NDACC 2025 Symposium Sessions

The NDACC 2025 Symposium will celebrate nearly 35 years of NDSC/NDACC science and explore and discuss NDACC future priorities. The Symposium is organized along the NDACC Objectives (www.ndacc.org > ABOUT tab) offering 6 sessions. We welcome presentations from NDACC scientists and partners, and from the larger science community. We invite contributions from stakeholders interested in NDACC-related issues, for establishing relationships with NDACC or deepening existing collaborations. We especially welcome presentations on NDACC achievements, successes and challenges from the last 35 years, the development of new instruments and techniques, and the discussion of emerging science topics.

Session 1: Creating and improving long-term data: Instrumentation, processing and providing past, present and future data-streams

Conveners: James Hannigan - National Center for Atmospheric Research, ACOM
Wolfgang Steinbrecht - German Weather Service, Observatory Hohenpeissenberg

One of the original NDACC/NDSC Objectives is to establish long-term atmospheric databases. This session invites talks on instrumentation, processing, and calibration that improve long term observational data. This includes opportunities for new instruments and processing and augmenting records by reprocessing past data.

Session 2: Validating atmospheric measurements from satellites and from other platforms

Conveners: Jean-Christopher Lambert - Royal Belgian Institute for Space Aeronomy (BIRA-IASB)
Eliane Maillard Barras - MeteoSwiss, Federal Office for Meteorology and Climatology

Providing independent reference measurements for the validation of atmospheric composition data is one of the founding NDACC/NDSC Objectives. This session invites contributions on the validation of satellite, air-borne and ground-based measurements, ranging from methodologies to new needs.

Session 3: NDACC synergistic environment in support of field campaigns and other chemistry and climate-observing networks

Conveners: Elizabeth Asher - CIRES & NOAA Global Monitoring Laboratory
Thierry Leblanc - Jet Propulsion Laboratory, California Institute of Technology

The NDACC Objective which promotes collaboration between observing networks and promotion of network data product development is necessary to leverage the benefit from such networks. This session invites works resulting from the collaborative efforts between researchers within and outside NDACC which utilize campaign or network data from NDACC and other networks.

Session 4: Synergistic use of models with NDACC and its Cooperating Networks' data to interpret observations and support model development and verification

Conveners: Martine De Mazière - Royal Belgian Institute for Space Aeronomy (BIRA-IASB)
Sarah A. Strode - Morgan State University & NASA GSFC

This session solicits presentations demonstrating the use of long-term data series from NDACC and/or its Cooperating Networks for supporting model development and verification, the use of models for interpreting observed variability and trends or the use of models in conjunction with observational data to support source attribution.

Session 5: Linking changes in atmospheric composition, climate, and air quality

Conveners: Roeland Van Malderen - Royal Meteorological Institute of Belgium (KMI-IRM)
Bärbel Vogel - Research Centre Jülich (FZJ), Institute of Climate and Energy Systems

Linking changes in atmospheric composition, climate, and air quality is an important challenge for understanding climate change as a prerequisite for finding mitigation and prevention strategies. This session invites talks on observing composition change as well as linking it to climate change and air quality. This includes climate and process simulations and studies of climate interventions.

Session 6: Oases in the desert: Measurements that address the impending gaps in atmospheric data

Conveners: Gerald E. Nedoluha - Naval Research Laboratory, Remote Sensing Division
Henry Selkirk - NASA Headquarters, Earth Science Division

We invite contributions from measurement systems that will provide critical data sets to fill the current and future gaps in satellite observations. Of particular interest are established data sets that will provide transition standards to future planned global satellite measurements.

Detailed Descriptions:

Session 1: Creating and improving long-term data: Instrumentation, processing and providing past, present and future data-streams

Establishing long-term databases has been an NDACC/NDSC Objective since its beginnings. Initiated while springtime Antarctic Ozone losses were actively being investigated and the EOS satellite era was yet to begin, the initial focus of the NDSC was stratospheric processes with remote sensing instrumentation. Bringing together individual investigators worldwide, working groups were instituted based on each instrumentation type. These early groups of experts' primary task was to consolidate and develop best practices, improve instrumentation and algorithms that were then implemented at all stations to produce global homogeneous datasets. NDACC widened its focus to the whole atmosphere, but these working groups and related measurements were maintained and still form the core of NDACC. We currently face new challenges to increase geographical representativeness, to be mobile and to be increasingly cost-effective.

This session invites presentations on instrumentation, procedures and algorithms that maintain, improve or augment NDACC datasets. This may include new instrumentation pushing the state of the art in ground based remote sensing, instruments appropriate for mobile and short term campaign support or non-expert moderate cost instruments for wider deployment scenarios. We invite talks on novel reprocessing of early observational data, multi-instrument retrieval methods, new calibration procedures or innovative data processing, new or automated methods for improved quality control and operational data-flows that can streamline or improve NDACC data-sets.

Session 2: Validating atmospheric measurements from satellites and from other platforms

Providing independent reference measurements and scientific support for the validation of atmospheric composition data from satellites and from other platforms has been an NDACC/NDSC Objective since inception of the network. A platform refers here to a specific setup such as a stationary or mobile ground-, balloon- or aircraft-based instrument operated routinely or during a specific campaign.

NDACC data provide a traceable reference for the comprehensive validation activities required to evaluate uncertainties and characterize properties of other atmospheric data, and in the longer term to assure that any observed variation can be tied unambiguously to the evolution of atmospheric composition, air quality or climate. NDACC provides a global transfer standard critical in ensuring that measurements from different satellites and other platforms are interoperable and can be combined together to generate multi-instrument/multi-platform data sets. To meet the required level of quality and fitness for validation purposes, NDACC adheres to the principles of Fiducial Reference Measurement (FRM) and the Quality Assurance framework for Earth Observation (QA4EO) developed by the space agencies.

