Mid-Continent Basin - Methane Emissions Reconciliation: Facility Level Emissions

12122-95
Dan Zimmerle
Colorado State University

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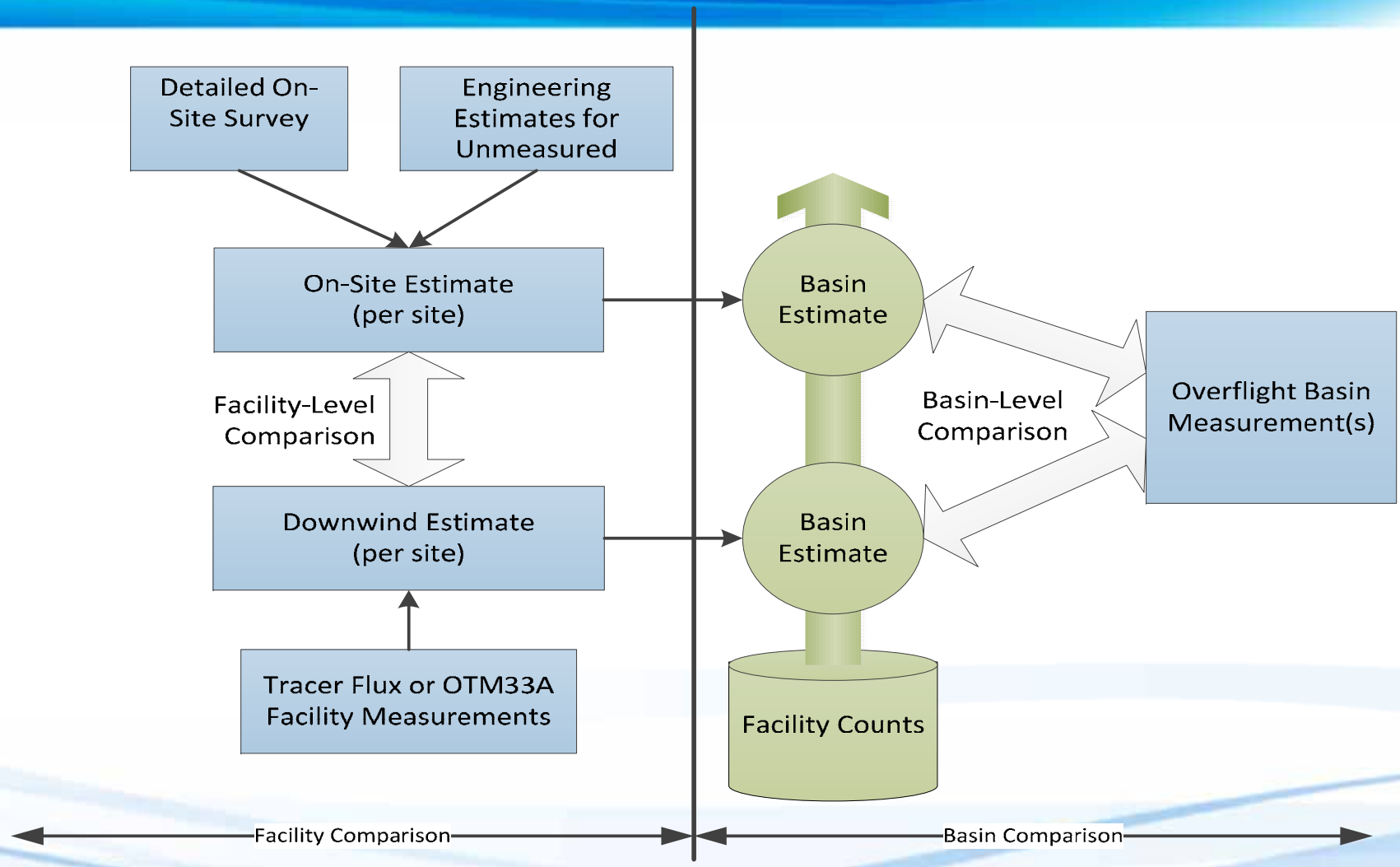
Study Goal From CSU

