<u>ACT-America Community Workshop Agenda</u>
April 27-30, 2020

<u>Charge</u>: ACT-America is a NASA Earth Venture Suborbital - 2 missions whose objective is to improve our understanding of regional to continental terrestrial carbon fluxes, via both direct application of ACT-America airborne observations and via application of these data to improve GHG flux inversions using long-term atmospheric observations including towers, aircraft and satellite remote sensing. The workshop's objective is to bring together any interested scientists working to improve atmospheric inversions whose work would benefit from and/or complement ACT observations, models and scientific progress.

The workshop presentations are intended to initiate a round of publications to be submitted this coming summer. Our hope is that these publications will be the foundation for fundamental improvements in regional to continental inverse flux estimates. We encourage you to use this workshop to find synergistic collaborations and work toward new publications that will advance this research agenda. Time at the workshop is limited, so **please present your scientific objectives, summarize progress and findings to date, and note research needs and opportunities for collaboration.** And please leave some time for discussion. ACT is hosting continued working group discussions which you are encouraged to join. Detailed methodological discussions can be pursued in our ongoing working group discussions.

To connect to the meeting, go to http://eesi.rocks/ACT-America-Teams.
In case or problems connecting, check
http://eesi.rocks/Teams_meeting_connection_help.html
or email: 5a053ad2.PennStateOffice365.onmicrosoft.com@amer.teams.ms

Given the range of time zones we're trying to encompass and the shortened meeting days, we aren't scheduling a uniform lunch break. Please respect the time limits.

EDT + 4 hours = UT. All times are EDT.

Thanks to Patty Craig and Jenn Renoe, Penn State, and to the organizing committee and session leads for their work in preparing for this workshop. **Special thanks** to Penn State's Earth and Environmental Systems Institute, in particular Francisco Tutella and Patryk Soika, who agreed to help us conduct an online workshop, and then stuck

with us and helped us to learn a new online platform a week before the workshop started!

Day 1: Monday, April 27, 2020

11:00 EDT	Welcome, Logistics & Opening Remarks	Ken Davis, Penn State
11:10 EDT	A word from our sponsors	Ken Jucks, NASA HQ
	ACT-America Data	
11:20 EDT	Plan, gaps, opportunities	Yaxing Wei, S Pal, T Gerken
11:25 EDT	Data Flags	S Pal, T Gerken, L. Campbell
11:35 EDT	Lidar ABL depth data	S Pal, A Nehrir
11:45 EDT	Description of the final MFLL XCO2 product	J. Campbell, B. Lin, LaRC
12:00 EDT	HALO XCH4 data product	Rory Barton-Grimley, LaRC
12:15 EDT	Break / Discussion	
12:30 EDT	ACT data archive overview. Feedback and beta-testing session	Yaxing Wei, Rupesh Shrestha, ORNL
13:30 EDT	Break	
13:45 EDT	ACT numerical modeling products. (WRF-Chem, TM5/GEOS, CASA, CarbonTracker, OCO2MIP, influence functions)	S Feng, A Schuh, C Williams, T Lauvaux, A Jacobson, Y Cui
14:30 EDT	Break / Discussion	
	XCO2	
14:45 EDT	Total column measurements of GHGs from ground-based low-resolution remote sensing instruments and their comparison to TCCON	Mahesh Kumar Sha,Royal Belgian Institute for Space Aeronomy

15:00 EDT	Overview of the remaining ACT XCO2-related tasks, impacts and synthesis	Chris O'Dell, CSU
15:15 EDT	XCO2 comparisons of MFLL, OCO-2, WRF-Chem; connections to atmospheric inversions	Emily Bell, CSU
15:30 EDT	XCO2 curtains	Brad Weir, USRA/Goddard
15:45 EDT	Break / discussion	
16:00 EDT	Exploring what ACT CO2 data can tell us about the vertical information in OCO-2 retrievals	Susan Kulawik, JPL
16:15 EDT	Frontal analyses with MFLL observations	Walley, Pal, Texas Tech
16:30 EDT	ACES XCO2	A Corbett, LaRC
16:45 EDT	Discussion	C O'Dell

Day 2: Tuesday, April 28, 2020

	Atmospheric Transport	
11:00 EDT	Plan, gaps, opportunities	A Schuh, CSU
11:15 EDT	The CO2 Human Emissions (CHE) project: GHG nature runs	A Agusti-Panadera, ECMWF
11:30 EDT	TM5 and GEOS-Chem transport mechanisms: Meridional XCO2 Flux Decomp	Andrew Schuh, CSU
11:45 EDT	OCO-2 v9 MIP model-data comparison	Andrew Jacobson, NOAA/CIRES
12:00 EDT	Break / Discussion	
12:30 EDT	Convective transport of GHGs in WRF-Chem	T. Lauvaux, LSCE
12:45 EDT	MPAS CO2 simulations for ACT	Tao Zheng, CMU
13:00 EDT	How tracer transport in global models depends on their resolution	Sourish Basu, ESSIC/Goddard

13:15 EDT	Frontal Contrasts in Four Seasons over the Eastern US: A path toward the mechanistic understanding of GHG transport in the lower troposphere	Sandip Pal, Texas Tech
13:45 EDT	Scalar budget calculations and high resolution transport simulations	Arkayan Samaddar, Penn State
14:15 EDT	Break / Discussion	
14:30 EDT	Model-data comparisons with ACT CO2 and ABL depths	Lily Campbell, Penn State
14:45 EDT	Resolving Scales on Atmospheric Tracer Transport	Nick Geyer, CSU
15:00 EDT	Examine CO2 bands along cold fronts observed during ACT-America using WRF-VPRM, a weather-biosphere-online-coupled model	Xiao-Ming Hu, U Oklahoma
15:15 EDT	Can we connect model-data metrics to transport bias?	Ken Davis, Penn State
15:30 EDT	Break / Discussion	
15:45 EDT	The predictability of CO2 in a limited-area model and implications for data assimilation	Jinwoong Kim, Environment and Climate Change Canada
16:00 EDT	Soil moisture in connection with atmospheric transport, chemistry, and photosynthesis	Min Huang, George Mason Univ
16:15 EDT	Discussion	A Schuh

