

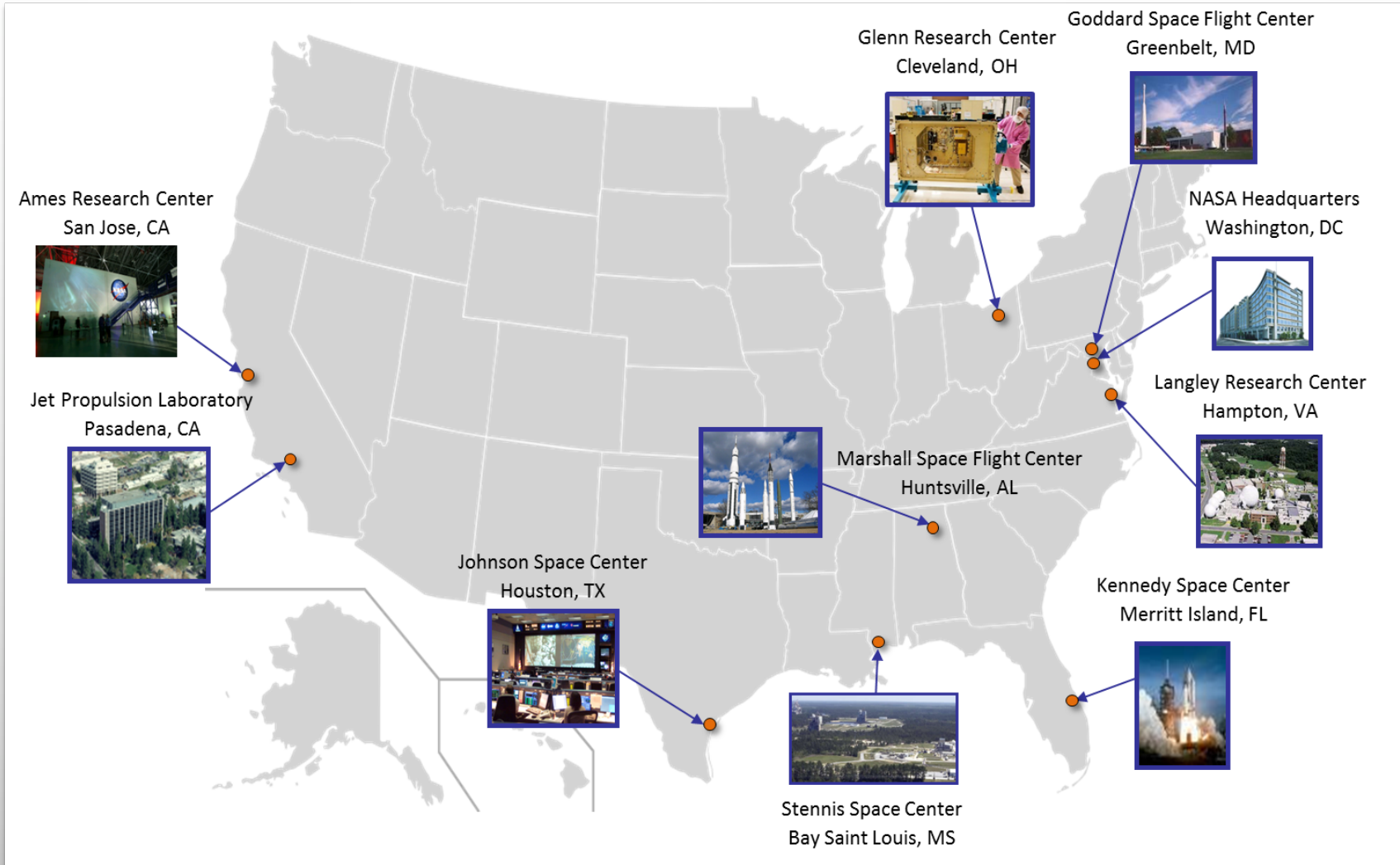
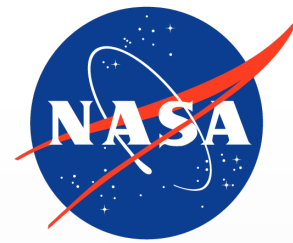


HOW NASA STUDIES THE EARTH

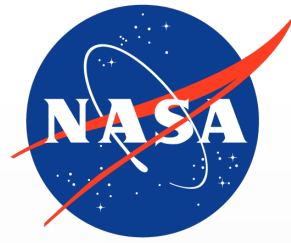
JOHN LECKEY, PH.D

NASA LANGLEY RESEARCH CENTER

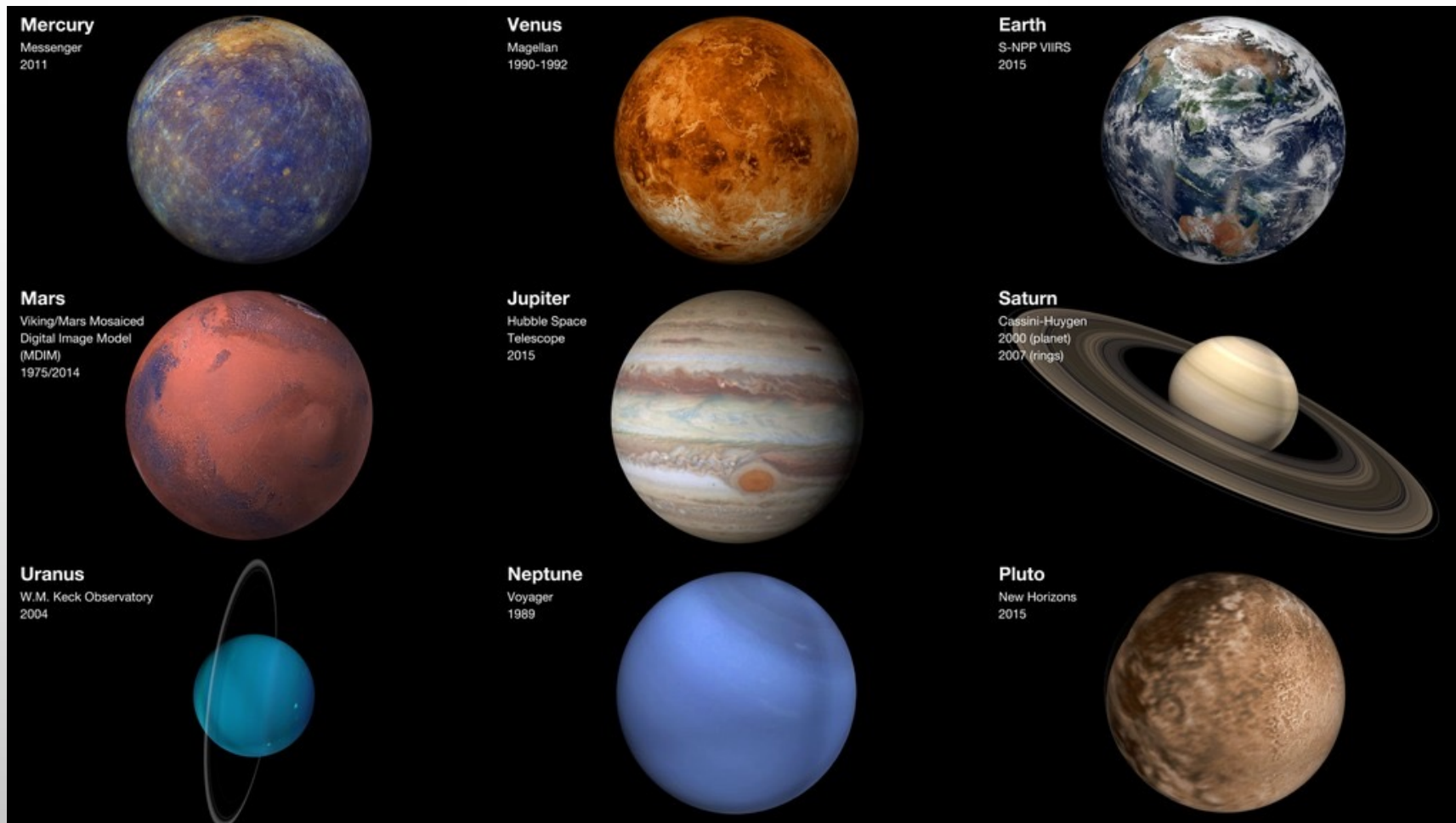
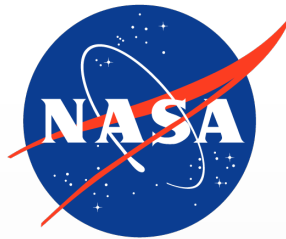
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



