Our Sustainable Planet

Perspectives from NASA

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Earth

Voyager 1: 60 frame mosaic, from more than 4 billion miles, Earth is only 0.12 pixel.

Also

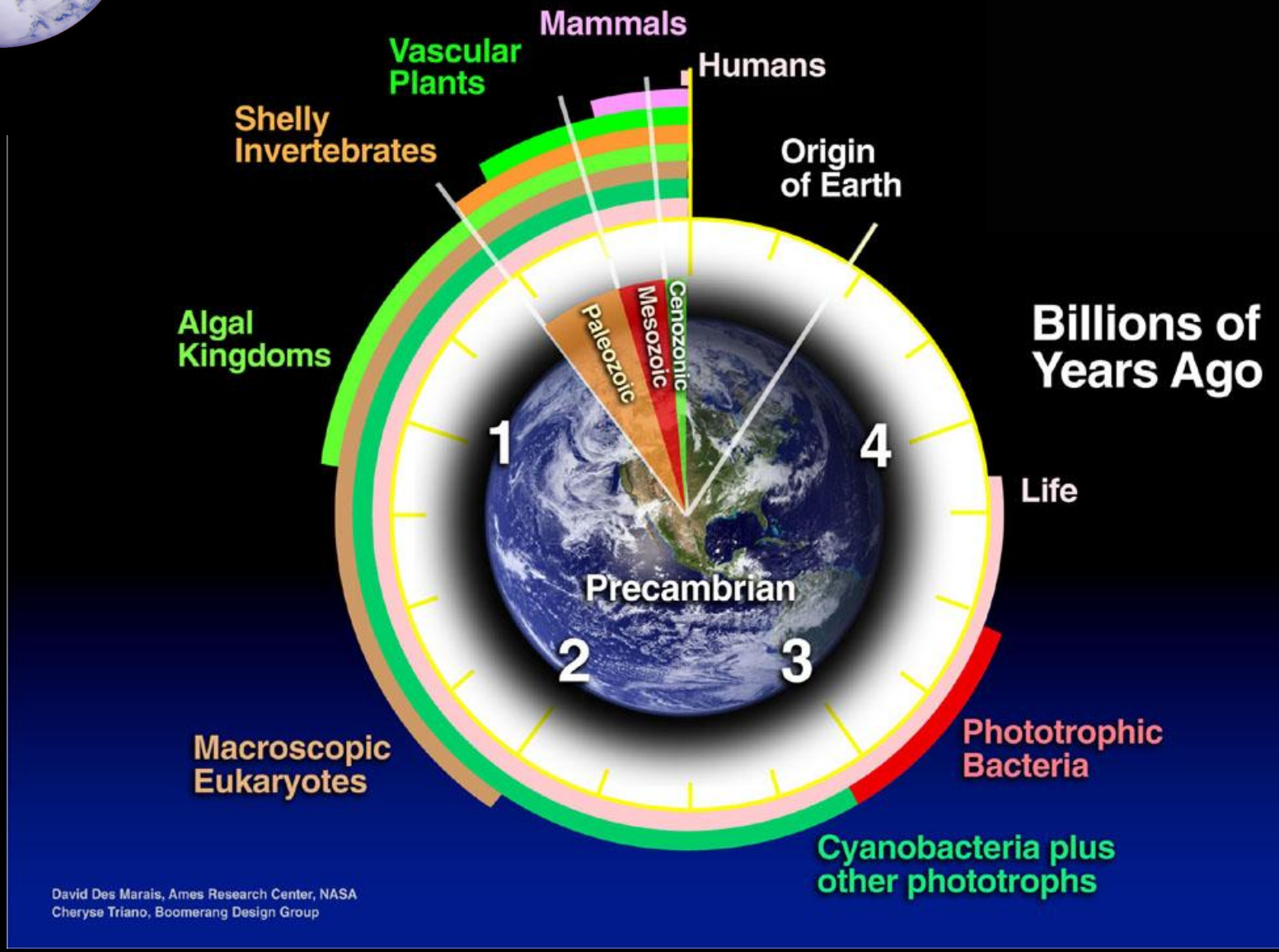
Carl Sagan, Pale Blue Dot: A Vision of the Human Future in Space, Random House, 1994

