Dr Stephen Lewis

I am Deputy Head of Department and a Senior Lecturer in the Department of Physical Sciences at the Open University.
I joined the OU in October 2005, having previously held a Lectureship in Atmospheric, Oceanic and Planetary Physics, Department of Physics, Oxford University, where I remain a Visiting Fellow. I am also a Fellow of the Royal Meteorological Society.

My first degree was in Natural Sciences from the University of Cambridge and my doctorate was from the University of Oxford, researching vortices in the atmosphere of Jupiter, such as the Great Red Spot.

Research interests
My research interests lie in understanding planetary atmospheres and in the use of that knowledge to aid in the design of spacecraft missions and to interpret the data that is returned. This involves comparative modelling studies of dynamical meteorology and climate processes on different planets.

A unique aspect of this work is the assimilation of spacecraft observations of the atmospheres of other planets, a process that combines information from incomplete observations with physical understanding captured by models. This produces a best estimate of the atmospheric state as it evolves with time and helps to identify possible gaps in the models. Primarily I have applied this technique to data from a succession of spacecraft sent to study Mars.

I am Co-Principle Investigator for AMELIA entry, descent and landing science on ESA ExoMars 2016 Schiaparelli and Co-Investigator on NOMAD aboard ESA ExoMars Trace Gas Orbiter and on Mars Climate Sounder aboard NASA Mars Reconnaissance Orbiter. My work has included making forecasts for the NASA Mars Curiosity landing in 2012. I am a lead developer of the ESA Mars Climate Database.

Although my research focuses mainly on the atmosphere of Mars at present, I have developed and supervised projects that used a Venus atmosphere model, which is able to reproduce the striking atmospheric super-rotation seen in the cloud decks: the atmosphere of Venus rotates up to sixty times faster than its solid surface.

My doctoral research was an idealized modelling study of vortices on Jupiter, a Giant Planet, and I have a continued interest in both numerical modelling and laboratory fluid dynamics studies of the processes that lead to the formation of atmospheric zonal jets and vortices within them. This has included simulations of giant extra-solar planets, including those close to their parent stars, known as ‘hot jupiters’.

I have also worked on problems involving the Earth's paleoclimate and climate change in the deep past, such as attempts to model neoproterozoic (from around 750 million years BP) frozen ‘Snowball Earth’ states in a coupled atmosphere-ocean climate model.

Teaching interests
Since joining the Open University I have written, taught and chaired science modules at all levels of the curriculum. I have worked as a tutor at residential schools at all three levels and helped to develop materials for the online module *Practical Science*. Most modules I have worked on have been in the area of physics and astronomy, from *Understanding the Weather* to *Electromagnetism*, but I have recently worked on the main level 1 *Exploring Science* module and the level 2 *Environmental Science* module.

I have supervised about twenty postgraduate students on a variety of projects at the OU and Oxford.

Impact and engagement
Results from my work have been used by both ESA and NASA in planning space missions. My work for ESA involves working with a variety of industrial users who need access to the data that I provide. I also work on an EU project with a large component of public engagement.

I enjoy science outreach and have acted as nominated academic consultant on OU BBC series, including 'Wild Weather' on BBC1.