



Children and Climate Change

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Sept 4-7, 2018

Flow of presentation

- Natural hazards
- Climate Change
- Effect of Climate Change on Health
- Effect of Climate Change on Children
- A few suggestions

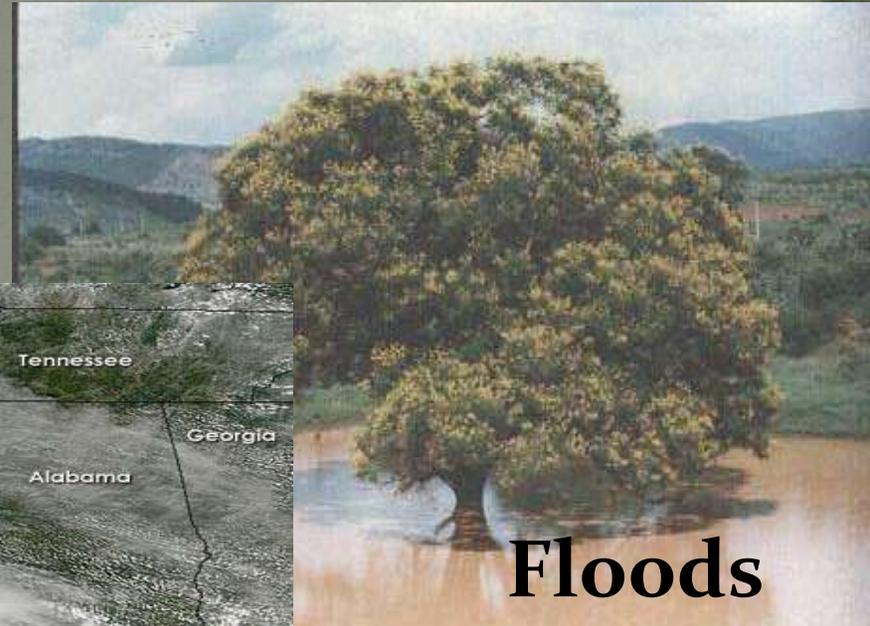
Major Natural Hazards



**Droughts/
Heat Waves**



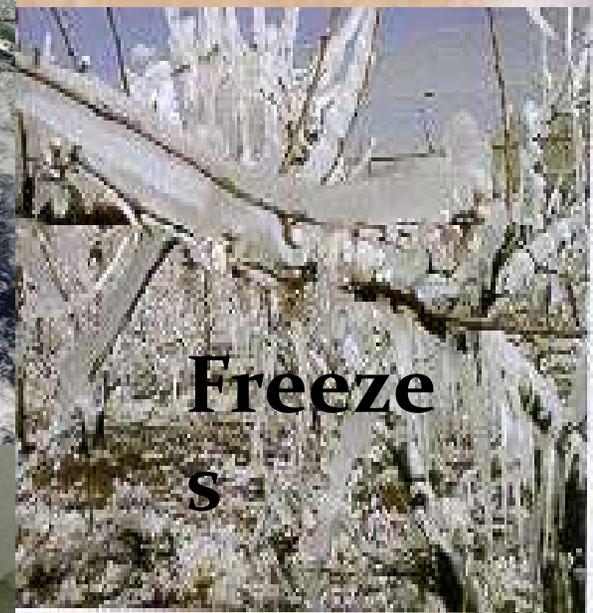
**Hurricanes/
Tropical Cyclones**



Floods



**Wild
Fires**



**Freeze
s**

Type of Hazards

Disaster Subgroup	Definition	Disaster Main Type
Geophysical	Events originating from solid earth	Earthquake, Volcano, Mass Movement (dry)
Meteorological	Events caused by short-lived/small to meso scale atmospheric processes (in the spectrum from minutes to days)	Storm
Hydrological	Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up	Flood, Mass Movement (wet)
Climatological	Events caused by long-lived/meso to macro scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)	Extreme Temperature, Drought, Wildfire
Biological	Disaster caused by the exposure of living organisms to germs and toxic substances	Epidemic, Insect Infestation, Animal Stampede

Global Disaster Events (1900-2009)

Disaster Types	Decades											
	1900-09	1910-19	1920-29	1930-39	1940-49	1950-59	1960-69	1970-79	1980-89	1990-99	2000-09	Total
Hydro meteorological	28	72	56	72	120	232	463	776	1498	2034	3529	8880 78.4%
Geological	40	28	33	37	52	60	88	124	232	325	354	1373 12.1%
Biological	5	7	10	3	4	2	37	64	170	361	612	1275 11.3%
Total	73	107	99	112	176	294	388	964	1900	2720	4495	11328

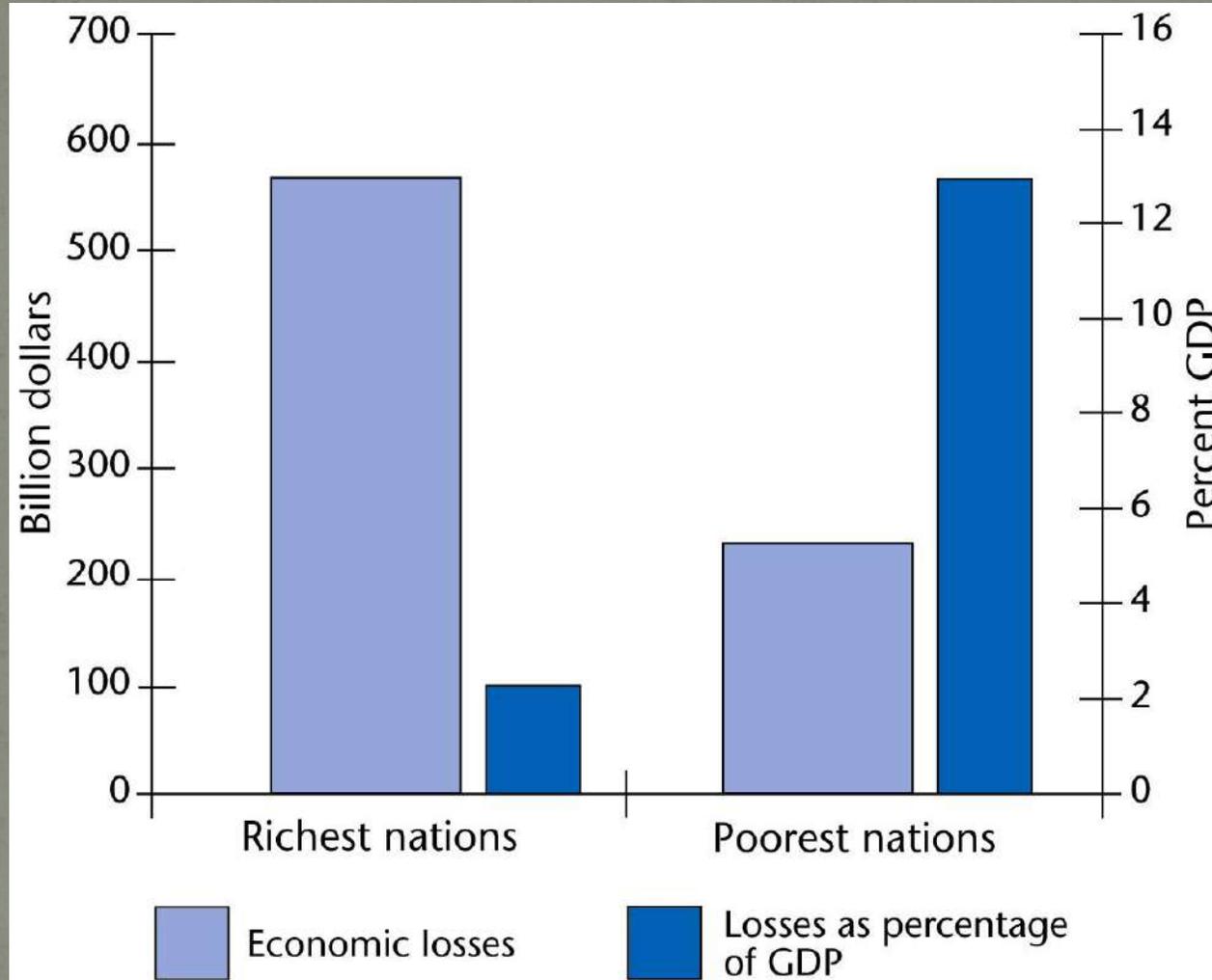
India is vulnerable to a large number of disasters

- Approx. 60% of the landmass is prone to Earthquakes
- Approx. 12% (About 40 million hectares of land) is prone to flood and river erosion.
- Approx. 68% of the cultivable area is vulnerable to drought /landslides /avalanches
- About 5770 km of coastline out of a total 7516 km is prone to Cyclone and Tsunami

Recent Disasters in India (1990-2005)

YEAR	PLACES &	DISASTER	LOSS OF LIVES (APPROX)	LOSS OF PROPERTY (Rs Crore) APPROX)
1991	Uttarkashi	Earthquake	2000	2000
1993	Latur	Earthquake	9500	6000
1997	Jabalpur	Earthquake	200	5000
1999	Chamoli	Earthquake	2000	2000
1999	Orissa	Super Cyclone	9887	10000
2001	Bhuj	Earthquake	14000	13400
2004	SE India	Tsunami	15000	10000
2004	Assam & Bihar	Floods	700	5000
2005	J&K	Avalanche	350	100
2005	Mah, Guj, HP, Karnataka, T'Nadu	Floods	1569	10300
2005	J&K	Earthquakes	1336	1000
Total Losses of Major Disasters only			56542	64800

Developing countries are hit the hardest ...