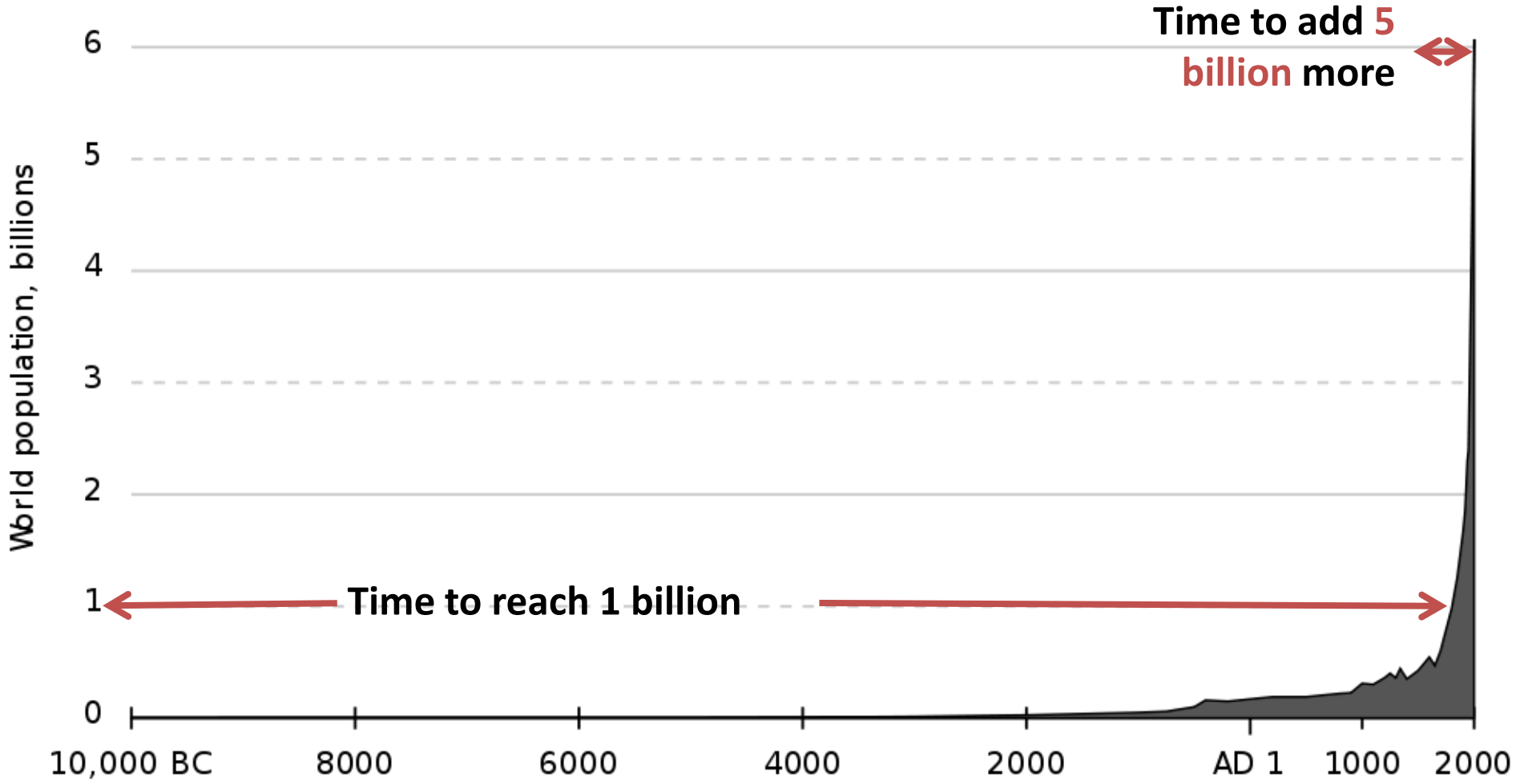
NASA's Mission

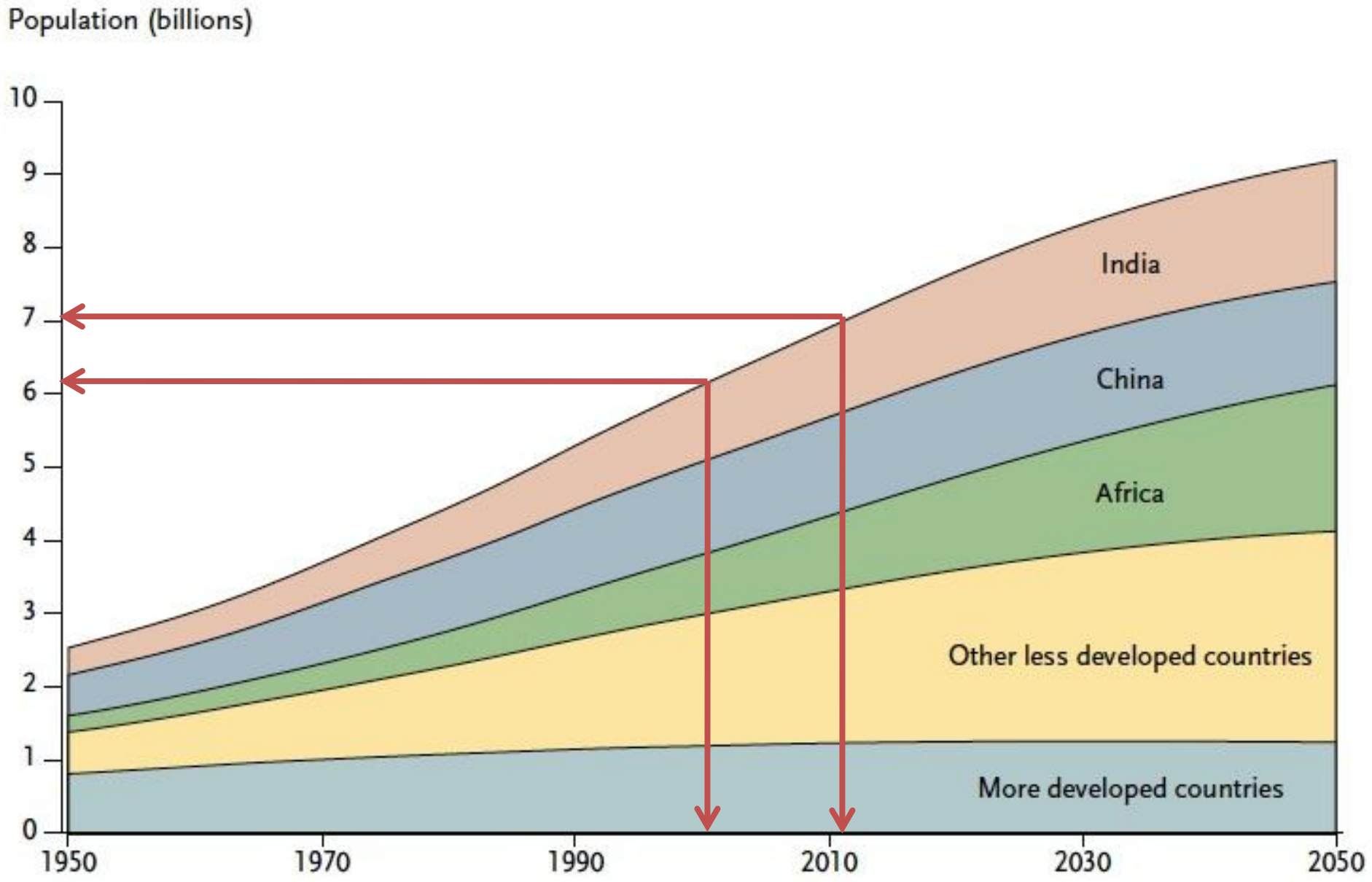
- Includes:
  - Optimizing Aeronautics, the first 'A' in NASA
  - Using NASA's unique (aeronautics and space) perspectives to reveal/study Earth's processes
  - Understanding life in a planetary context

