



## Technical Meeting

Zagreb, Croatia  
27-29 June 2016

## WG3 Source Apport

# CAMx Sensitivity SA Runs

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ENVIRON



# What was done?

- Two 3 month periods - seasons
  - **Summer** (01/06 - 31/08/2011)
  - **Winter** (15/11/2011 - 15/02/2012)
- Sensitivity analysis
  - **benchmark case** (RSE)
  - **KV scheme changed in WRFCAMx (from YSU to CMAQ)** (ARPAV)
  - **nested domain switched off (influence of resolution on SA results)** (UAVR)
  - **evaluate Organic aerosol through VBS instead of SOAP** (RE)
- 10 receptors
- 9 mandatory categories/ 15 optional
- SOA PSAT - turned off

# Which categories/species?

## Species

**PM25**

EC

POA

SOA

NO3

SO4

NH4

OPA-25

**PM10**

OPA-10

# Which categories/species?

## Mandatory categories

01 - Electric Energy production

02- BIO - Domestic heating (b. burning)

03-04 - Industrial processes

07 - Transport (all)

08 – Shipping

10 – Agriculture

11 - Dust

99 - Other Anthrop + MS2 other + SSalt + BVOC

## Optional categories

01 - Electric Energy production

02-BIO - Domestic heating (biomass burning)

03-04 - Industrial processes

07-RTR - Transport (others)

71-RTG - Transport (gasoline)

72-RTD - Transport (heavy duty)

75-RTW - Transport (mopeds)

08 – Shipping

10 – Agriculture

11-DST – Dust

11-SLT – Sea Salt

11-BSO – Biogenic VOC

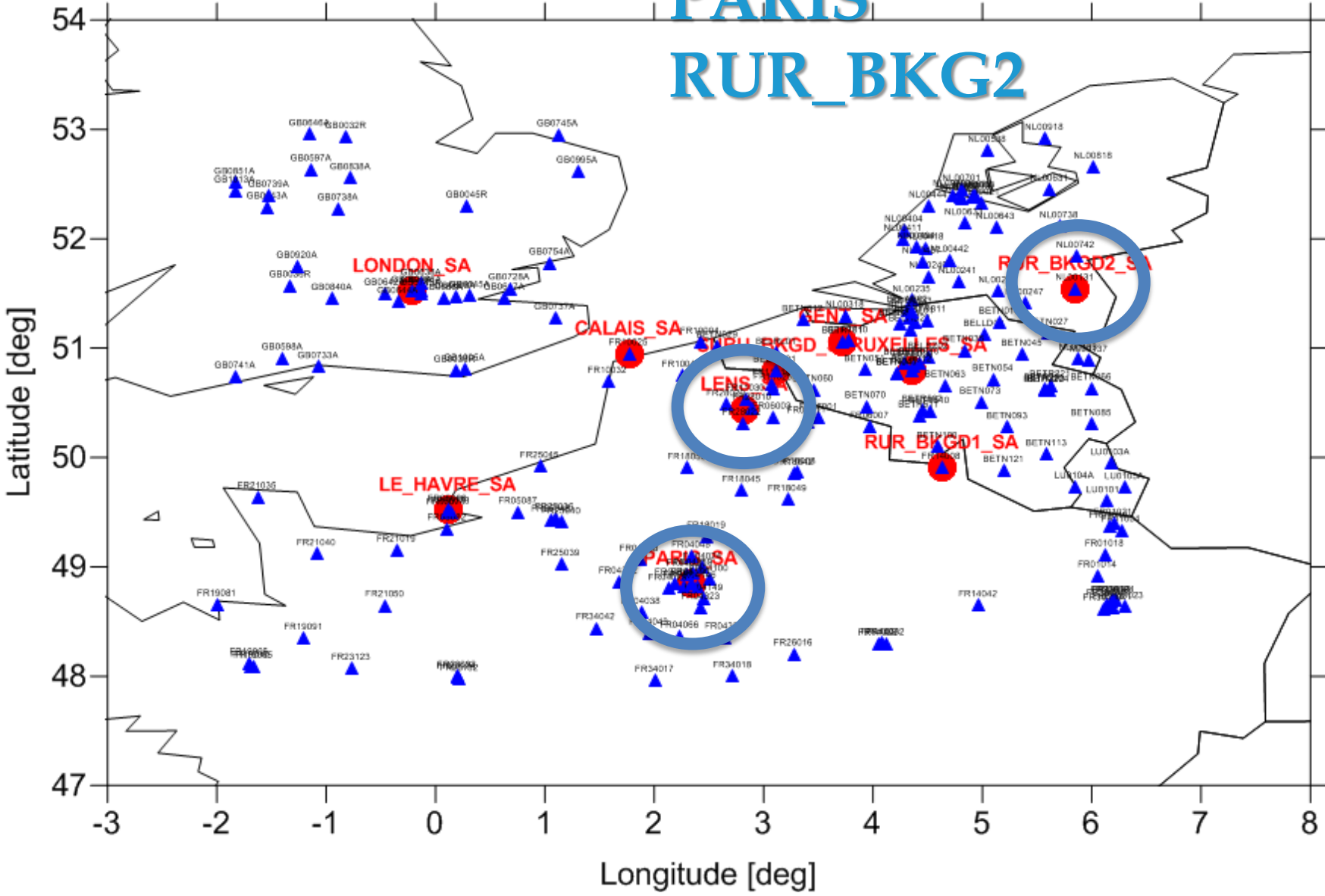
99 - Other Anthrop

02-OTH - Domestic heating (other)

ALL\_BC - contribution of boundary conditions

# Global Results

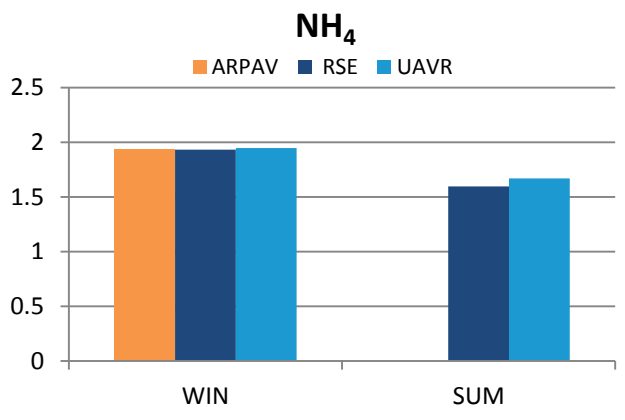
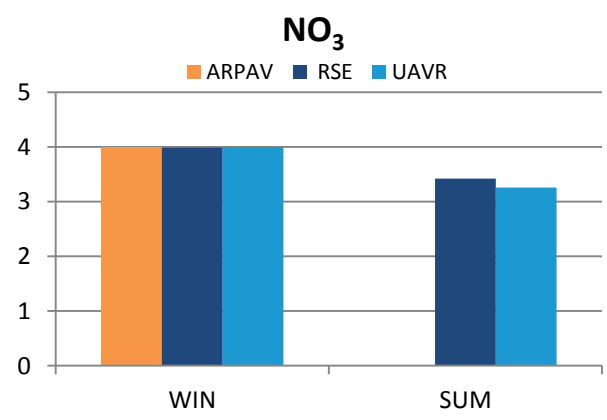
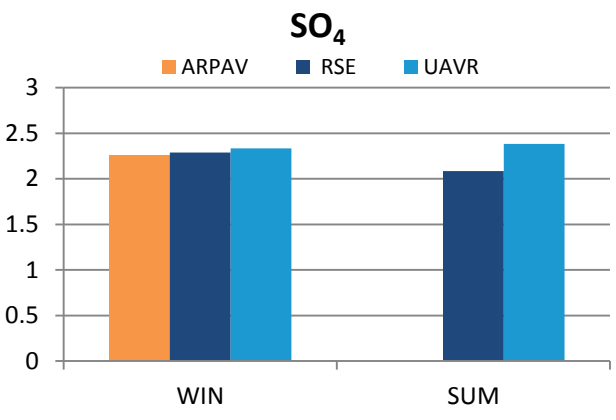
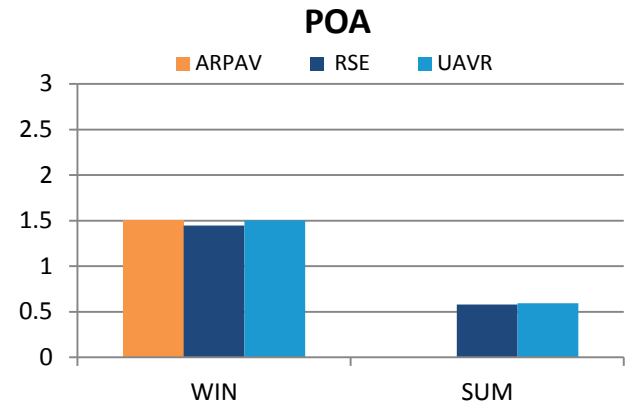
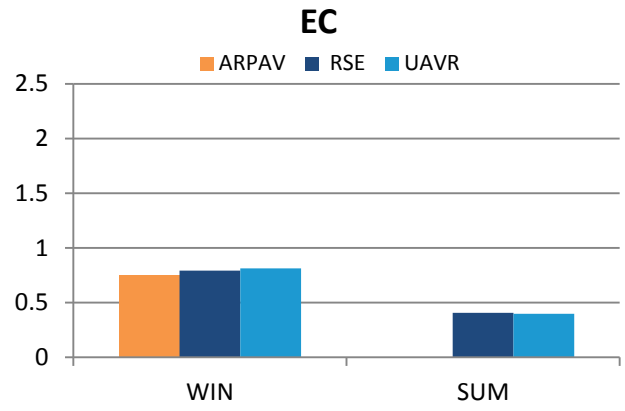
@ LENS  
PARIS  
RUR\_BKG2



