



MANE-VU Technical Support Committee Update



OTC/MANE-VU Spring Meeting

June 6, 2017

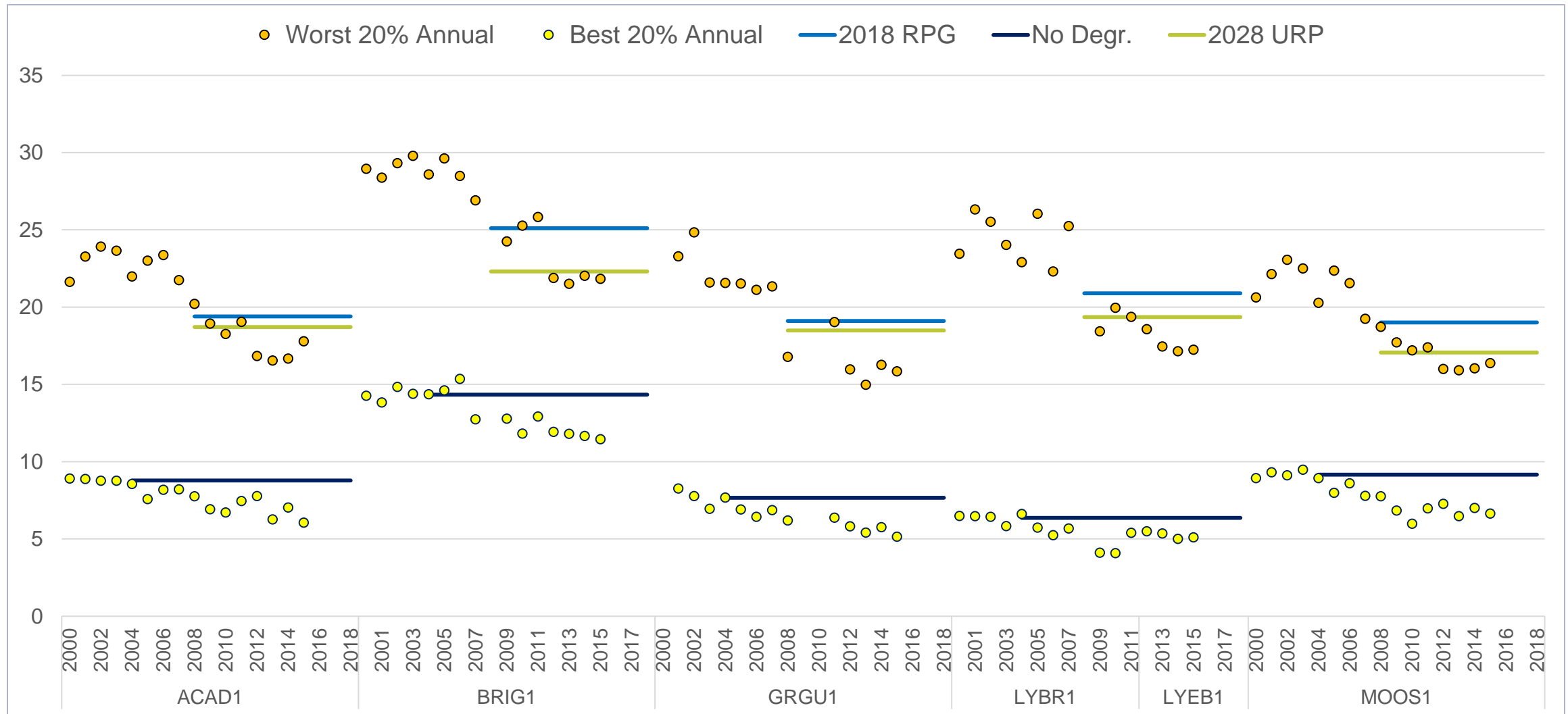
Overview

1. Action Plan & Schedule Updates
2. Monitoring Data
3. Contribution Analysis
4. Consultation
5. Draft MANE-VU “Ask”

Regional Haze SIP Planning Schedule

IMPROVE Data Analysis	<ul style="list-style-type: none"> • Decisions on Methods • Calculations, QA, and TSD 	Complete Complete (in Back Traj. Report)
Inventory Development & Analysis	<ul style="list-style-type: none"> • 2011/2028 Alpha 2 & TSD • Emissions Trends Analysis 	Complete Fall 2017
Modeling	<ul style="list-style-type: none"> • 2011 Base Case Modeling • 2028 Base Case Modeling • 2028 Control Case(s) Modeling • Document Modeling Platform and Results 	Complete Complete If Requested Complete (Except Control Case)
Four-Factor Analysis/Contribution Assessment	<ul style="list-style-type: none"> • Qc/d • CALPUFF Assessment • Back Trajectory & IMPROVE Data Analysis • 4-Factor Data Collection • HEDD Analysis • Synthesize Assessments 	Complete Complete Complete Complete Summer 2017 Summer 2017
Updating RPGs	<ul style="list-style-type: none"> • Draft RPGs and Document 	Late 2017
Consultation	<ul style="list-style-type: none"> • Establish Consultation Process • Technical Consultation with FLMs, Contributing States, EPA 	Complete Fall 2017
SIP Submission	<ul style="list-style-type: none"> • Rule Adoption • SIP Submission 	2017-2018 Summer 2018

Progress at Monitored Class I States in MANE-VU using 20% Worst Day IMPROVE Algorithm