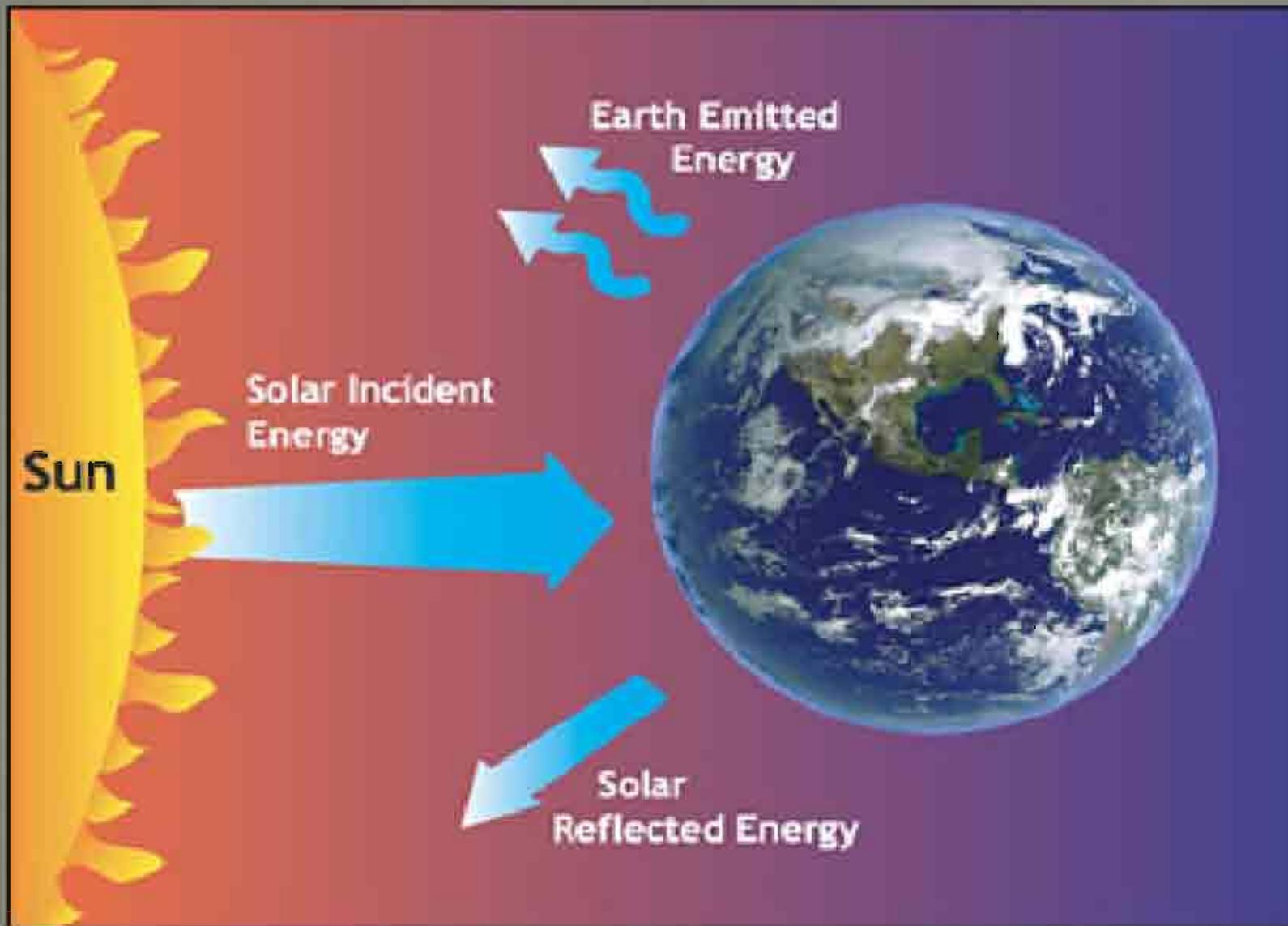


Disasters in Future

Global Warming and Climate Change

What is Global Warming?

Radiation Balance

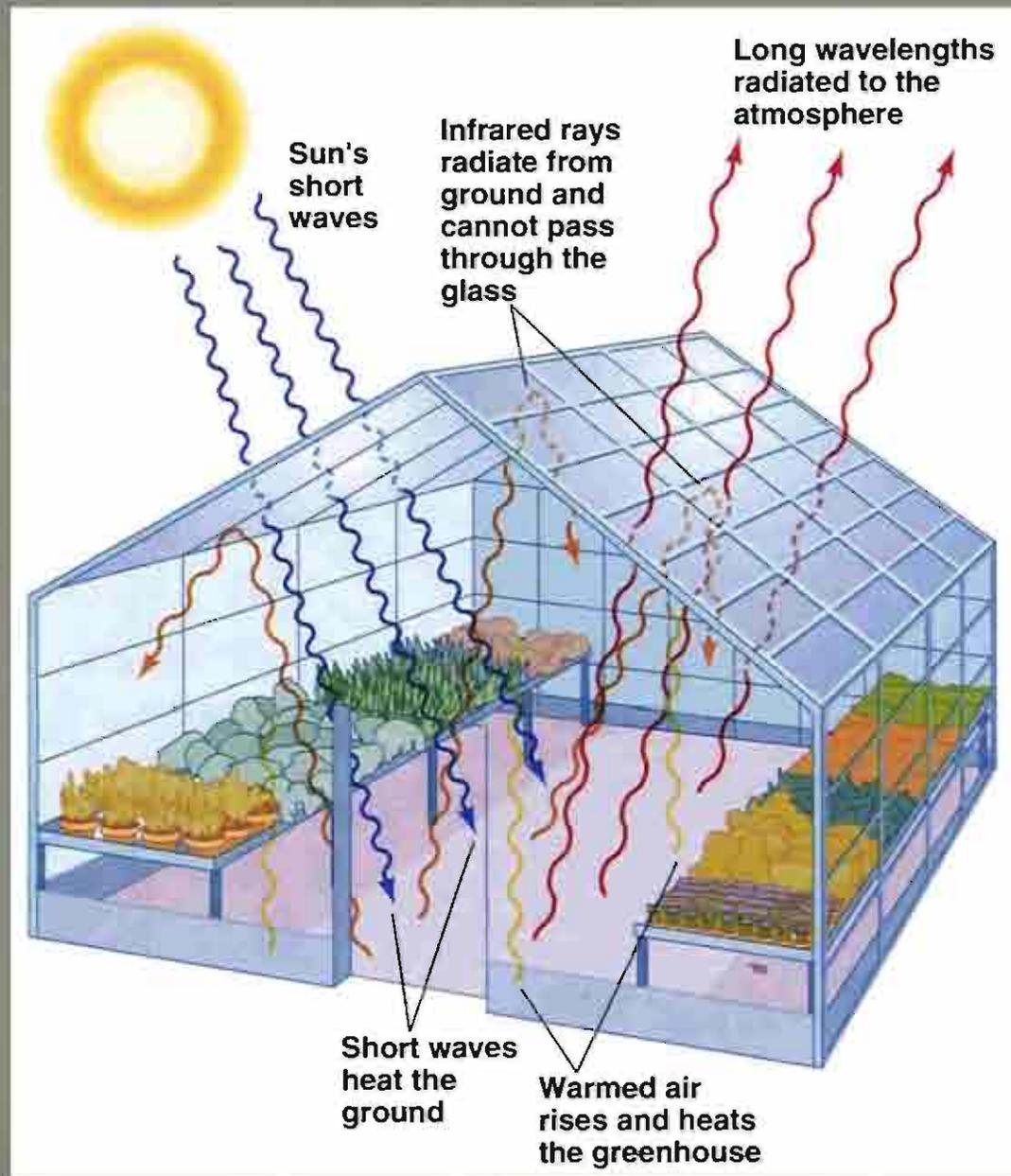


Green house effect

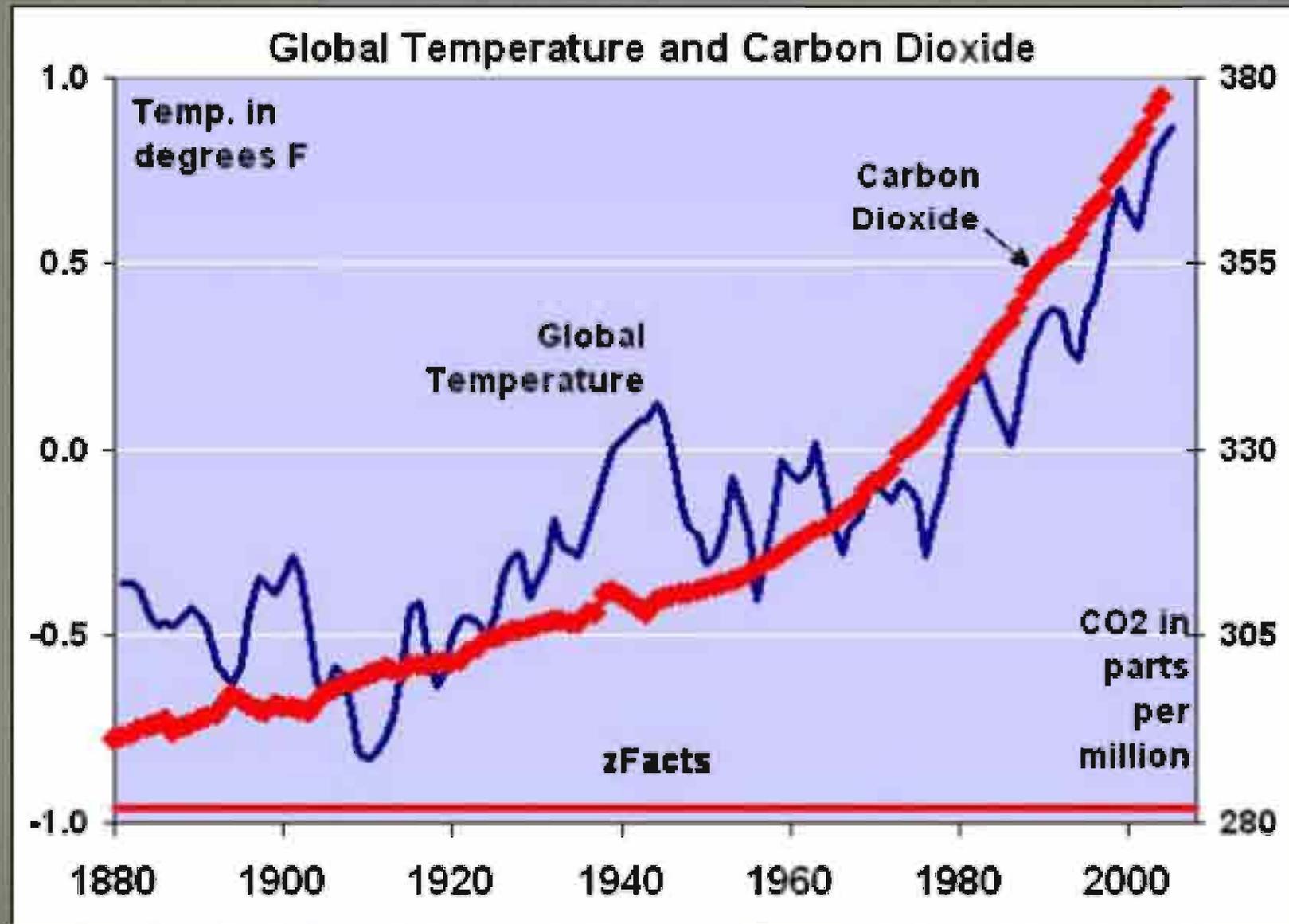
Total power received=Total power emitted