# Results

# @LENS

## Totals

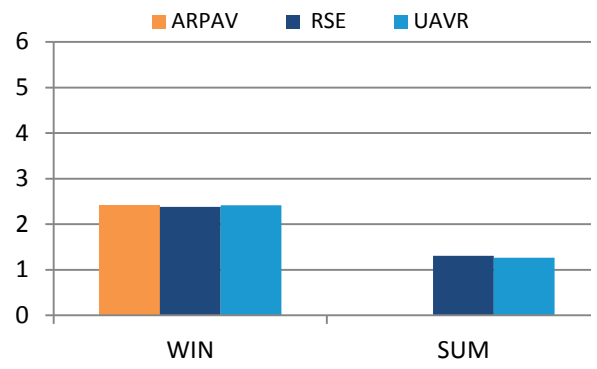


# Results

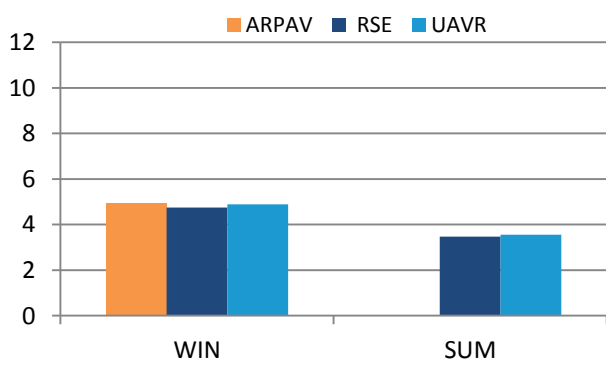
# @LENS

## Totals

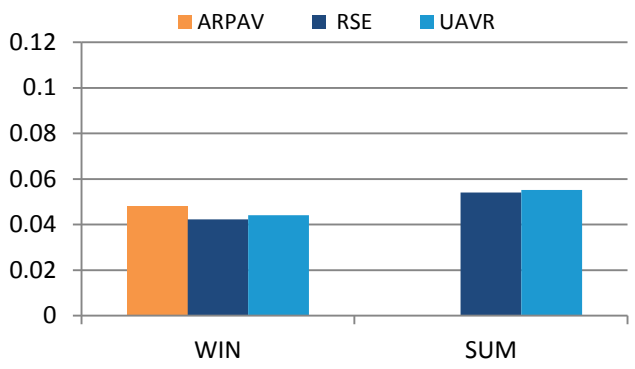
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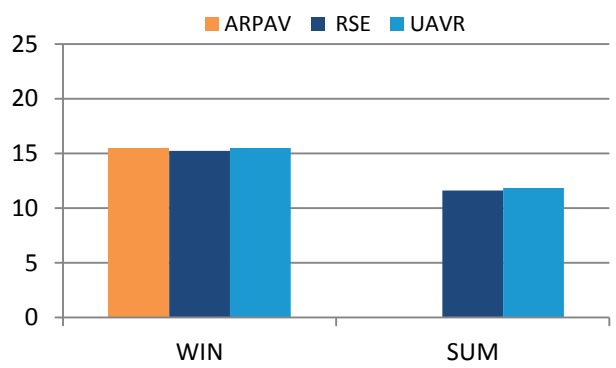
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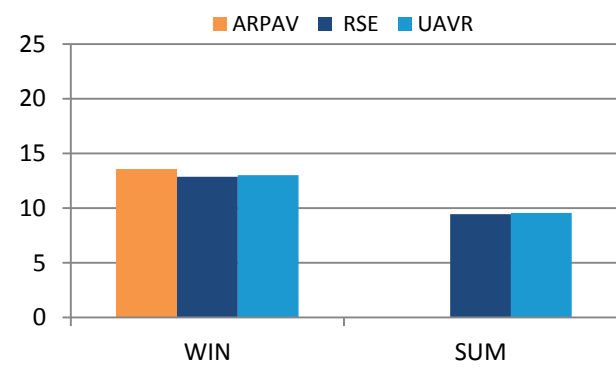
### SOA



### PM10



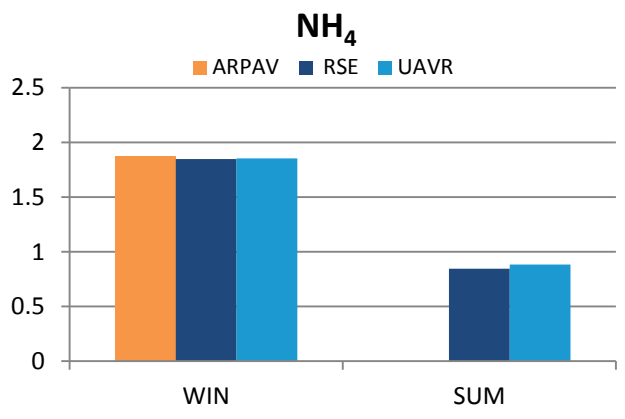
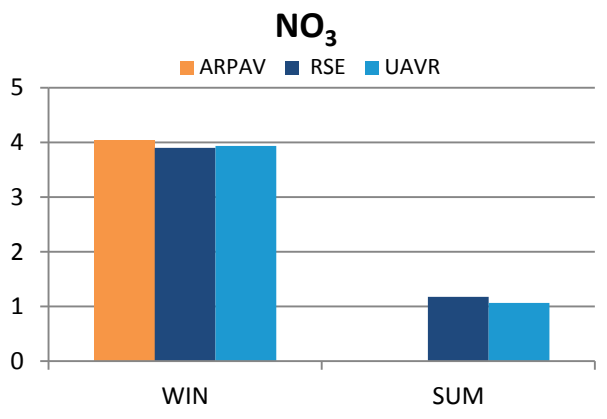
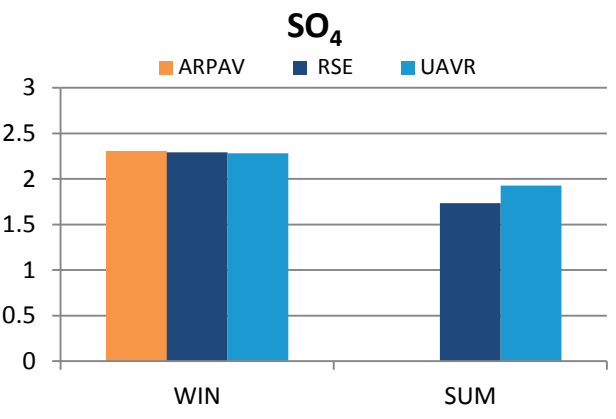
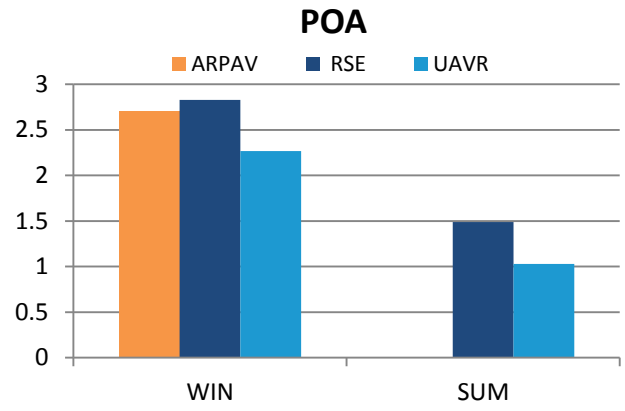
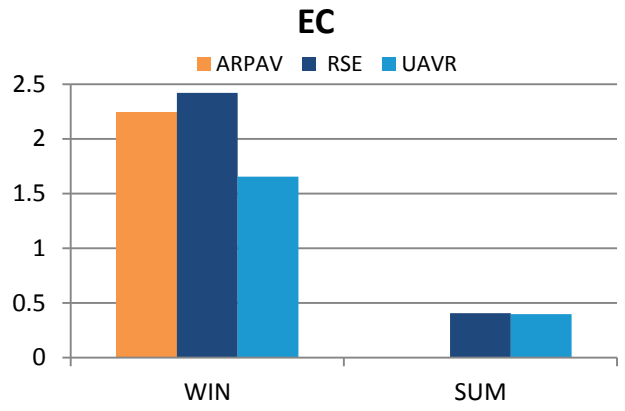
### PM2.5