Our Planet. Our Future. Our Mission.

Earth's Biogeologic Clock

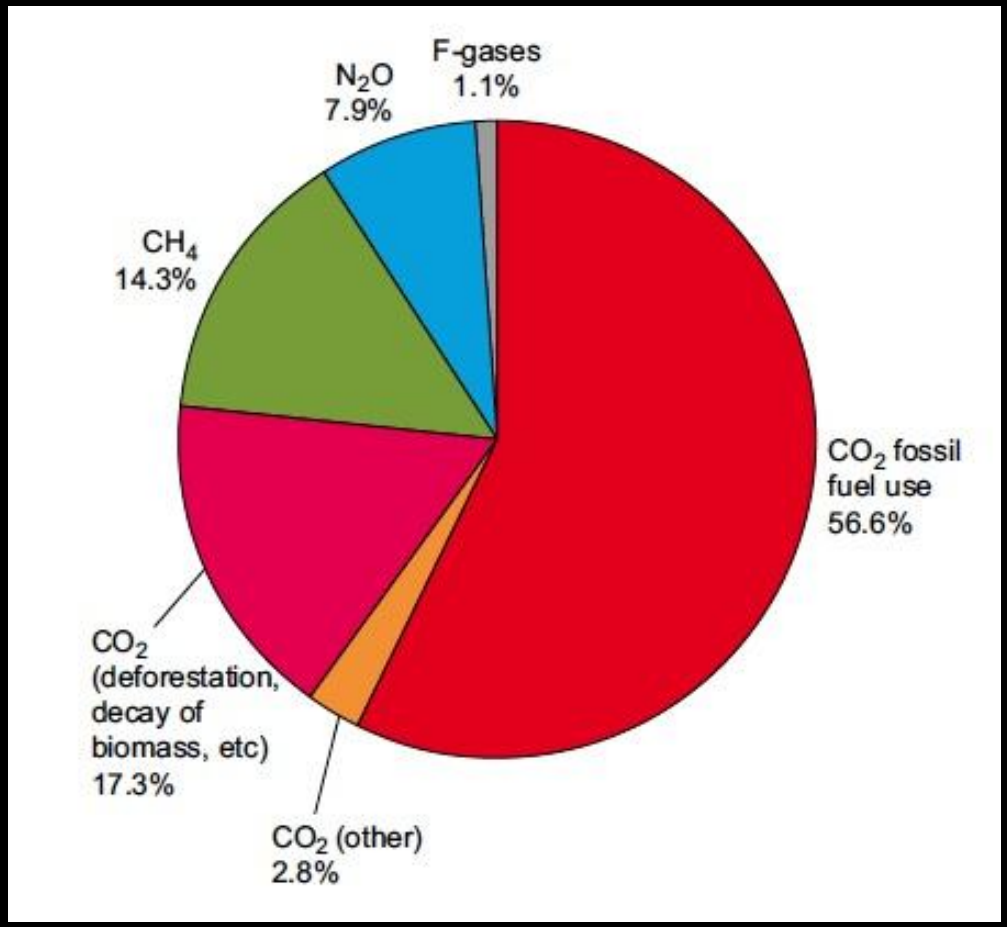



Time to add 5 billion more
Time to reach 1 billion
World population, billions
0
1
2
3
4
5
6
10,000 BC
8000
6000
4000
2000
AD 1
1000
2000



World Population Prospects: The 2006 Revision, Medium Variant (2007), UN population Division