$$\pi R_{earth}^2 S = 4\pi R_{earth}^2 \sigma T^4 + A \pi R_{earth}^2 S$$

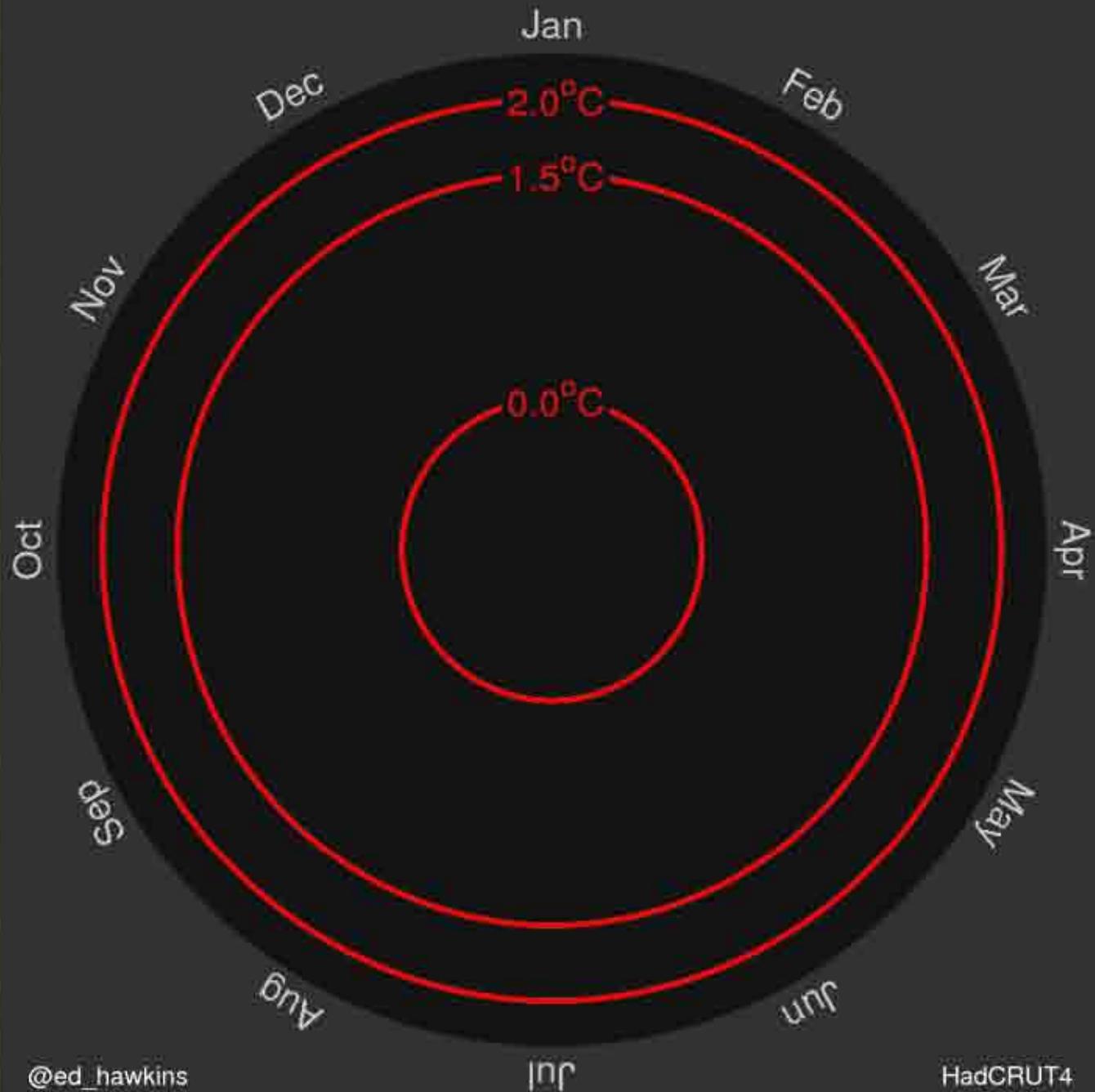
Green House Effect



Global Temperature rise



Global temperature change (1850–2016)



