EXTREME EVENTS – CARIBBEAN REGION

Analysis of atmospheric and hydrological variables

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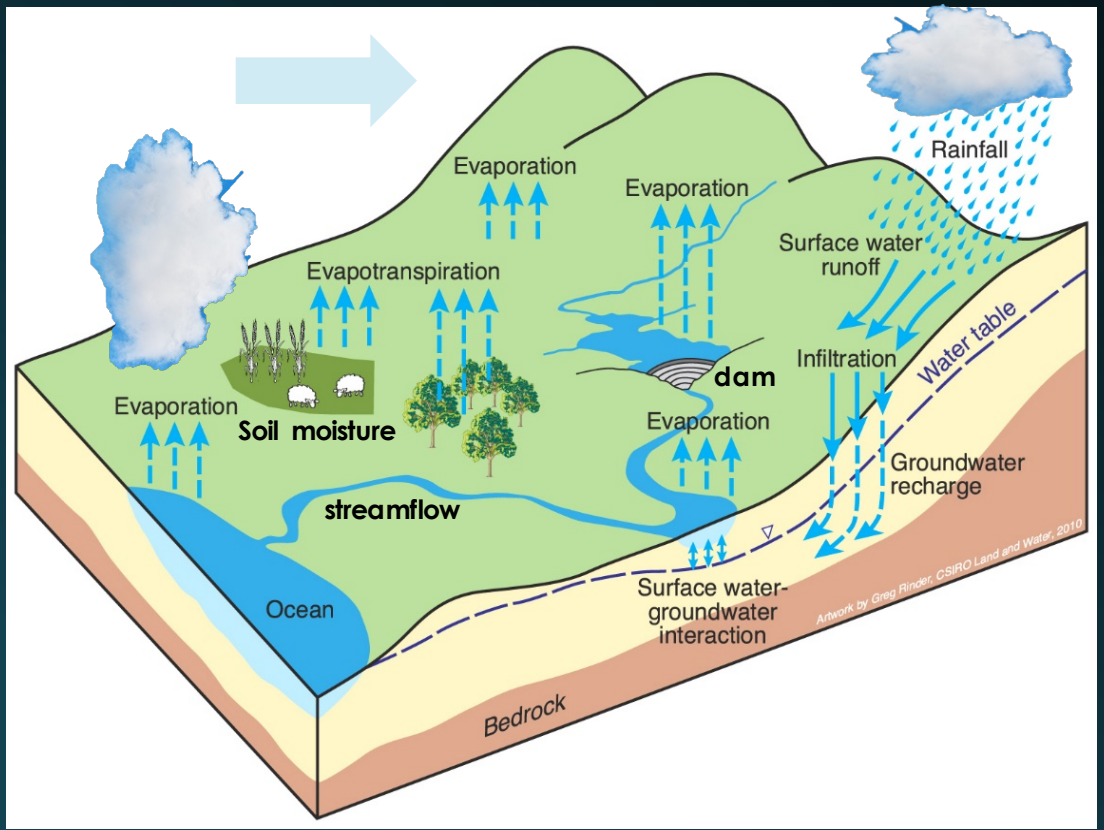
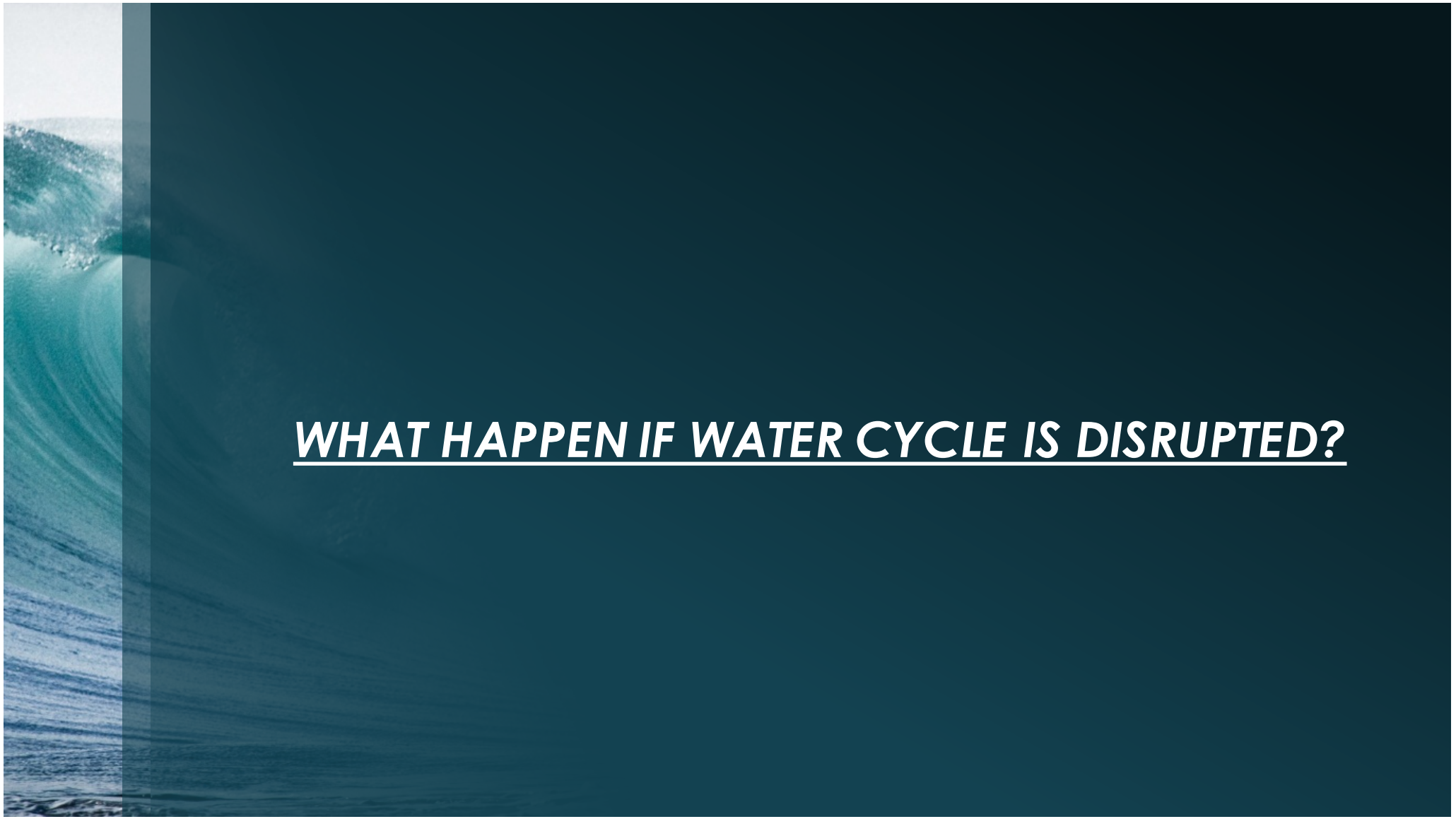
WATER CYCLE

