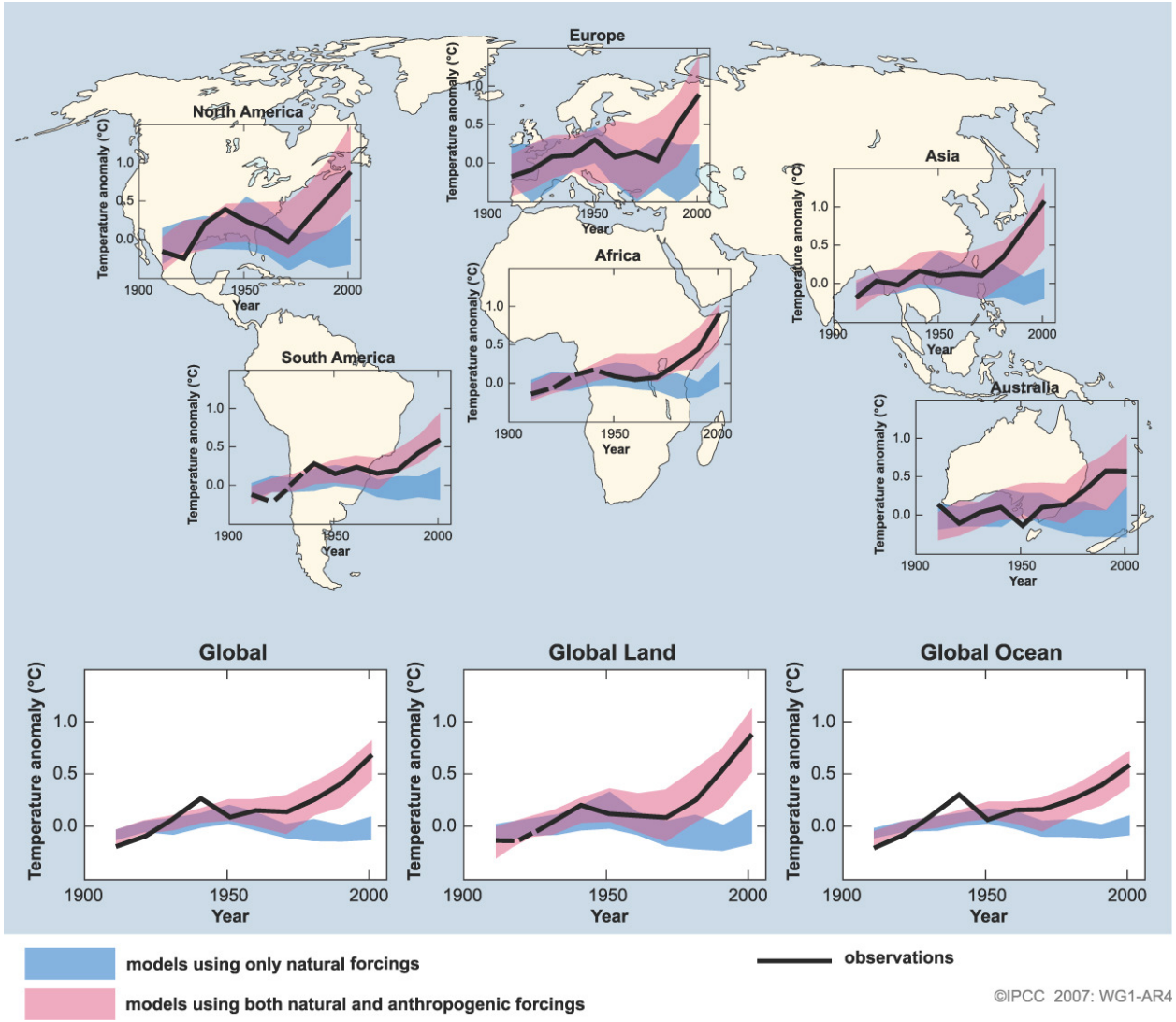


Annual Growth Rates (decadal means)