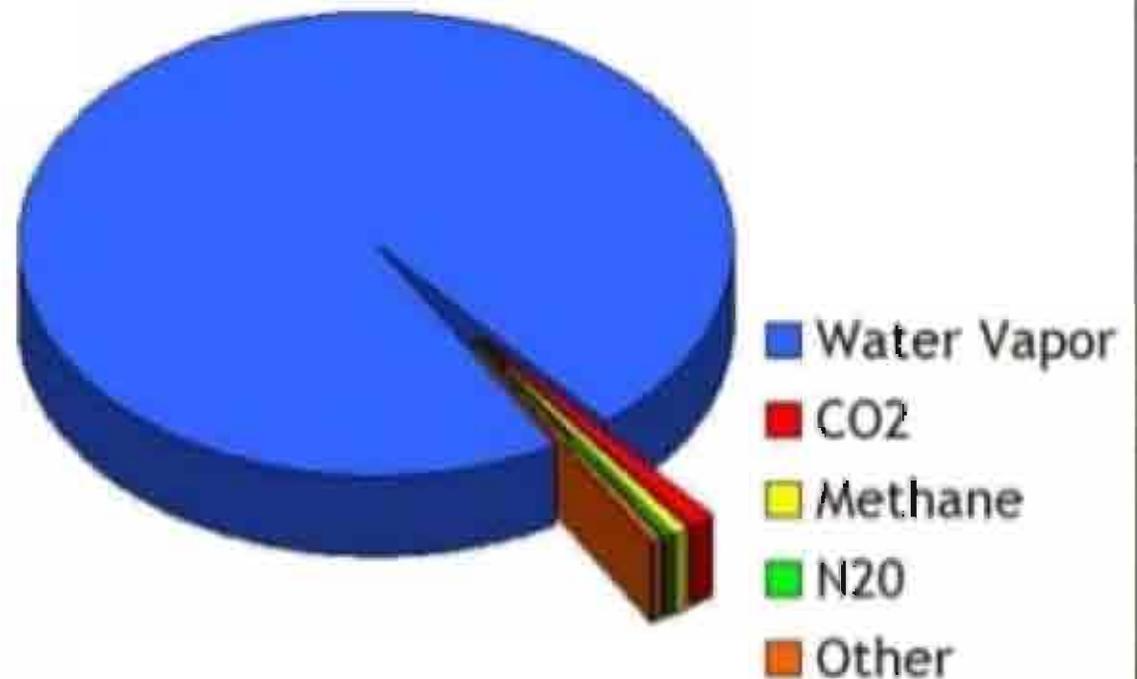
@ed_hawkins

HadCRUT4

Greenhouse gases

- Water Vapor
- Carbon dioxide
- Methane

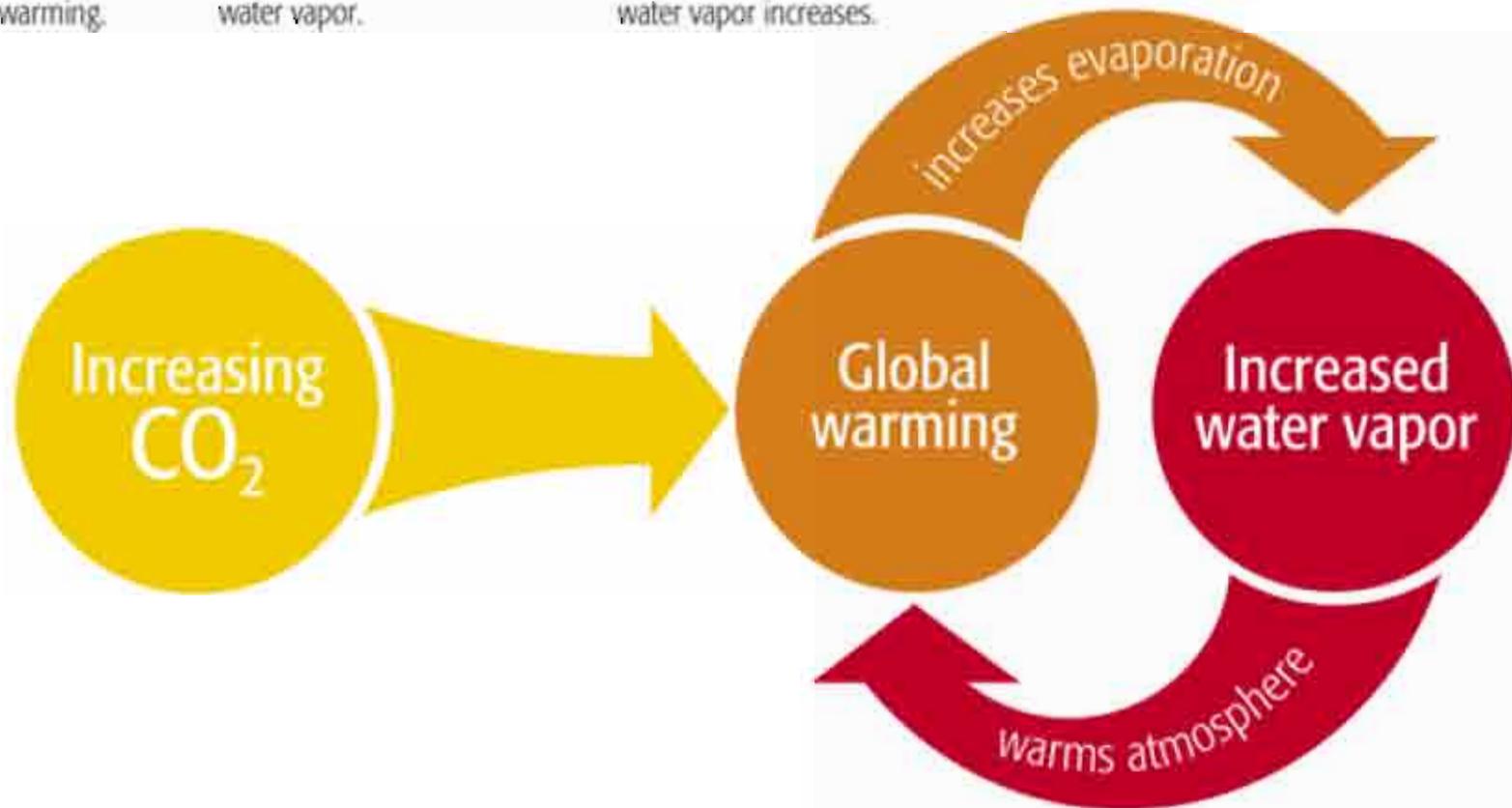
Greenhouse Gases In The Atmosphere



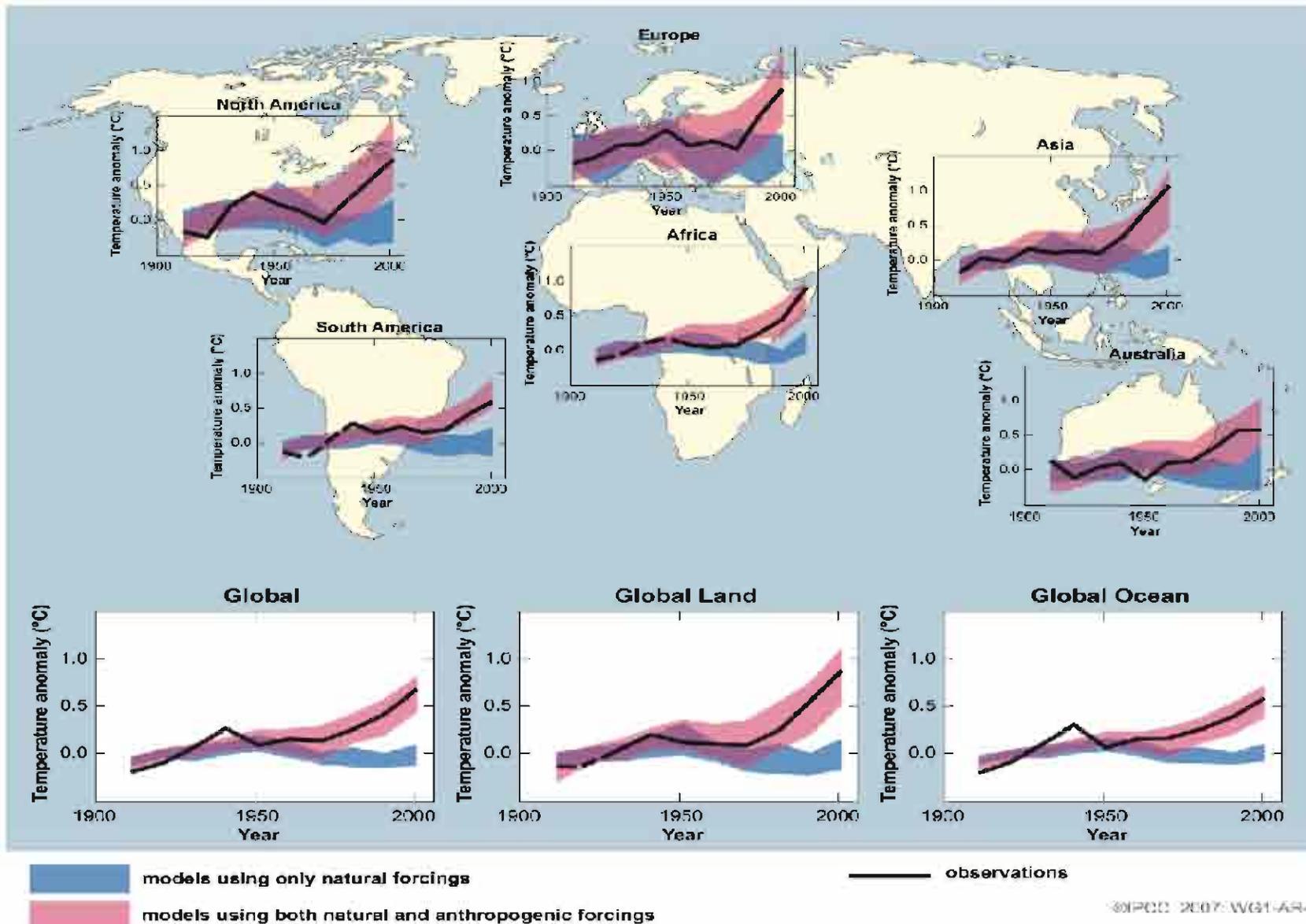
Effect of warming on vapor

POSITIVE FEEDBACK LOOP

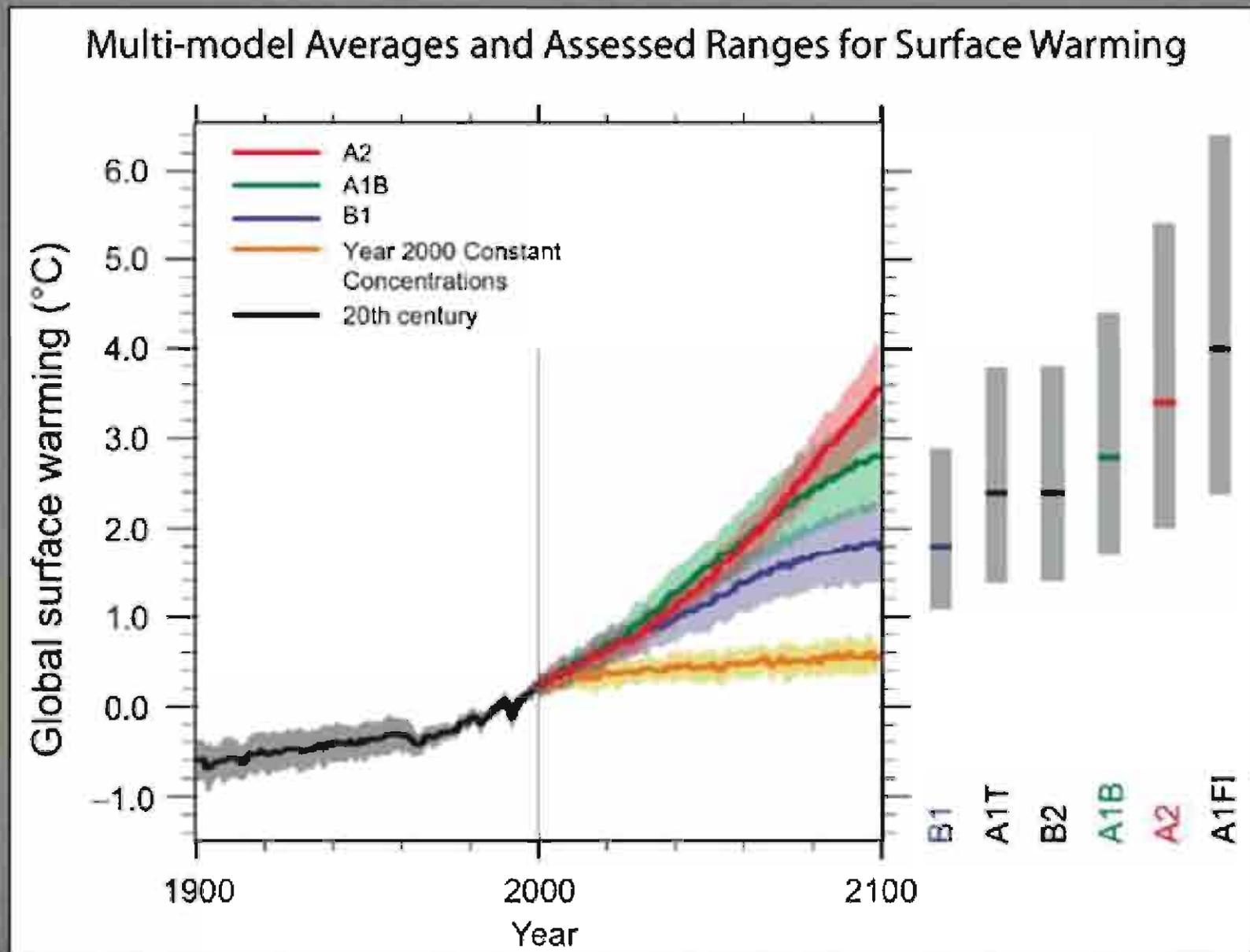
- Adding carbon dioxide to the atmosphere tends to warm the atmosphere, causing global warming.
- The warm atmosphere causes surface water to evaporate and become water vapor.
- Since water vapor is a greenhouse gas, the atmosphere tends to warm even more as water vapor increases.



Is global warming natural or anthropogenic?

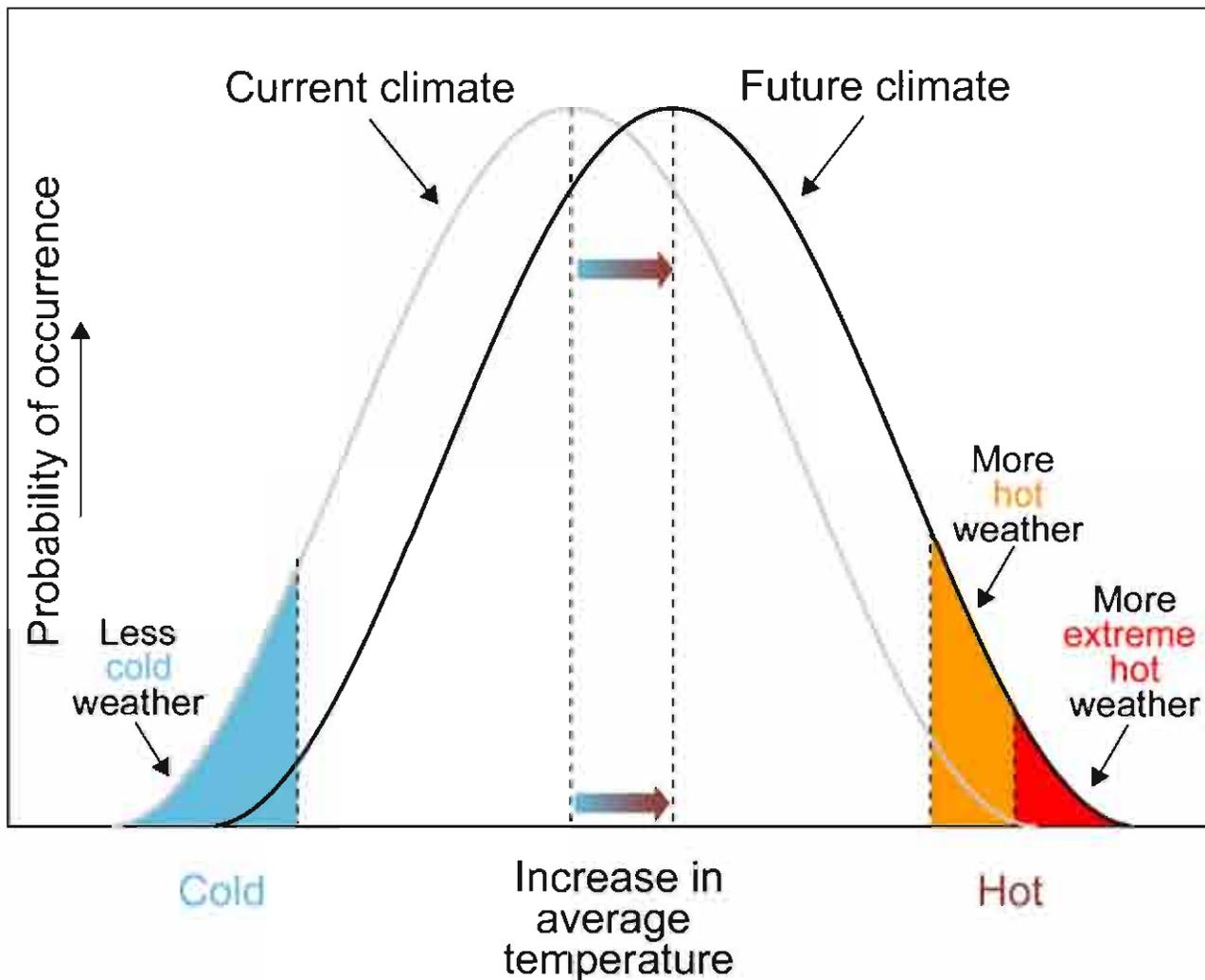


Climate Change Predictions (IPCC AR4)



Shifting Towards more intensified events

Climate Change Means More Hot Weather



(IPCC, 2007)

Prediction by IPCC, 2007

- *Likely* increase of peak wind intensities
- Increase in near-storm precipitation
- A decrease in the overall number of storms
- Decrease of relatively weak storms
- Increase in the numbers of the most intense tropical cyclones.

Effect of Climate change on Disasters such as Cyclone

Climatic Change (2014) 127:227–241
DOI 10.1007/s10584-014-1255-4

Tropical and extratropical cyclone damages under climate change

Matthew Ranson · Carolyn Kousky · Matthias Ruth ·
Lesley Jantarasami · Allison Crimmins · Lisa Tarquinio

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Abstract This paper provides the first quantitative synthesis of the rapidly growing literature on future tropical and extratropical cyclone damages under climate change. We estimate a probability distribution for the predicted impact of changes in global surface air temperatures on future storm damages, using an ensemble of 478 estimates of the temperature-damage relationship from nineteen studies. Our analysis produces three main empirical results. First, we find strong but not conclusive support for the hypothesis that climate change will cause damages from tropical cyclones and wind storms to increase, with most models predicting higher future storm damages due to climate change. Second, there is substantial variation in projected changes in losses across regions. Potential changes in damages are greatest in the North Atlantic basin, where the multi-model average predicts that a 2.5 °C increase in global surface air temperature would cause hurricane damages to increase by 63 %. The ensemble predictions for Western North Pacific tropical cyclones and European wind storms (extratropical cyclones) are +28 % and +23 %, respectively. Finally, our analysis shows that existing models of storm damages under climate change generate a wide range of predictions, ranging from moderate decreases to very large increases in losses.

