NEWS FROM:

Communication and Marketing Department
Isebe loThungelwano neNtengiso
Kommunikasie en Bemarkingsdepartement

Private Bag X3, Rondebosch 7701, South Africa
La Grotto House, Glendarrach Rd, Rondebosch, Cape Town
Tel: +27 (0) 21 650-3733/2, Fax: +27 (0) 21 650-5682
Internet: www.uct.ac.za

13 December 2011

Dust's effects on climate: UCT researchers dig up the dirt

Particles floating in the atmosphere (known as aerosols) cause the seasonal average surface temperature in southern Africa to fall by as much as 2°C during the austral winter season, resulting in changes in the surface energy balance and dynamics of the lower troposphere, according to research by Fiona Tummon, who is receiving her PhD in Environmental & Geographical Science at the University of Cape Town this week.

In one of the first studies of its kind over the region, Tummon's PhD thesis, *Direct and semi-direct aerosol effects on the southern African regional climate during the austral winter season,* applies a regional modeling approach and concludes that the atmospheric aerosol burden over southern Africa largely affects only the tropical regions of the subcontinent, where aerosol loading is highest. Her study focuses on the austral winter season, when biomass burning and mineral dust emissions are at the maximum over the subcontinent.

Mineral dust – mostly coming off bare ground – makes up about half of the aerosols in the atmosphere. It can either cool the Earth, by deflecting the sun's radiation, or warm the planet by absorbing radiation, depending on the dust's composition. The largest sources of mineral dust in the world can be found in desert areas in China and North Africa. The collection of aerosols (including dust) floating across the Atlantic Ocean off the Sahara Desert is said to be one of the largest sources of nutrients for the Amazon Basin in South America.

Tummen's results show that in combination with surface cooling, the absorbing nature of the predominating biomass burning aerosol results in warming of the atmosphere at altitude. Over much of southern Africa this is shown to result in stabilisation of the regional atmosphere, but in the tropical areas, between 5° north and 5° south, this additional warming enhances convection and increases precipitation by as much as 50 percent.

Tummon has BSc and BSc (Hons) degrees from UCT, where she has been studying since 2004. She carried out her PhD jointly between the Climate Systems Analysis

Group at UCT and the Laboratory of Aerology in Toulouse, France. Her supervisor at UCT is Dr Mark Tadross.

Exploring dust factories and climate change

In a similar study conducted for a master's degree at UCT in 2010, Kathryn Vickery identified for the first time some of the largest points of origin of dust on the African sub-continent, as well as some of the environmental and climatological roles dust can play.

Vickery's master's thesis was named the best for 2010 by the Southern African Association of Geomorphologists. She also won a prestigious Commonwealth Scholarship, which she has applied towards her current doctoral studies on the same subject at UCT and Sheffield University in the UK.

Working off about 5 000 images of various resolutions obtained off Meteosat and Moderate-Resolution Imaging Spectroradiometer satellites, she looked at what aerosols are blowing off Southern Africa, their make-up, where they are heading and their speed of travel. She paid particular attention to salty aerosols coming off the Makgadikgadi Pan in Botswana, one of the largest salt flats in the world, and the Etosha Pan in Namibia. As part of her doctoral work she joined a team of researchers from UCT, Oxford, Sheffield, Imperial and the UK Meteorological Office on a data collection field trip in the Makgadikgadi Pan earlier this year.

Vickery explored the links of dust sources with regional weather patterns. Her supervisor, Dr Frank Eckardt in the Department of Environmental and Geographical Science at UCT, said the part played by these "dust factories" in climate cannot be underestimated. "Southern Africa has hundreds of these pans, from a few square kilometres in size to thousands of square kilometers," he said. "Each of which has the potential to produce tons of dust. We're interested in how and when these factories switch on and off their production of dust."

Eckardt pointed out that climate change in this sense does not necessarily mean global warming; the process of dust creation and transportation has taken place since the beginning of the world. The way dust factories switch on and off have largely to do with wind and surface moisture at the dust source. Scientists expect that "extreme events" – such as potentially stronger winds around dust pans – will go hand in hand with climate change, potentially causing shifts in dust production and transport.

Professor Bruce Hewitson, who holds the national chair in climate change at UCT, said: "The more direct impact of the dust is not so much the land-surface change, but how it feeds back into the local climate dynamics; how it changes the rainfall patterns and how it changes the energy of the region."

ENDS

Please note: Information in this release is based on the supervisor's citation for the PhD thesis. UCT advises journalists to obtain a copy of the thesis and/or interview the PhD graduate to verify and expand on this information.

Issued by: UCT Communication and Marketing Department

Patricia Lucas

Tel: (021) 650 5428 Fax (021) 650 5628
Cell: 076 292 8047
E-mail: pat.lucas@uct.ac.za
University of Cape Town
Rondebosch
Website: www.uct.ac.za