Contribution Assessment

- ▶ Synthesizing Results in a Technical Memo - Weighted Contribution Assessment
- ▶ Steps to be Completed
 - ✓ Inventory Analysis
 - ✓ Met Adjusted Emissions/distance ($Q \cdot c/d$)
 - ✓ 2002 SO₂ Ratio Scaling to 2011 & 2014
 - ✓ CALPUFF Modeling
 - ✓ Back trajectories during 20% most impaired days with IMPROVE Data Analysis
 - HEDD analysis

2016 CALPUFF

- ▶ Built from previous VT DEC and MDE platform development procedures
- ▶ Considered 2011 and 2015 SO₂ and NO_x EGU emissions (CAMD and MARAMA)
 - ▶ CAMD 95th percentile SO₂ and NO_x emissions
 - ▶ MARAMA annual emissions and stack parameters
- ▶ Considered 2011 typical industrial facility emissions (MARAMA)
- ▶ Modeled with 2002, 2011 and 2015 meteorology (CALMET)
- ▶ Finalized Paper is available at <http://otcair.org/manevu>

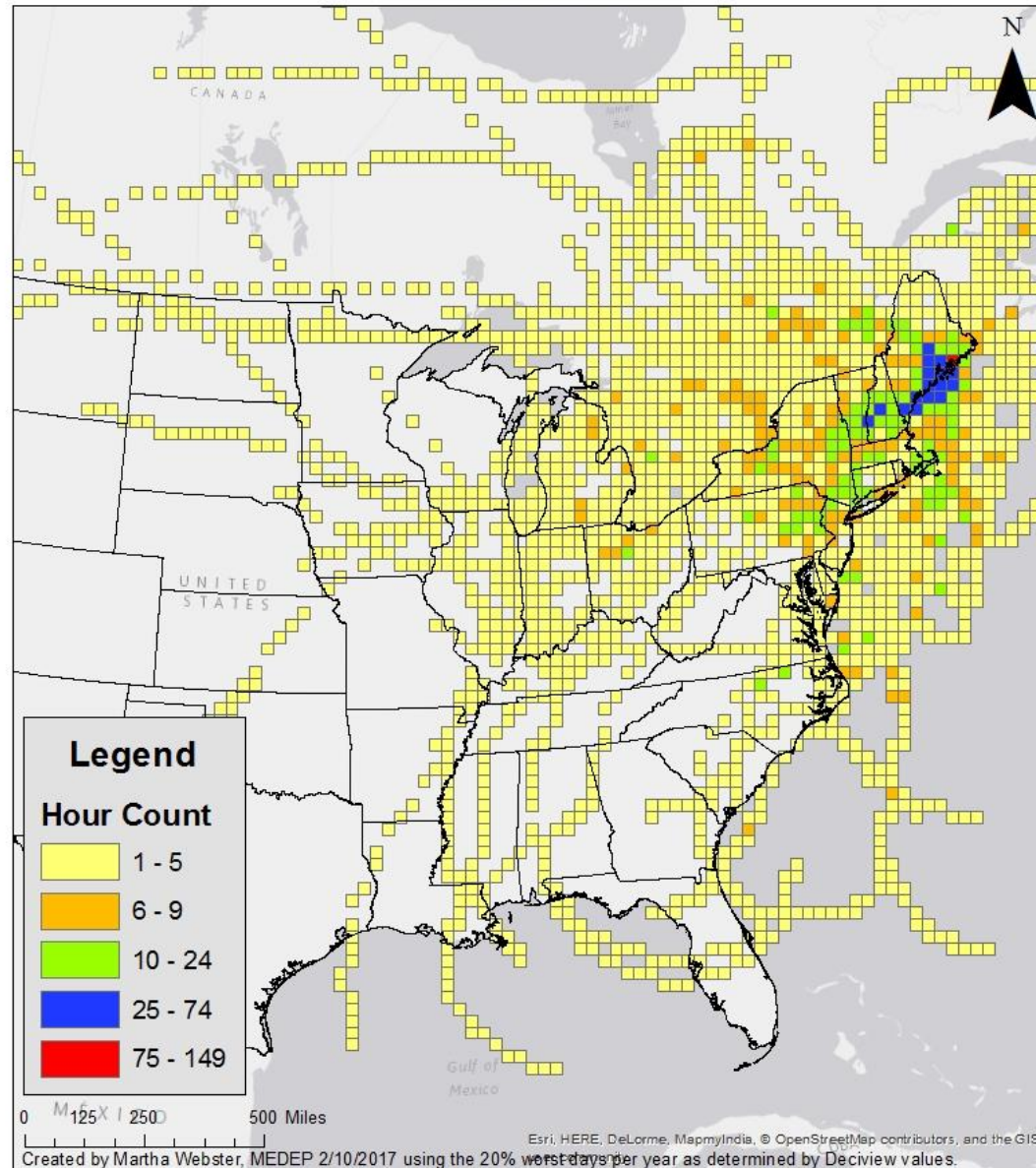


20% Most Impaired Day Back Trajectories

- ▶ Used HYSPLIT to analyze 500m, 72-hour back trajectories on the 20% most impaired days
- ▶ Analyzed all 5 monitored MANE-VU Class I Areas and 3 nearby SESARM Class I Areas
- ▶ Acadia's 2011 back trajectories will be shown as an example
 - ▶ Example 1: count of 20% most impaired day back trajectories throughout the year
 - ▶ Example 2: 20% most impaired day back trajectories for winter along with speciated data
- ▶ Comments received from:
 - ▶ Olympus Power – concerned we didn't take a holistic view, but this gets addressed in the synthesized report
- ▶ Finalized Paper is available at <http://otcair.org/manevu>