Greenhouse Gases

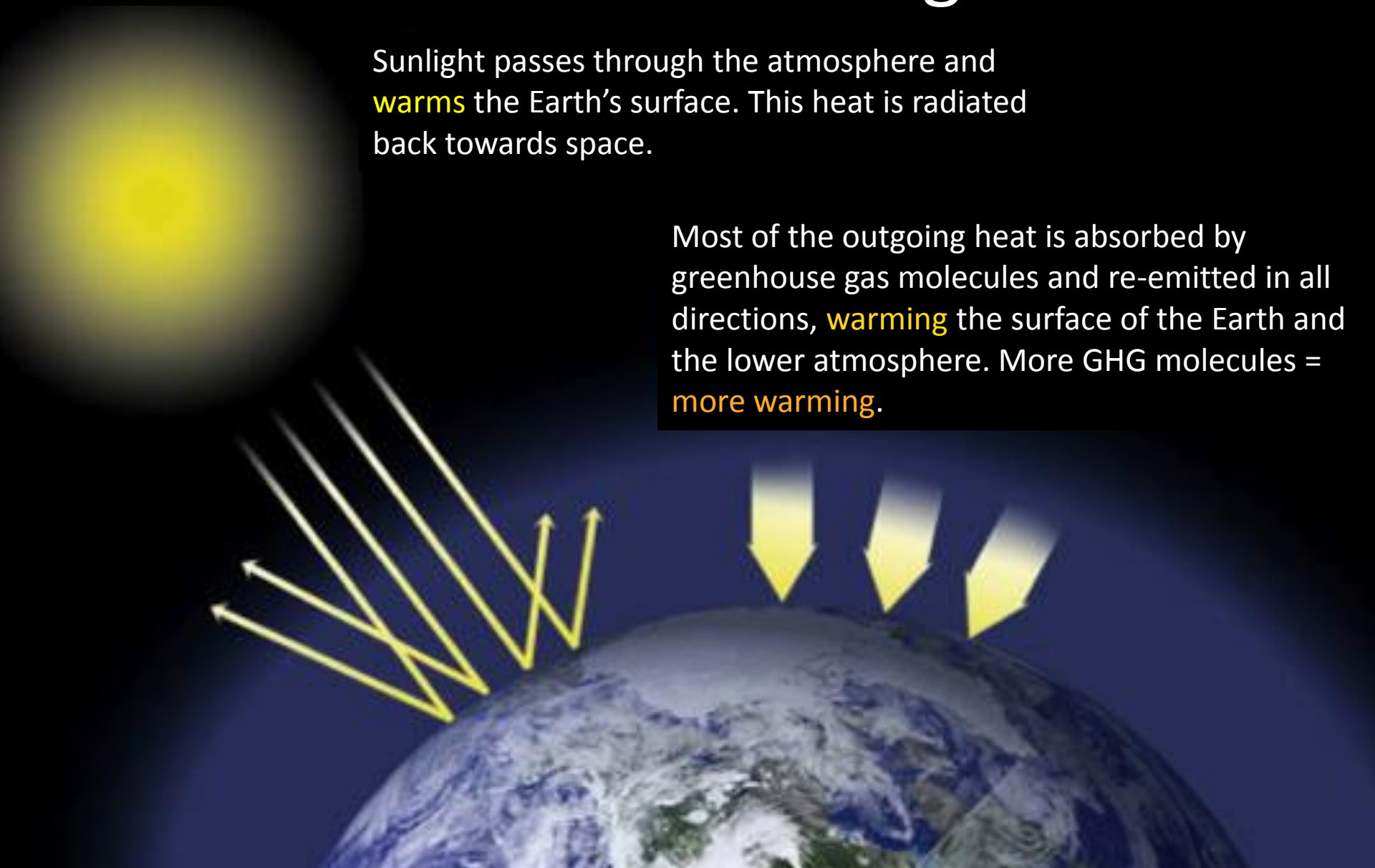


International Panel on Climate Change, 2007

Planet Warming

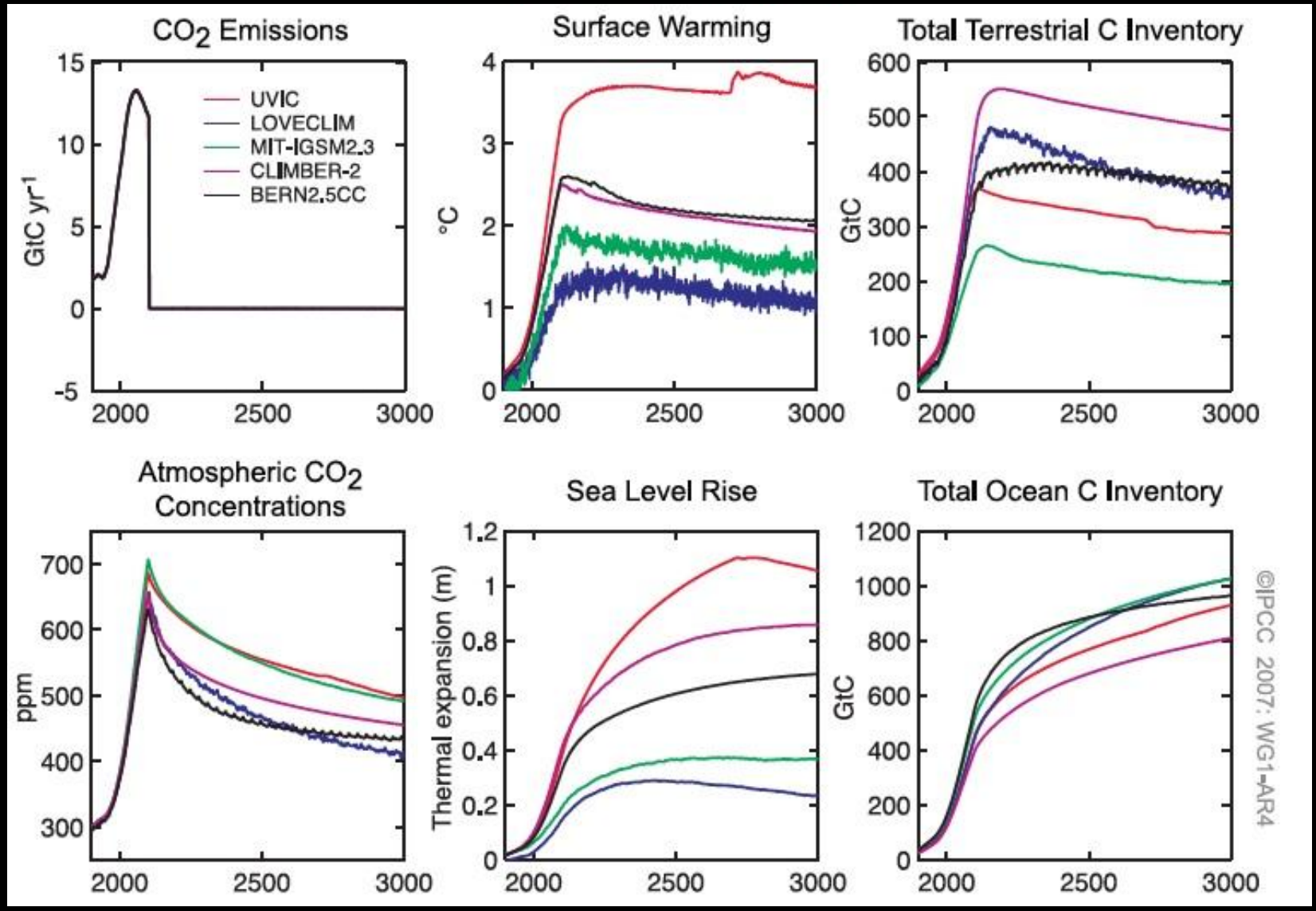
Sunlight passes through the atmosphere and warms the Earth's surface. This heat is radiated back towards space.