1970 – 1979: 1.3 ppm y^{-1}
1980 – 1989: 1.6 ppm y^{1}
1990 – 1999: 1.5 ppm y^{-1}
2000 – 2010: 1.9 ppm y^{-1}

Annual Mea	Growth Rate (ppm y^{-1})
2010	2.36
2009	1.63
2008	1.81
2007	2.11
2006	1.83
2005	2.39
2004	1.58
2003	2.20
2002	2.40
2001	1.89
2000	1.22

Data Source: Thomas Conway, 2011, NOAA/ESRL + Scripts Institution

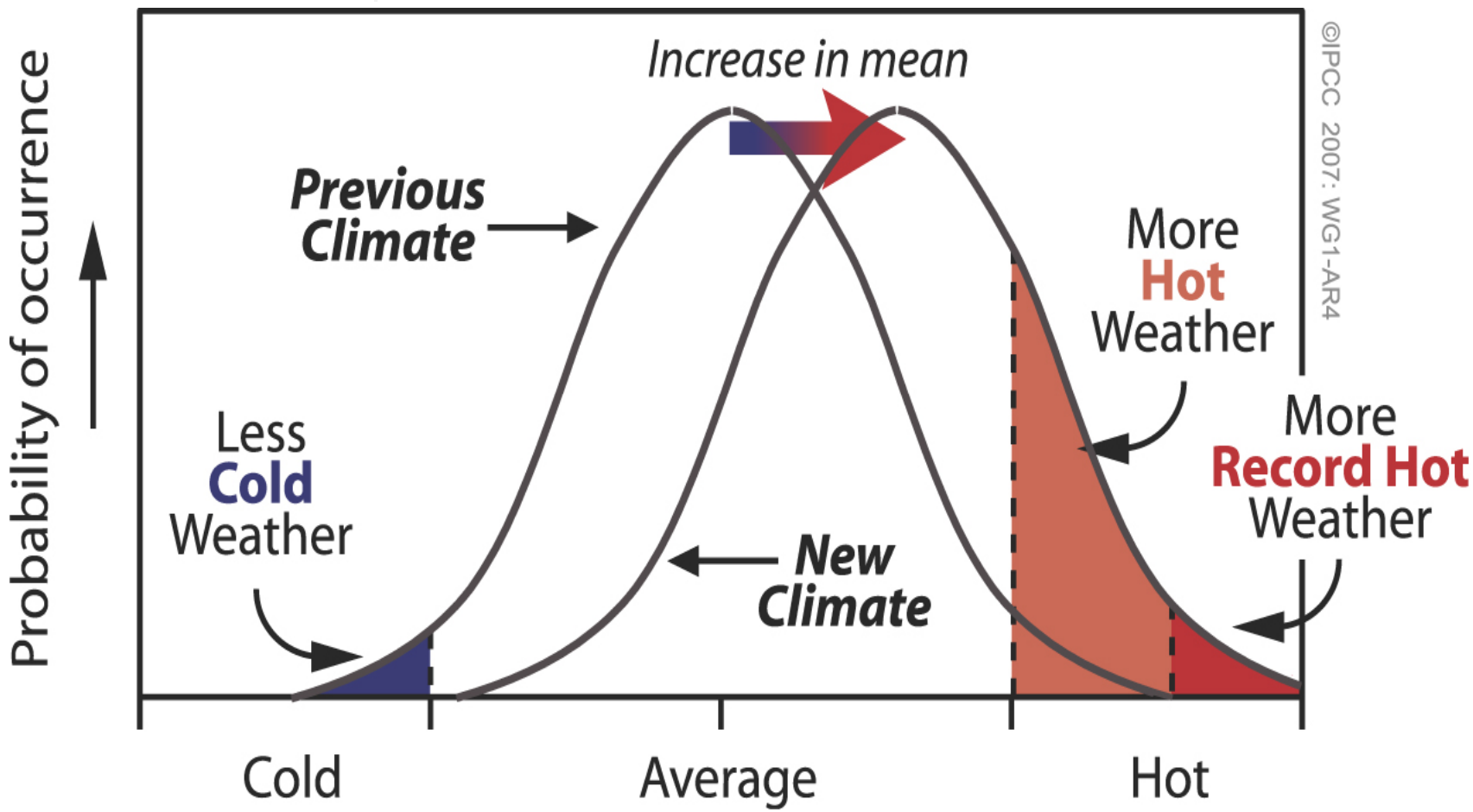


At the Global and Continental scales models and observation agree on significant warming