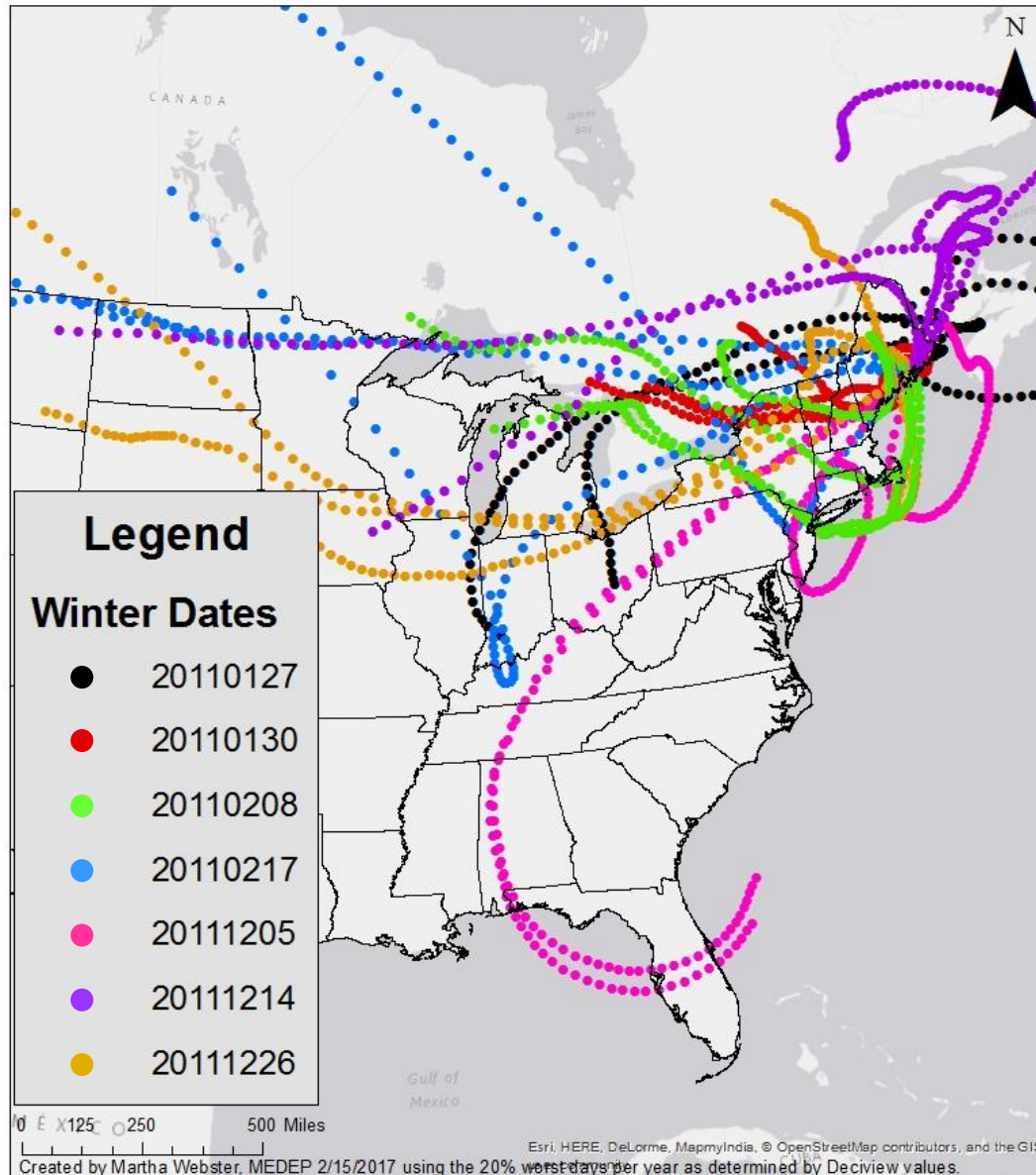
Acadia NP Maine BackTrajectory Hourly Endpoint Counts for 20% Most Impaired Days in 2011

These 500m trajectories were modeled by NOAA's HYSPLIT model.
72 hour back trajectories were created 4 times per day at 3 AM & PM and 9 AM & PM.
2011 trajectories used EDAS 40km MET.
Grid cells are 25 X 25 Miles

