**Synthesis and Major Findings of the NASA Atmospheric Tomography Mission (ATom)**

*ATom Science Team Meeting*

*Nov 18 – 20, 2019, Center Green, Boulder, CO (2.5 Days)*

*Members of the ATom Science Team and the public can request to register via email to Erin Czech (*[*erin.czech@nasa.gov*](mailto:erin.czech@nasa.gov)*). The meeting is open to registered attendees up to capacity limits for the venue. All registered attendees will be approved by ATom management.*

The goal of the upcoming Science Team meeting is to address "Why ATom", to enunciate the major findings of ATom, the science questions answered or newly identified. For example,

* What are the major new scientific findings from ATom?
* What long-standing science questions did ATom help answer?
* What new questions did ATom identify for subsequent investigations?
* In what ways was ATom unique in addressing/uncovering these questions?
* How has ATom advanced previous knowledge, esp. from aircraft missions?
* How could ATom be changed to address key remaining uncertainties?
* To whom are these new ATom results important?

**Day 1**

**0845 Welcome and logistics – Erin Czech**

**Session 1 0900 – 1115**

**Opening the Box and Looking Inside**

Views of ATom from the Leadership team:

Assessment of the mission, framing the challenges, examples of major findings

20 minute talks, 5 minutes for discussion

* Michael J. Prather
* Thomas Hanisco
* Paul A. Newman
* Paul Wennberg
* Steven C. Wofsy
* General discussion, focus on the next steps (20 min)

**First Poster Session and Lunch 1115 – 1300**

*The following afternoon and the next day will be devoted to 5 major theme sessions. There are also two poster sessions that are integral to the success of the meeting by bringing forward new studies, planned investigations, data system information, etc. We strongly encourage individual and group posters.*

Each Major Session is themed by a large-scale topic and should be organized to address these four questions:

* What **questions** in this theme did ATom answer and what new questions did ATom discover for future investigations?
* **What did ATom do** to address or uncover these questions?
* What were the **major findings/results**?
* Why are these ATom results **important**?

The session is organized by the designated Chair, who in most cases will be the Keynote Speaker, but may assign to another investigator. *Sessions consist of shorter AGU-style contributed talks, preceded or followed by a longer invited keynote presentation to provide a synthesis/identify gaps/suggest further work, followed by full team discussion*. *The products of each session are (1) a short summary document and (2) a slide deck for ATom science team members to use as they bring ATom results out into the world*.

Session schedule

**1300 – 1500**

**Major Theme 1. Global oxidation and ocean exchange** How do ATom measurements constrain global oxidation rates? What new insights have we gained? What remains to be investigated (ideas for continued analysis)? Chair: **Glenn Wolfe**

1300 Glenn Wolfe - Major Theme 1: Opening Thoughts

1305 David Miller, “Exploring oxidation in the remote free troposphere”

1320 Colleen Baublitz, “Developing observable proxies to infer spatiotemporal variability of the hydroxyl radical”

1335 William Brune, “Missing OH Reactivity in the Marine Boundary Layer”

1350 Siyuan Wang, “Global budget of acetone examined using CAM-chem and GEOS-chem: importance of air-sea exchange and the implication for HOx radicals”

1405 Jared Brewer, “An Oceanic Source of Methyl Ethyl Ketone to the Atmosphere”

1420 Andrew Rollins, “SO2 measurement and model comparisons from ATom-4”

1435 Patrick Veres, “In-situ observations reveal the importance of dimethyl sulfide autoxidation in the marine atmosphere”

1450 Discussion

**1500 – 1530 Coffee Break**

**1530 – 1730**

**Major theme 2. NOx and related "radical reservoir" species, sources and sinks**: Are ATom measurements consistent with each other, and with models? Do ATom measurements of NOx constrain the radical chemistry, the reservoir sources and sinks? If not, what would be required to bridge those gaps? Chairs: **Paul Wennberg, Jeff Peischl**

1530 Paul Wennberg and Jeff Peischl – Opening remarks

1545 Emily Fischer, “Evaluation of the new Cross-track Infrared Sounder (CrIS) peroxyacetyl nitrate (PAN) product with ATom Data”

1600 Julie Nicely, “A Box Model Investigation of the Tropospheric NOx Budget”

1615 Chelsea Thompson, “Oxidized Reactive Nitrogen Species During ATom-1 through-4”

1630 Lee Murray, “Evaluation of the reactive nitrogen budget in the Chemistry-Climate Modeling Initiative (CCMI) ensemble versus ATom observations”

1645 Theodore Koenig, “First Quantitative Detection of Iodine in the Stratosphere”

1700 Andy Neuman, “Reactive Halogens measured during ATom”

1715 Discussion

**Day 2**

**0830 – 1030**

**Major Theme 3. Global distributions of hydrocarbons, the well-mixed trace gases, and the tracers of pollution:** What did we learn about emissions from major source regions, their effects on the chemistry of the remote atmosphere, the transport processes that control dispersion to the far ends of the atmosphere, and global biogeochemical cycles? Chair: **Kathryn McKain**