# Results

# @PARIS

## Totals

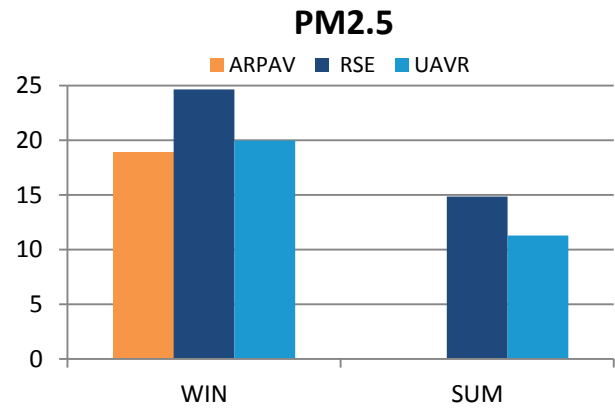
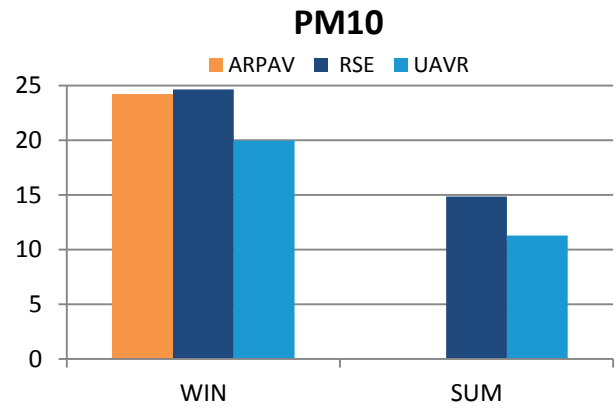
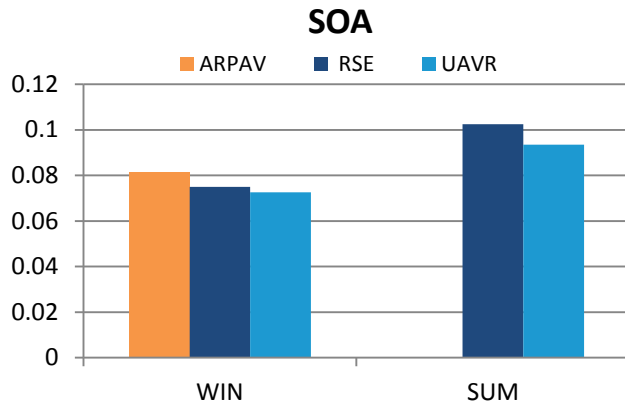
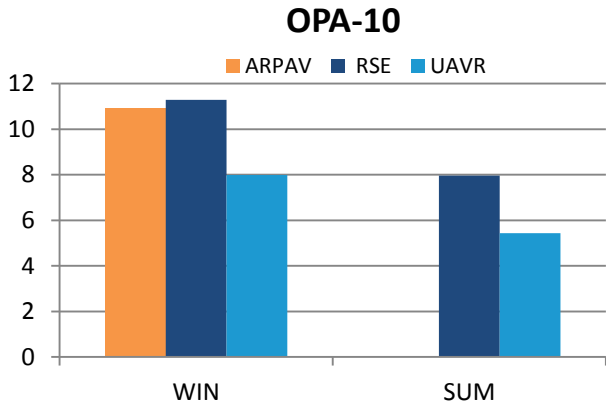
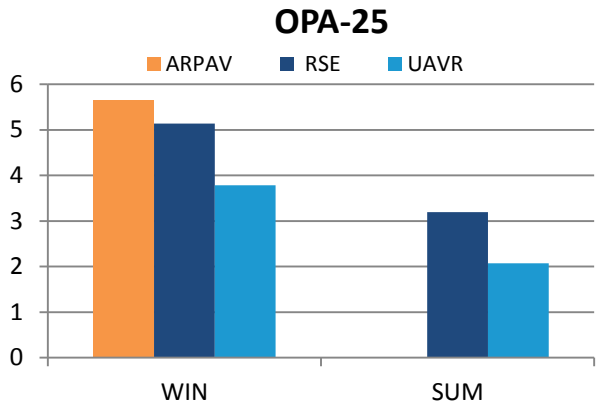




# Results

# @PARIS

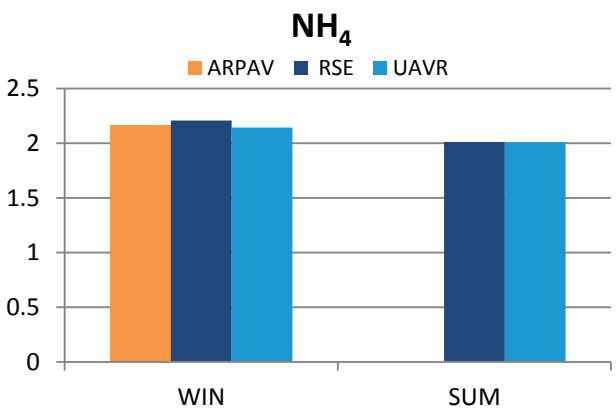
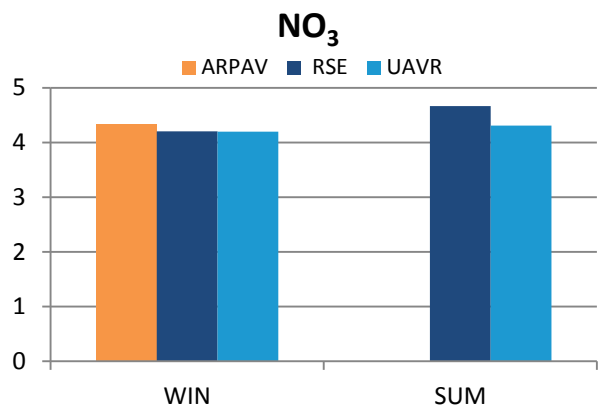
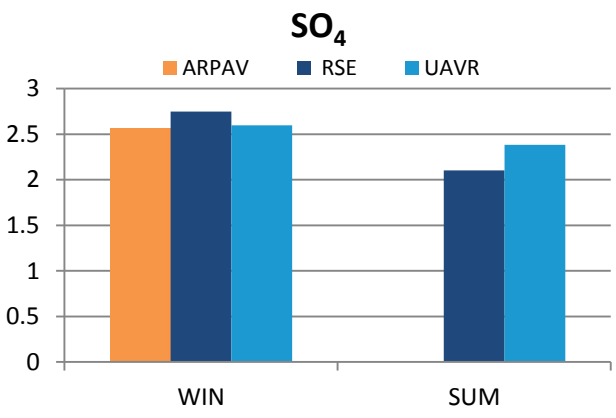
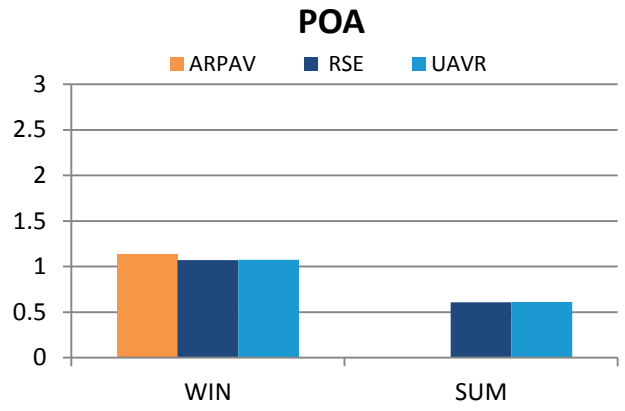
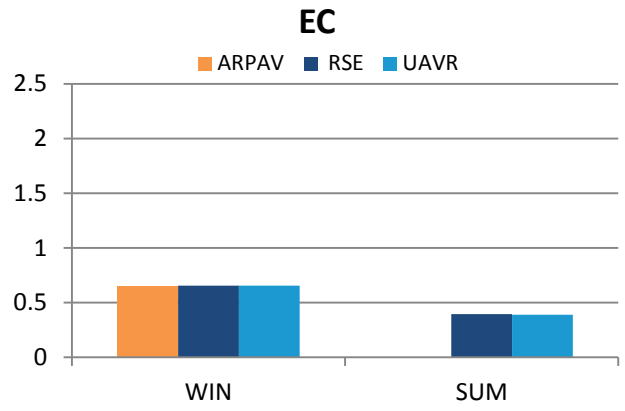
## Totals