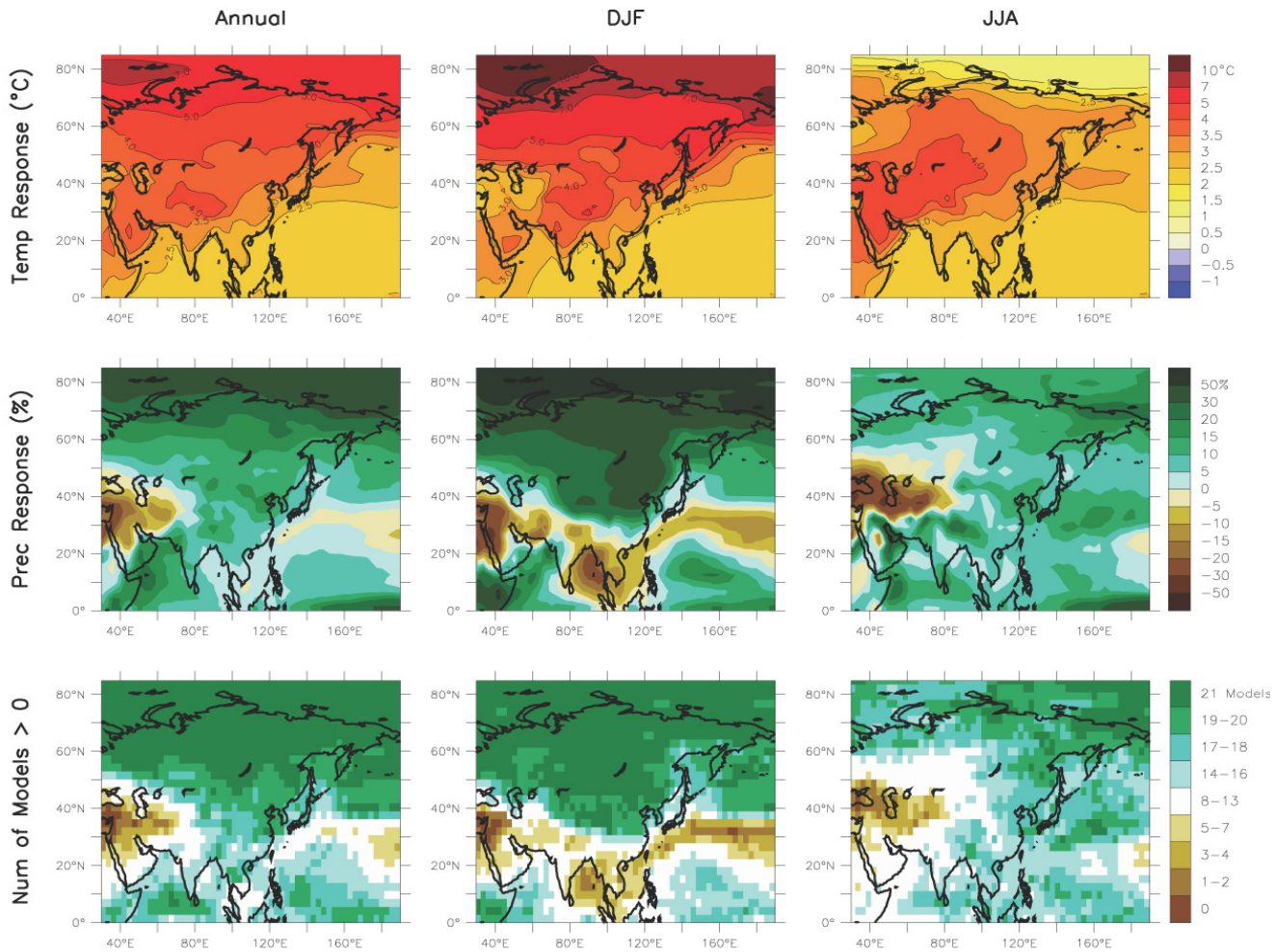
Season	2010-2039 Temp (C)	2010-2039 Precip (%)	2040-2069 Temp (C)	2040-2069 Precip (%)	2070-2099 Temp (C)	2070-2099 Precip (%)
DJF	1.3 1.1	-3 -4	3.1 2.0	-3 -5	**5.1 2.8**	**-11 -4**
MAM	1.3 1.2	-2 -8	3.2 2.2	-8 -9	**5.6 3.0**	**-25 -11**
JJA	1.6 1.5	13 5	3.7 2.5	13 20	**6.3 2.7**	**32 13**
SON	1.5 1.4	18 13	3.6 2.2	27 29	**5.7 3.2**	**52 25**