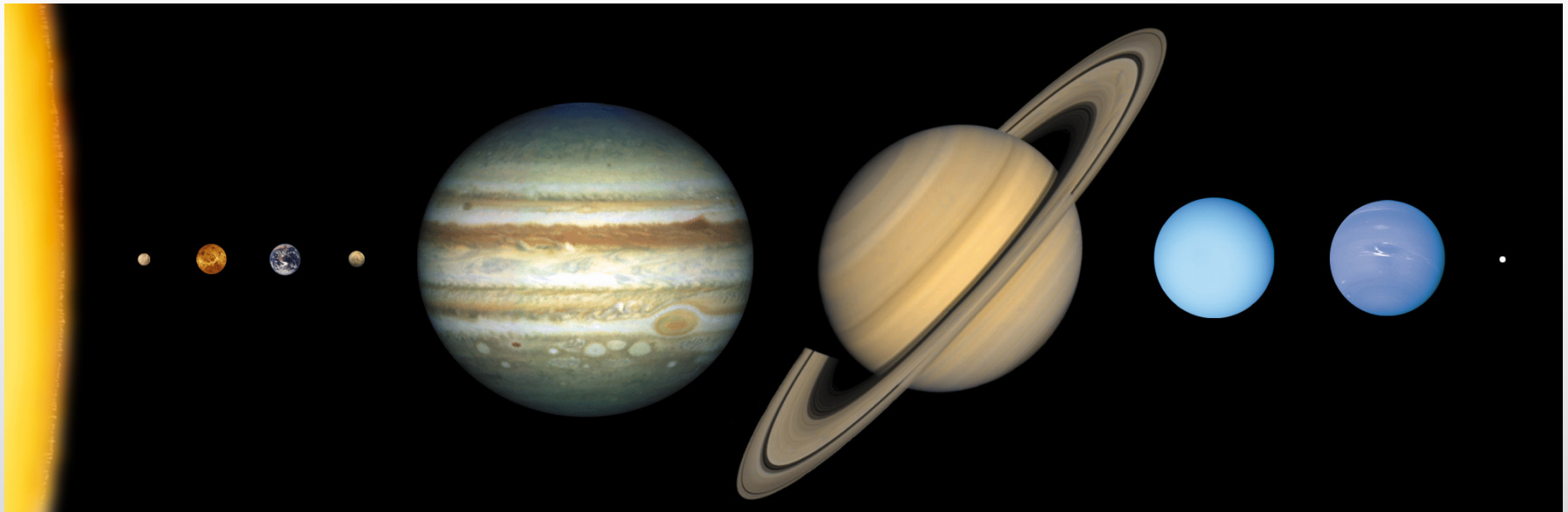
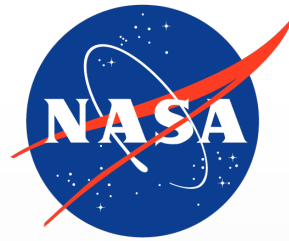
OUR SOLAR SYSTEM (ART)