Most of the outgoing heat is absorbed by greenhouse gas molecules and re-emitted in all directions, warming the surface of the Earth and the lower atmosphere. More GHG molecules = more warming.

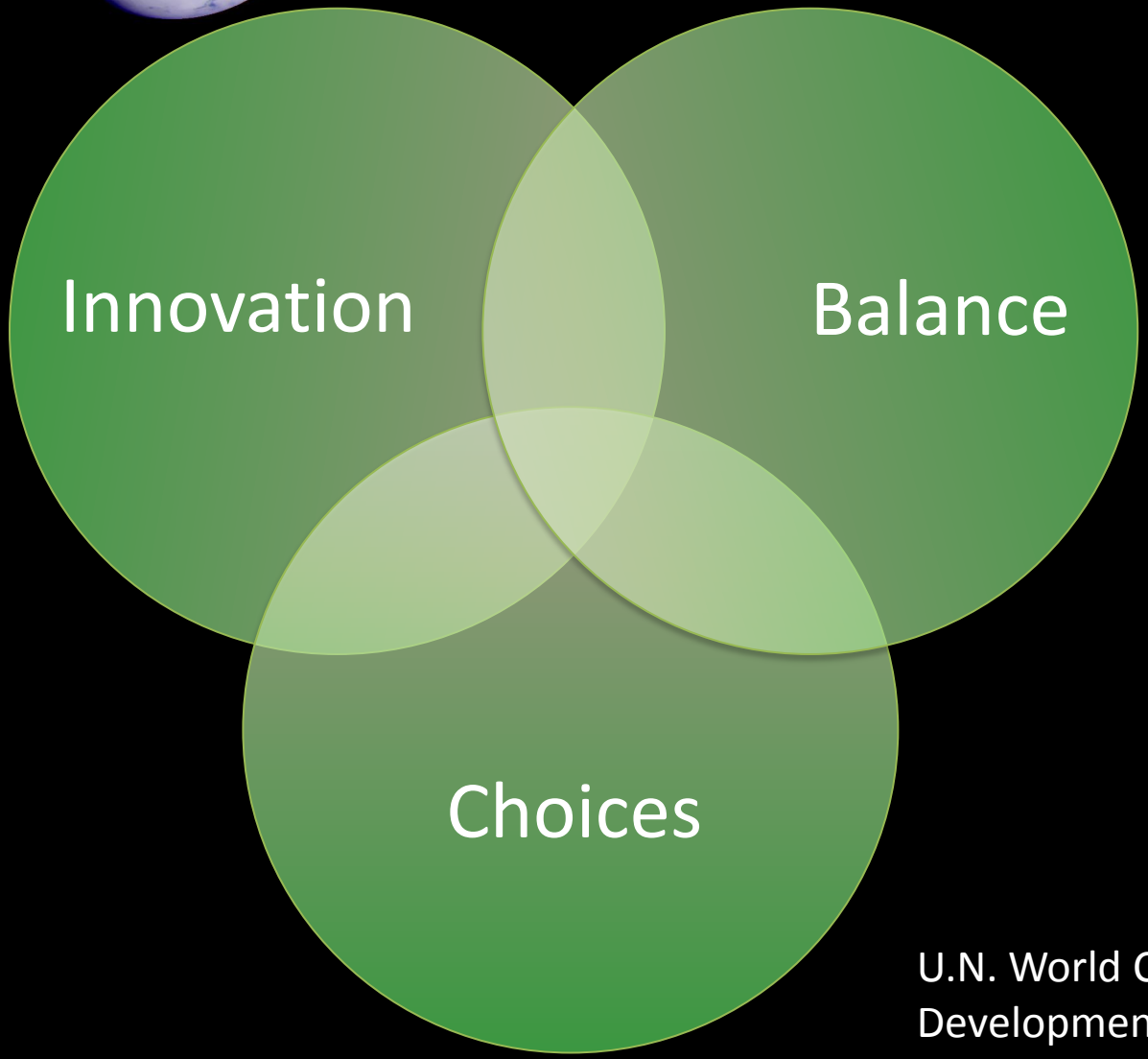


climate.nasa.gov

Climate Change Commitment



Sustainability

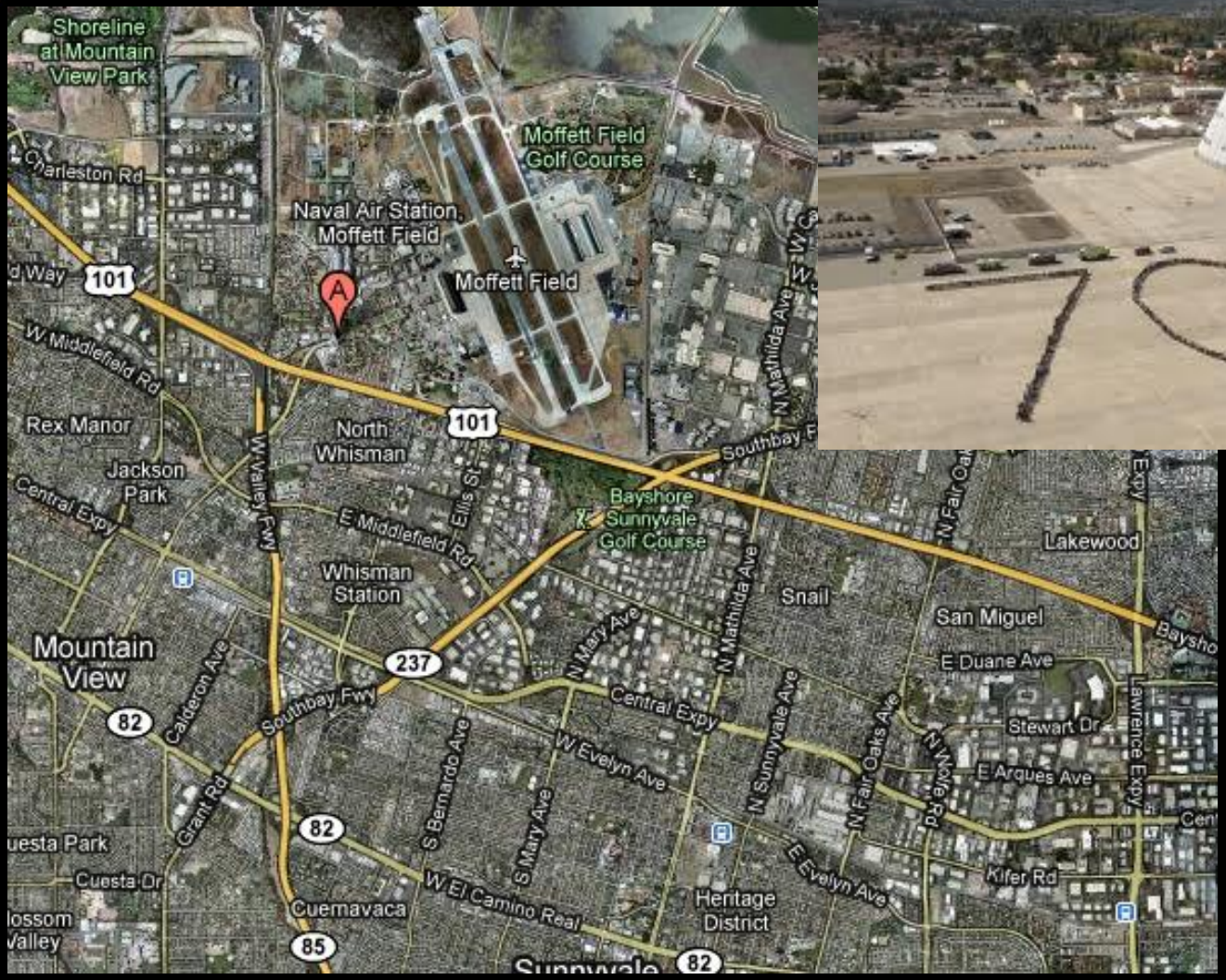


Sustainable development …meets the needs of the present without