IPCC Predictions Over West Asia:
significant warming (2 – 6 degrees); a decrease in winter rainfall, and increase in summer rainfall

Impact on extreme hot weather can be more severe!

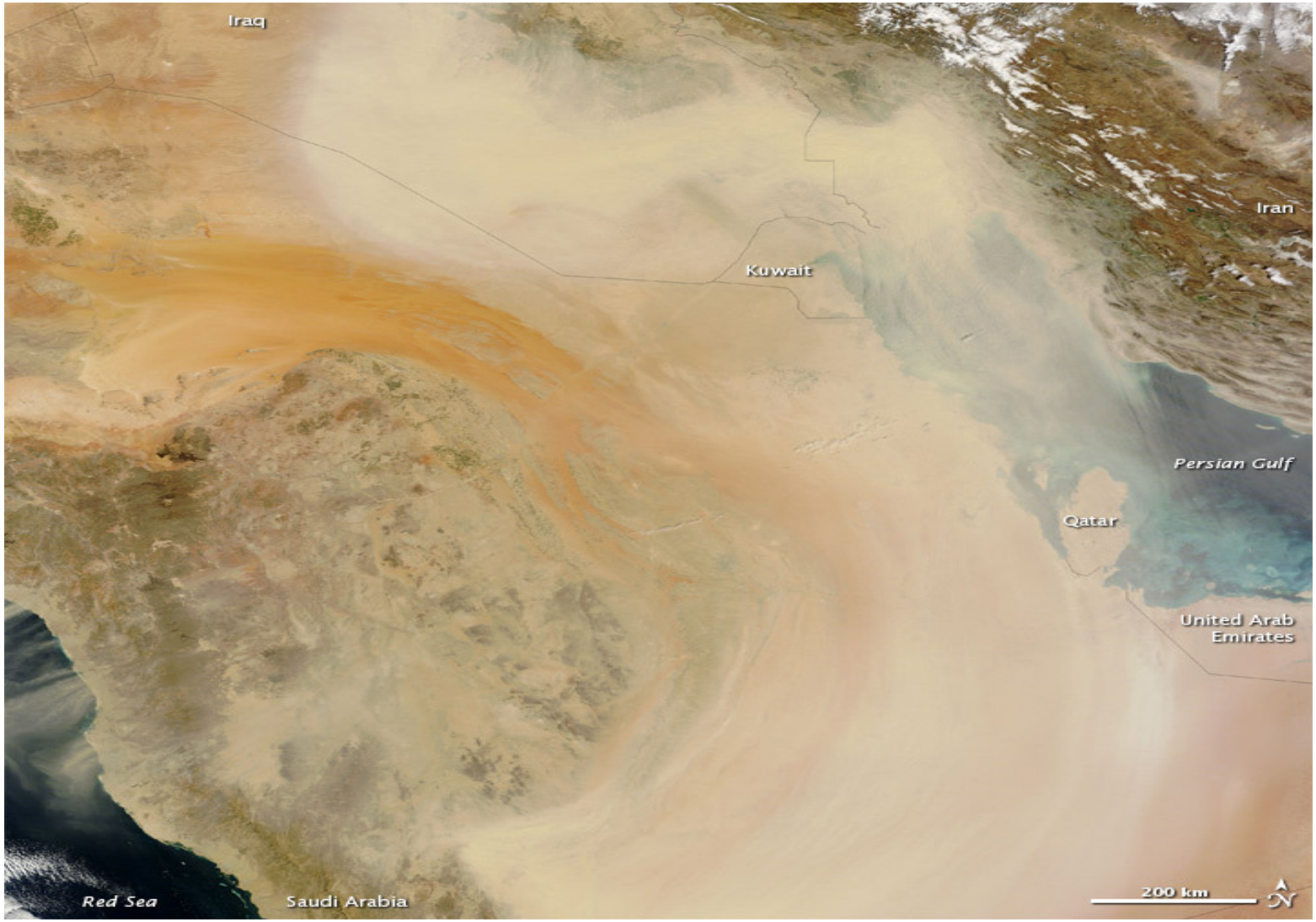


(IPCC 4th Assessment Report 2007)