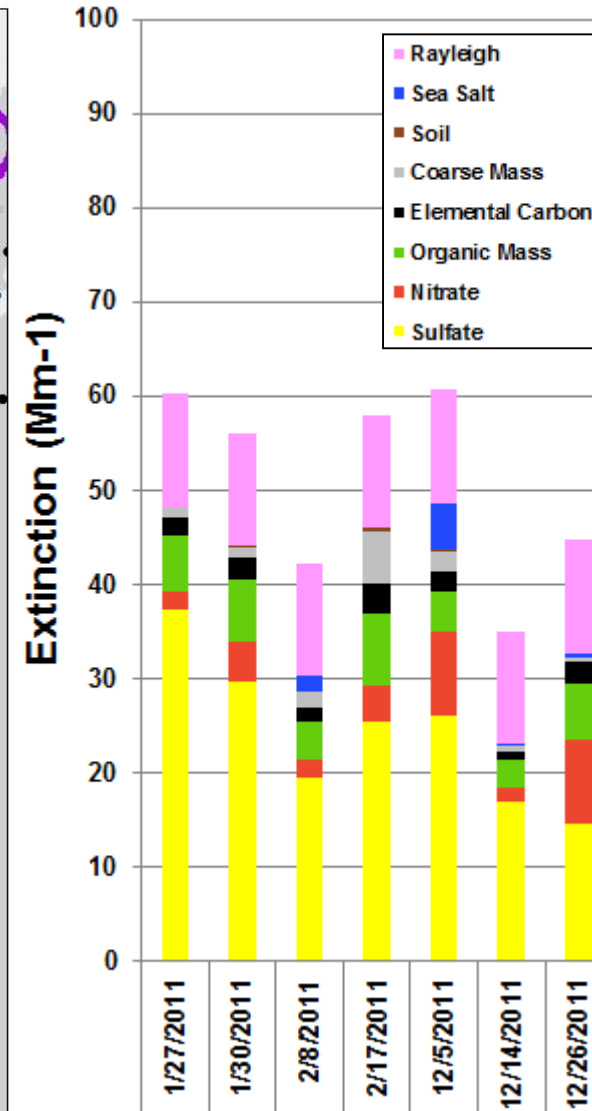


Acadia NP Maine Date Specific BackTrajectory Hourly Endpoints for 20% Most Impaired Days in 2011

These 500m trajectories were modeled by NOAA's HYSPLIT model.
72 hour back trajectories were created 4 times per day at
3 AM & PM and 9 AM & PM.
2011 trajectories used EDAS 40km MET.



Acadia – ME: Light extinction (Mm-1) for 20% most impaired days in Winter 2011



Percentage of Back Trajectories By State at each Class I Area

RPO		MANE-VU											LADCO						SESARM									CENSARA									
State		CT	DC	DE	MA	MD	ME	NH	NJ	NY	PA	RI	VT	IL	IN	MI	MN	OH	WI	AL	FL	GA	KY	MS	NC	SC	TN	VA	WV	AR	IA	KS	LA	MO	NE	OK	TX
Acadia	2002	1%	0%	0%	2%	1%	9%	3%	1%	7%	4%	0%	2%	1%	1%	2%	1%	2%	2%	0%	0%	0%	1%	0%	1%	0%	0%	1%	1%	0%	1%	1%	0%	2%	0%	1%	0%
	2011	1%	0%	0%	1%	0%	9%	3%	1%	7%	4%	0%	2%	1%	1%	2%	1%	2%	1%	0%	0%	0%	1%	1%	1%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	1%
	2015	1%	0%	0%	1%	1%	10%	2%	1%	5%	4%	0%	2%	2%	1%	4%	1%	1%	2%	1%	0%	0%	1%	0%	1%	0%	0%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%
Brigantine	2002	1%	0%	1%	0%	3%	0%	0%	7%	3%	7%	0%	0%	2%	2%	3%	2%	4%	4%	1%	0%	0%	2%	1%	3%	1%	1%	5%	2%	1%	1%	0%	0%	2%	1%	0%	0%
	2011	0%	0%	1%	0%	3%	0%	1%	6%	4%	14%	0%	0%	3%	4%	5%	1%	5%	5%	0%	0%	0%	1%	0%	2%	0%	0%	4%	2%	1%	2%	0%	0%	1%	0%	0%	0%
	2015	0%	0%	2%	0%	4%	0%	0%	8%	4%	10%	0%	0%	2%	2%	3%	2%	4%	2%	1%	0%	1%	2%	0%	2%	0%	1%	6%	4%	0%	1%	0%	0%	1%	0%	0%	0%
Great Gulf	2002	1%	0%	0%	1%	0%	2%	7%	1%	15%	7%	0%	5%	2%	1%	2%	1%	4%	1%	0%	0%	0%	2%	0%	1%	1%	0%	1%	1%	0%	1%	0%	0%	1%	0%	0%	0%
	2011	2%	0%	0%	2%	1%	3%	9%	1%	14%	5%	0%	8%	2%	1%	2%	0%	2%	1%	0%	0%	0%	1%	0%	0%	0%	1%	1%	1%	1%	1%	0%	0%	1%	0%	1%	0%
	2015	1%	0%	0%	2%	0%	3%	8%	0%	12%	4%	0%	5%	1%	1%	3%	2%	2%	2%	1%	0%	0%	2%	0%	0%	0%	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%
Lye Brook	2002	2%	0%	0%	1%	1%	0%	0%	3%	17%	12%	0%	3%	3%	4%	5%	2%	4%	3%	1%	0%	0%	2%	1%	1%	1%	0%	1%	1%	0%	2%	0%	0%	1%	0%	0%	0%
	2011	2%	0%	0%	3%	2%	1%	0%	1%	22%	10%	0%	4%	0%	1%	2%	0%	3%	1%	0%	0%	0%	1%	0%	1%	0%	1%	4%	3%	0%	0%	0%	0%	0%	0%	0%	0%
	2015	2%	0%	0%	2%	2%	0%	1%	2%	20%	7%	0%	4%	3%	2%	3%	1%	3%	1%	0%	0%	0%	2%	0%	2%	1%	1%	3%	1%	0%	1%	0%	0%	2%	0%	0%	0%
Moosehorn	2002	1%	0%	0%	2%	0%	16%	2%	1%	9%	3%	0%	1%	1%	1%	1%	0%	2%	1%	0%	0%	1%	1%	0%	0%	0%	1%	1%	0%	1%	1%	0%	0%	1%	0%	0%	0%
	2011	1%	0%	0%	1%	0%	13%	2%	0%	4%	3%	0%	1%	1%	1%	1%	1%	2%	1%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	1%	1%	12%	1%	1%	4%	2%	0%	1%	1%	1%	3%	1%	1%	2%	0%	0%	0%	1%	0%	1%	0%	0%	2%	1%	0%	1%	1%	0%	1%	0%	0%	0%