# Results

# @RUR\_BKG2

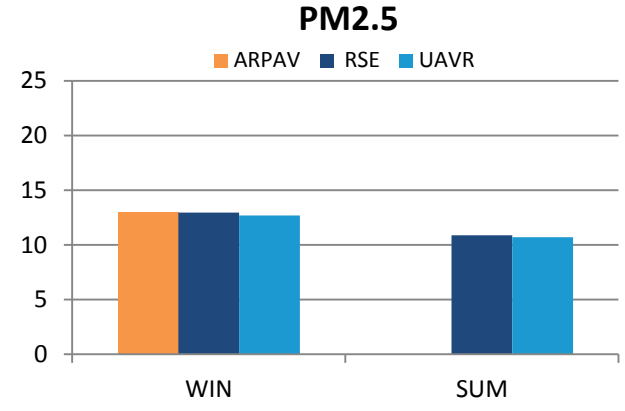
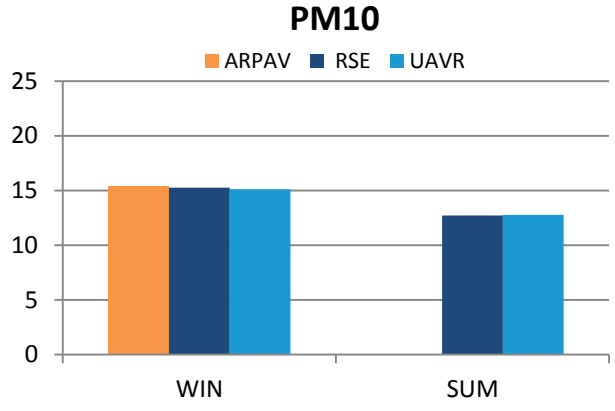
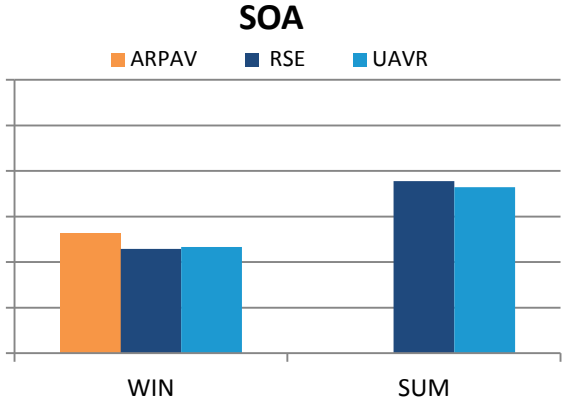
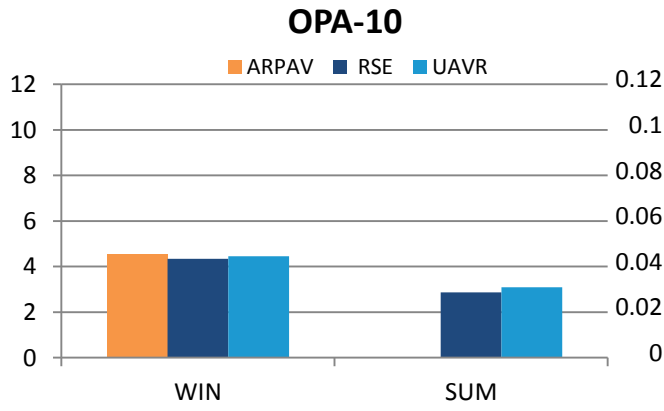
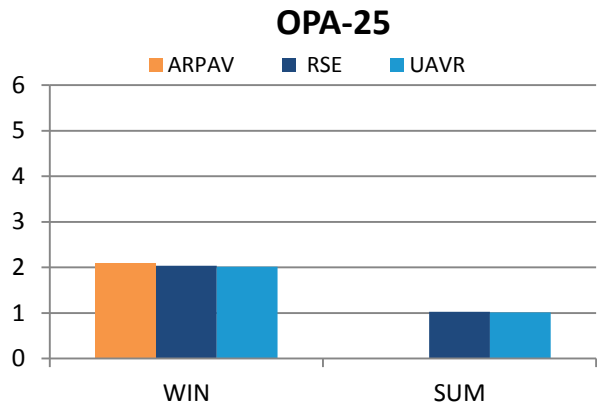
## Totals



# Results

# @RUR\_BKG2

## Totals



# Detailed Results

@ LENS

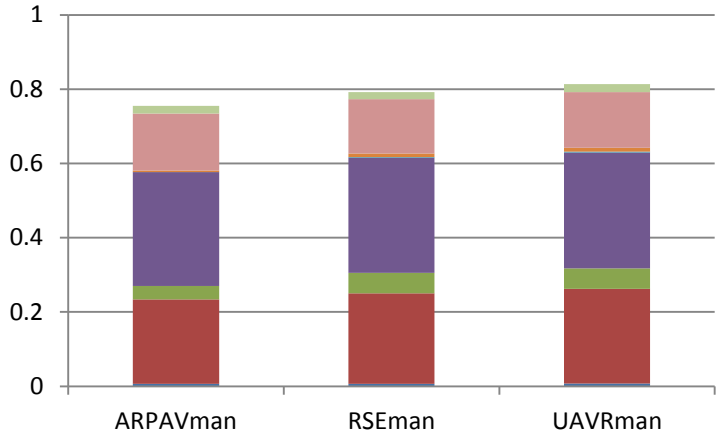
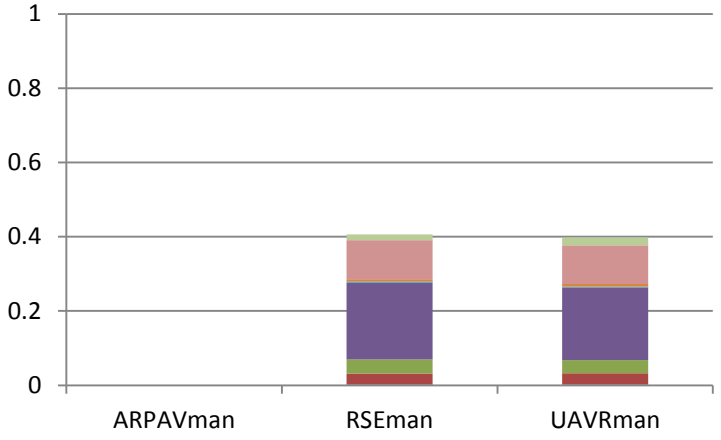
# Results @LENS

## EC

### Summer

### Winter

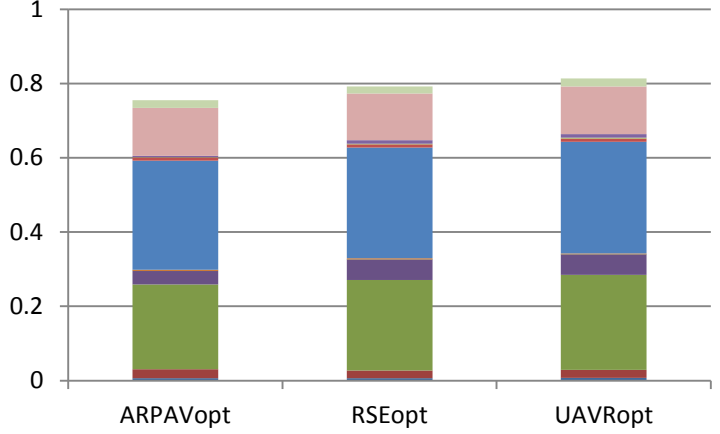
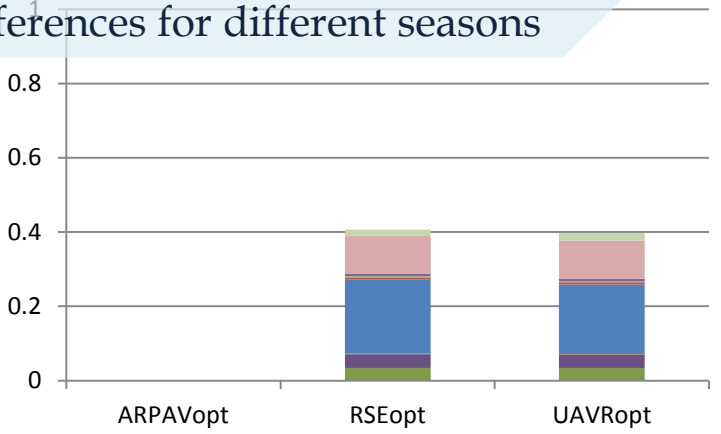
Man



- EC-25-ALLBC
- EC-25-99-OTH
- EC-25-11-DST
- EC-25-AGR
- EC-25-08-SHP
- EC-25-07-RTR
- EC-25-34-IND
- EC-25-02-BIO

Similar contributions among runs but differences for different seasons

Opt



- EC-25-ALLBC
- EC-25-99-OTH
- EC-25-11-BSO
- EC-25-11-SLT
- EC-25-11-DST
- EC-25-10-AGR
- EC-25-08-SHP
- EC-25-75-RTW
- EC-25-72-RTD
- EC-25-71-RTG
- EC-25-07-RTR
- EC-25-34-IND
- EC-25-02-BIO
- EC-25-02-OTH
- EC-25-01-ENI