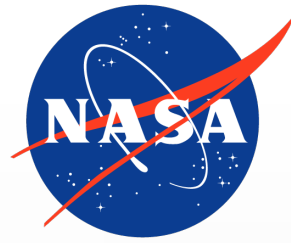


OUR SOLAR SYSTEM UP CLOSE



OUR SOLAR SYSTEM TO SCALE





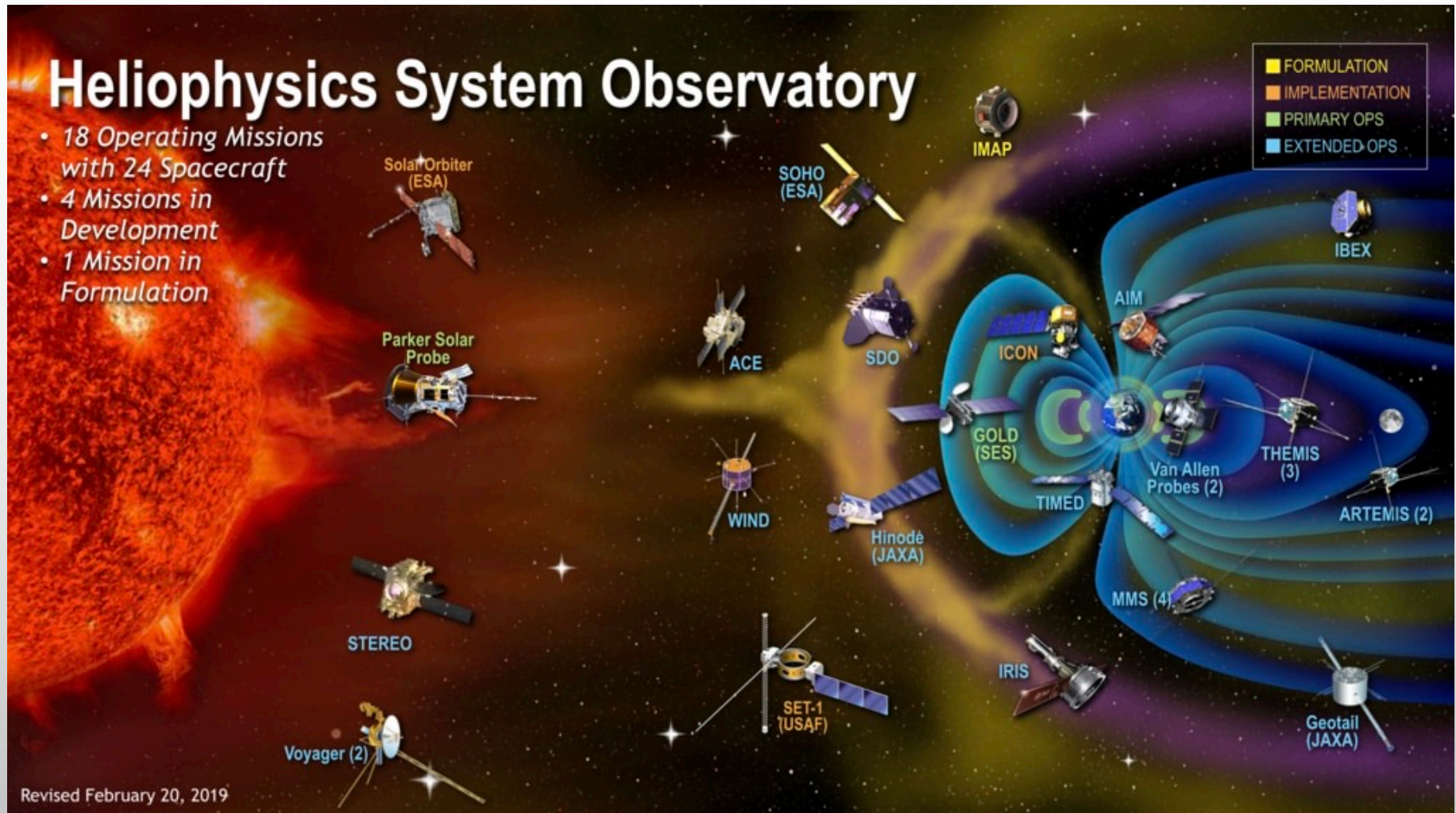
QUESTION

- TRUE OR FALSE: EARTH'S CLOSEST NEIGHBORS ARE VENUS AND MARS

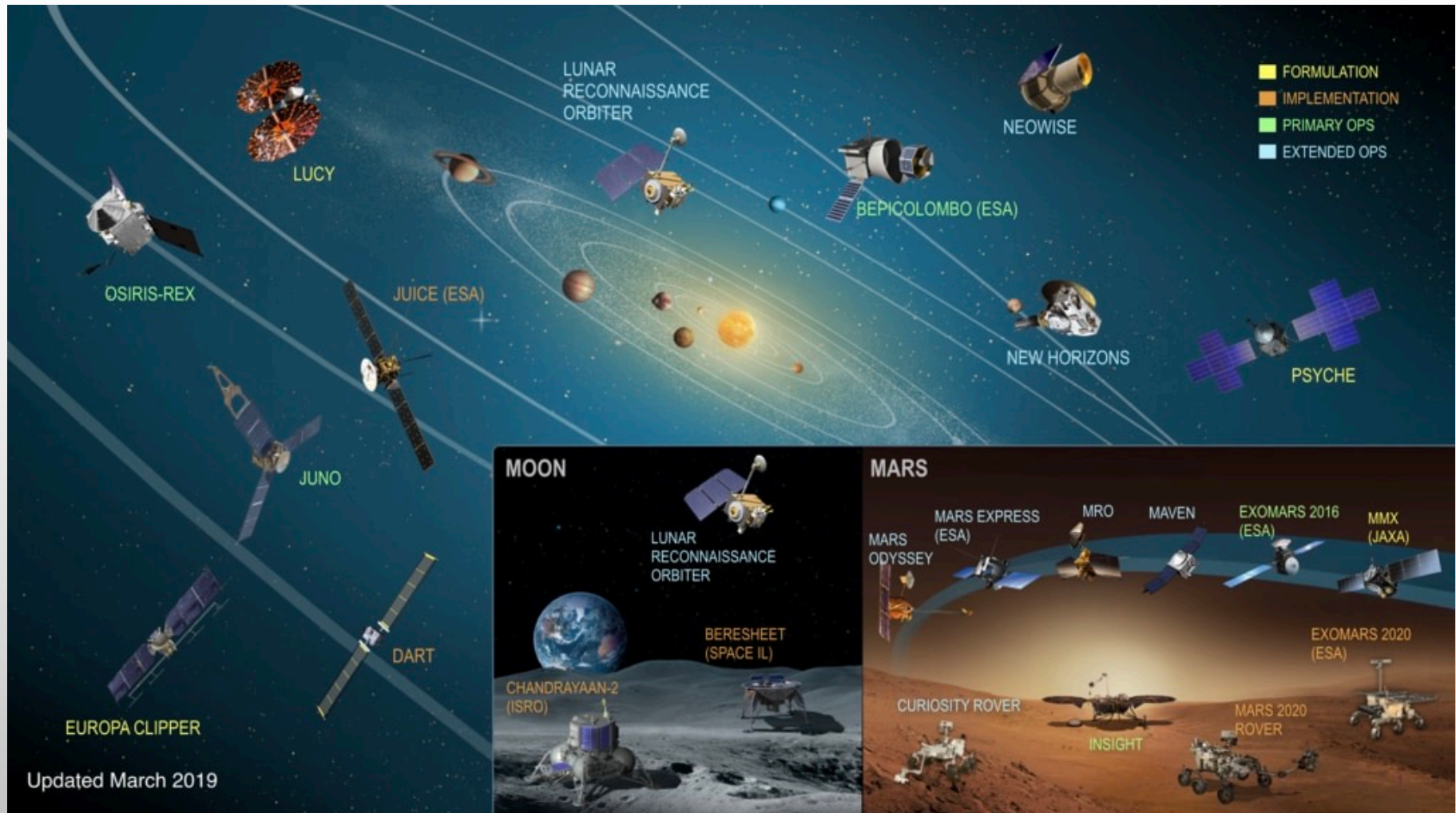
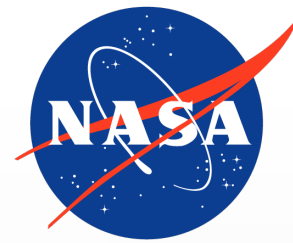
EARTH MISSIONS