Preliminary High Electricity Demand Day (HEDD) Analysis: Brigantine 2015

- ▶ HEDDs considered to be the top 15% of energy production
- ▶ 46% of 20% most impaired visibility days occurred during summer

19 HEDDS in 2015

Day Percentile	Days	Percentage
20% Worst	7	37%
20-40%	5	26%
40-60%	3	16%
60-80%	4	21%

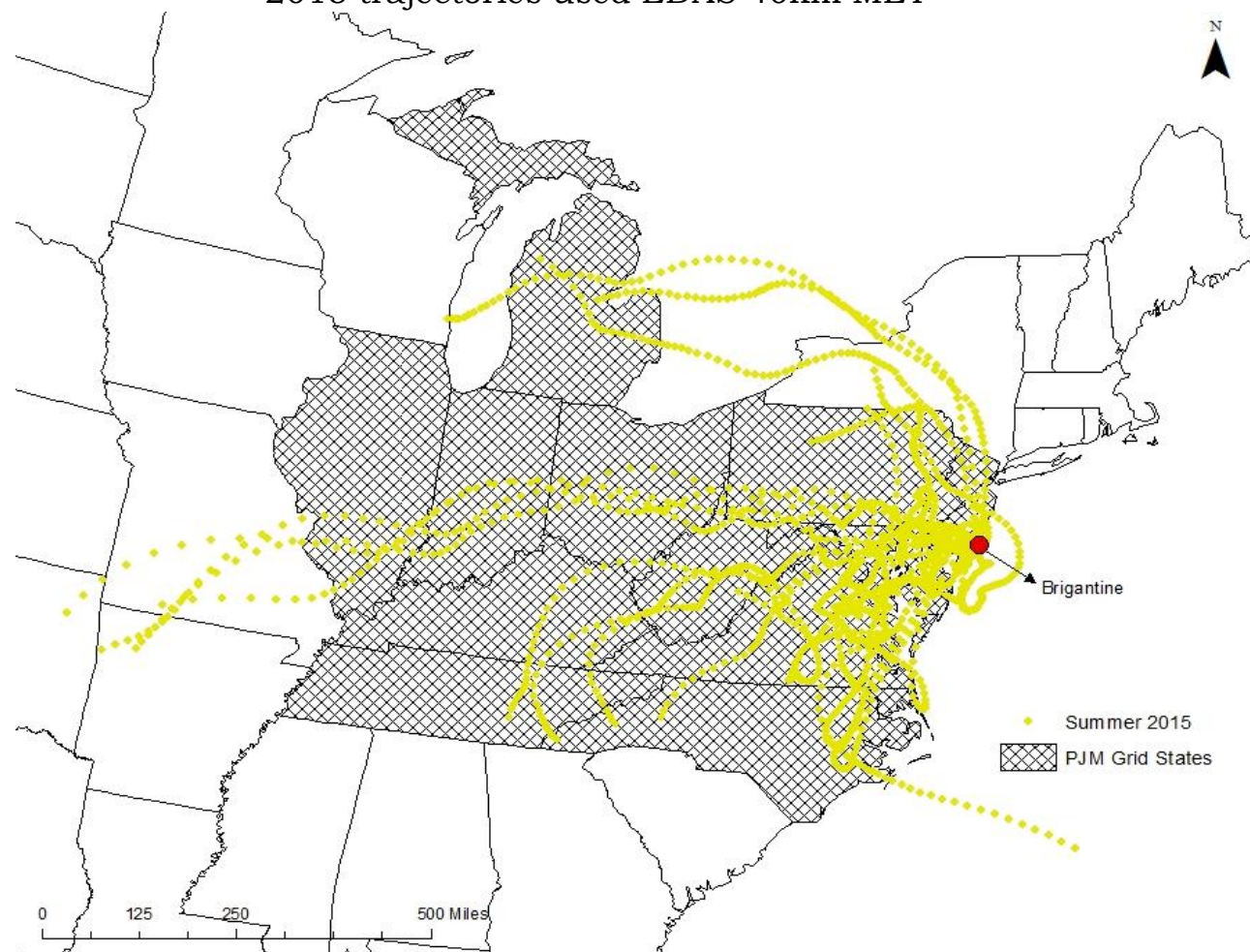
11 Ozone Season 20% Most Impaired Days in 2015

Day Percentile	Days	Percentage
Code Orange	5	45%
Code Yellow	3	27%
HEDD	5	45%

- ▶ Preliminary Results
 - ▶ HEDDs are more likely to occur on visibility impaired days in Brigantine
 - ▶ Summer impaired days more likely to occur on HEDDs and during ozone events
 - ▶ The best visibility days do not occur on HEDDs
- ▶ Draft expected this summer

Regional Haze Back Trajectories for Brigantine for 20% Most Impaired Days in Summer 2015

