TANG PRIZE

2026 Tang Prize

SUSTAINABLE DEVELOPMENT

Susan Solomon

Why Susan Solomon

Recognizing Prof. Susan Solomon for her groundbreaking advances and leadership in atmospheric and climate sciences that shaped global policy for sustainable development.

- An exceptional blend of scientific discovery, societal impact, and moral leadership throughout her professional career.
- Made pivotal contributions to the formulation of the Montreal Protocol through Antarctic field research findings.
- Helped lay a solid foundation for the Paris Agreement through the advancing scientific understanding of climate change.

A Historic First:
Direct Measurement of Reactive Chlorine Compounds in the Antarctic Atmosphere

In 1986, Prof. Solomon, as Head Project Scientist of the U.S. National Ozone Expedition, led an expedition to Antarctica.

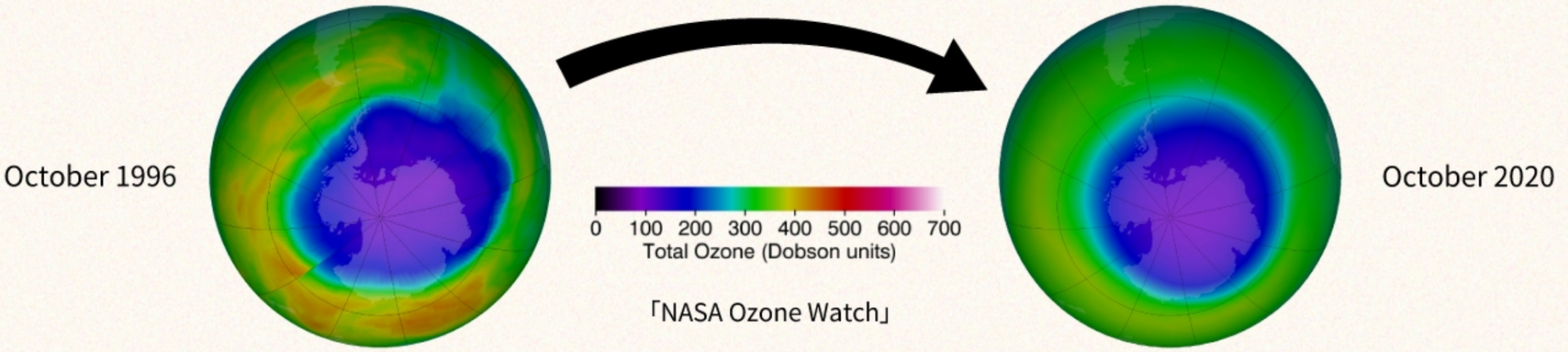
- Collected the first direct measurements of reactive atmospheric chlorine compounds in the Antarctic atmosphere.
- Confirmed that chlorofluorocarbons (CFCs) were the cause of the widening ozone hole over Antarctica.
- Combined research data to propose that heterogeneous chemical reactions were the primary driver of ozone depletion.

Identifying the Primary Cause of the Ozone Hole — Heterogeneous Chemical Reactions

- In 1985, scientists at the British Antarctic Survey discovered that ozone levels over Antarctica declined by more than 40% during 1977-1984 between September and November, while the underlying cause remained unclear.
- Drawing on Antarctic field observations, Prof. Solomon found that under extremely low temperatures, polar stratospheric clouds (PSCs) formed as ice crystals in the stratosphere.
- Based on these findings, she proposed heterogeneous chemical reactions, in which reactions occurring between gases and solid ice crystals are accelerated by the increased reactive surface area provided by ice particles, creating conditions that release molecular chlorine and accelerate ozone depletion.

