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GRIPS - The Geostationary Remote Infrared Pollution Sounder

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Climate change and air quality are the most pressing environmental issues of the 21st century for America and for the world as a whole. Despite decades of research, the sources and sinks of key greenhouse gases and other pollutants remain highly uncertain making atmospheric composition predictions difficult. The Geostationary Remote Infrared Pollution Sounder (GRIPS) will measure carbon dioxide (CO_2), carbon monoxide (CO), and methane (CH4). By using measurements of nitrous oxide (N2O) and the O_2 A-band to help correct for clouds and aerosols, GRIPS will achieve unprecedented precision. Together these gases account for about 85% of all climate forcing and they impact atmospheric ozone (O_3). GRIPS, employing gas-filter correlation radiometry, uses the target gases themselves in place of dispersive elements to achieve outstanding throughput, sensitivity, and specificity. Because it uses a combination of reflected and thermal IR, GRIPS will detect trace gas concentrations right down to the Earth's surface. When flown in parallel to a UV/VIS sensor such as GEMS on GEO-KOMPSAT-2B over East Asia or the Sentinel 4 on MTG over Europe/Africa, the combination offers powerful finger-printing capabilities to distinguish and quantify diverse pollution sources such as electricity generation, biomass burning, and motor vehicles. From geostationary orbit, GRIPS will be able to focus on important targets to quantify sources, net flux, diurnal cycles, and long-range transport of these key components in the Earth's radiative balance and air quality.