Uncertainty regarding the sign of the change in rainfall over West Asia: half the models indicate an increase and the other half a decrease in rainfall amounts

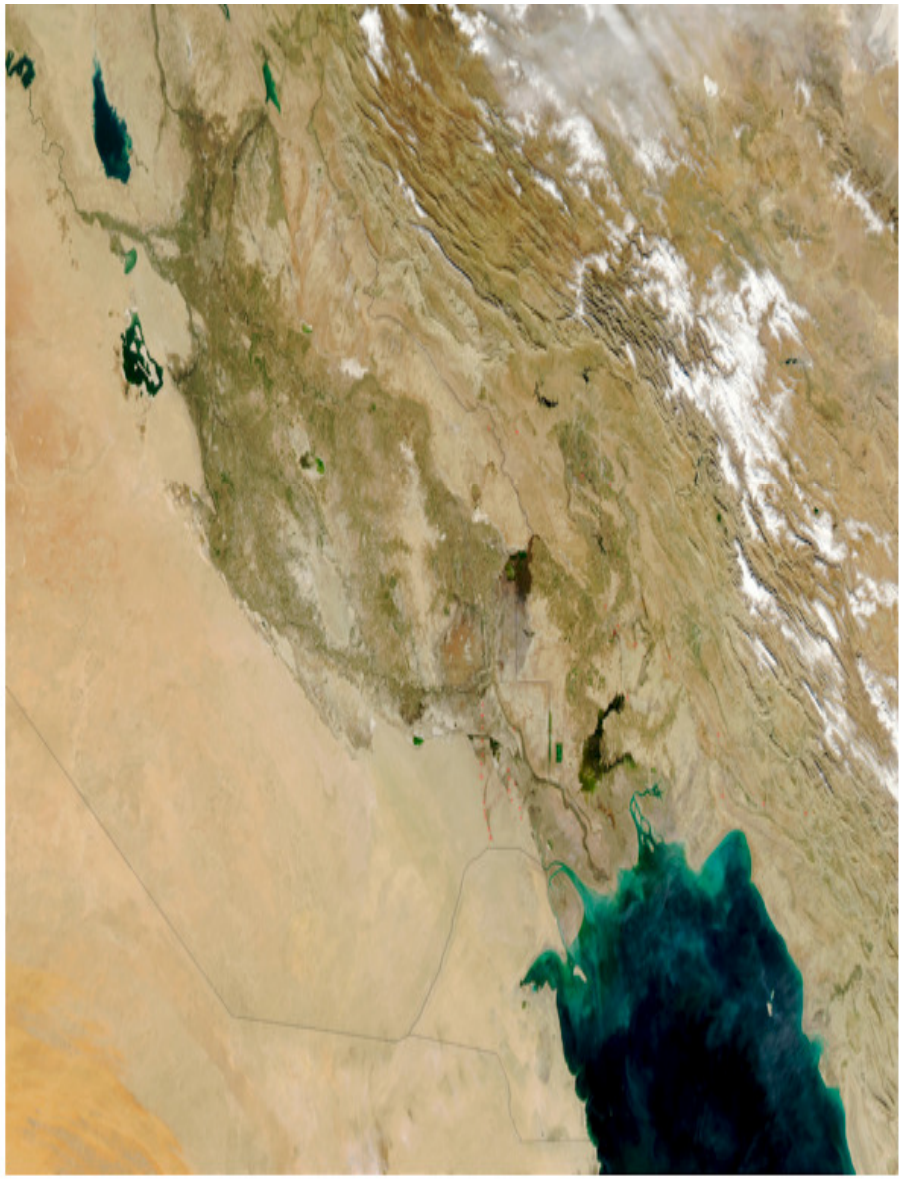
Local Processes: Dust Storms from Satellites, March 18, 2012