compromising the ability of future generations to meet their own needs.

U.N. World Commission on Environment and Development (“Brundtland Commission”)

NASA Across the U.S.

NASA Ames Research Center



Green Aviation

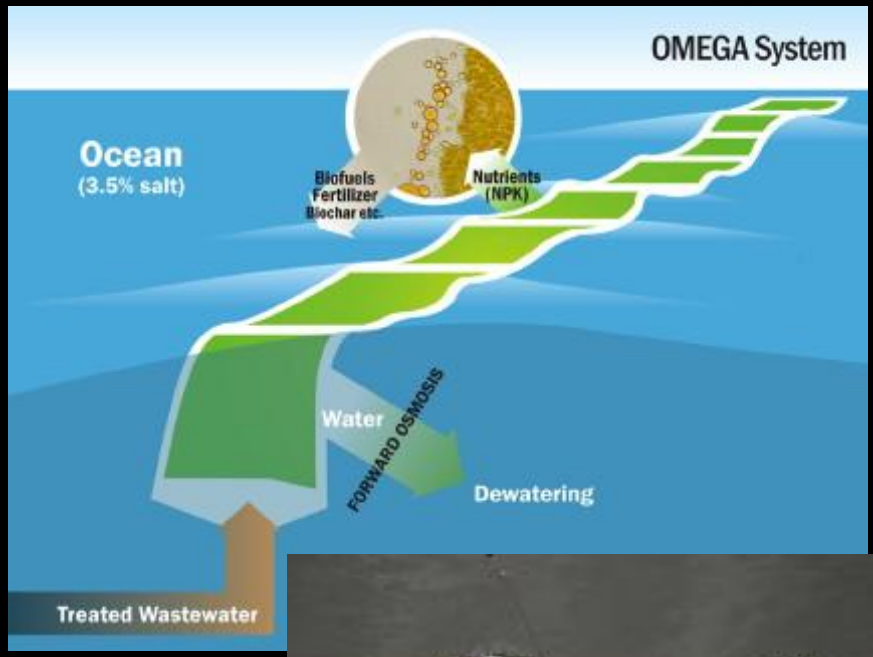
NextGen (Next Generation Air Transportation System) –satellite-based navigation and surveillance, advanced flight deck automation, more pilot interaction