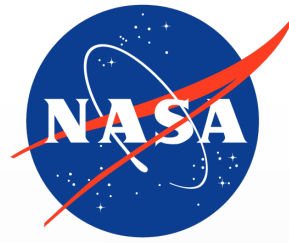
SOLAR MISSIONS



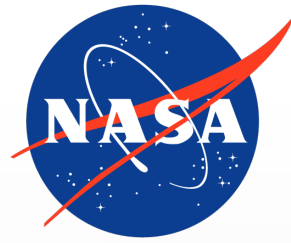
PLANETARY MISSIONS



CLIMATE MEASUREMENTS



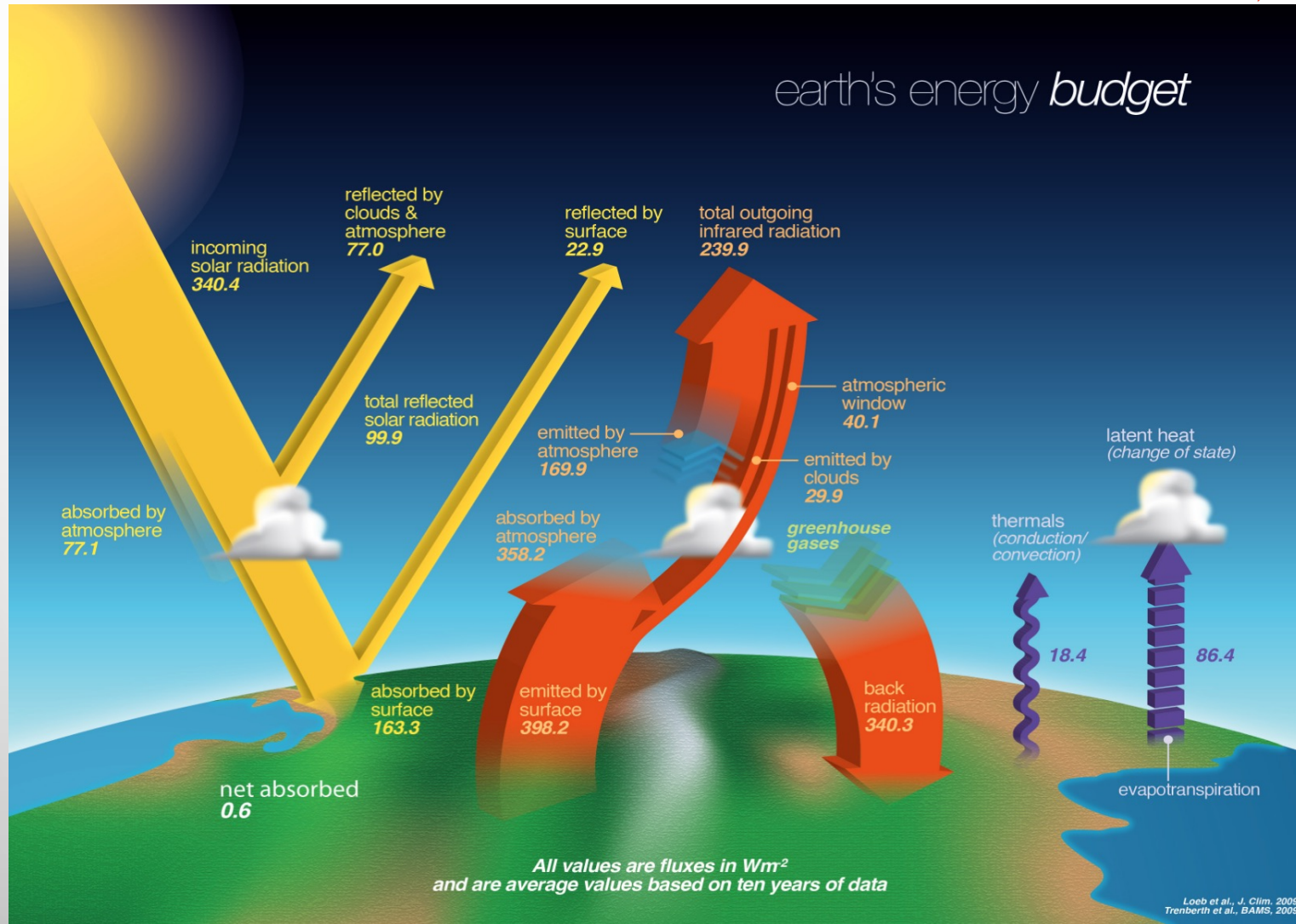
- TEMPERATURE (SEA SURFACE TEMPERATURE, AIR TEMPERATURE)
- ATMOSPHERIC REFLECTIVITY, SURFACE REFLECTIVITY (SNOW/ICE REFLECTS MORE THAN ROCKS AND DIRT)
- CHEMICAL SPECIES (OZONE, BLACK CARBON, SMOKE, CARBON DIOXIDE, METHANE, ETC.)
- WATER (RAINFALL, SEA LEVEL, ICE MELTING, ETC.)
- LAND USE CHANGE (INDUSTRIAL, FARMING, FOREST, ETC. AND THE CHANGES BETWEEN)
- MANY MORE