- The sun drives the water cycle. Some water in the oceans evaporates into the air
- Rising air currents take the vapor up into the atmosphere, where cooler temperatures cause it to condense into clouds.
- Air currents move clouds around the globe, and cloud particles collide, grow, and fall out of the sky as precipitation
- Most precipitation falls back into the oceans or onto land, due to gravity, the precipitation flows over the ground as surface runoff.
- A portion of runoff enters rivers in valleys in the landscape, with streamflow moving water towards the oceans



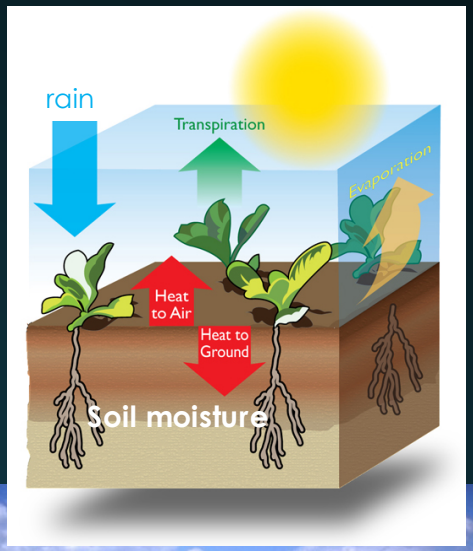


WHAT HAPPEN IF WATER CYCLE IS DISRUPTED?