Empirical Evidence Providing the Scientific Foundation for the Montreal Protocol

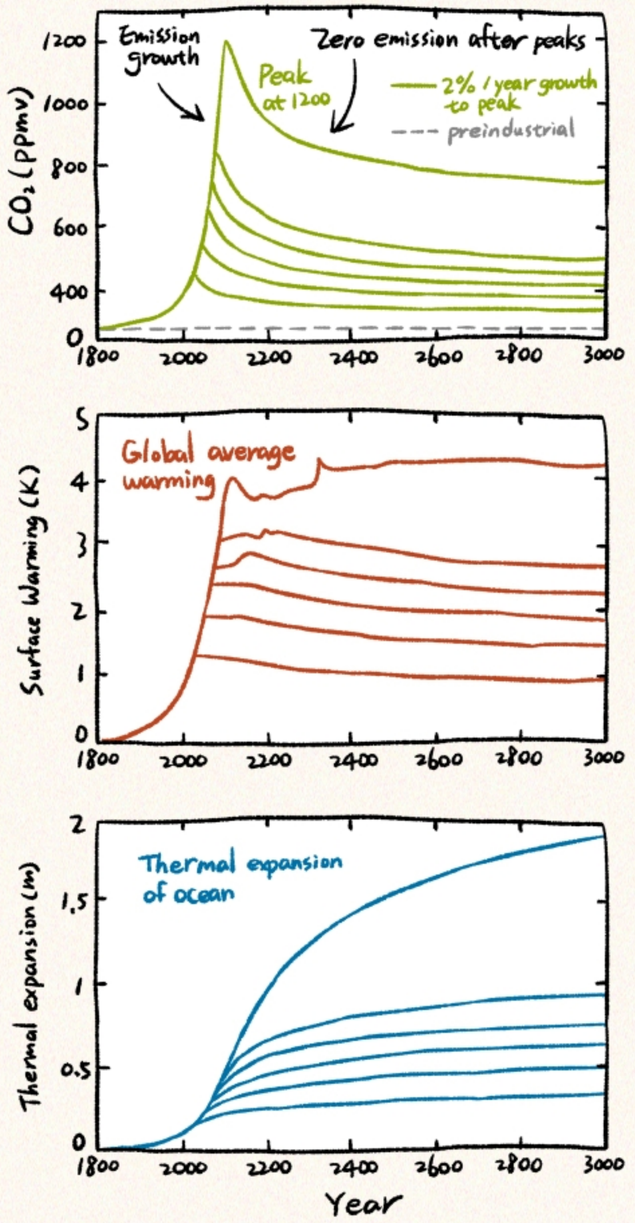
- Heterogeneous chemical reactions are the primary cause of the ozone hole — a discovery that became a cornerstone of the scientific evidence behind the Montreal Protocol on Substances that Deplete the Ozone Layer.
- The Protocol led to strict international regulation and phased reduction of the production of chlorofluorocarbons (CFCs) and related compounds.
- In 2016, Prof. Solomon and her MIT research team observed the first signs of recovery of the Antarctic ozone layer, marking an important milestone in sustainability science.



「NASA Ozone Watch」

Scientific Evidence of Global Warming and the Imperative for Climate Mitigation

- In 2009, Prof. Solomon clearly demonstrated the climate impacts of carbon dioxide emissions on surface temperature, precipitation, and sea level.
- Model simulations showed that even if anthropogenic CO_2 emissions were halted immediately, the resulting climate impacts would remain largely irreversible for more than 1,000 years.
- This work not only revealed the long-term environmental consequences of global warming, but also underscored the urgent need for immediate and sustained climate mitigation actions.



Leading the IPCC Assessment and Laying a Solid Foundation for Global Climate Negotiations

- From 2002 to 2008, Prof. Solomon co-led the Intergovernmental Panel on Climate Change (IPCC) Working Group I, overseeing the production of the IPCC's Fourth Assessment Report on the Physical Science Basis of Climate Change.
- She played a leading role in communicating key scientific findings to policymakers worldwide. Those findings became important scientific foundation for the language of the 2015 Paris Agreement.
- This Report established core messages which include: that warming of the climate system is unequivocal, and that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.
- This report not only led to the IPCC winning the 2007 Nobel Peace Prize, but is also recognized as one of the most influential international expert assessments in environmental science, driving worldwide recognition of climate change as a critical global issue.

IPCC
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WMO

UNEP

2007

Science-Based Leadership for Advancing Sustainable Development

- Researcher: Dedicated to polar and planetary system studies, with the rare honor of having Antarctic glaciers named after her.
- Outstanding Science Communicator: Delivered hundreds of lectures worldwide, integrating science and sustainability to raise public awareness
- Policy Influencer: Contributed to a landmark model of science–policy–international cooperation, and through her book Solvable: How We Healed the Earth, and How We Can Do It Again, offers a hopeful roadmap for addressing today's environmental challenges.