Day 3: Wednesday, April 29, 2020

	Inversions	
11:00 EDT	Plan, gaps, opportunities	D Baker, A Jacobson
11:15 EDT	Splitting dynamical errors off of MDM errors -- how can ACT help?	David Baker, CSU
11:30 EDT	Progress toward new MDM errors in CarbonTracker using ACT observations	A Jacobson, T Gerken
11:45 EDT	The CHE Project: Representation of Model CO2 Uncertainty	Joe Mcnorton, ECMWF

12:00 EDT	Towards a hybrid satellite-based CO2 flux inversion setup for CarbonTracker Europe	Liesbeth Florentie, Wageningen U.
12:15 EDT	Break / Discussion	
12:45 EDT	Applications of ACT results to CT-Lagrange / new progress in CT-Lagrange	Lei Hu, Arlyn Andrews, NOAA
13:00 EDT	OCO-2 error characterization using MFLL data and cloud-related metrics. Applications to inversions	D Baker, E Bell, C O'Dell, S Massie
13:15 EDT	NEE constrained by surface and space-based atmospheric CO2 measurements over 2010--2015 and satellite up-scaled GPP from FluxSat over 2001-2017	Brendan Byrne, JPL
13:30 EDT	Discussion. Inversions using improved priors and prior errors, improved transport and transport errors, improved XCO2 errors.	D Baker, A Jacobson
	Methane	
14:00 EDT	Quantification of nitrous oxide emissions in the U.S. Midwest – A top-down study	Max Eckl, DLR
14:15 EDT	Plans, gaps, opportunities	Zach Barkley, Penn State
14:30 EDT	A catalogue of flight methane and ethane data. Characteristics, days, seasons, simulations	Zach Barkley, Penn State
14:45 EDT	A flight-by-flight analysis of continuous ethane data from the ACT-America aircraft campaign. Constraints on oil and gas methane emissions	Zach Barkley, Penn State
15:00 EDT	Break / Discussion	
15:15 EDT	High-resolution constraints on methane emissions in the Upper Midwest based on GEM aircraft measurements and a multi-Inversion framework	Xueying Yu, U Minnesota
15:30 EDT	Long-Term Measurements Show Little Evidence for Large Increases in Total U.S. Methane Emissions Over the Past Decade	Xin Lan, NOAA/CIRES
15:45 EDT	Continental ethane inversion and potential connections to ACT-America	Scot Miller, Johns Hopkins

16:00 EDT	Peatland methane sensitivity to temperature mediated by seasonal water table dynamics	Julian Deventer, U. Minnesota
16:15 EDT	CH4 and CO2 fluxes from stream and river networks in agricultural watersheds of Southern Minnesota	Ashish Singh, U. Minnesota
16:30 EDT	Discussion	Zach Barkley

Day 4: Thursday, April 30, 2020

	Bio CO2	
11:00 EDT	Plan, gaps, opportunities	I Baker, N Parazoo, B Baier, S Feng
11:15 EDT	Constraint of terrestrial model parameters from ensemble forward simulations	Sha Feng, Penn State
11:30 EDT	Constraining seasonal biogenic and fossil fuel CO2: observations of critical tracers and model evaluation	Bianca Baier, NOAA/CIRES
11:45 EDT	CASA suite and uncertainty	Yu Zhou, Clark U
12:00 EDT	Break / Discussion	
12:30 EDT	BioCO2 fluxes and process understanding across seasons	Ian Baker, CSU
12:45 EDT	Influence functions and their applications to evaluating BioCO2 fluxes	Yuyan Cui, Penn State
13:00 EDT	Exploring North American carbon fluxes at the component level using the dual constraints of atmospheric COS and CO2	Yoichi Shiga, USRA/NASA Ames
13:15 EDT	Tracer-tracer analysis of biological co2	Nick Parazoo, NASA JPL
13:30 EDT	Break / Discussion	
14:00 EDT	Summer 2019 evaluation of GEOS system	Nikolay Balashov, NASA Goddard
14:15 EDT	Spatiotemporal structure of model-data residuals	Daniel Wesloh, Penn State

14:30 EDT	Eastern U.S. bio flux evaluation in support of urban inversions	Sharon Gourdji, NIST
14:45 EDT	Net ecosystem exchange anomalies contribute to growing season warm-sector CO2 enhancement	Nina Randazzo, Stanford
15:00 EDT	SIF	Yi Yin, CalTech
15:15 EDT	Variation in growing season CO_2 fluxes in the Mississippi Delta Region	Ben Runkle, U. Arkansas
15:30 EDT	Break / Discussion	Ian Baker
16:00 EDT	Closing Remarks	Ken Davis, Penn State

Workshop organizing committee: Bianca Baier, NOAA/U. Colorado; David Baker, Colorado State; Ian Baker, Colorado State; Zach Barkley, Penn State; Ken Davis, Penn State; Sha Feng, Penn State; Tobias Gerken, Penn State; Andrew Jacobson, NOAA/U. Colorado; Klaus Keller, Penn State; Mike Obland, NASA Langley; Bing Lin, NASA Langley; Chris O'Dell, Colorado State; Nick Parazoo, Jet Propulsion Lab; Andrew Schuh, Colorado State; Yaxing Wei, Oak Ridge National Lab.