DROUGHT

- Lack of precipitation causes a complex reverse process of evaporation and slow depletion of soil moisture.

Cause of a drought: lack of precipitation, which is the main source of soil moisture



HEAT STROKES

Air temperature, RH → Heat Index (HI)

- 30 °C (86 °F)
  - Mildly comfortable – Moderate sweating keeps body cool when it evaporates from our skin, but concentration is reduced.
- 35 °C (95 °F)
  - Heart rate and sweating increase, body loses water and salts causing muscles to ache.
- 40 °C (104 °F)
  - Heat exhaustion – Heart rate becomes rapid, the body feels tired and nauseous and sweating becomes heavier.
- 45 °C (113 °F)
  - Heat stroke – Core temperature raised, sweating stops, skin becomes dry. Fainting, organ damage and death possible.

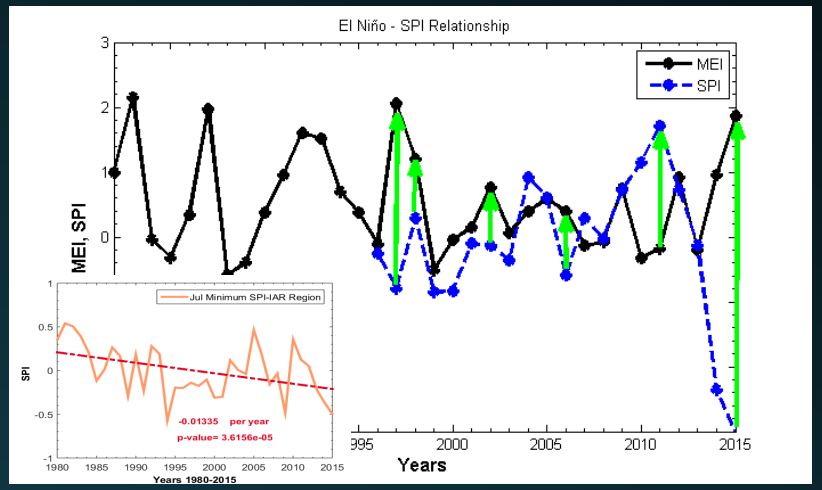
- Heat stress and higher temperatures can contribute to greater cardiovascular morbidity and mortality
- Probably by means of dehydration, endothelial cell damage, and increased blood viscosity, etc.

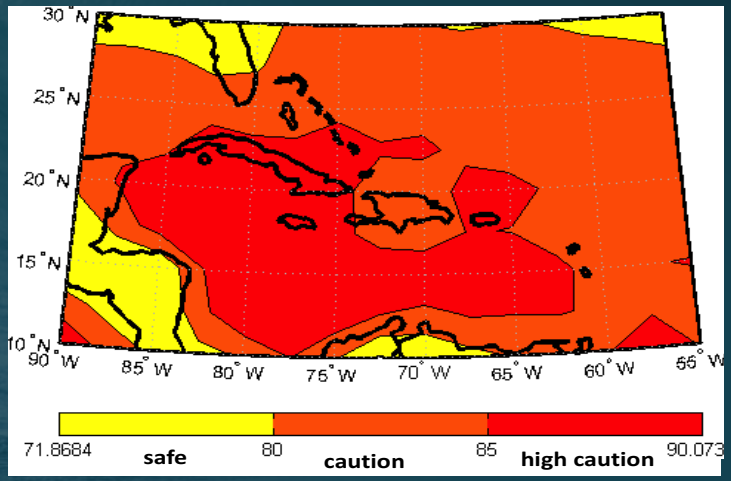
Howitworksdaily, Australian Government, and Tibbetts Jhon, Environmental Perspective, 2015


HOW IS CHANGING THE DROUGHT/HEAT INDEX?