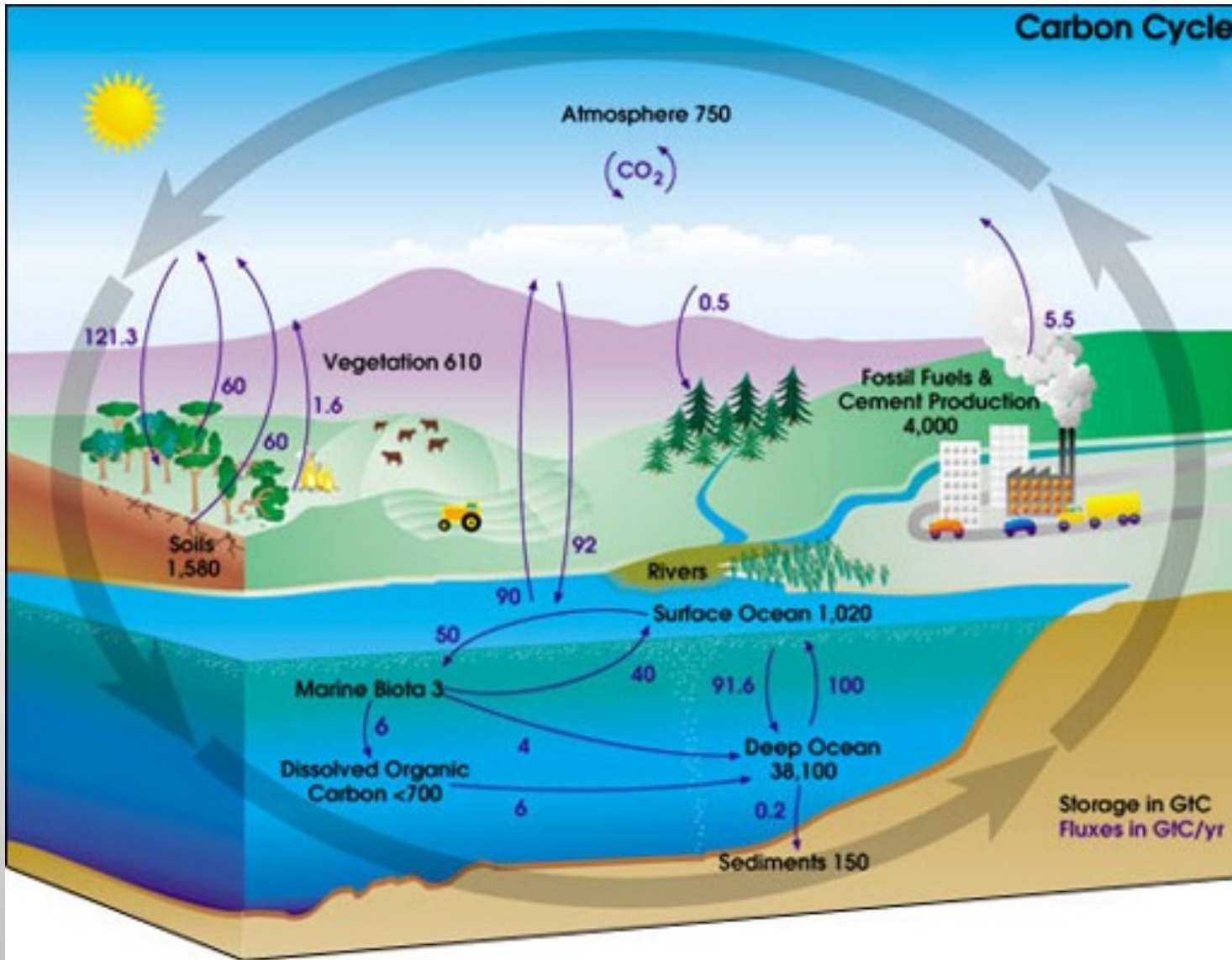
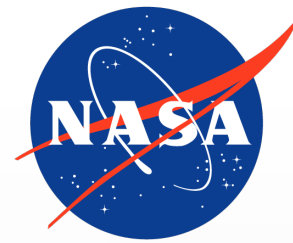
QUESTION

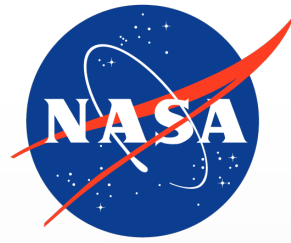
- TRUE OR FALSE: EARTH'S CLIMATE IS EASIER TO PREDICT THAN ITS WEATHER

RADIATION BUDGET



CARBON CYCLE

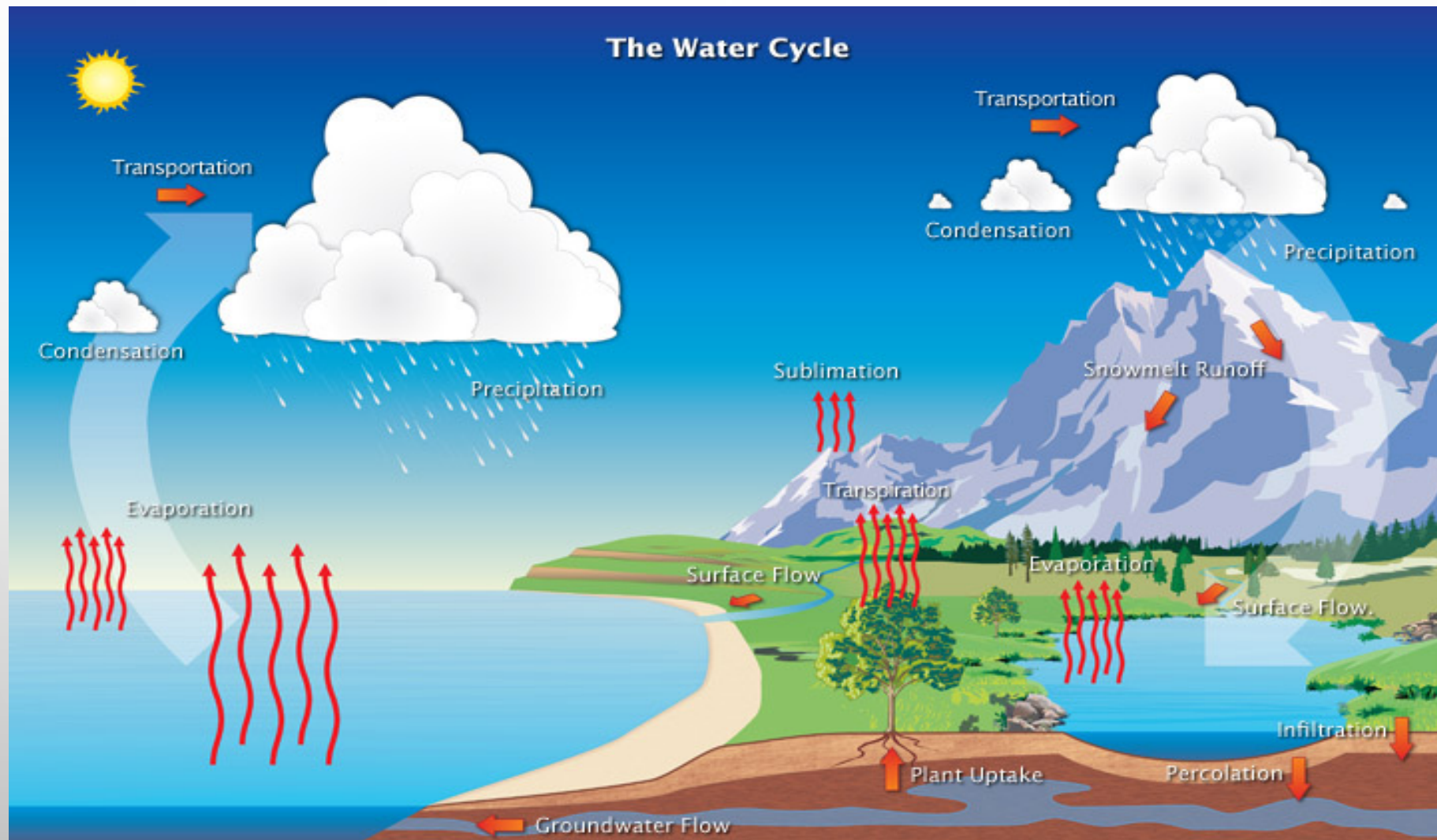
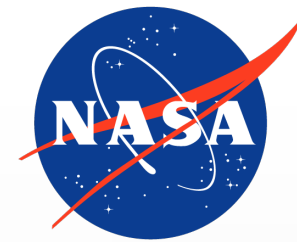