Drop in cyclone numbers

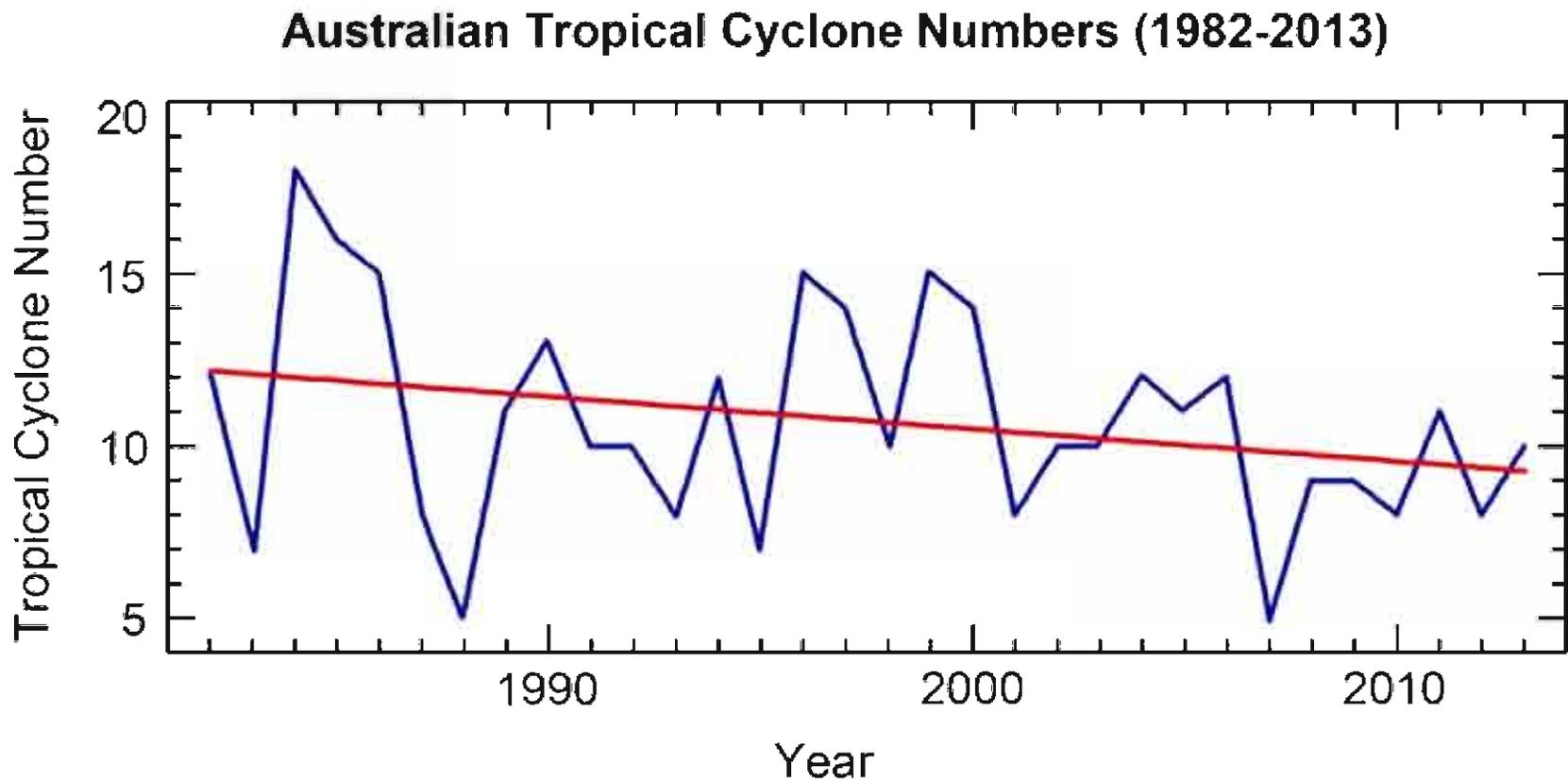


Figure 1. Annual number of tropical cyclones in the Australian region of the southwestern Pacific Ocean over the period 1982-2013. Adapted from Dowdy (2014).

Intensification of Cyclones



Typhoon Jebi: Japan battered by strongest storm in 25 years

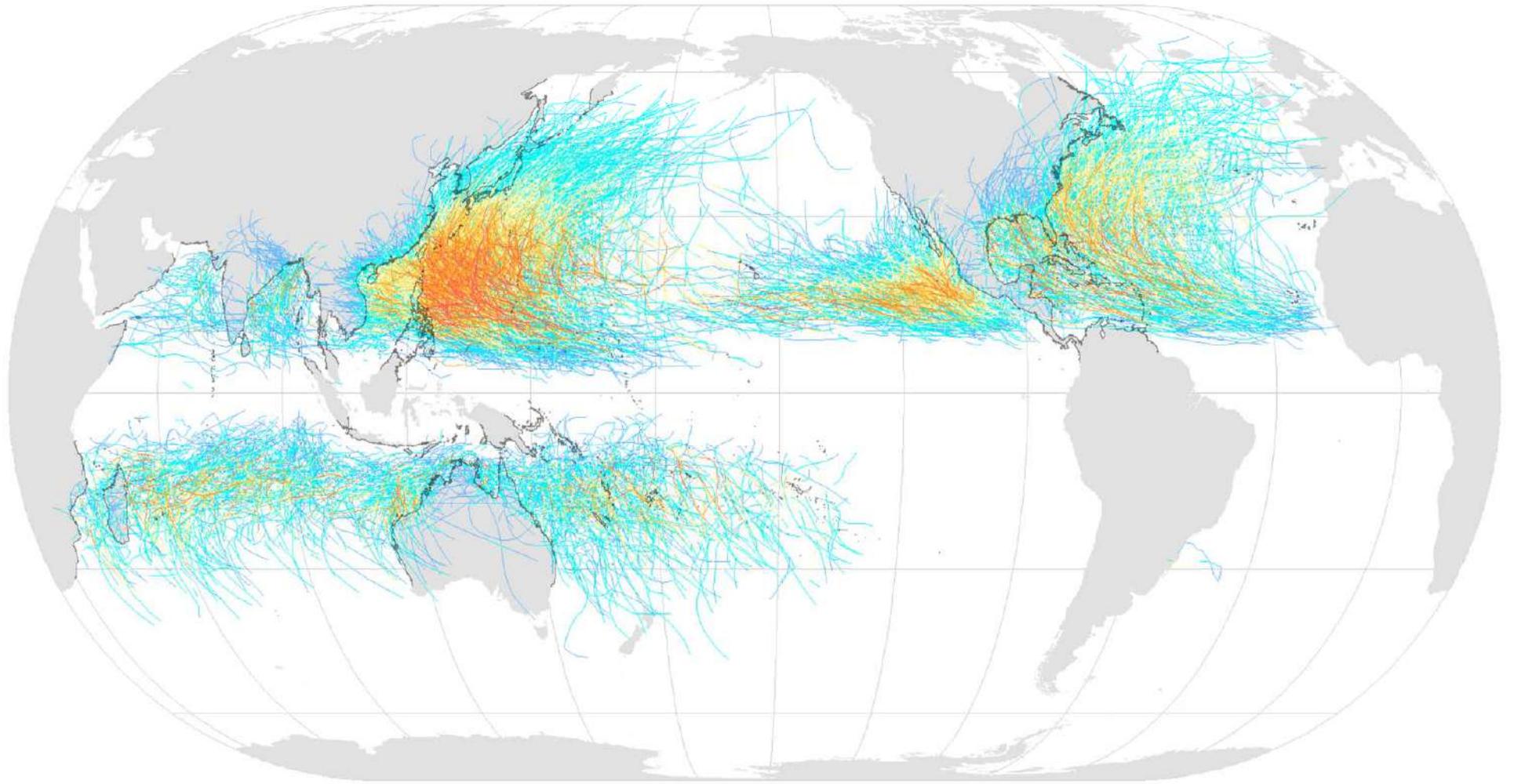
Western Japan is being hit by the most powerful typhoon in a quarter of a century.

The storm has torn roofs off houses, damaged tankers and tens of thousands of people have been left without power.

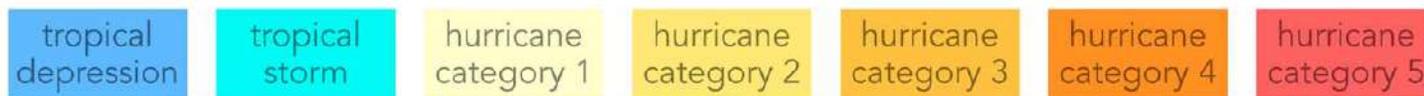
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Tropical Cyclones, 1945–2006



Saffir-Simpson Hurricane Scale:

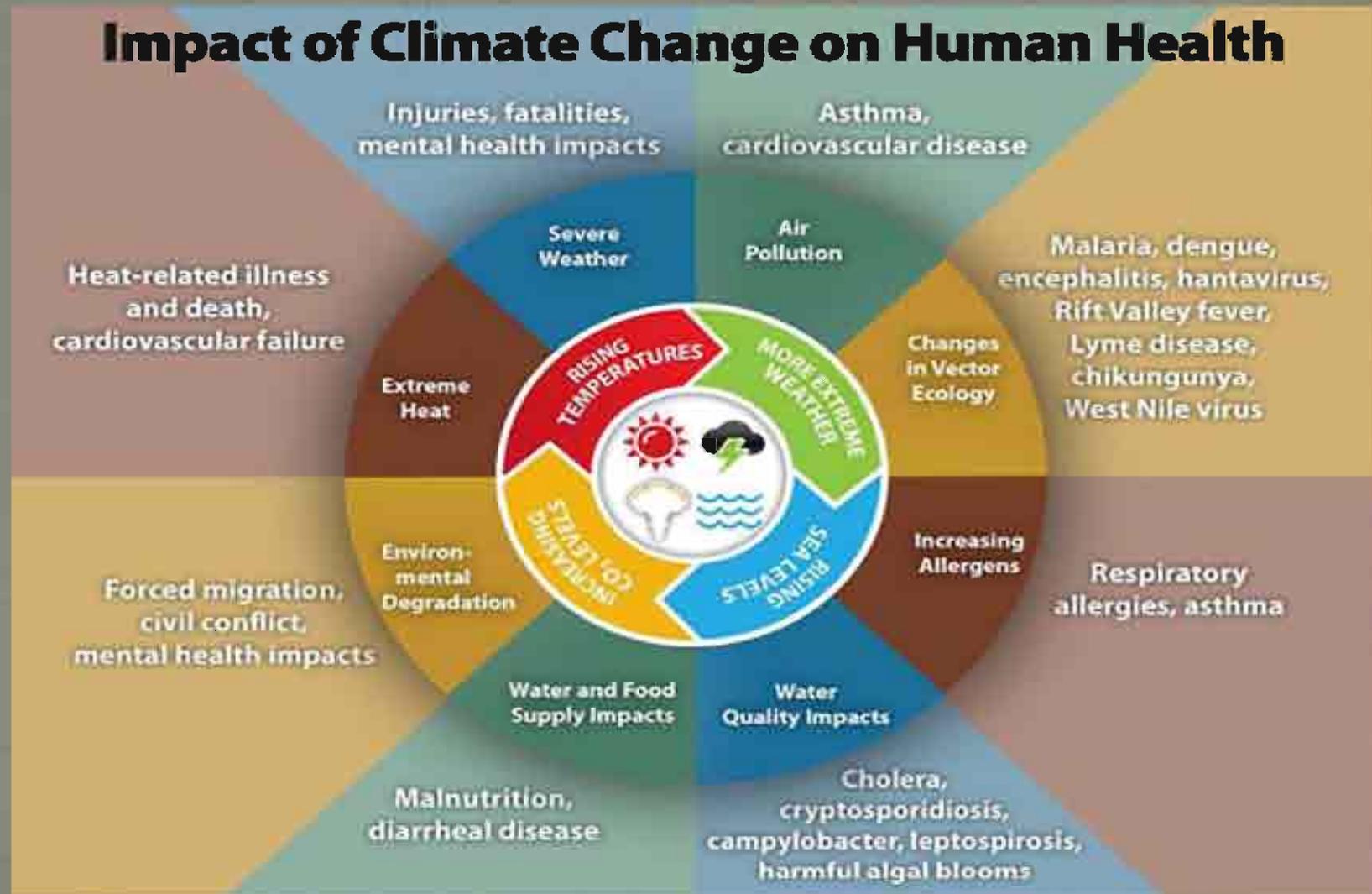


Number of Cyclones crossing different coasts (1891-2000)

State	Total No.
West Bengal	69
Orissa	98
Andhra Pradesh	79
Tamil Nadu	62
Karnatka	02
Maharashtra & Goa	18
Gujarat	28
Kerala	03

Climate Change and Children

Climate Change and Health Implications



IPCC Predictions-Climate Change 2014

- Until mid-century (2050), projected climate change will impact human health, mainly by exacerbating health problems that already exist (**very high confidence**).
- Throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions and especially in developing countries with low incomes, as compared to a baseline without climate change (**high confidence**).

Contd...

- Examples include: greater likelihood of injury, disease, & death due to more intense heat waves and fires (*very high confidence*); increased likelihood of under-nutrition resulting from diminished food production in poor regions (*high confidence*); risks from lost work capacity & reduced labor productivity in vulnerable populations; & increased risks from food- & water-borne diseases (*very high confidence*) & vector-borne diseases (*medium confidence*).
- Globally over the 21st century, the magnitude and severity of negative impacts are projected to increasingly outweigh positive impacts (*high confidence*).

Drivers of Health Issues

- Population density
- Urbanization
- Public health infrastructure
- Economic and technologic development
- Environmental conditions

Impact of climate change on people

The most vulnerable people (at increased risk) are

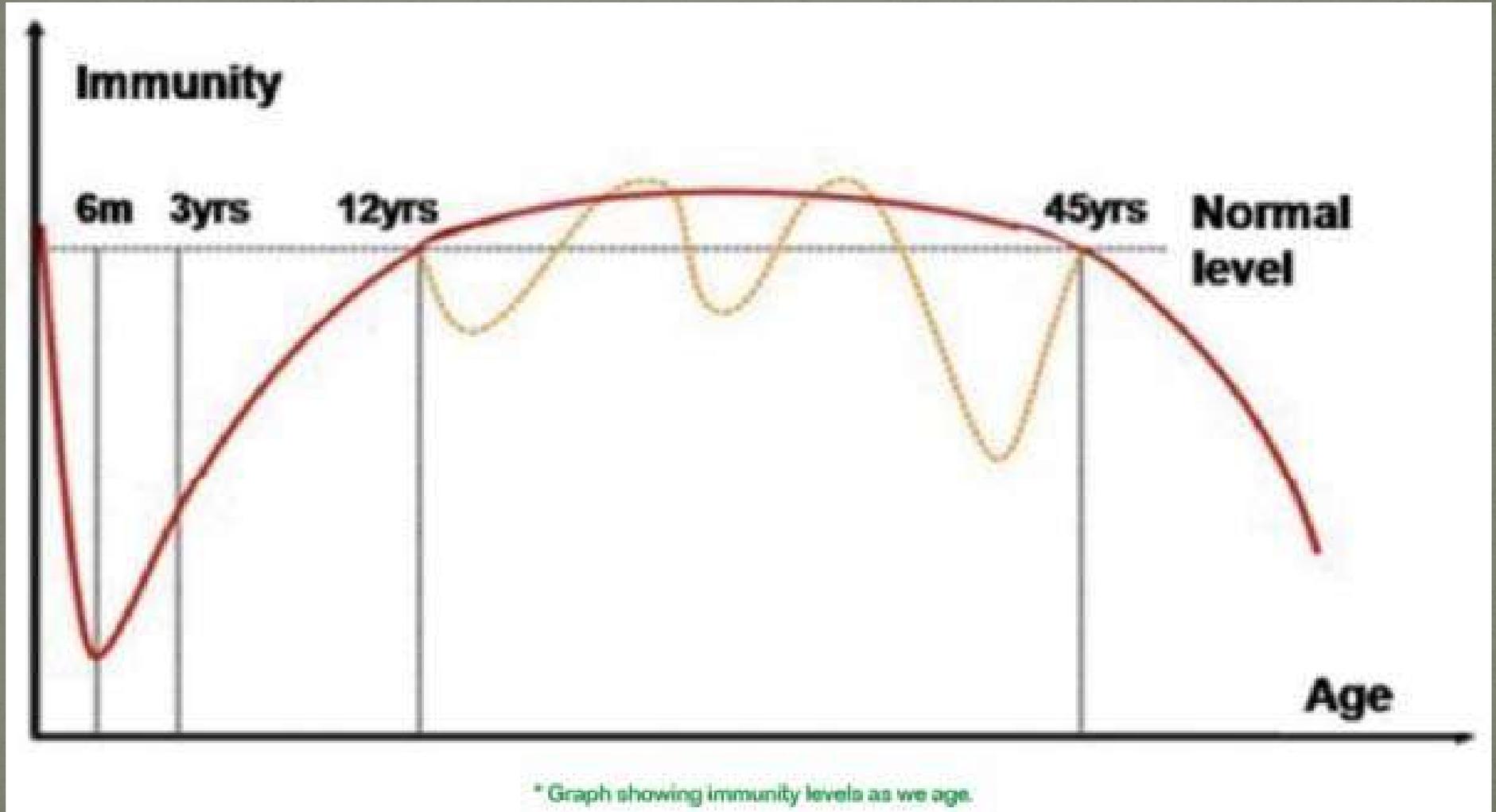
- The children
- The elders
- The poor and
- Those with underlying health conditions

What Makes Children Vulnerable?

Children are especially vulnerable to the impacts of climate change because of their

- Less immune power
- Easily get affected by infectious bacteria
- Growing bodies
- Unique behaviors and interactions with the world around them
- Dependency on caregivers

Immune power vs Age



Children's Vulnerabilities Can Vary by Life Stage



Newborns

Newborns are more likely to have been born before their due date or at a low birth weight if their **mother is exposed during pregnancy to extreme heat, air pollution, and flood-related contaminants.**

Infants and Toddlers

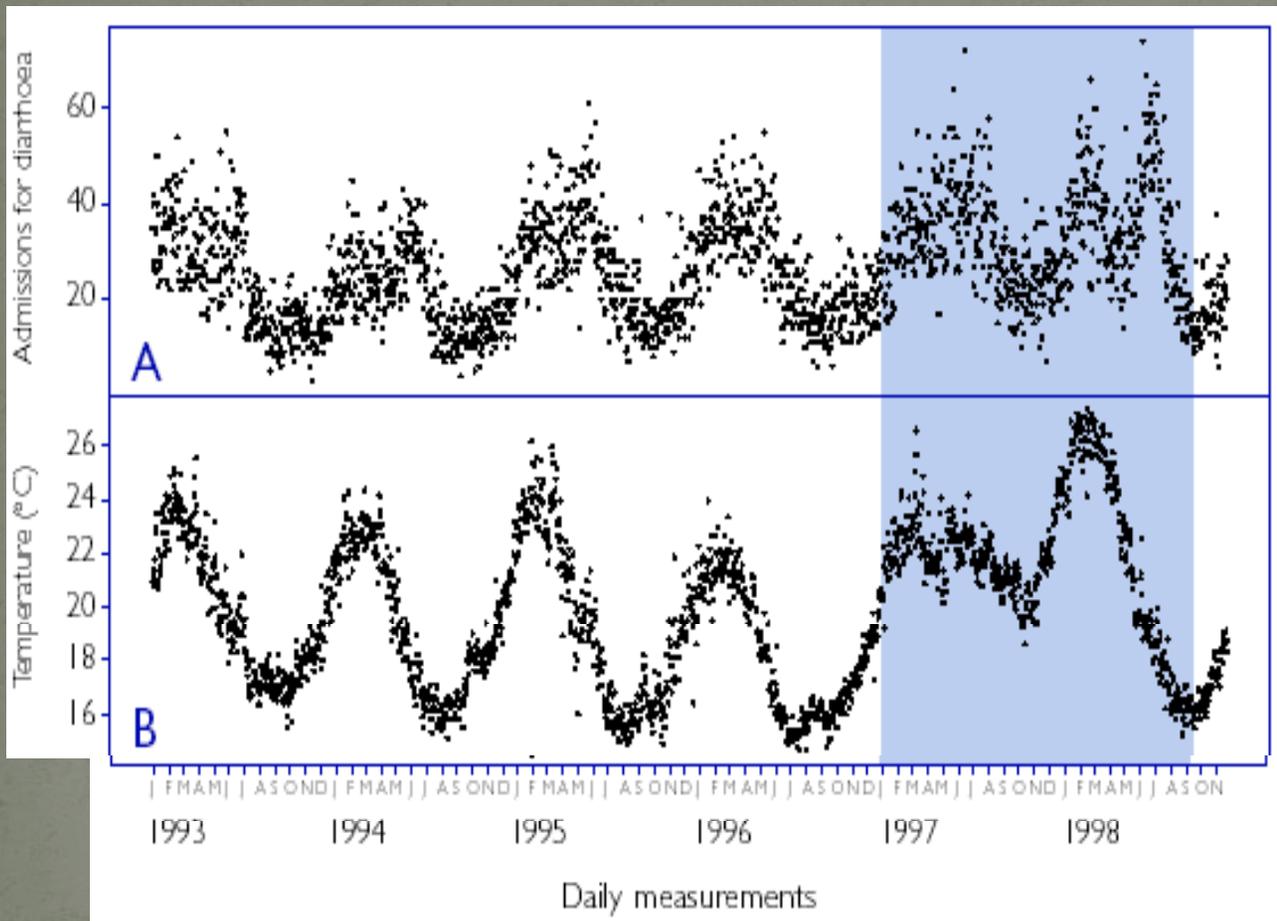
Infants and toddlers breathe, eat, and drink more for their body size than adults. They are **sensitive to pollutants or allergens in the air, which may trigger asthma episodes.** Infants and toddlers are also sensitive to contaminants in water and food, which increases the risk of diarrhea.