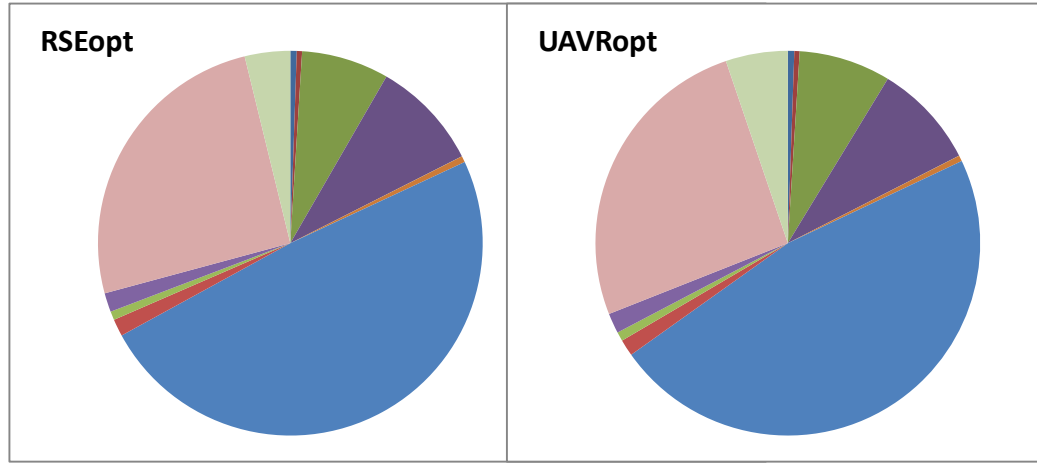
# Results

# @LENS

Opt

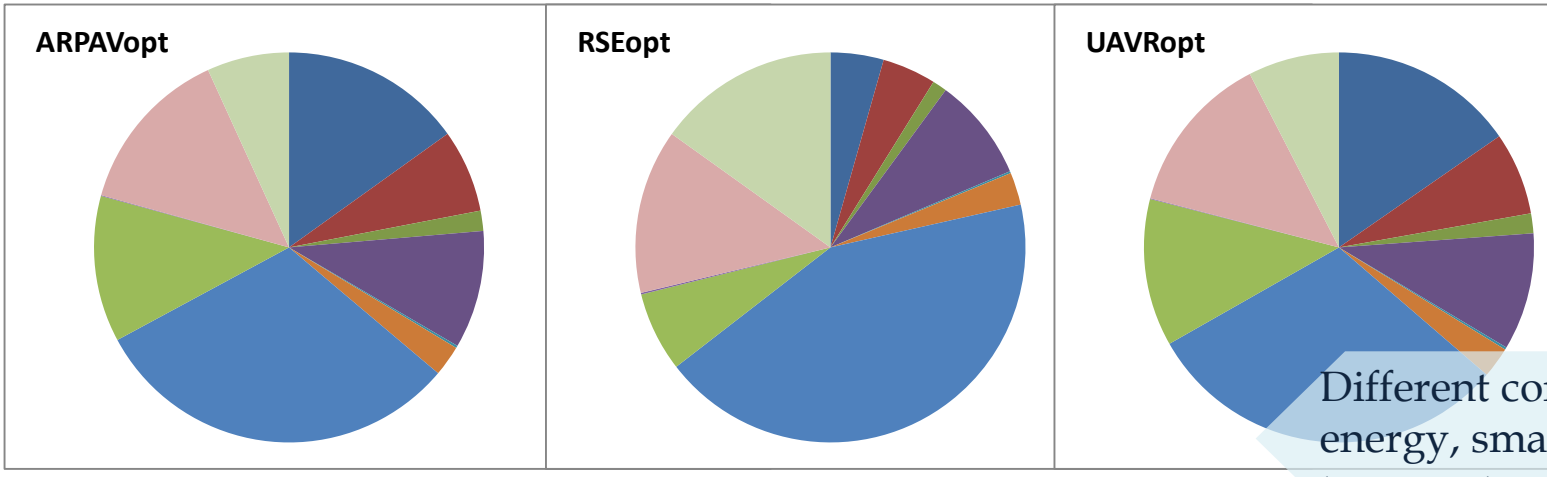
## EC

### Summer



- EC-25-01-ENI
- EC-25-02-OTH
- EC-25-02-BIO
- EC-25-34-IND
- EC-25-07-RTR
- EC-25-71-RTG
- EC-25-72-RTD
- EC-25-75-RTW
- EC-25-08-SHP
- EC-25-10-AGR
- EC-25-11-DST
- EC-25-11-SLT
- EC-25-11-BSO
- EC-25-99-OTH
- EC-25-ALLBC

### Winter



Different contributions from energy, small combustion, transport among runs

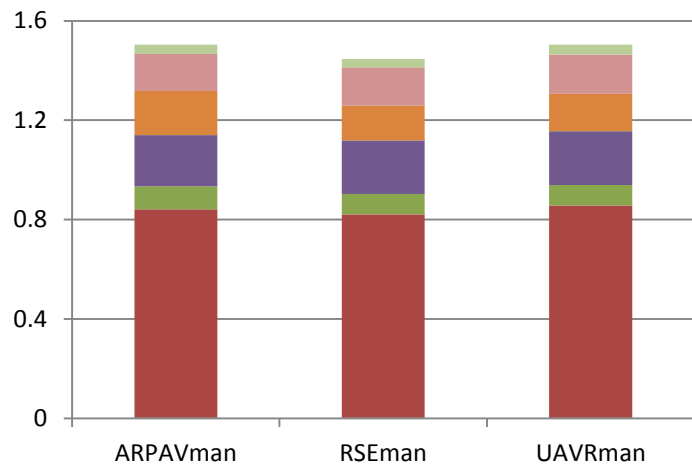
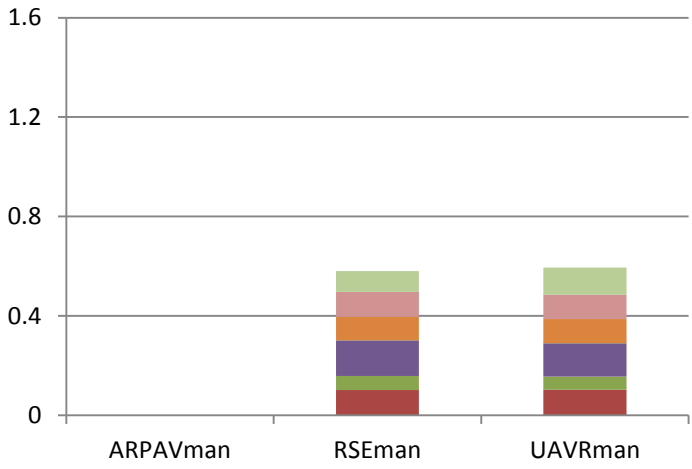
# Results @LENS

## POA

Summer

Winter

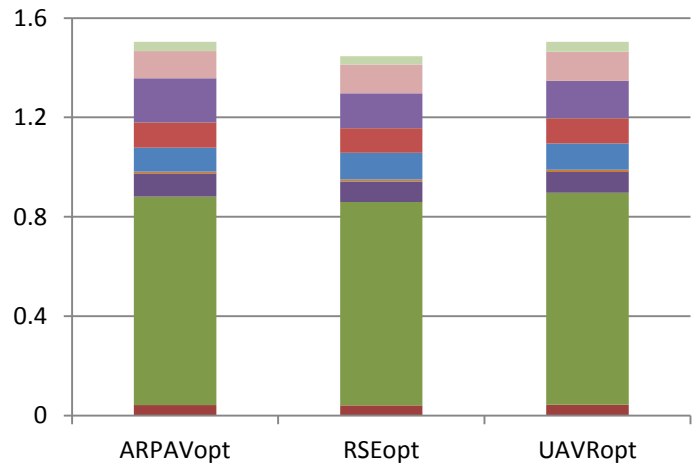
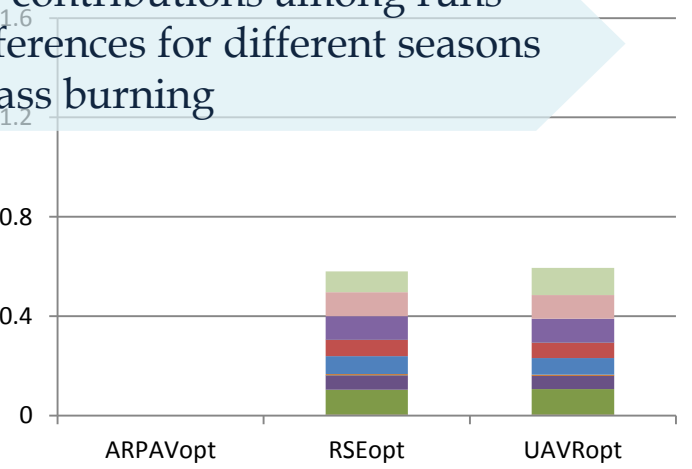
Man



- POA-25-ALLBC
- POA-25-99-OTH
- POA-25-11-DST
- POA-25-10-AGR
- POA-25-08-SHP
- POA-25-07-RTR
- POA-25-34-IND
- POA-25-02-BIO
- POA-25-01-ENI

Similar contributions among runs but differences for different seasons - biomass burning

Opt



- POA-25-ALLBC
- POA-25-99-OTH
- POA-25-11-BSO
- POA-25-11-SLT
- POA-25-11-DST
- POA-25-10-AGR
- POA-25-08-SHP
- POA-25-75-RTW
- POA-25-72-RTD
- POA-25-71-RTG
- POA-25-07-RTR
- POA-25-34-IND
- POA-25-02-BIO
- POA-25-02-OTH
- POA-25-01-ENI