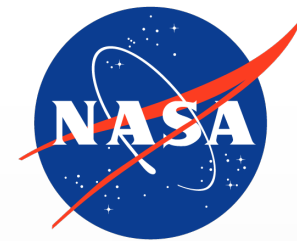


QUESTION

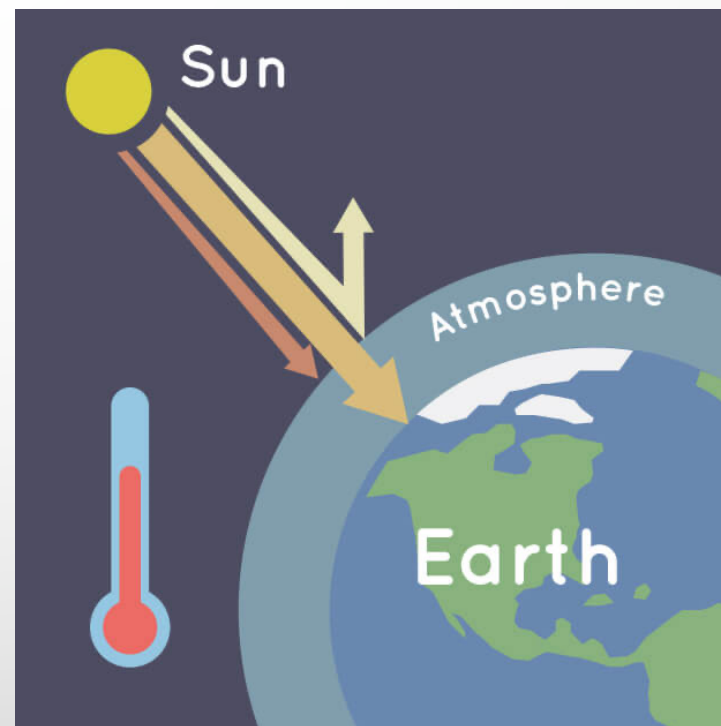
- TRUE OR FALSE: HUMANS BURNING FOSSIL FUELS RELEASES CO₂ INTO THE ATMOSPHERE CAUSING IT TO WARM

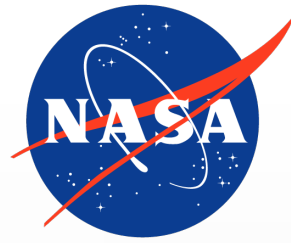
WATER CYCLE





GREENHOUSE EFFECT

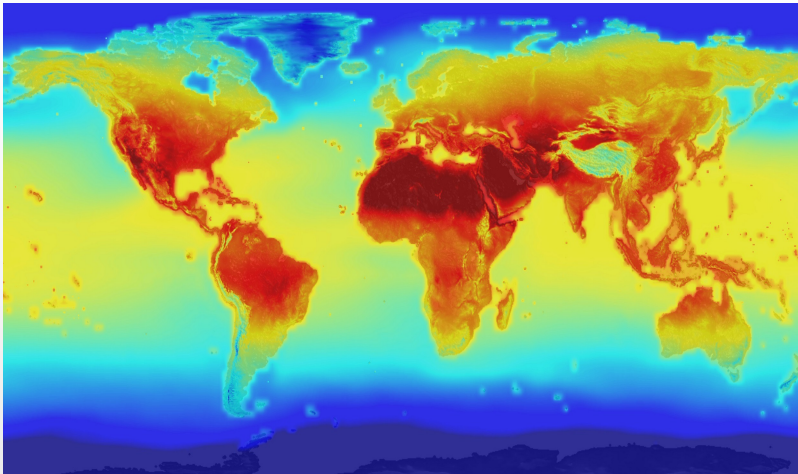
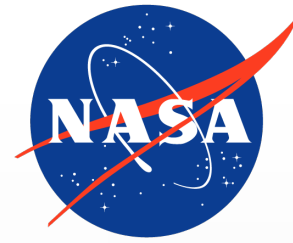




QUESTION

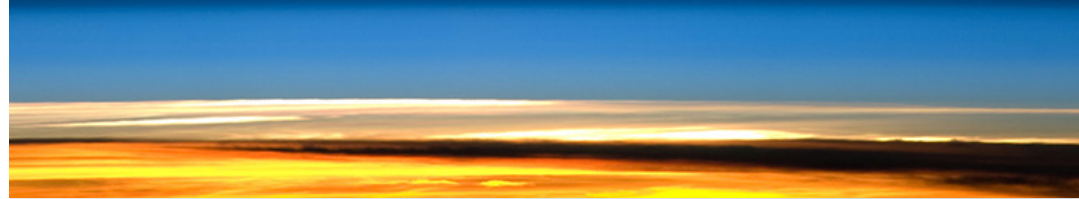
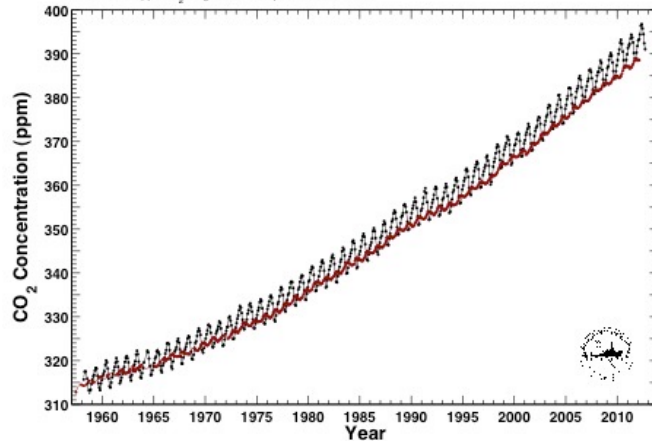
- TRUE OR FALSE: THE GREENHOUSE EFFECT CAUSES THE EARTH TO COOL