School Age and Older Children

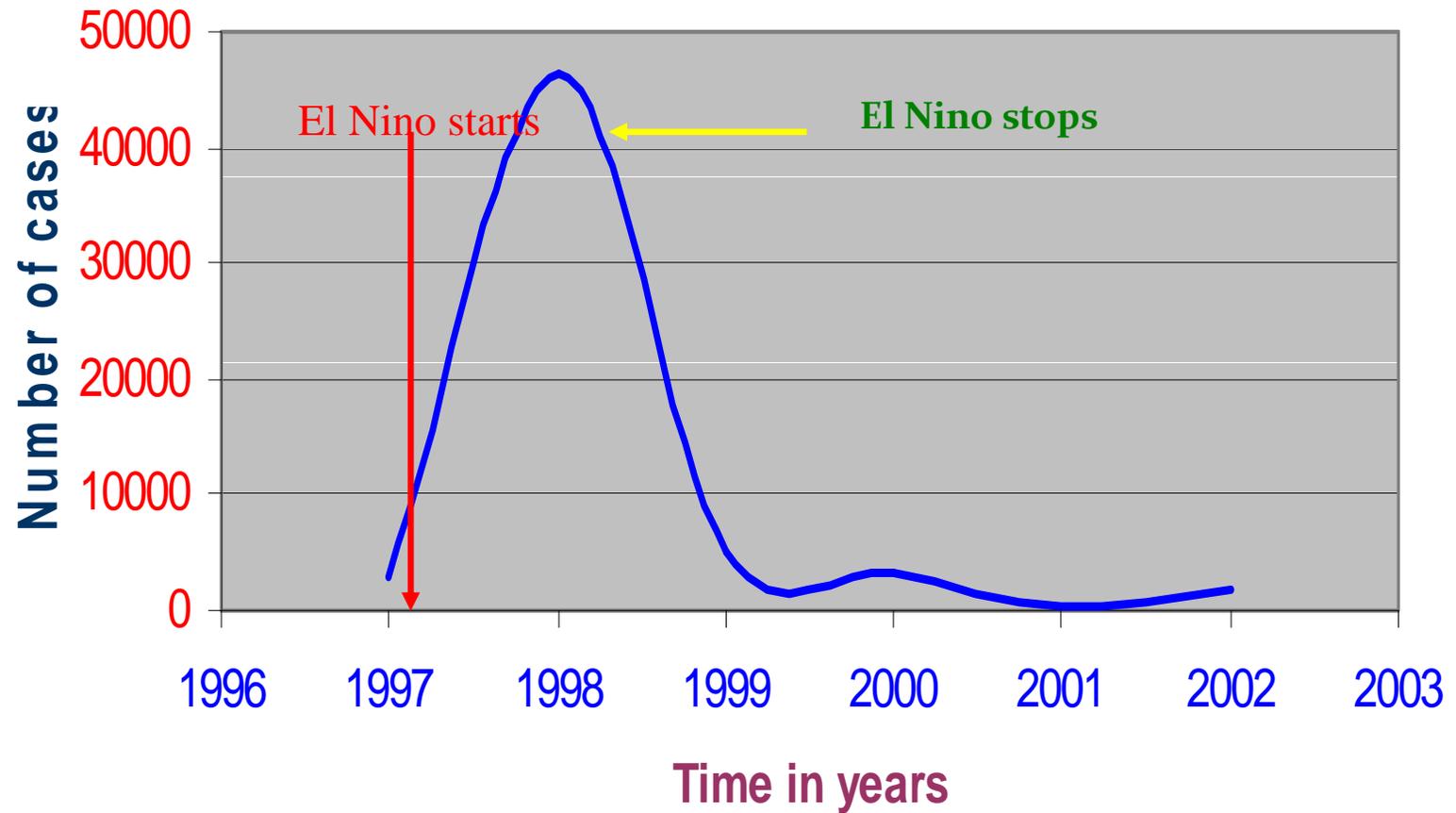
School age and older children spend more time outdoors than adults, which increases their **risk of being exposed to extreme heat and higher average temperatures, pollutants in air and water, and diseases carried by mosquitoes and ticks.**

Effect of temperature on diarrhoea

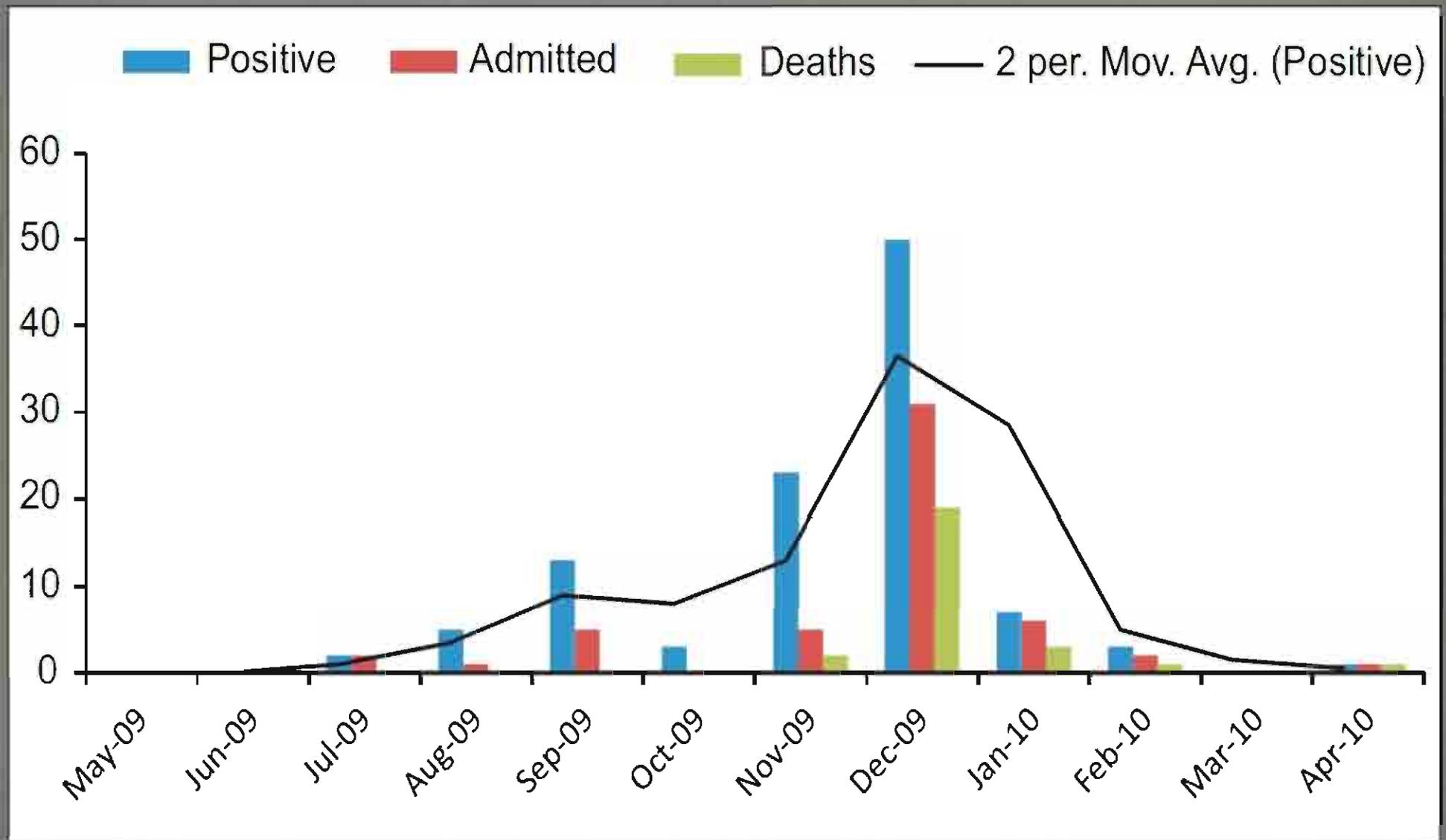


Diarrhoea is related to temperature and precipitation. In Lima, Peru, diarrhoea increased 8% for every 1°C temperature increase.

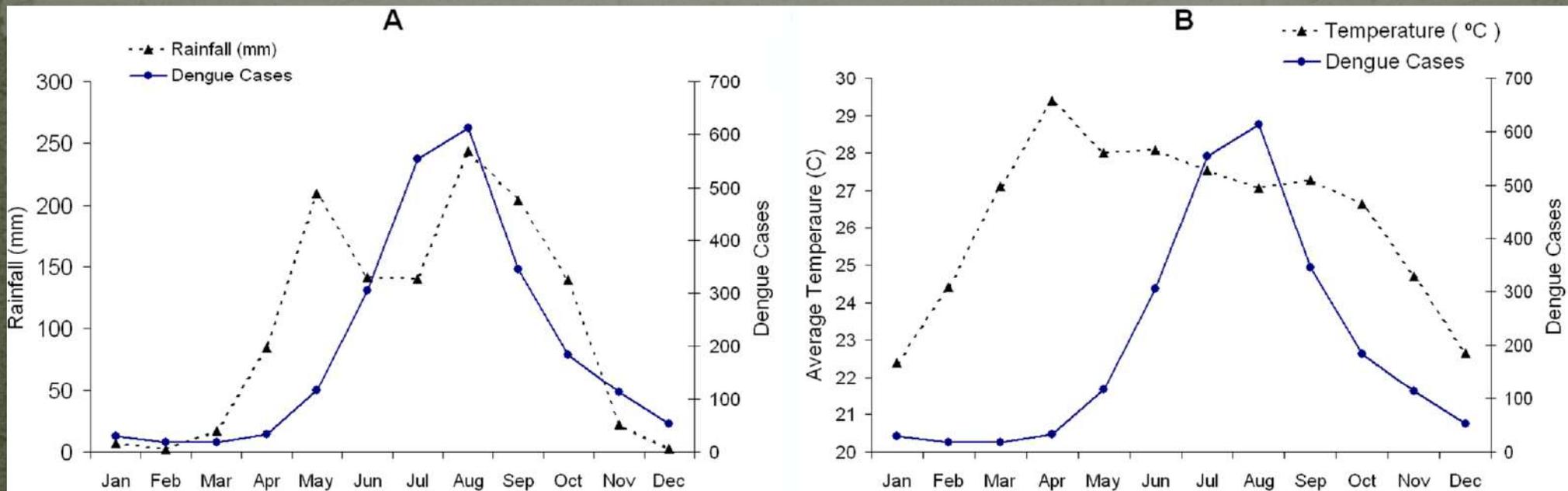
Number of Cholera cases in Uganda 1997-2002



Swine Flu cases in India



Dependency of dengue on temperature and rainfall



More Injuries, Disabilities, and Drowning from Extreme Weather Events



Photo: ©Abir Abdullah/Still Pictures



Photo: ©Abir Abdullah/Still Pictures

More Water Borne Diseases



In 2005, diarrhoeal diseases accounted for 20.1% of deaths in children less than five years

Need of Adaptation

“Sandy” triggered discussion that focused more on how to adapt to increasingly likely weather extremes than how to prevent climate change

-J. Tellefson, Nature, 2012



(Source: Image from “Geostationary Operational Environmental Satellite 13”)



(Source: web)

Future Challenges: problems

- More human loss due to bigger population
- Extensive damage due to intense extreme events
- More homeless Childs
- More post disaster effects
- More economical losses

Future Challenges: solutions

- Better prediction system
- Robust plan for disaster management
- Technological Advancement shall be utilize effectively
- A good dedicated team for execution
- A better plan to fight with psychological trauma

Unacceptable

It is unacceptable that lives, infrastructure and property are lost at a time when the relevant technologies, expertise and capacities are largely available to prevent hydrometeorological hazards including riverine floods, flash floods and storm surges from turning into major disasters.