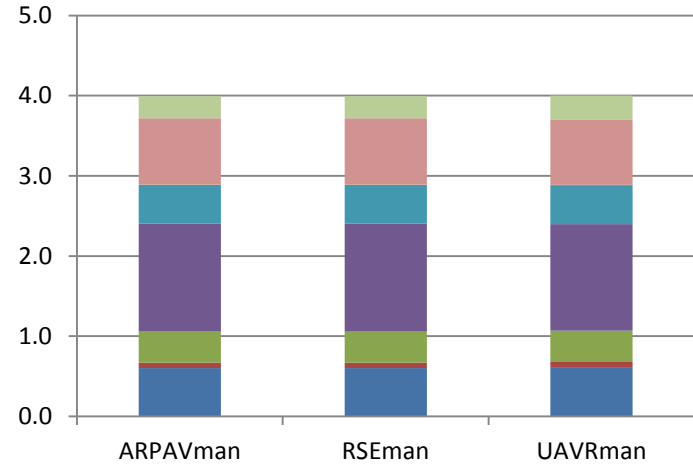
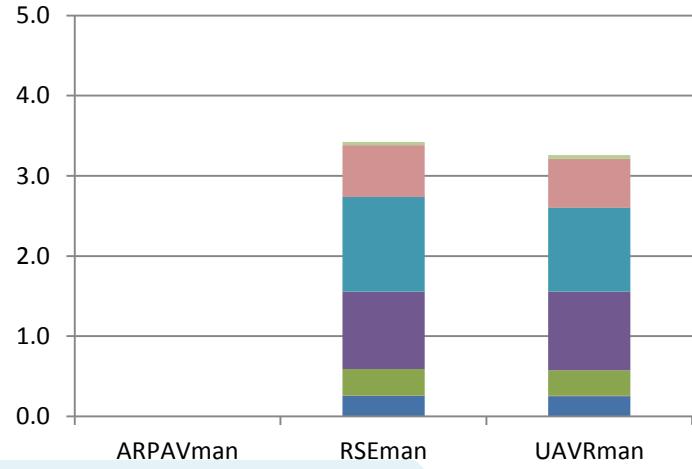
# Results @LENS

## NO3

### Summer

### Winter

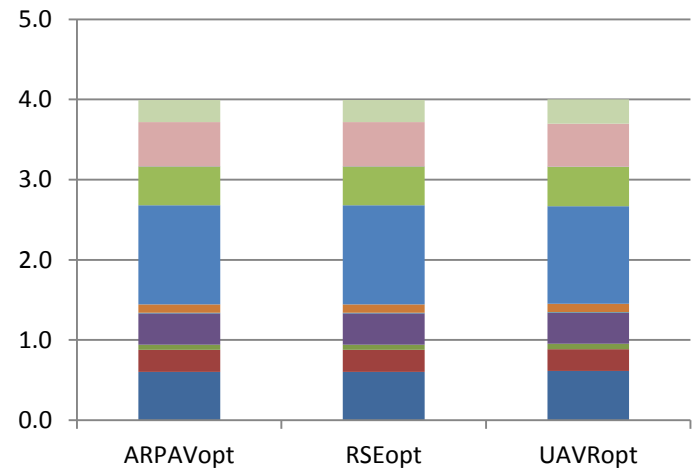
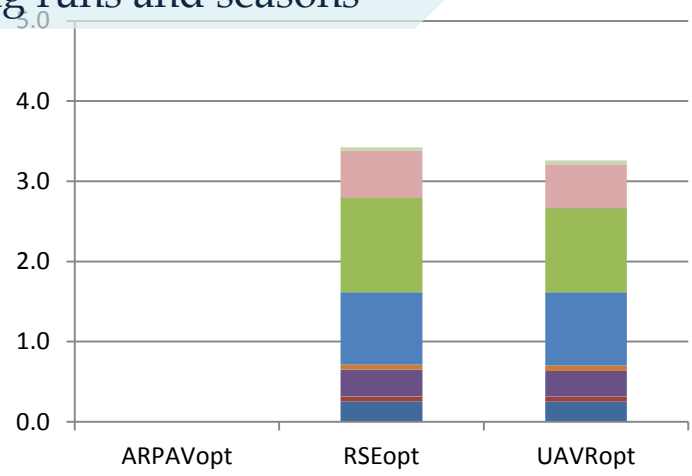
Man



- NO3-25-ALLBC
- NO3-25-99-OTH
- NO3-25-11-DST
- NO3-25-10-AGR
- NO3-25-08-SHP
- NO3-25-07-RTR
- NO3-25-34-IND
- NO3-25-02-BIO
- NO3-25-01-ENI

Different contributions among runs and seasons

Opt



- NO3-25-ALLBC
- NO3-25-99-OTH
- NO3-25-11-BSO
- NO3-25-11-SLT
- NO3-25-11-DST
- NO3-25-10-AGR
- NO3-25-08-SHP
- NO3-25-75-RTW
- NO3-25-72-RTD
- NO3-25-71-RTG
- NO3-25-07-RTR
- NO3-25-34-IND
- NO3-25-02-BIO
- NO3-25-02-OTH
- NO3-25-01-ENI



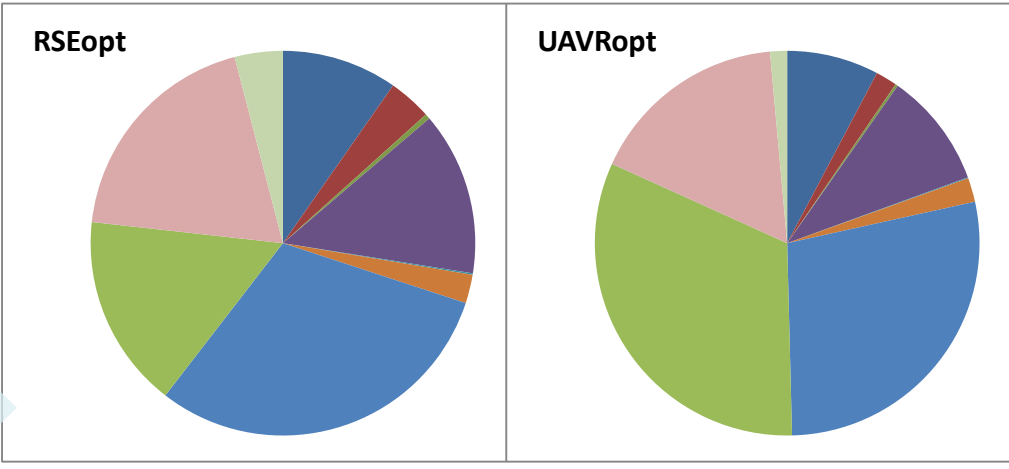
# Results

# @LENS

Opt

## NO3

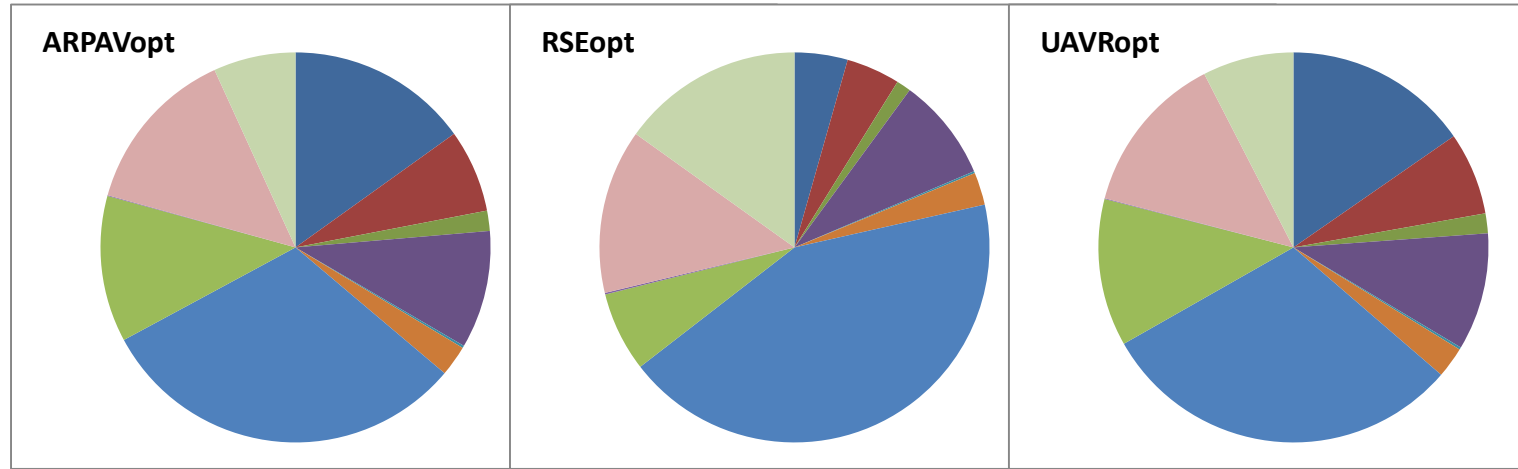
Summer



Different contributions among runs and seasons from energy, transport sources, boundaries

- NO3-25-01-ENI
- NO3-25-02-OTH
- NO3-25-02-BIO
- NO3-25-34-IND
- NO3-25-07-RTR
- NO3-25-71-RTG
- NO3-25-72-RTD
- NO3-25-75-RTW
- NO3-25-08-SHP
- NO3-25-10-AGR
- NO3-25-11-DST
- NO3-25-11-SLT
- NO3-25-11-BSO
- NO3-25-99-OTH
- NO3-25-ALLBC

