NMED-LANL partner on research for next generation greenhouse gas monitoring technologies at Four Corners NM

Air-quality in Four-corners NM region, home to two large power plants, a mid size city and thousands of oil and gas wells, is monitored routinely by the NMED and EPA to ensure state and federal standards are being met. Typically monitoring is done at a handful of stations dispersed in the region that sniff the air *in situ* and measure ozone, nitrogen oxides, ozone, particulates and toxins like mercury using commercial and certified sensors. The few point measurements are assumed to reflect the average pollution of the entire region. In 2010 EPA was also charged with accounting for greenhouse gases like carbon dioxide and methane that are implicated in climate change by global warming and ocean acidification. However, a network to monitor greenhouse gases does not exist and we rely on emissions reported by the industry. A team of LANL scientists, led by Dr. Manvendra Dubey, is developing new techniques that measure both criteria pollutants like nitrogen oxides and carbon monoxide and also all greenhouse gases like carbon dioxide, methane and nitrous oxide. The LANL instrument, a sun-tracking spectrometer, stares and tracks the sun and measures its spectrum at high resolution. This net solar absorption spectrum contains information on the chemical composition of the atmosphere that is determined by fitting spectra of individual gases or pollutants. The advantage of this is that one instrument measures all the gases in the atmosphere at the same time. Furthermore, the footprint of the remote measurement is 100 km so it observes the entire region. In addition, the LANL spectrometer will also be used to ground truth satellites that are measuring greenhouse gases from space over the region. The LANL solar spectrometer is being deployed by LANL at the San Juan sub station as the first prototype to monitor emissions from a power plant and urban region. The goal is to obtain measurements of criteria pollutants and greenhouse gases and to apportion them to separate sources such as individual power plants, traffic and oil and gas wells. This is a synergic collaboration between NMED and LANL to perform research that will modernize and expand monitoring, with Four Corners NM being at the forefront. The NMED-LANL team is working together to get the site prepared and have just finished a survey to ensure that the endangered Mesa Verde cactus is protected. The LANL spectrometer should be deployed this summer and will enrich NMED's ongoing air quality monitoring in the region. LANL and NMED staff are working synergistically to learn about the environment in this region. The lessons learned in Four Corners will guide the development of next generation criteria pollution and greenhouse gas monitoring. The baselines we measure may be able to help monitor the effectiveness of regulations to protect our health. Also, the project may help guide future policies to curtail greenhouse gases to reduce risks of climate change.

Manvendra Dubey, Dubey@lanl.gov