The Train must Move On !



Thanks



Climate Change and the Health of Children

Understanding the threats that climate change poses to human health can help us work together to lower risks and be prepared. Climate change threatens human health, including mental health, and access to clean air, safe drinking water, nutritious food, and shelter. Everyone is affected by climate change at some point in their lives. Some people are more affected by climate change than others because of factors like where they live, their age, health, income, and occupation; and how they go about their day-to-day life.

Children are especially vulnerable to the impacts of climate change because of (1) their growing bodies; (2) their unique behaviors and interactions with the world around them; and (3) their dependency on caregivers.

Growing Bodies

Children's growth and development from infancy to adolescence makes them more sensitive to environmental hazards related to climate. For example, because children's lungs develop through adolescence, they are more sensitive to respiratory hazards. Climate change worsens air quality because warming temperatures make it easier for ground-level ozone to form. Changing weather patterns and more intense and frequent wildfires also raise the amount of pollution, dust, and smoke in the air. For children, this change in air quality may increase the number and worsen the severity of asthma episodes. Climate change is also expected to lead to longer and more severe pollen seasons, triggering asthma and allergies in children.

In addition to developing physically, children are also developing emotionally. Climate change will lead to an

increase in the frequency, severity and duration of some extreme weather events, increasing risks to children's mental health. When extreme weather causes injuries, death, or displacement, children may have difficulty controlling their emotions, may not perform as well in school, and may face depression, anxiety and post-traumatic stress. While many children show resilience to traumatic events, mental health impacts may last into adulthood, especially if left untreated.

What is climate change and why does it matter for health?

We've all heard of it, but what exactly is climate change? Greenhouse gases act like a blanket around Earth, trapping energy in the atmosphere. Human activities, especially burning fossil fuels for energy, increase the amount of greenhouse gases in our atmosphere and cause the climate to warm. Climate is the typical or average weather for an area. Climate change is any change in average weather that lasts for a long period of time, like warming temperatures. Climate change affects the food we eat, the air we breathe, and the water we drink. It also leads to extreme weather events, like flooding, droughts, and wildfires. All of these impacts affect human health.

To protect children against the negative impacts of climate change, caregivers should consider the age, stage of development, and health of the children in their care and work with health professionals, educators, and others in the community to minimize exposure to environmental risks.

Unless we act now



The impact of climate change on children

unite for children



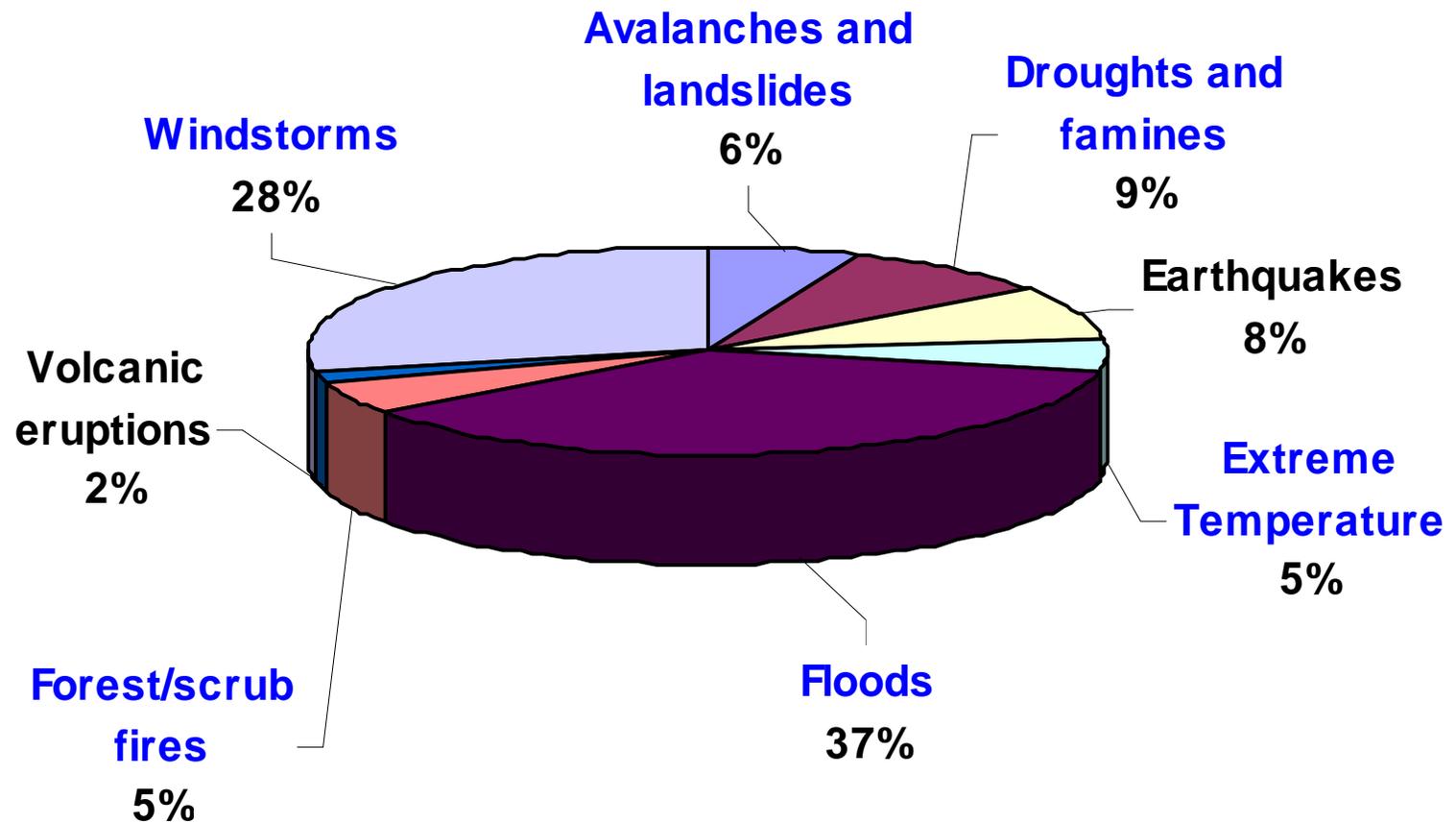
Wish you a very happy Teachers Day

“True teachers
are those who help us
think for ourselves.”

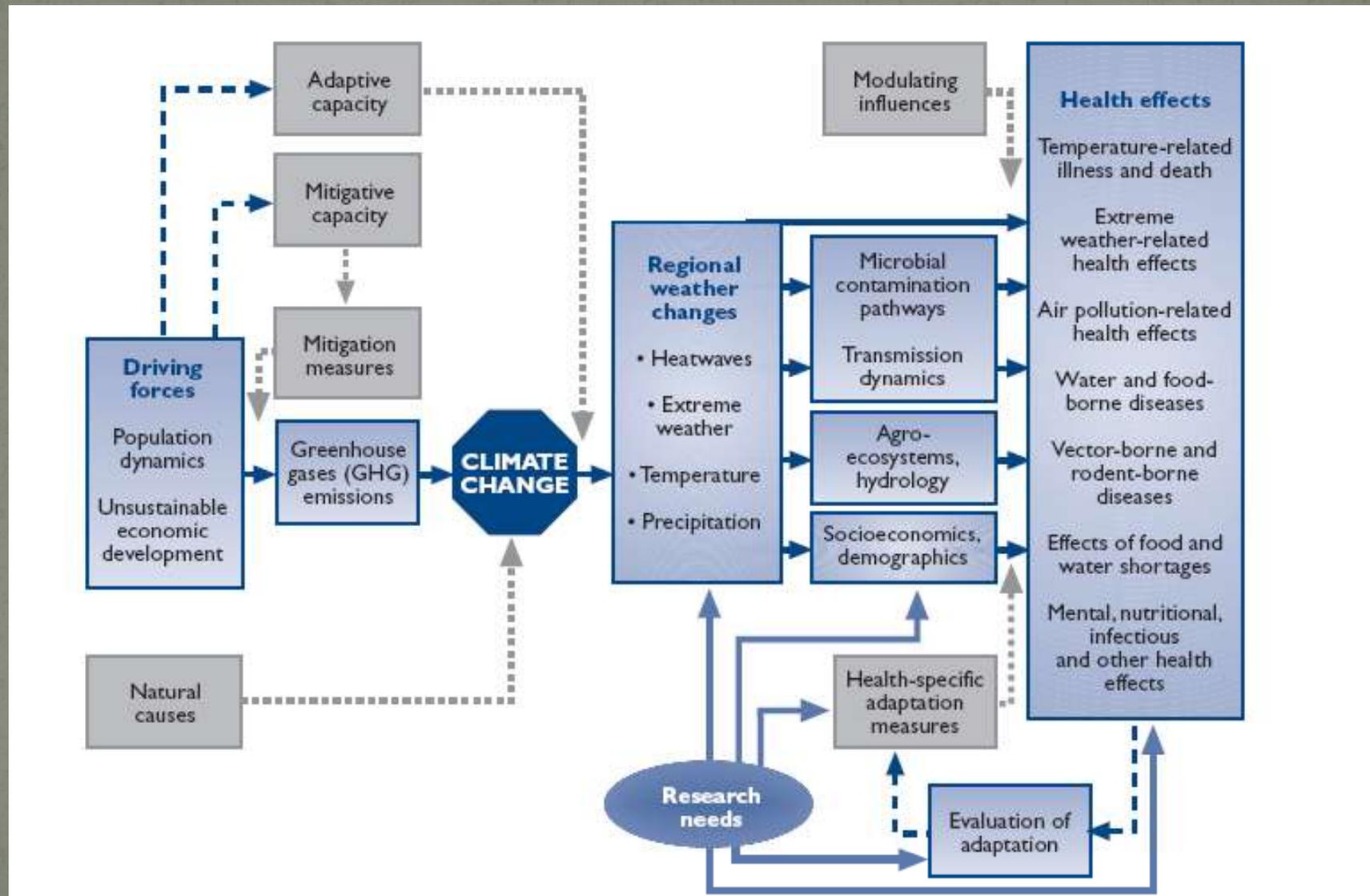
Dr. Sarvepalli Radhakrishnan



Global Distribution of Natural Hazards (1993-2002)



Pathways from Driving Forces to Potential Health Impacts



Action is in need