Winter



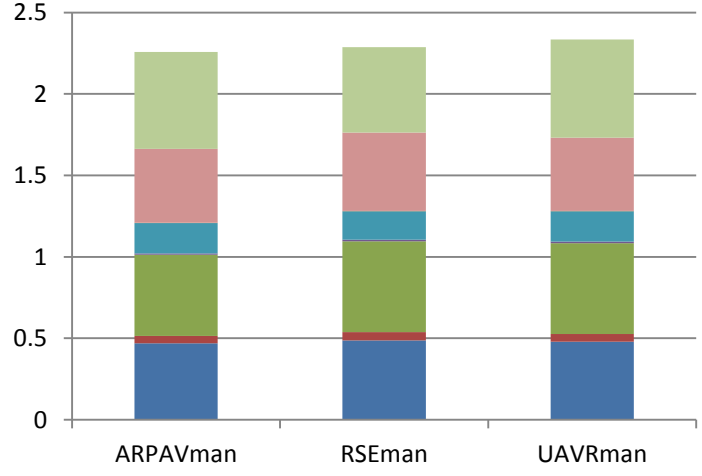
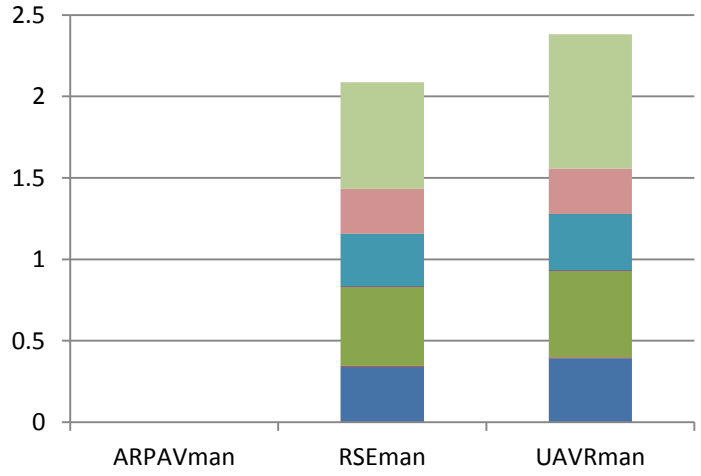
# Results @LENS

## SO4

### Summer

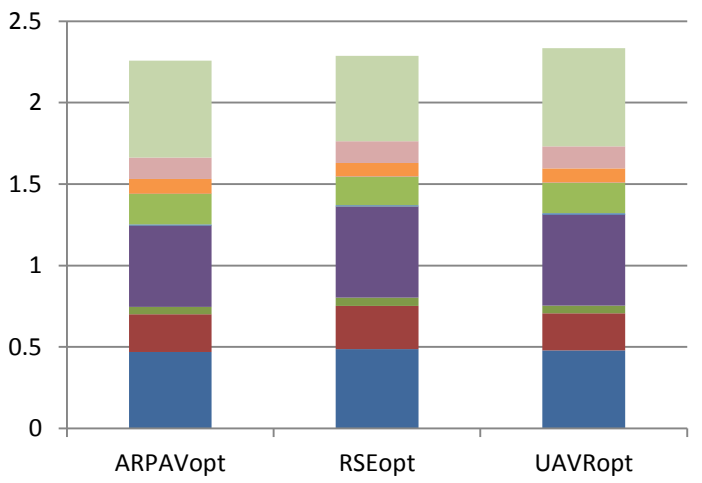
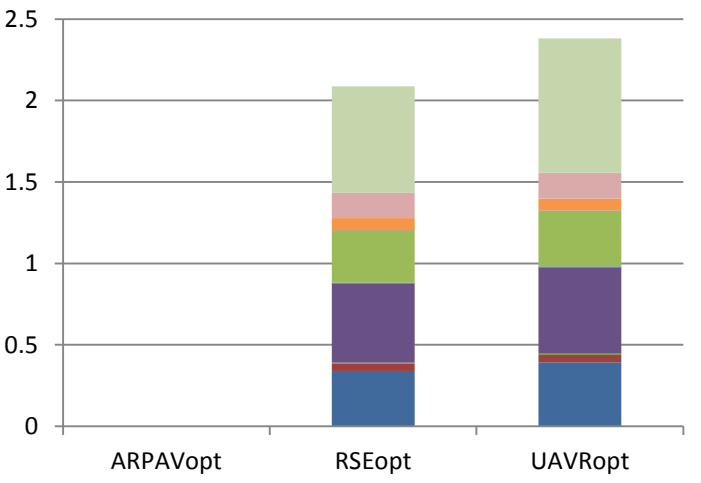
### Winter

Man



- SO4-25-ALLBC
- SO4-25-99-OTH
- SO4-25-11-DST
- SO4-25-10-AGR
- SO4-25-08-SHP
- SO4-25-07-RTR
- SO4-25-34-IND
- SO4-25-02-BIO
- SO4-25-01-ENI

Opt



- SO4-25-ALLBC
- SO4-25-99-OTH
- SO4-25-11-BSO
- SO4-25-11-SLT
- SO4-25-11-DST
- SO4-25-10-AGR
- SO4-25-08-SHP
- SO4-25-75-RTW
- SO4-25-72-RTD
- SO4-25-71-RTG
- SO4-25-07-RTR
- SO4-25-34-IND
- SO4-25-02-BIO
- SO4-25-02-OTH
- SO4-25-01-ENI

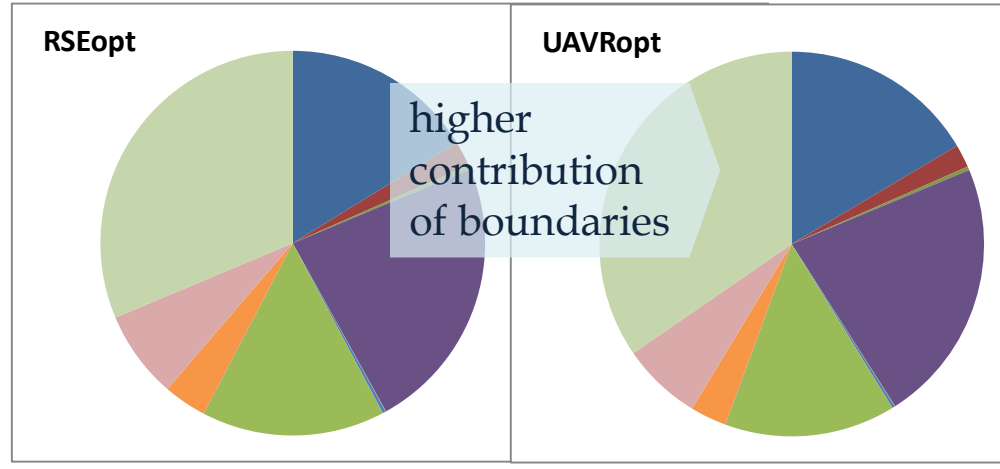
# Results

## @LENS

Opt

### SO4

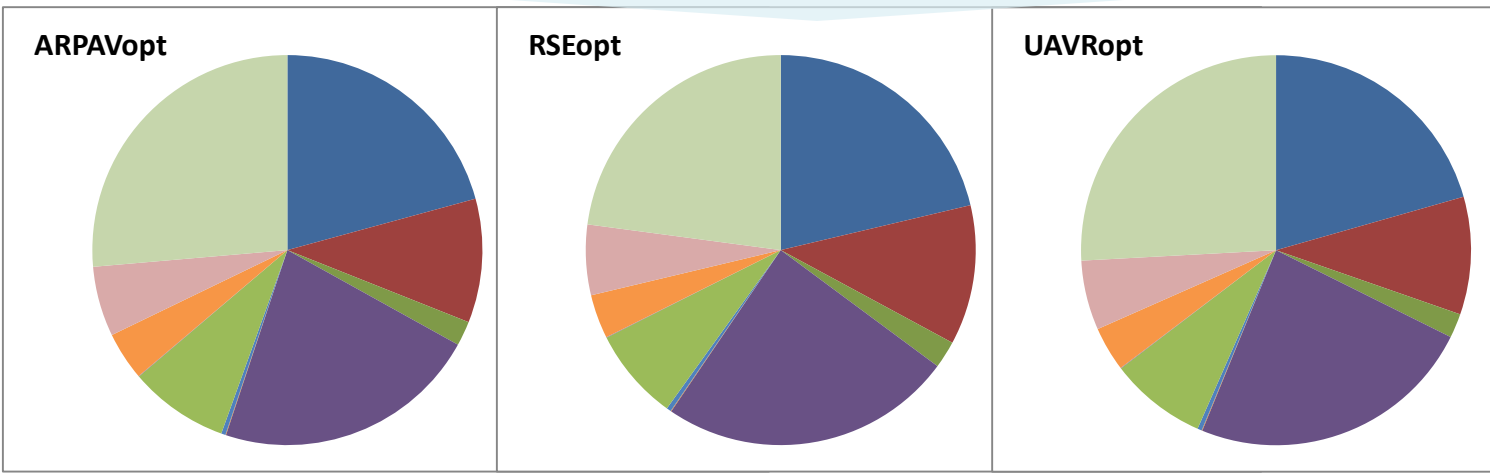
Summer



- SO4-25-01-ENI
- SO4-25-02-OTH
- SO4-25-02-BIO
- SO4-25-34-IND
- SO4-25-07-RTR
- SO4-25-71-RTG
- SO4-25-72-RTD
- SO4-25-75-RTW
- SO4-25-08-SHP
- SO4-25-10-AGR
- SO4-25-11-DST
- SO4-25-11-SLT
- SO4-25-11-BSO
- SO4-25-99-OTH
- SO4-25-ALLBC

