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The biogenic emission of nitric oxide from three ecosystems in the Namib Desert: a laboratory study

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Nitric oxide (NO) is an important compound in a number of environmental processes, such as controlling the concentrations of ozone and the hydroxyl radical in the troposphere, and in the production of nitric acid, an important component of acid precipitation. The total emissions of NO are thought to have more than tripled during the Anthropocene. While most of this increase is due to anthropogenic activity, the biogenic production of NO is known to be an important source of this gas, accounting for between 10% and 20% of the global total. In spite of the recognised importance of biogenic emission of NO from soil, and the vast extent of arid and semi-arid regions, very few studies from arid and semi-arid regions have been conducted. Here we present the results of a laboratory based study on the potential NO flux from three ecosystems in the Namib Desert. Nitric oxide release and uptake measurements were conducted at 15˚C, 25˚C and 35˚C on soils obtained in 2006 from three ecosystems in the Namib Desert. These ecosystems included; *Dune*, *Gravel Plains* and the *Riparian* zone of the ephemeral Kuiseb River. In the *Dune* and *Riparian* ecosystems, samples were separated into "under *vegetation* canopy" and "*bare soil*" to determine the effects of vegetation on the NO flux. The effect of the soil moisture content and the soil temperature on the NO flux was determined, showing (a) that the peak NO flux occurred at low soil moisture contents (below 10% water filled pore space), and (b) that the optimal temperature for the production of NO is closer to 25˚C than to either of the other temperatures. At 25˚C the maximum NO flux from these ecosystems ranged between 1.0ng.m^{-2}.s^{-1} and 5.2ng.m^{-2}.s^{-1} which is within the range of previously

published measurements in arid and semi-arid regions. Differences between the three ecosystems occurred, with the highest fluxes being obtained from the *Gravel Plain* systems. Vegetation did not have a marked effect on the NO flux. This presentation will discuss the differences in NO flux on the ecosystem and vegetation patch scale and will consider the prospects for up-scaling these results to a greater geographical extent.