Advanced Concepts Flight Simulator at the Crew-Vehicle Systems Research Facility -- integrated air/ground closely spaced approach simulation, including NASA Human-in-the-Loop decision assist for dynamic airspace configuration

Trajectory-Based Operations and Tactical Separation Assisted Flight Environment) – reduces flight plan amendments by 8x over today's 'Conflict Alert' system

Green Aviation - Biofuels

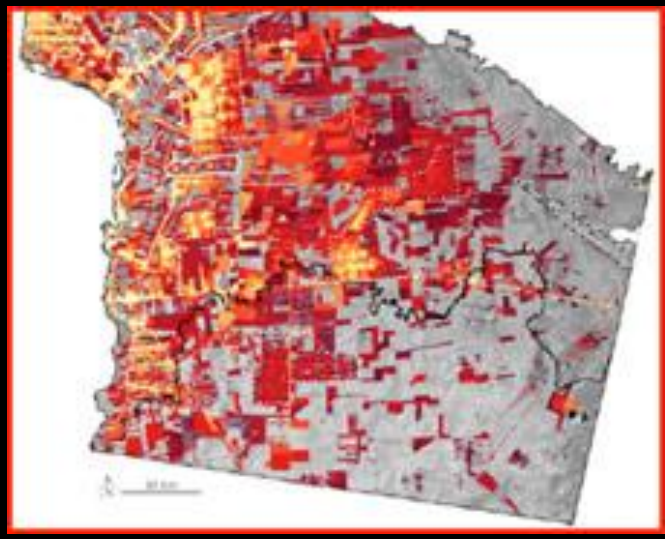
AlgaeOMEGA (Offshore Membrane Enclosure for Growing Algae)



ALEX (Algae for Exploration) and RoboAlgae

Planetary Skin

Sense. Predict. Act.



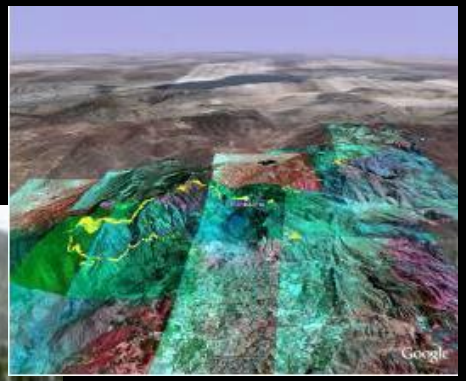
NASA and Cisco teamed up to develop this global "nervous system" display integrating land-, sea-, air- and space-based sensor data, helping us all to make decisions to prevent and adapt to climate change.

The pilot project will track how integrated much carbon is held by rain forests, and where. Planetary Skin will later extend to other critical biosphere systems (water, biodiversity, food, …)

Earth Systems Science

ARCTAS (Arctic Research of the Composition of the Troposphere from Aircraft and Satellites) –Arctic air quality and pollution transport processes

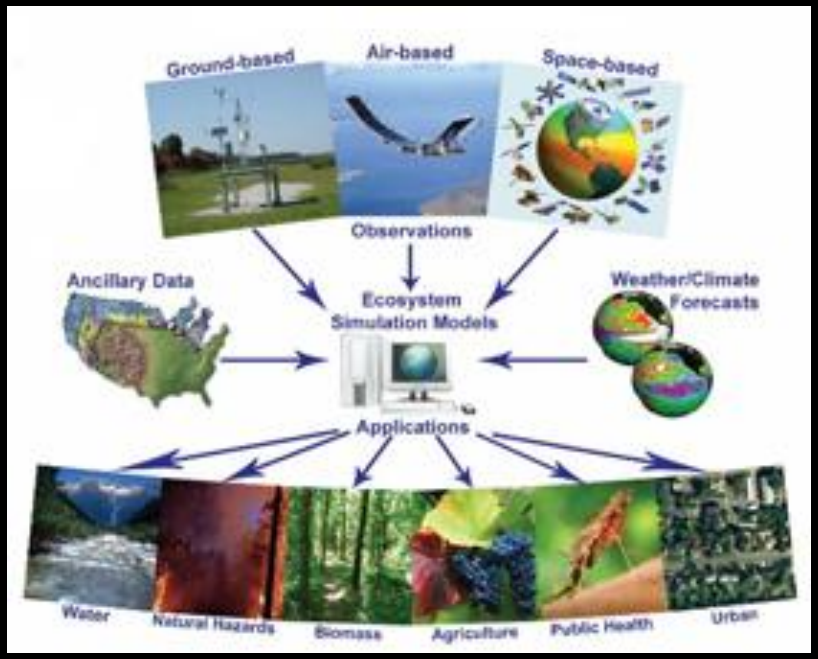
ARCTAS-CARB -- Summer ARCTAS collaboration with the California Air Resources Board (CARB) on California air quality



WRAP (Wildfire Research and Applications Partnership) –air-to-ground integrated system of sensors, data, and platforms