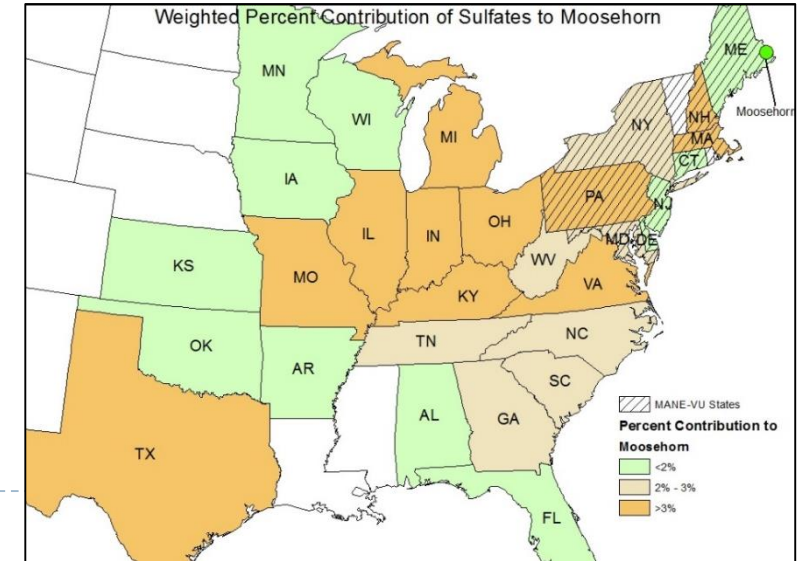
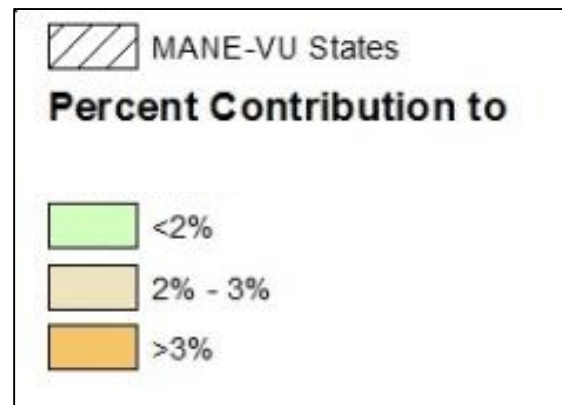
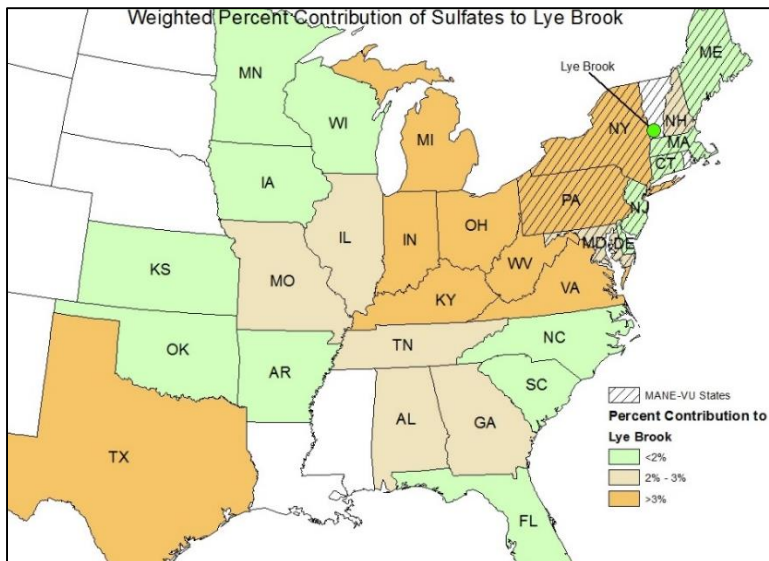
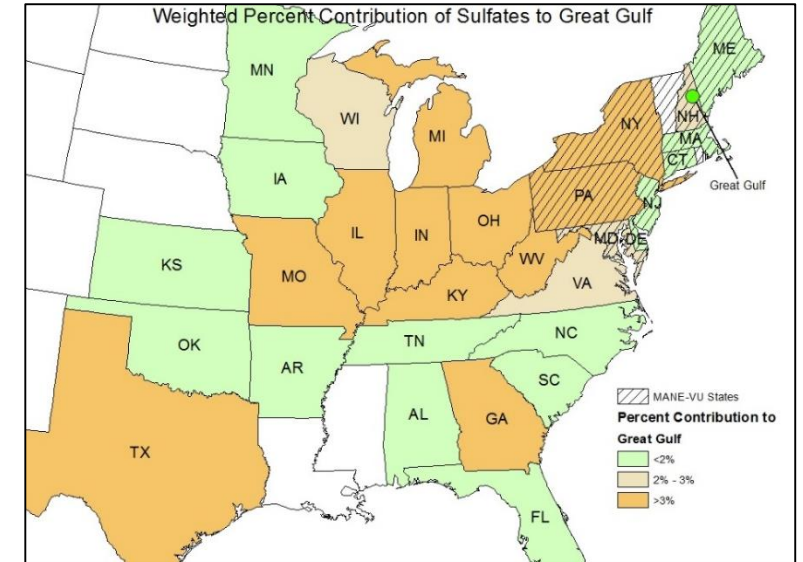
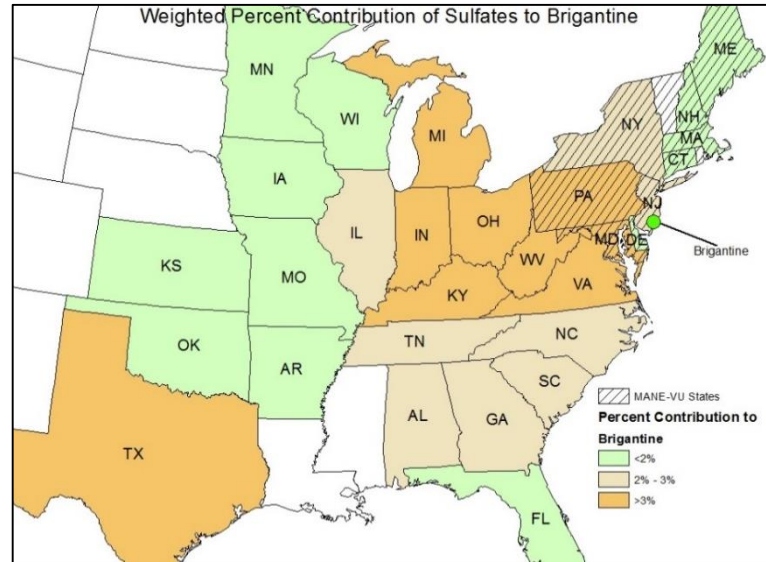
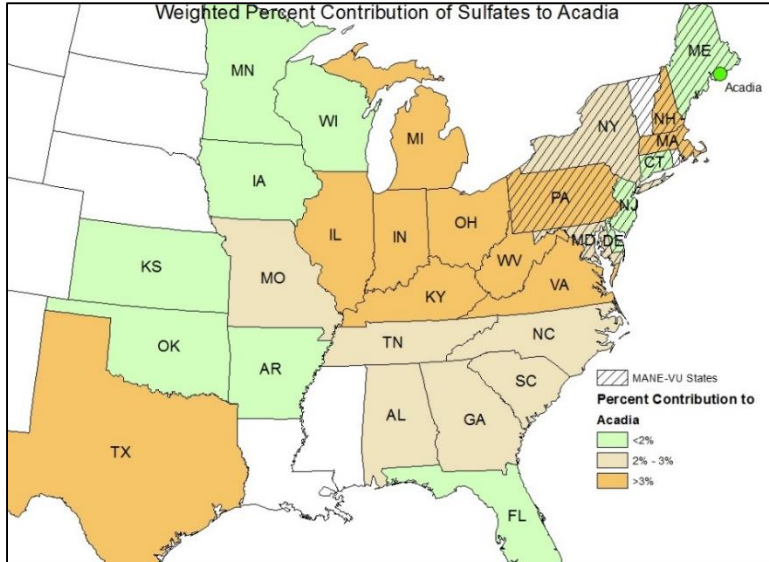
These Trajectories were modeled using NOAA's HYSPLIT model
72 hour back trajectories were created 4 times per day at 500m at 3 AM & PM and 9 AM & PM
2015 trajectories used EDAS 40km MET