CLIMATE CHANGE

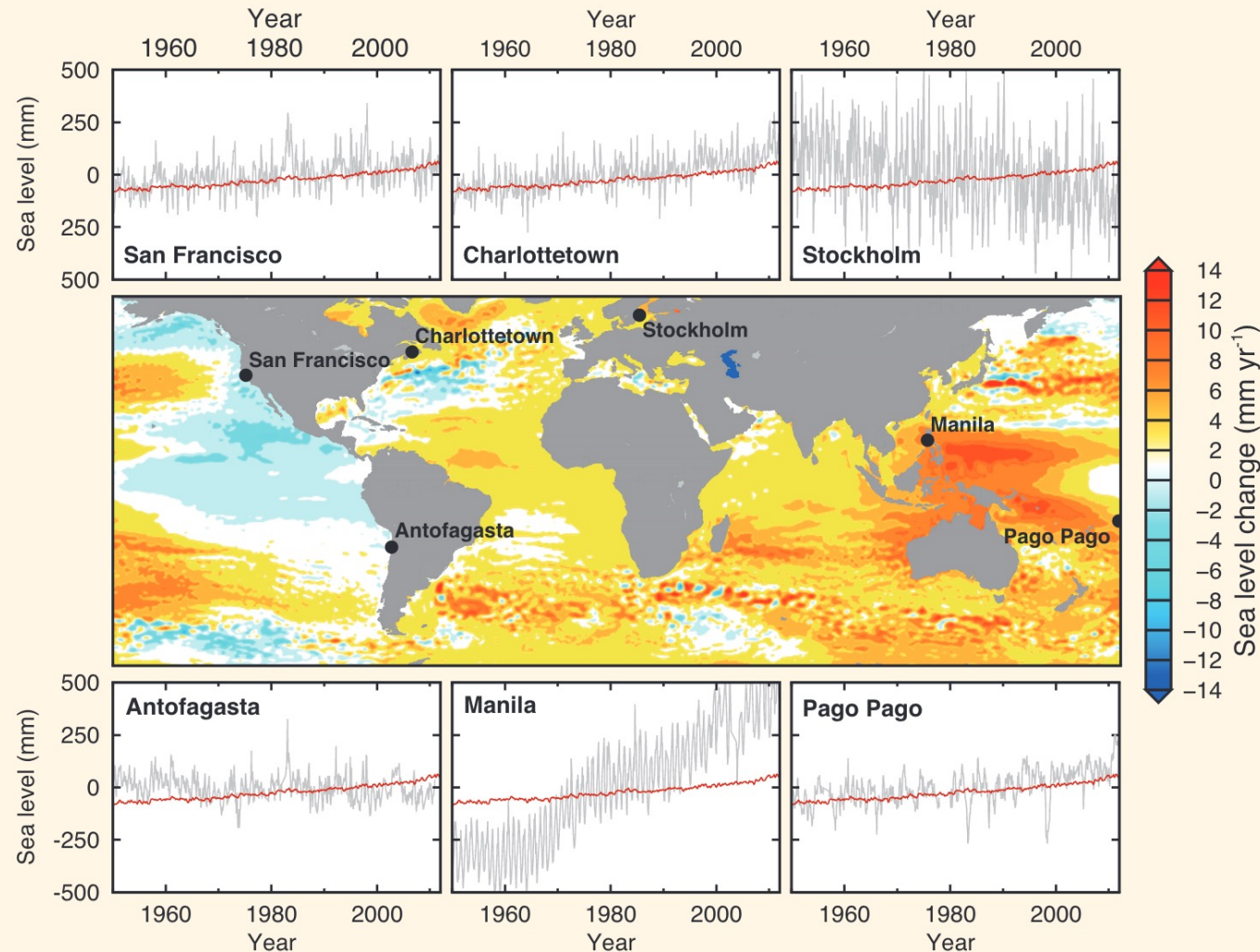
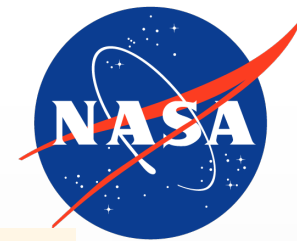


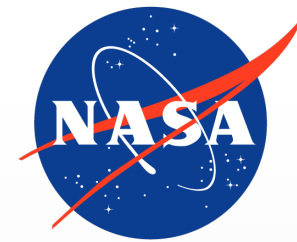
Mauna Loa Observatory, Hawaii and South Pole, Antarctica
Monthly Average Carbon Dioxide Concentration