This session welcomes presentations on studies of atmospheric composition data from satellites and from other platforms using NDACC data as a reference, on in-depth and longer term validation of satellite missions and of new ground-based instruments, on validation methodologies, on development and testing of retrieval algorithms, on generation of multi-instrument/multi-platform data sets, and on tailoring NDACC data to the highest levels of FRM maturity. Identification of new validation needs and of challenges to NDACC to improve response to these needs will be particularly appreciated.

Session 3: NDACC synergistic environment in support of field campaigns and other chemistry and climate-observing networks

NDACC advances its mission through long-term high-quality ground-based and remote sensing measurements from globally distributed sites. Ground-based networks, such as NDACC, and field campaigns improve our understanding of atmospheric composition change at local, regional, and continental scales. Collaboration between observing networks and promotion of network data product developments is necessary to leverage the benefit from such networks.

Networks, including NDACC, together with field campaigns serve an important role within the research community, providing a baseline of data to support modeling and satellite-based process studies. This session invites works resulting from the collaborative efforts between researchers within and outside NDACC which utilize field campaign data and/or network data from NDACC and other networks with the objective to:

(1) address specific questions in atmospheric composition change;
(2) strengthen data quality of ground-based and satellite products using instrument intercomparisons and data homogenization;
(3) highlight or promote cross-network and -discipline engagement;
(4) develop and validate new retrieval algorithms, technologies, and sensors for long-term monitoring applications.

We welcome field remote sensing and network-oriented synergistic studies that examine both the scientific and operational aspects of field campaigns and networks. Contributions sharing researchers' experience to establish, manage and maintain sustainable networks are also welcome.

Session 4: Synergistic use of models with NDACC and its Cooperating Networks' data to interpret observations and support model development and verification

NDACC provides observations of multiple constituents relevant to atmospheric chemistry and chemical transport modelling. The long-term records, global distribution, and vertical extent of NDACC data make it a valuable resource for evaluating long-term trends and variability in atmospheric models. One of the original NDACC/NDSC Objectives is to "Provide validation and development support for atmospheric models". At the same time, models provide valuable insights into the drivers of the distributions and trends in atmospheric constituents seen in NDACC and other data. Models can also provide a tool to assess the representativeness of station data and to synthesize results from different instruments or observing platforms.

In this session, we solicit presentations demonstrating why and how reference data from NDACC and/or its Cooperating Networks are used

(1) for developing and improving atmospheric chemistry-transport or climate models, or
(2) in conjunction with atmospheric model simulations for confirming the model results
(3) as independent reference data for validating atmospheric data assimilation analyses
(4) for supporting the development of Earth System models and Digital twins of the Earth.

We also solicit presentations demonstrating how models can be used to interpret trends, variability, or other features seen in NDACC data, or to support network design or source attribution.

Session 5: Linking changes in atmospheric composition, climate, and air quality

As human activities continue to alter the composition of Earth's atmosphere, these changes drive significant shifts in climate, with e.g. more extreme weather events such as heat waves and drought, and directly impact air quality, both having profound implications for ecosystems and human health. Changes in the composition of the atmosphere, in particular in the upper troposphere and stratosphere also have an impact on large-scale circulation patterns of the atmosphere (including the Brewer-Dobson circulation) and on surface climate by changing its radiative balance. Climate change also exacerbates air quality issues by e.g. creating more favorable conditions to the formation of harmful pollutants.

NDACC aims to contribute to a better understanding of the linkages between atmospheric composition changes, changes in atmospheric dynamics and transport, and the evolution of air quality and climate. To this end, NDACC is also engaged in international environmental assessments (e.g., WMO/UNEP Scientific Assessments of Ozone Depletion, IPCC, TOAR) and in global research initiatives (e.g., APARC, GEWEX, CEOS). In this session, we welcome submissions from observational and modelling studies that investigate the interplay between changes in atmospheric composition, air quality and climate. Possible examples include, but are not limited to:

(1) studies analyzing changes in atmospheric composition (e.g. ozone, water vapor, aerosol and its gas-phase precursors as well as ozone depleting substances)
(2) inferring changes in air quality, e.g. from national air quality networks
(3) simulations of climate change including climate interventions
(4) analyzing feedback of climate change on the radiative balance of the atmosphere and on atmospheric dynamics
(5) studies investigating environmental impacts of climate and atmospheric composition change

Session 6: Oases in the desert: Measurements that address the impending gaps in atmospheric data

The ACE-FTS and MLS satellite instruments have played a key role in advancing our understanding of stratospheric composition and the effect of human activities on the ozone layer. MLS measurements will cease no later than mid-2026, and ACE-FTS is already 18 years beyond its design lifetime. Loss of these systems will create a deep gap in essential observations of stratospheric water vapor, chlorine species, and tracers of transport.

In the impending period of data loss for stratospheric composition, presently available observations representing space- and ground-based vantage points will not be able to provide the daily global coverage that had formerly been provided by MLS. Ground-based and suborbital reference observations will be critical to providing transition standards to future satellite measurements of stratospheric composition. And it is fortunate in this moment that with the aid of the more than 20 years of Aura MLS measurements, we have greatly improved our understanding of the extent to which a limited number of ground-based local measurements from networks such as NDACC represent regional and global-scale atmospheric variations.

We invite contributions to this session that address how ground-based and suborbital measurements, along with observations from SAGE-III/ISS and other space-based instruments, can help to address the impending stratospheric data deficiency and be well positioned for future potential data gaps. We also welcome studies exploring how the global coverage of ground-based measurements sites should be expanded to sparsely covered regions, Asia, Africa and South America in particular, to fill the gaps in satellite observations.