Weighted Contribution Assessment

- ▶ **Weighted by state:**
 - ▶ Q/d point source SO₂ analysis
 - ▶ CALPUFF point source SO₂ analysis
 - ▶ CALPUFF point source NO_x analysis
- ▶ Estimated which states contribute more to visibility impairment than others
- ▶ Examined trajectories for each regional Class I area on 20% most impaired visibility days as a Quality Assurance check
- ▶ Paper available on <http://otcair.org/document.asp?fview=meeting> for comment
 - ▶ Comments due on June 26 to jjakuta@otcair.org

Weighted Percent Contribution of Sulfates

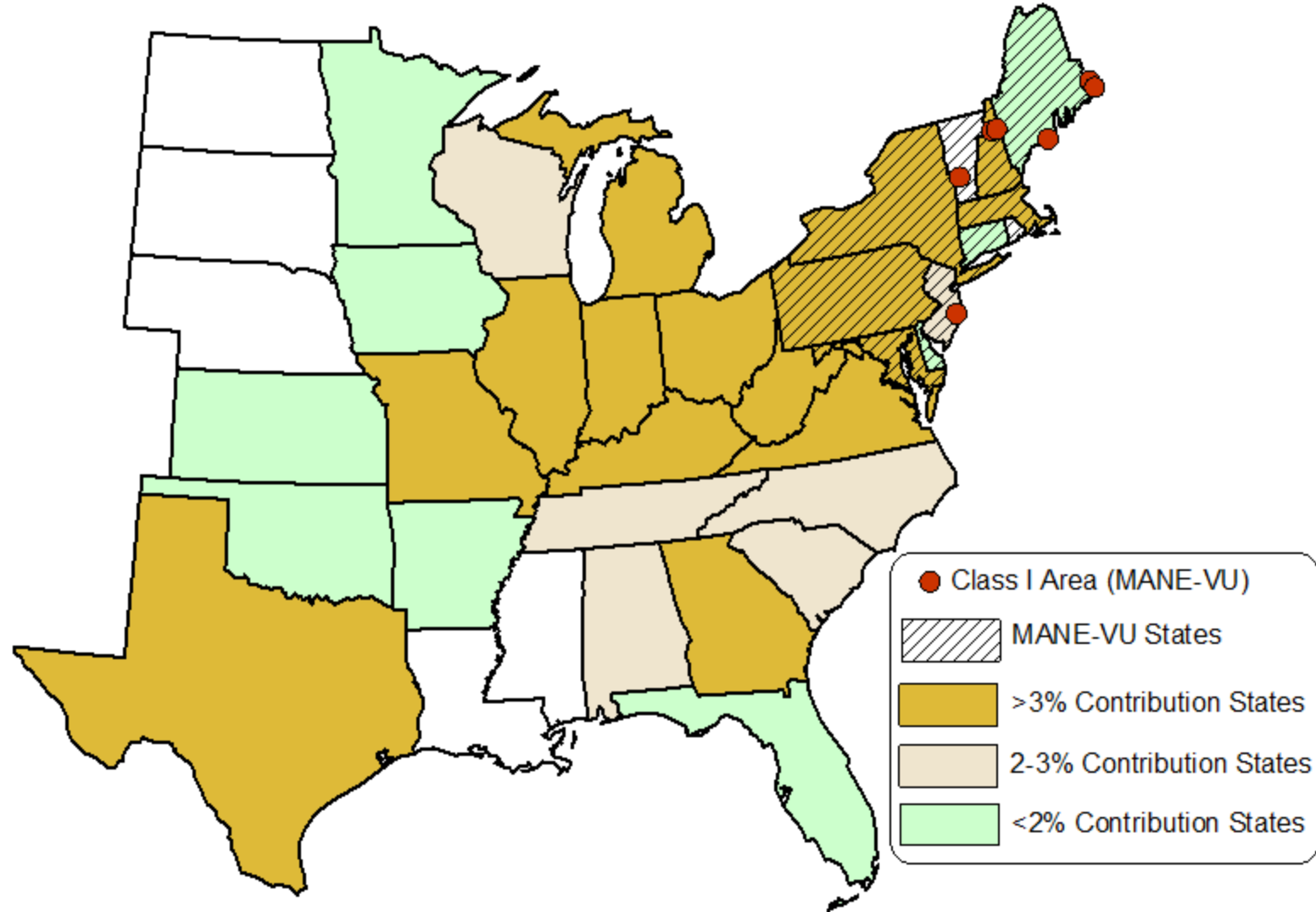


Mass Weighted Percent Rankings

	Acadia	Brigantine	Great Gulf	Lye Brook	Moosehorn
1	OH 17	OH 18	OH 18	OH 19	OH 17
2	PA 12	PA 13	PA 12	PA 14	PA 11
3	IN 8	IN 7	IN 10	IN 8	IN 9
4	MI 6	VA 6	MI 7	MI 6	MI 7
5	VA 4	MD 5	KY 4	NY 5	KY 4
6	KY 4	MI 5	IL 4	KY 4	VA 4
7	MA 3	WV 4	NY 3	WV 4	IL 4
8	NH 3	KY 4	WV 3	VA 3	TX 3
9	IL 3	TX 3	TX 3	TX 3	MA 3
10	TX 3	GA 3	GA 3	IL 2	MO 3
11	WV 3	NJ 2	MO 3	NH 2	NH 3
12	NY 2	NC 2	NH 2	MD 2	WV 2
13	GA 2	TN 2	VA 2	MO 2	NY 2
14	MO 2	IL 2	WI 2	GA 2	GA 2
15	MD 2	AL 2	MD 2	TN 2	MD 2
16	NC 2	SC 2		AL 2	NC 2
17	SC 2	NY 2			TN 2
18	TN 2				SC 2
19	AL 2				

MANE-VU
 LADCO
 SESARM
 CENSARA

Consolidated Contribution Map



Consultation Requirements

- ▶ State-to-state consultation
 - ▶ Class I states must consult with contributing states regarding the emissions reductions needed
 - ▶ Contributing states must consult with Class I states to develop coordinated emission management strategies
- ▶ Consultation with FLMs
 - ▶ Must occur early enough in the State's technical and policy analyses to consider FLM input
- ▶ Consultation requirements apply regardless of when States plan to submit their SIP revisions
- ▶ Each state must demonstrate that it has included in its long-term strategy “all measures agreed to during state-to-state consultations or a regional planning process, or measures that will provide equivalent visibility improvement.” If a contributing state cannot agree with the “Ask”, the State must describe the actions taken to resolve the disagreement.