Data from Scripps CO₂ Program Last updated October 2012

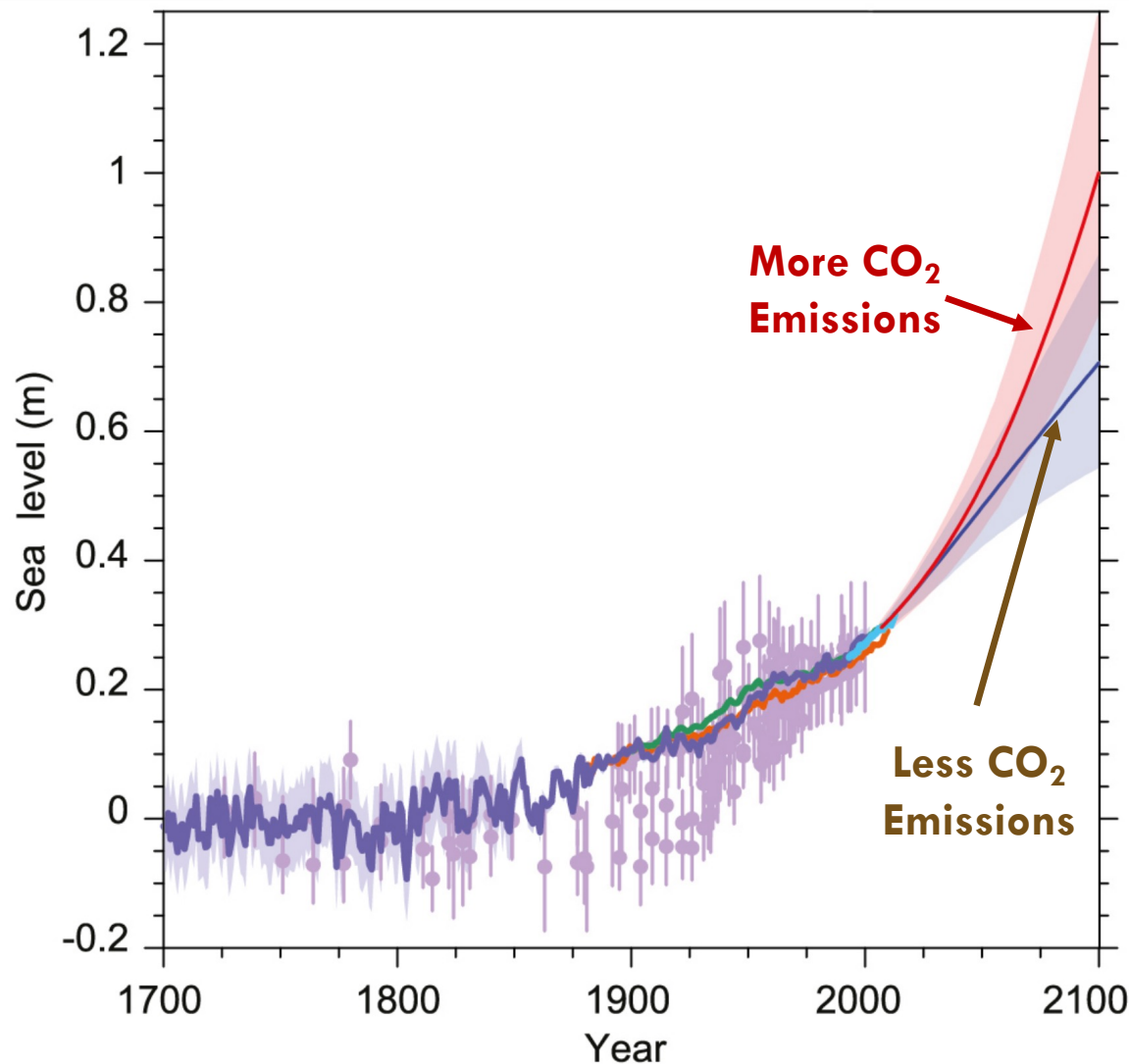


SEA LEVEL RISE 1993-2012

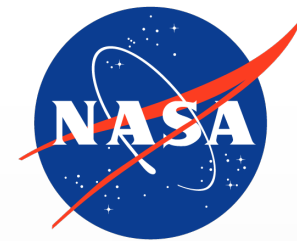




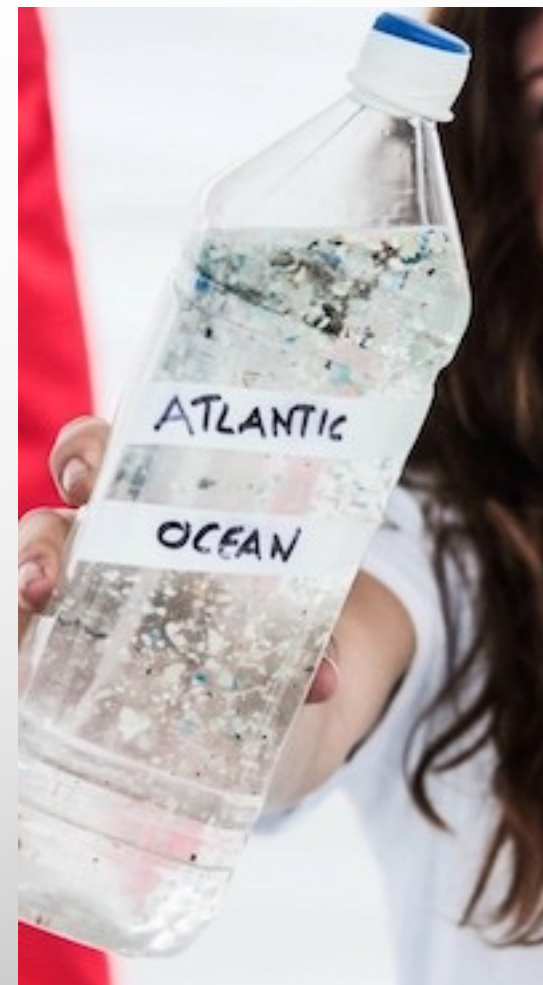
FUTURE SEA LEVEL RISE

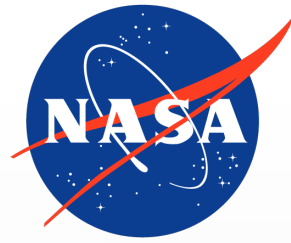


- Sea level rise proportional to increase in greenhouse gas emissions
- Models disagree on timing of specific events (ice sheet collapse, currents shifting)
- Some argue IPCC values are conservative



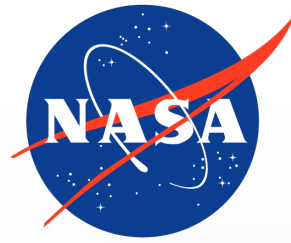
PLASTIC POLLUTION





WHAT CAN WE DO

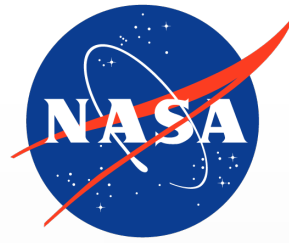
- POLLUTE LESS
 - REUSE EVERYTHING YOU CAN
 - RECYCLE EVERYTHING YOU CAN
 - MINIMIZE USE OF SINGLE USE PLASTICS (BAGS, BOTTLES, ETC.)
 - MINIMIZE THE USE OF CHEMICALS
 - PICK UP TRASH
- CONSUME LESS
 - USE LESS ENERGY (LED LIGHTS, MORE INSULATION, LESS AIR-CONDITIONING/HEATING, DRIVE LESS, ETC.)
 - USE SUSTAINABLY SOURCED PRODUCTS/FOODS
 - LIVE CLOSE TO SCHOOL/WORK
- TELL YOUR FRIENDS TO DO THE SAME!!!



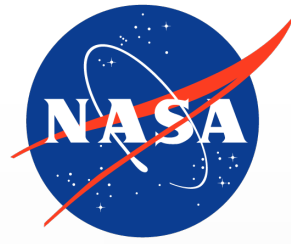
QUESTION

- TRUE OR FALSE: YOU CAN CHANGE THE FUTURE WITH THE DECISIONS YOU MAKE TODAY

SUMMARY



- NASA IS OPERATING A VARIETY OF INSTRUMENTS MAKING A VARIETY OF MEASUREMENTS FOR A VARIETY OF REASONS
- BETTER MEASUREMENTS MAKE FUTURE PREDICTIONS MORE ACCURATE
- ALL FUTURE CLIMATE PROJECTIONS ARE DEPENDENT ON WHAT WE DO NOW
- POLLUTE LESS AND CONSUME LESS FOR A BETTER FUTURE



QUESTIONS?