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Long Term Monitoring of Greenhouse Gases at NOAA - a Forty Year Record

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NOAA's Earth System Research Laboratory and its precursor organizations have been monitoring trends and distributions of greenhouse gases and other climatically relevant constituents in the atmosphere for over 40 years (http://www.esrl.noaa.gov/gmd). The focus of these measurements has been to obtain reliable records of global trends and distributions, but the experimental design and use of these measurements have advanced over time with evolving scientific questions. In earlier days, measurements and data products were global in nature (e.g., Annual Greenhouse Gas Index, http://www.esrl.noaa.gov/gmd/aggi). Later, they addressed intra-hemispheric properties, continental contributions, and eventually regional sources and sinks (e.g., http://CarbonTracker.noaa.gov). Today, and into this century, scientific questions continue to progress and the observation systems will need to progress accordingly. Critical questions likely will center on greenhouse gas emission reduction efforts, ecosystem feedbacks, and climate surprises. Regional information will become increasingly important for supporting greenhouse gas emission reduction efforts, and this information must be accurate, precise, and without bias. With emerging diverse, regionalized efforts to monitor greenhouse gases, comparability of measurements and measurement systems becomes more important than ever. NOAA, with its long-standing networks and its role as the WMO Central Calibration Laboratory for the major greenhouse gases, is well positioned to provide the linkages necessary to assure that regional measurements are comparable. Policy-makers, businesses, and regulatory organizations will need the best information available for decision-making. This presentation will identify major, climate-relevant findings that have come from NOAA's networks and those of others over the past several decades and will address the long-term monitoring needs to support decision-making over the next decades as society begins to seriously address climate change.