- Measurement campaign coordinated with aircraft mass balance measurements:
  - Remove “temporal uncertainty” between bottoms-up and top-down comparisons
  - Representative sample from all sectors
  - Spatially and temporally resolved model built from site level characterization
- Improved understanding of measurement uncertainty
  - Compare measurement techniques normally utilized for site-level measurements
  - Improve uncertainty analysis for the measurements *and* engineering estimates.

Study Design: Facility Measurements in Context



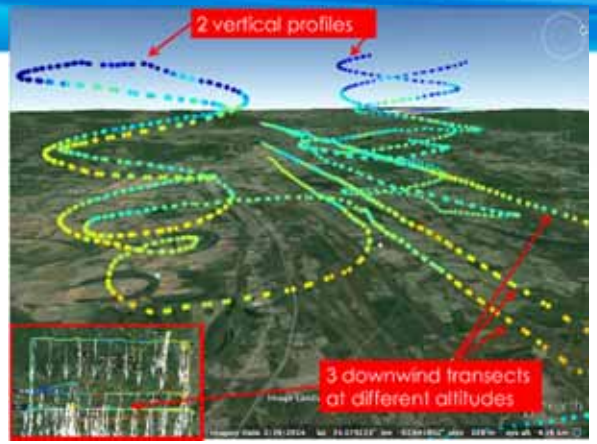
Partner Operations in the Study Region

Asset Type	SP Operated	NP Operated	Study Region Total	SP Percentage
Active Natural Gas Well	4648	1068	5716	81%
Active Oil Well	0	0	0	
Gathering Compression Facility	95	33	128	74%

Notes:

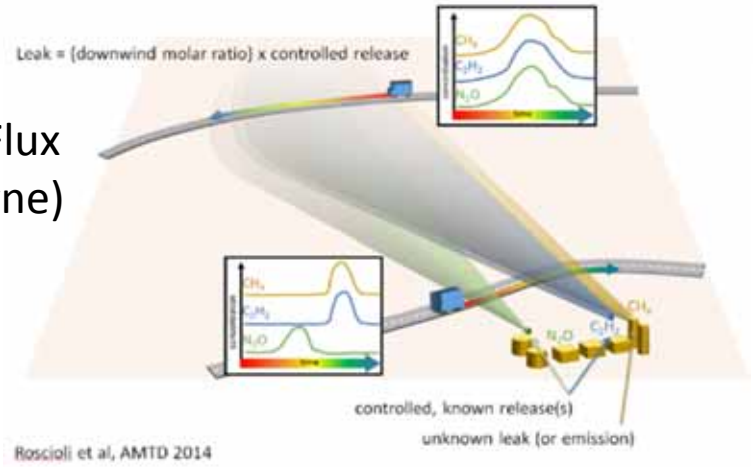
- Well data from public lists of well locations
- Gathering facilities from air quality permitting data

Measurement Methods



Aircraft
(NOAA-Conley)

Tracer Flux
(Aerodyne)



OTM33A (UWy)

Onsite
(AECOM, SWN LDAR, GHD)

Gathering Line
Measurements
(GHD)

Measurement & Modeling Methods

Target	Facility Measurements		Study Area - Aircraft
	On Site Component Measurements	Downwind Measurements	
Well Pads	OGI/High Flow (not all components)	OTM33A Dual Tracer Release	
Gathering Stations	OGI/High Flow (not all components)	Dual Tracer Release Aircraft Spiral	
Gathering Pipelines	Flux screening & High Flow		
Distribution	OGI/High Flow		
Study Area	**Upscaling of facility/operation emissions model for MCB**		• Aircraft Mass Balance • Aircraft Raster Flights & NOAA Van Surveys