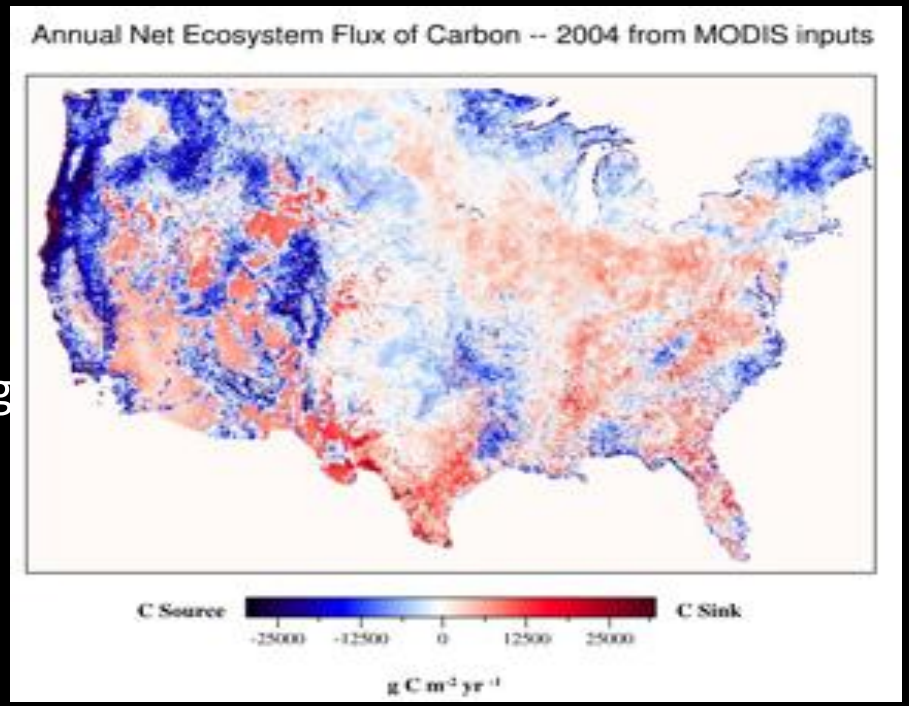
RAM (Rights-of-Way Autonomous Monitoring) -- remote detection of leaks in, or trespass onto, pipeline rights-of-way

Earth Systems Science



TOPS (Terrestrial Observation and Prediction System) -- Daily monitoring and prediction of biospheric indicators

CQUEST (Carbon Query and Evaluation Support Tool) and **NASA-CASA** (NASA-Carneg Ames Stanford Approach) -- Imagery, maps, and numerical outputs from Earth system simulation model



Advanced Supercomputing and Intelligent Systems

NEX (NASA Earth Exchange) **–**
collaboration platform for the Earth science community combines supercomputing, Earth system modeling, workflow management, NASA remote sensing data feeds, and a social networking platform

Pleiades -- provides >2.5 times current high-end computing capability; ranks #54 on the Green500 list; #5 when combining energy efficiency and computational power

Prognostics Center of Excellence –
includes **Battery Test Facility**

Life in a Planetary Context: Astrobiology

Are we alone?

Is there Life elsewhere in the Universe?

Where did we come from?

How does Life Originate and Evolve?

Where are we going?

What is the Future of Life on Earth and Beyond?

Astrobiology at Ames

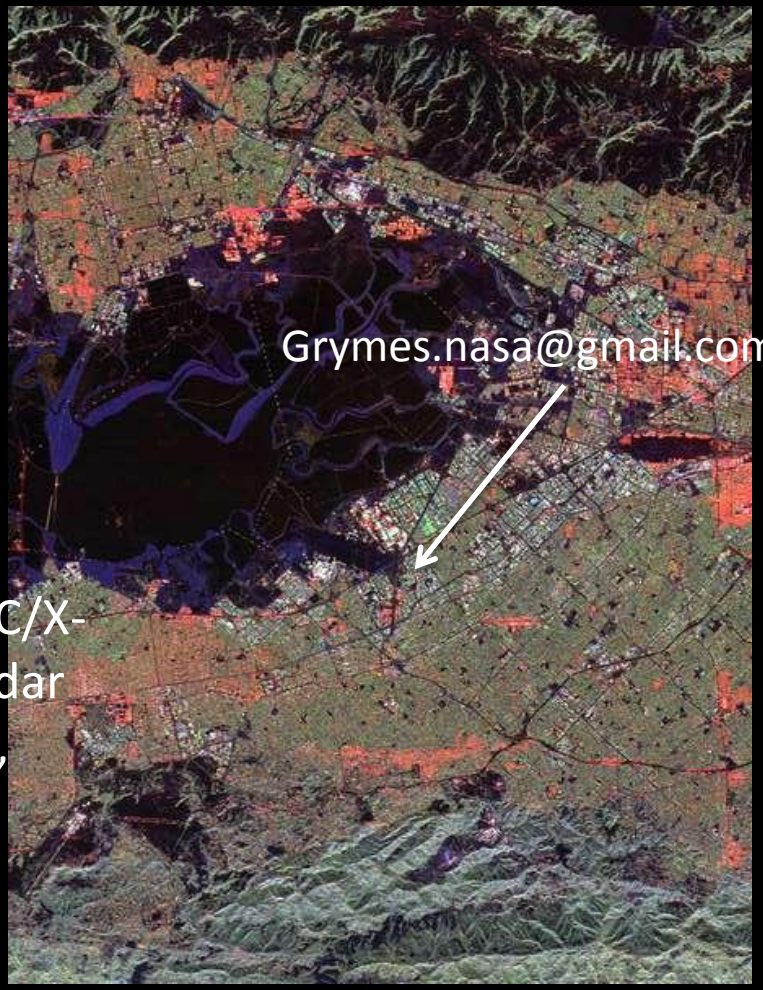
Environmental Management & Facility Operations

Eco-Lawn installation and **Native Garden Conversion** -- saved 19,000+ gal, also using grey water for golf course irrigation and rainwater for Sustainability Base

2010 NASA Blue Marble Award for Environmental and Energy Excellence – Dr. Leslie Prufert-Bebout

Photovoltaic Panel Installation – part of Utility Energy Services Contract (UESC)

Thank You!



Cupertino (and environs)
Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar (SIR-C/X-SAR) imaging radar, Space Shuttle Endeavour, October 2, 1994