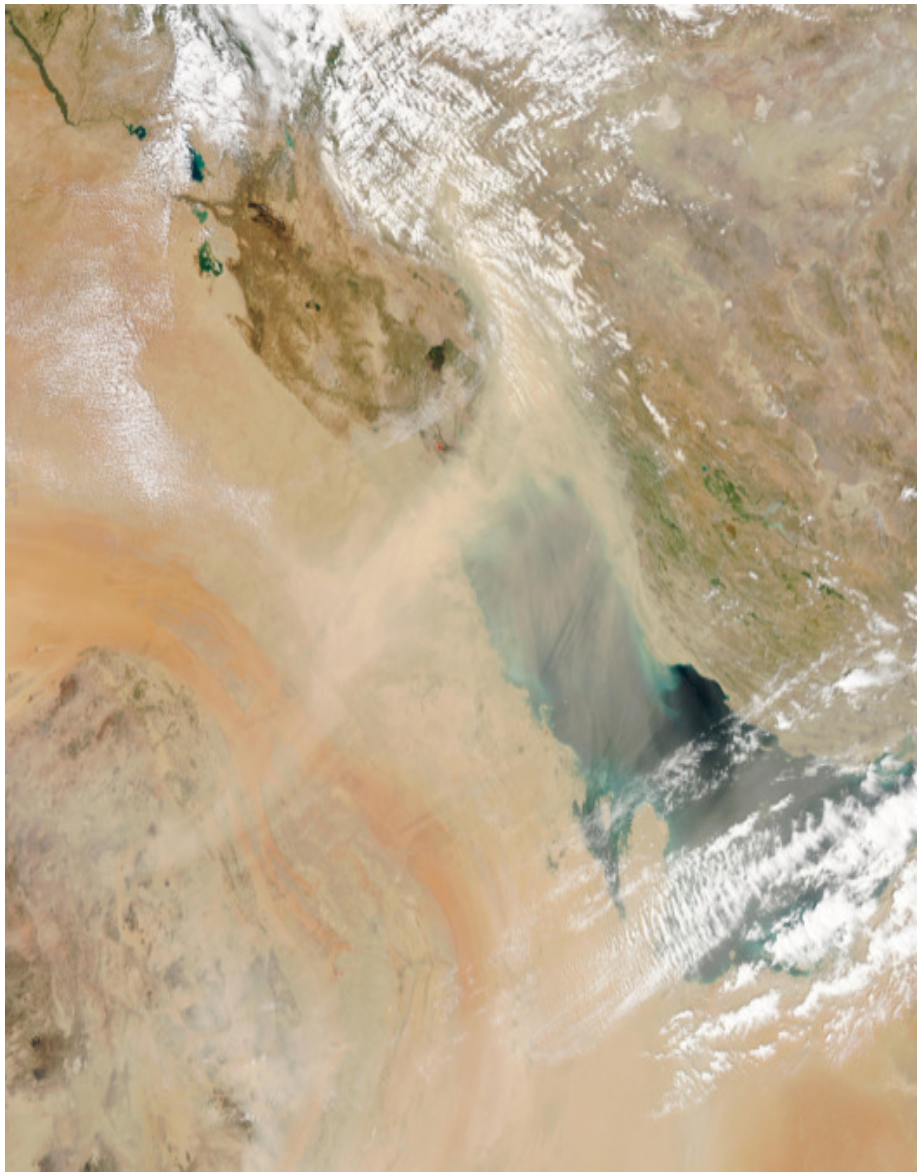


Approach to Climate Change Research in Qatar

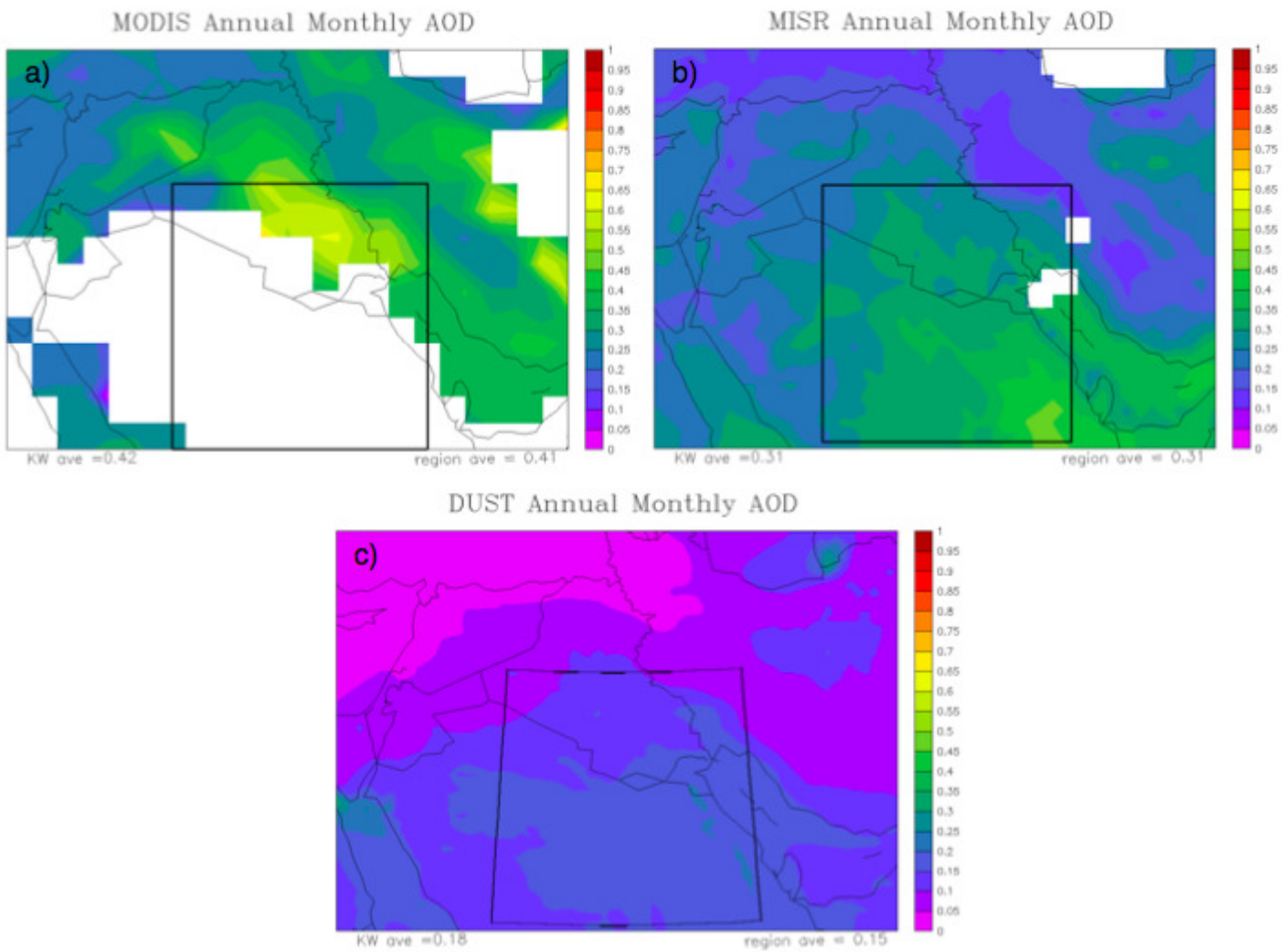
- Focus on regional scales as opposed to global;
- Focus on processes and variables that are relevant to arid regions such as dust, heat waves, and water scarcity;
- Build in-house capacity to carry state of the art climate research.