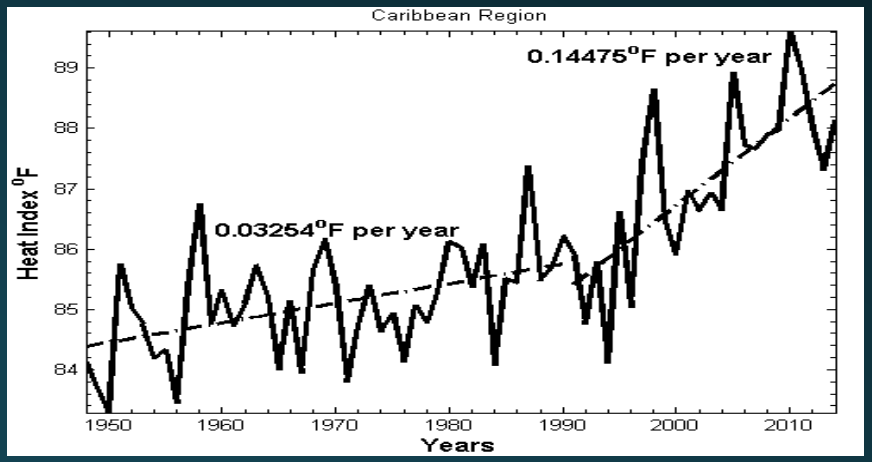
DROUGH/HEATINDEX-CARIBBEAN REGION

- Drought tends to intensify across the Caribbean region
- Climatologically, the Greater Antilles can be defined as a region of "caution" for heat stress.
- Long term HI trend shows a HI increasing tendency. Since the nineties a fast HI increase is observed with a rate of 0.14°F per year.
- ***SST → Air temperature → main driver of the HI.***





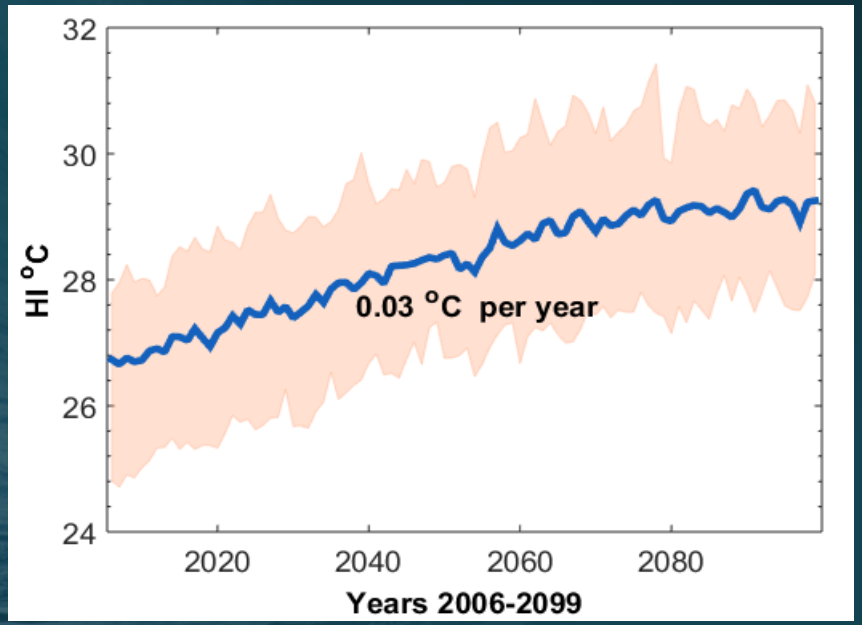
Classification using the NWS Heat Index chart