Attempted Measurements by Facility type and Measurement method

Facility Type	Number of Methods Used		
	1	2	3
Gathering	7	23	6
Production	220	46	8
Transmission	4		

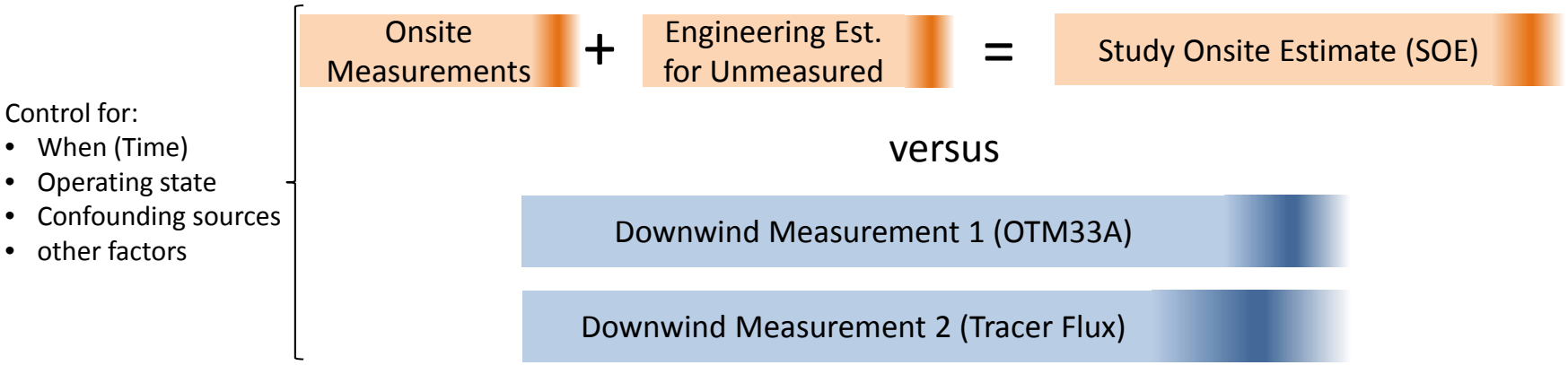
Gathering Facilities	Meas. With 2 or More Methods	One Meas. Method	Total
Onsite		4	4
Tracer		3	3
Tracer Onsite Spiral	6		6
Tracer Onsite	23		23

Production Well Pads	Meas. With 2 or More Methods	Unpaired Meas.		Total
		Multiple Meas. / One Method	One Meas. / One Method	
Onsite		29	179	208
OTM33A			10	10
Tracer			2	2
Tracer OTM33A	1			1
Tracer Onsite OTM33A	8			8
Onsite OTM33A	37			37
Tracer Onsite	8			8

Note: Counts presented here are preliminary and subject to change during QC/QA. Failed measurements have not been removed.

Making Apples to Apples Comparisons

- Comparisons use "best estimate" of comparable emissions



- "An Experiment" = one set of paired measurements
  - One estimate may be in more than one experiment
- Measurements computed independently for each method
- Comparing *emissions rate* of CH_4
- Using 95% confidence intervals

RESULTS Slides Removed Prior to POSTING

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Next Steps

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Next Steps

- Complete facility-level comparisons and gathering line estimates
- Develop a spatially and temporally resolved model of emissions in the study area
- Compare study area model to mass balance flight results

Thank You!

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Contacts

Principal Investigator:
Dag Nummedal
Colorado School of Mines
nummedal@mines.edu
303-384-2506

Project Manager:
Sandy McSurdy
NETL
sandra.mcsurdy@netl.doe.gov
412-386-4533

Presenter:
Dan Zimmerle
Colorado State University
dan.zimmerle@colostate.edu
970-581-9945

Technical Coordinator:
Kent Perry
RPSEA
kperry@rpsea.org
281-725-1252

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