Keynote Address - Keeping Up the Standards: Building and Maintaining a Global Atmospheric Measurement Network

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The challenges and the rewards of building and maintaining a global observational network at the highest observational standards can be considerable. The example I know best is the Advanced Global Atmospheric Gases Experiment (AGAGE), which operates a network of field stations around the globe that measures, at high frequency and over long time periods, more than 50 gases of importance to climate forcing and/or stratospheric ozone depletion research. Doing the AGAGE job properly has required designing, building and deploying custom instrumentation: a multi-detector gas chromatograph with whole air injection, and the *Medusa* gas chromatograph-mass spectrometer with cryogenic pre-concentration. And as long-term observations continue, there is also a need to adapt to new technologies and changing scientific priorities. In AGAGE the emphasis is on adapting new optical and mass-spectrometric techniques to automated field measurements of trace gas abundances and isotopic compositions, and on commercializing such applications so that scientists can spend their time doing science. Similarly, in AGAGE instrument operation and diagnostics, data acquisition, data processing, and data quality control have all required custom software for automated monitoring applications that has become commercially available to other projects. AGAGE also maintains independent primary calibration scales that are propagated to the global network. While AGAGE operates independently, it also works cooperatively with the NOAA global network of atmospheric observations and with other monitoring programs around the world, thus helping to insure the robustness of these important measurements. Following the COP-21 Paris Agreement and its "pledge and review" approach to emissions reductions there will be an increased need for the regional high frequency measurements required for "top-down" regional emissions verification by inverse modeling.

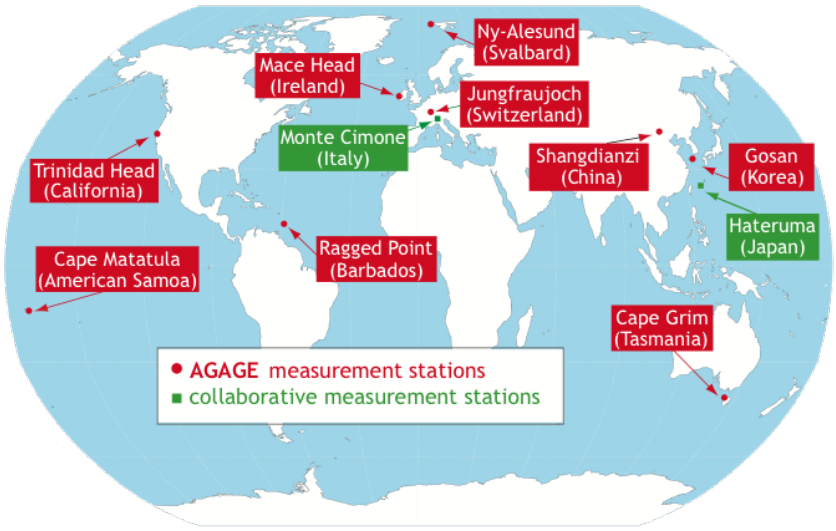

Figure 1. Locations of AGAGE and collaborating measurement stations.