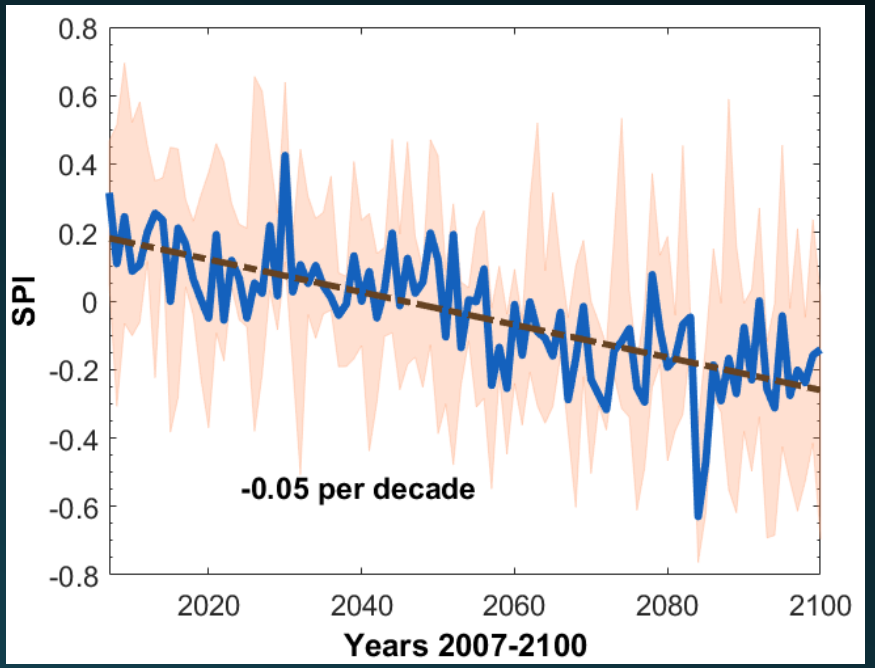


HOW IS CHANGING THE DROUGHT IN THE FUTURE?

DROUGH/HEATINDEX-CARIBBEAN REGION

- Drought intensification in the future under the IPCC scenarios
- Increased risk of heatstroke

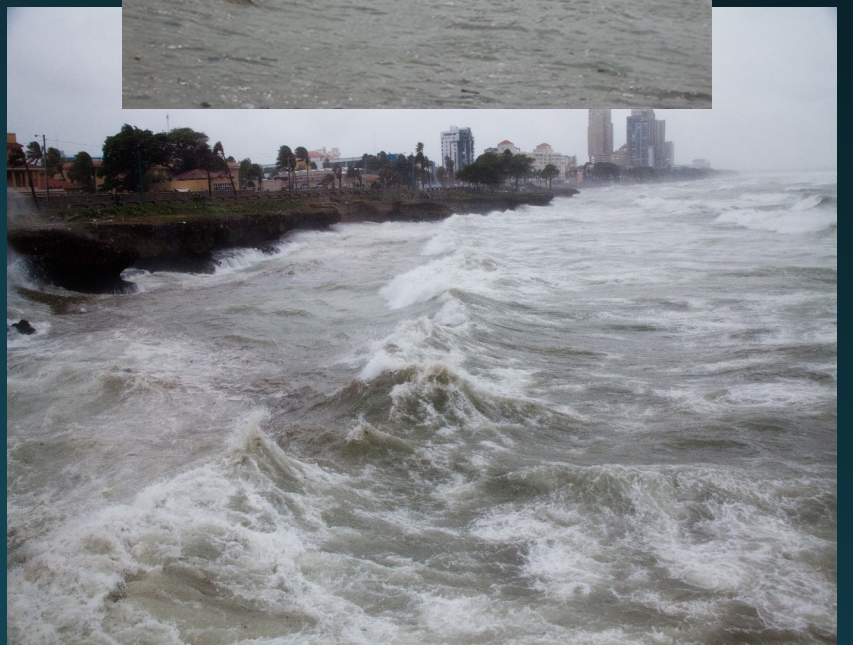




COASTALINE MORPHOLOGY

COASTLINE CHANGES-DOMINICAN REPUBLIC

- Dominican Republic faces a dramatic coastal degradation with the tourism activity and the urban area growing as the main sectors impacting the marine resources, coral reef and mangroves ecosystem.
- Coastal dunes plays a crucial protective role during storm to protect the beach and urbanization close to the shoreline. Human activities have interfered the natural processes for many decades.
- Task: assess the coastal marine morphology changes due to urban growing and tourism activity. Provide useful information in mitigation planning.
- Satellite images collected from Landsat data products will allow to quantify the coastal urban growing and inland sea water penetration.



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QUESTIONS