



Prof. Susan Solomon

Lee and Geraldine Martin Professor of Environmental Studies Environmental Studies, MIT



Most important awards, prizes and academies

Crafoord Prize, Royal Swedish Academy of Sciences (2018); Bakerian Prize, Royal Society, UK (2018); BBVA Frontiers of Knowledge Prize, BBVA Foundation, Spain (2013); Chevalier, Legion d'honneur, Republique de France (2010); Listed by Good Housekeeping Magazine as one of the 125 women who changed the world (2010); Member, US National Women's Hall of Fame (2009); Volvo Environment Prize, Sweden (2009) Grande Medaille, Academie des Sciences de France (2008); Listed by Time Magazine US as one of the 100 most influential people in the world in 2008; Lemaitre Prize, Foundation Georges Lemaitre, Brussels, Belgium (2007); Bowie Medal, American Geophysical Union (2007); Carl-Gustaf Rossby Award, American Meteorological Society (2000); Goldschmidt Award, Geochemical Society (2006); Fellow, Royal Society of Chemistry (2006); UNEP/ WMO Vienna Convention Award for outstanding contributions to the Vienna Convention for the Protection of the Ozone Layer (2005); Blue Planet Laureate, Asahi Glass Foundation, Tokyo, Japan (2004); U.S. National Medal of Science (2000); Solomon Glacier ($78^{\circ}23'S$, $162^{\circ}30'E$) and Solomon Saddle ($78^{\circ}23'S$, $162^{\circ}39'E$) were named in honor of leadership in Antarctic research (1994); Member, US National Academy of Science; Honorary Fellow, The Geological Society of London; Fellow, Royal Society of London; Fellow, American Philosophical

Society; Foreign Member, Academia Europaea; Associée Étranger (Foreign Associate), Académie des sciences de France; Fellow, American Geophysical Union; Fellow, American Meteorological Society; Fellow Royal Meteorological Society.

Summary of scientific research

Susan Solomon is well known for pioneering work that explained why there is a hole in the Antarctic ozone layer. She solved the mystery of the Antarctic ozone hole by elucidating the key chemical reaction that takes place on the surfaces of cold polar stratospheric clouds that are most prevalent in the Antarctic. In 1986 and 1987, Solomon led two expeditions during the Antarctic spring, and gathered the first data on atmospheric composition that pointed toward human production of chlorofluorocarbon chemicals as the primary cause. Science had already established that a lack of ozone led to an increase in the ultraviolet radiation reaching Earth, but it was Solomon who proved, in later research with colleague David W.J. Thompson, that these changes in stratospheric composition also impacted Antarctic surface climate. She later co-chaired the 2007 Intergovernmental Panel on Climate Change with Qin Dahe of China, which established that warming is unequivocal. Further, she played a leading role in showing how and why the global warming due to anthropogenic emissions of carbon dioxide is essentially irreversible for at least 1000 years. She also demonstrated for the first time the signs of healing of the Antarctic ozone hole, in response to chlorofluorocarbon production reductions worldwide. Her current research continues to focus on atmospheric chemistry and climate change.

Main publications

Over 225 peer-reviewed papers in atmospheric chemistry and climate change, authored one book, and co-authored two books. Solomon, S., Garcia, R.R., Rowland, F.S., Wuebbles, D.J., On the depletion of Antarctic ozone, *Nature*, 321 (6072) 755-758, 1986; Solomon, S., Mount, G.H., Sanders, R.W., Schmeltekopf, A.L., Visible spectroscopy at McMurdo Station, Antarctica, 2. Observation of OCIO, *Journal of Geophysical Research: Atmospheres*, 92 (D7) 8329-8338, 1987; Solomon, S., Mount, G.H., Sanders, R.W., Jakoubek, R.O., Schmeltekopf, A.L., Observation of the nighttime abundance of OCIO in the winter stratosphere above Thule, Greenland, *Science*, 242 (4878) 550-555, 1988; Solomon, S., Portmann, R.W., Garcia, R.R., Thomason, L.W., Poole, L.R., McCormick, M.P., The role of aerosol variations in anthropogenic ozone depletion at northern mid-latitudes, *Journal of Geophysical Research: Atmospheres*, 101 (D3) 6713-6727, 1996; Portmann, R. W., Solomon, S., Garcia, R.R., Thomason, L.W., Poole, L.R., McCormick, M.P., Role of aerosol variations in anthropogenic ozone depletion in polar regions, *Journal of Geophysical Research: Atmospheres*, 101 (D17) 22991-23006, 1996; Solomon, S., Borrmann, S., Garcia, R.R., Portmann, R., Thomason, L., Poole, L.R., Winker, D., McCormick, M.P., Heterogeneous chlorine chemistry in the tropopause region, *Journal of Geophysical Research: Atmospheres*, 102 (D17) 21411-21429, 1997; Thompson, D. W. J., Solomon, S., Interpretation of recent southern hemisphere climate change, *Science*, 296 (5569) 895-899, 2002; Solomon, S., Portmann, R.W., Thompson, D.W.J., Contrasts between Arctic and Antarctic ozone depletion, *Proceedings of the National Academy of*

Sciences, 104 (2) 445-449, 2007; Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2007; Solomon, S., Plattner, G.K., Knutti, R., Friedlingstein, P., Irreversible climate change due to carbon dioxide emissions, *Proceedings of the National Academy of Sciences*, 106 (6) 1704-1709, 2009; Solomon, S., Daniel, J.S., Sanford, T.J., Murphy, D.M., Plattner, G.K., Knutti, R., Friedlingstein, P., Persistence of climate changes due to a range of greenhouse gases, *Proceedings of the National Academy of Sciences*, 107 (43) 18354-18359, 2010; Solomon, S., Posenlof, K.H., Portmann, Daniel, J.S., Davis, S.M., Sanford, T.J., Plattner G.K., Contributions of stratospheric water vapor to decadal changes in the rate of global warming, *Science*, 327 (5970) 1219-1223, 2010; Solomon, S., Daniel, J.S., Neely, R.R., Vernier, J.P., Dutton, E.G., Thomason, L.W., The persistently variable "background" stratospheric aerosol layer and global climate change, *Science*, 333 (6044), 866-870, 2011; Matthews, H.D. Solomon, S., Irreversible Does Not Mean Unavoidable, *Science*, 340 (6131) 438-439, 2013; Peters, G., Andrew, R.M., Solomon, S., Friedlingstein, P., Measuring a fair and ambitious climate agreement using cumulative emissions, *Environmental Research Letters*, 10 (10) 105004, 2015; Solomon, S., Kinnison D., Garcia, R.R., Bandoro, J., Mills, Wilka, C., Neely R.R., Schmidt, A., Barnes J., Vernier, J.P., Hoepfner, M., Monsoon circulations and tropical heterogeneous chlorine chemistry in the stratosphere, *Geophysical Research Letters*, 43 (24) 12,624-12,633, 2016; Solomon, S., Ivy, D.J., Kinnison, D., Mills, M.J., Neely, R.R., Schmidt, A., Emergence of healing in the Antarctic ozone layer, *Science*, 353 (6296) 269-274, 2016; Lickley, M., Solomon, S., Fletcher, S., Velders, GJM., Daniel, J., Rigby, M., Montzka, S., Kuijpers, JM., Stone, K., Quantifying contributions of chlorofluorocarbon banks to emissions and impacts on the ozone layer and climate, *Nature Communications*, 11 (1) 1-11, 2020; Solomon, S., Alcamo, J., Ravishankara, AR., Unfinished business after five decades of ozone-layer science and policy, *Nature Communications*, 11 (1) 1-4, 2020.