0830 Eric Apel, “Remote global distributions of anthropogenic and biogenic volatile organic compounds”

0845 Xin Chen, “HCOOH in the Remote Atmosphere during ATom-3 and 4”

0900 Ilann Bourgeois, “Global impacts of biomass burning on ozone in the remote troposphere”

0915 Lei Hu, “Investigating CFC-11 emissions and their changes using ATom and HIPPO global atmosphere sampling surveys”

0930 Roisin Commane, “What is the impact of sub-Saharan African biomass burning and anthropogenic emissions on the Atlantic remote troposphere?”

0945 Britt Stephens, “O2:CO2 ratios of the African tropical Atlantic Plume”

1000 Eric Morgan, “Vertical and Interhemispheric Gradients of the Ar/N2 Ratio in the Troposphere on ATom1-4”

1015 Kathryn McKain, “Upstream surface influences on atmospheric CO2 distributions over the Southern Ocean”

**1030 – 1100 Coffee Break**

**1100 – 1230**

**Major theme 4. Aerosol Properties, Distributions, and Processes.** What have we learned about new particle formation, aerosol acidity; atmospheric lifetime and removal mechanisms – what have models been able to replicate? Chair: **Charles** **Brock, Gregory Schill**

1100 Gregory Schill, “Aerosol Overview and Synthesis of Published Works”

1115 Rodney Weber, “A Global Survey of Brown Carbon”

1130 Kara Lamb, “Global-scale constraints on light-absorbing anthropogenic combustion iron oxide aerosols”

1145 Maximillian Dollner, “Anthropogenic influence on cirrus clouds during ATom”

1200 Daniel Murphy, “Size-resolved particle composition in the stratosphere”

1215 Christina Williamson, “New Particle Formation in the Free Troposphere”

**1230 – 1330 Lunch**

**Major theme 4 continued**

1330 Pedro Campuzano-Jost, “Quantifying the rate of chemical removal of Organic Aerosol in the remote FT: Implications for global OA modeling”

1345 Karl Froyd, “A new narrative for mineral dust aerosol and its role in ice cloud formation from ATom measurements combined with global and process-level modeling”

1400 Benjamin Nault, “Global Survey of Aerosol Acidity from Polluted to Remote Locations: Measurements and Comparisons with Global Models”

1415 Hongyu Guo, “Evaluating the Consistency of Submicron Aerosol Volume from Chemical and Optical Instruments during the Atmospheric Tomography (ATom) Mission”

**1430 – 1600 Coffee and Second Poster Session**

**1600 – 1830**

**Major Theme 5. Global model—measurement synthesis:** How do ATom measurements constrain global models? Do ATom measurement provide a climatology of reactive and trace-gas chemistry over the remote ocean basins? Where and how have ATom measurements identified/improved model weaknesses, have we developed MIP criteria for model evaluation? What problems and opportunities for existing and new remote sensing observations emerge from ATom? Chair: **Sarah Strode**

1600 Sarah Strode, “Global Modeling Overview”

1615 Samuel Hall, “Photolysis frequencies in the 2017Antarctic ozone hole”

1630 Eric Ray, “Back Trajectory Influences for ATom”

1645 Clara Orbe, “Observations of the Age of Air from the Northern Hemisphere Midlatitude Surface: New Estimates from the NASA Atmospheric Tomography Mission (ATom)”

1700 Hao Guo, “Seasonal variations for chemical reactivity in remote troposphere from ATom 1 to 4”

1715 Eric Hintsa, “Comparison of measured and modeled ozone distributions over the Atlantic and Pacific Oceans in ATom”

1730 Forrest Lacey, “N/A (it's about biomass burning inventories in global models)”

1745 Joyce Penner, “Aerosol model with mechanistic SOA formation: Comparison with AToM measurements”

1800 Alma Hodzic, “Characterization of Organic Aerosol across the Global Remote Troposphere: A comparison of ATom measurements and global chemistry models”

**Day 3**

**0830 – 1000**

**Major theme "Everything else \*Hot Topics\* and other synthesis" :** Contributed papers (15 minutes, AGU-style) on topics not well covered by the "Major Themes 1 – 5". **Summaries of the take-aways by Session Chairs***. Please send proposed abstracts for this session to Steve Wofsy (*[*steven\_wofsy@harvard.edu*](mailto:steven_wofsy@harvard.edu)*) and Erin Czech (*[*erin.czech@nasa.gov*](mailto:erin.czech@nasa.gov)*) .*

**1000 – 1130 Summary overview, data overview, future publications, the way forward.**

All, discussions led by leadership team individuals.

**Posters**