Regional features : irrigation, dust, etc

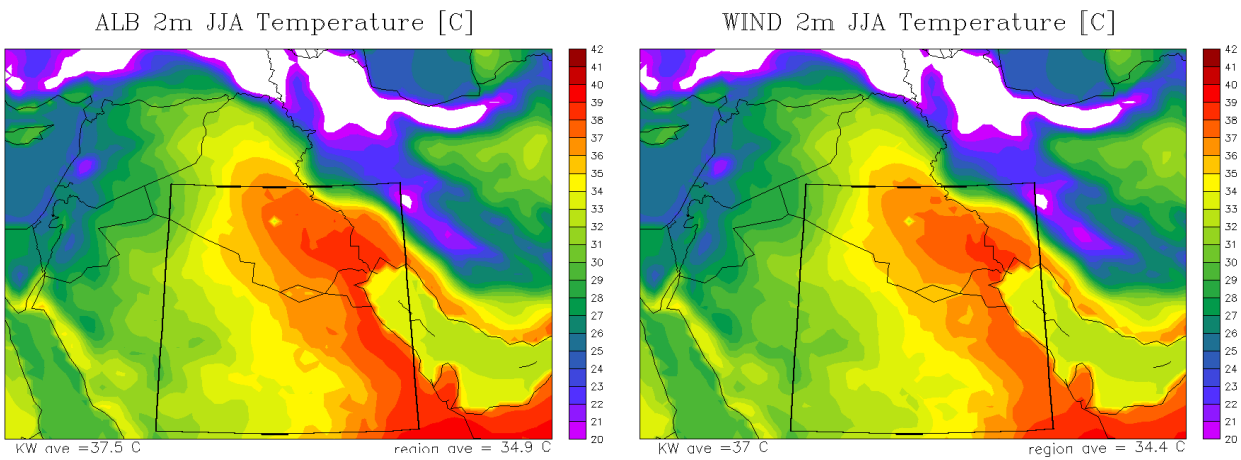




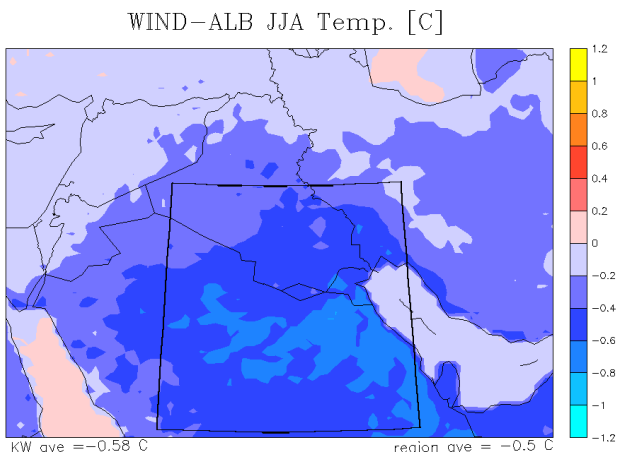
MODIS/MISR: Dust Emissions



Effects of Dust on Surface Temperatures



Occurrence of extreme daily temperatures (top 20th percentile) are reduced (~10%) by dust events.



Average daily surface cooling from dust ranges from 0.5°-1°C across the Arabian Peninsula.

Marcella and Eltahir (2011)

Thank You

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