MANE-VU Consultation Plan

▶ State consultation

▶ Phase 1: Intra-RPO consultation

- ▶ MANE-VU states, tribes, EPA, and FLMs
- ▶ by webinar and in-person at OTC/MANE-VU meetings

▶ Phase 2: Inter-RPO consultation

- ▶ Between MANE-VU and contributing states, as identified using weighted contribution analysis
- ▶ by webinar, following intra-RPO consultation
- ▶ facilitates consultation between contributing states and affected Class I states

▶ FLM consultation

- ▶ Invited to intra- and inter-RPO consultations, and special FLM webinars

Consultation Overview: Draft “Ask”

- ▶ 3 Documents – MANE-VU States, Upwind States, FLMs/EPA
- ▶ Draft “Ask” to States:
 1. Operating and optimizing of installed SCRs and scrubbers on EGUs (≥ 25 MW) year-round
 2. Conduct 4-factor analysis for most important sources (based on 3Mm^{-1} extinction)
 3. Complete low sulfur fuel oil rule of 2007 in all of MANE-VU and outside of MANE-VU
 4. Achieve a 90% reduction in SO_2 at the 4 remaining sources from the 167 stacks that have not met that goal
 5. Update permits and/or rules to reflect already achieved rates for SO_2 , NO_x , and $\text{PM}_{2.5}$
 6. Perform 4-factor analysis on HEDD units [*MANE-VU states only*]
 7. Initiate measures to increase energy efficiency and implement CHP or other DG
- ▶ Draft “Ask” to FLMs/EPA:
 1. FLMs to consult with MANE-VU Class I States when scheduling prescribed burns
 2. EPA to develop measures that will further reduce emissions from heavy-duty onroad vehicles
 3. EPA to ensure that Class I Area state “Asks” are addressed in “contributing” state SIPs prior to approval.



Next Steps

Contribution Assessment

1. Finish HEDD analysis draft and review with stakeholders & FLMs
2. Factor in public comments on Weighted Contribution Assessment

Consultation

1. Finalize the MANE-VU Ask during Intra-RPO Consultation
2. Begin discussions with upwind RPOs and FLMs/EPA about the MANE-VU Ask