Winter

Different contribution of boundaries and industry



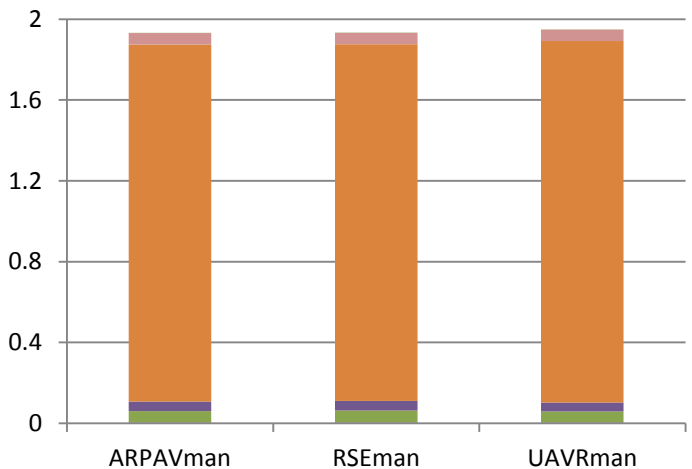
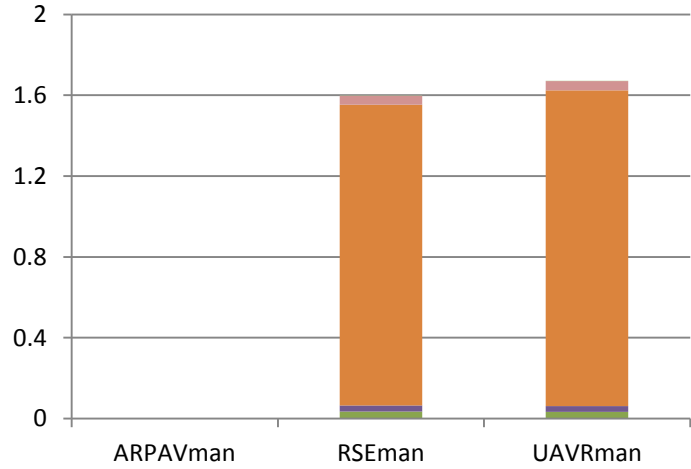
# Results @LENS

## NH4

### Summer

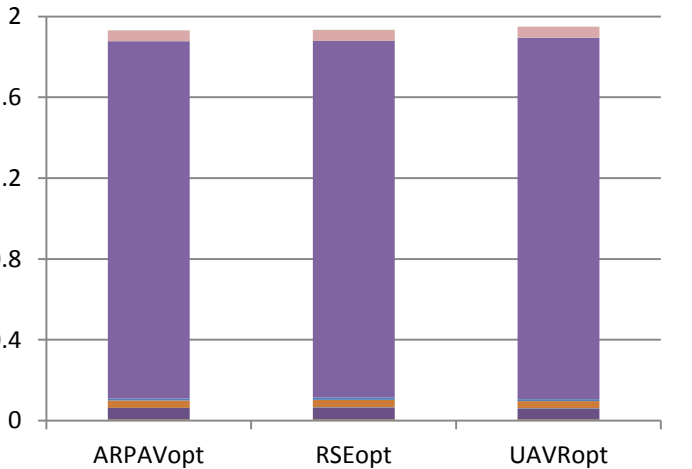
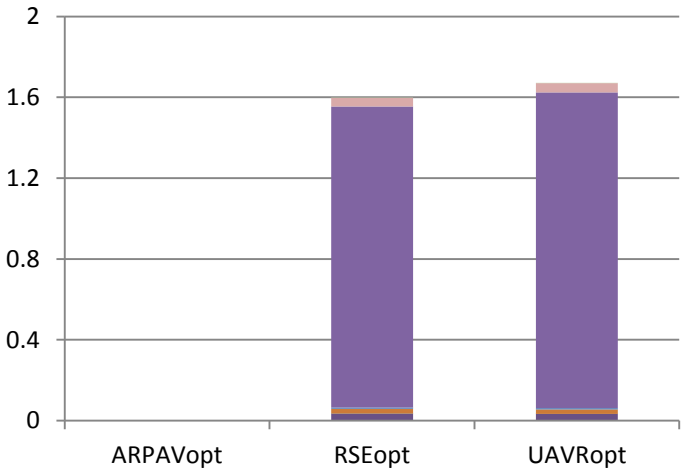
### Winter

Man



- NH4-25-ALLBC
- NH4-25-99-OTH
- NH4-25-11-DST
- NH4-25-10-AGR
- NH4-25-08-SHP
- NH4-25-07-RTR
- NH4-25-34-IND
- NH4-25-02-BIO
- NH4-25-01-ENI

Opt



- NH4-25-ALLBC
- NH4-25-99-OTH
- NH4-25-11-BSO
- NH4-25-11-SLT
- NH4-25-11-DST
- NH4-25-10-AGR
- NH4-25-08-SHP
- NH4-25-75-RTW
- NH4-25-72-RTD
- NH4-25-71-RTG
- NH4-25-07-RTR
- NH4-25-34-IND
- NH4-25-02-BIO
- NH4-25-02-OTH
- NH4-25-01-ENI

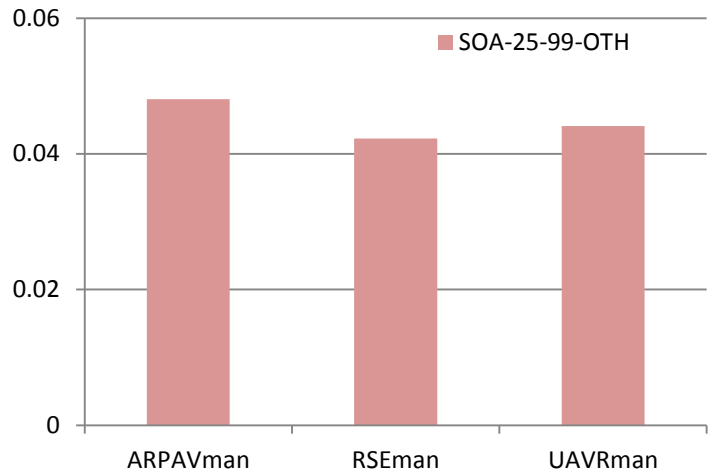
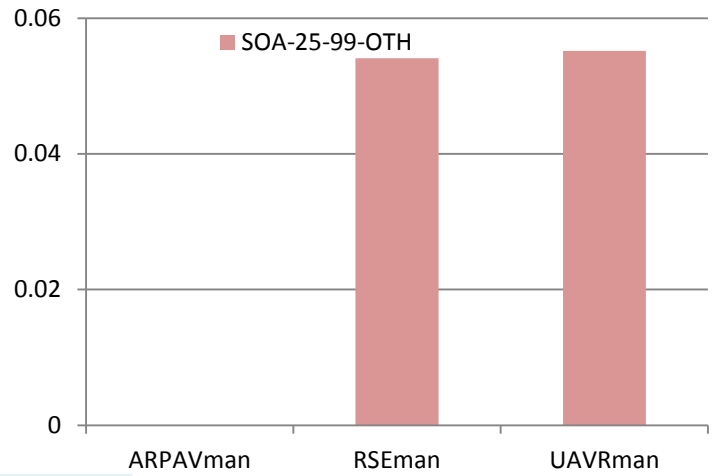
# Results @LENS

## SOA

### Summer

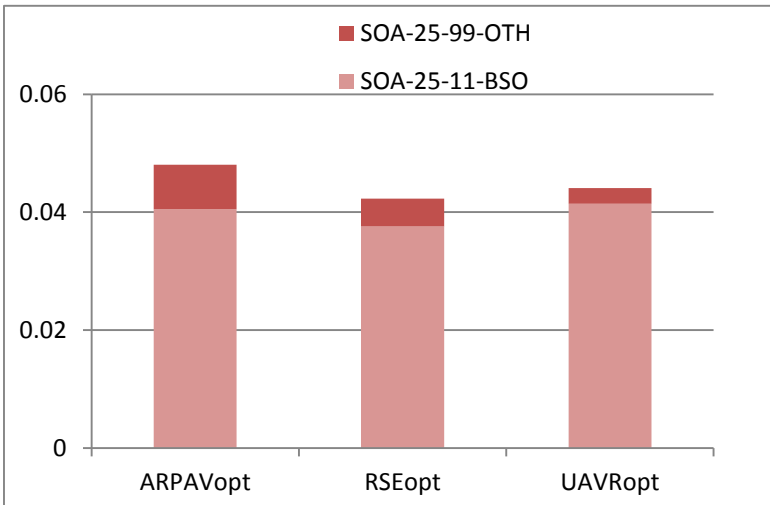
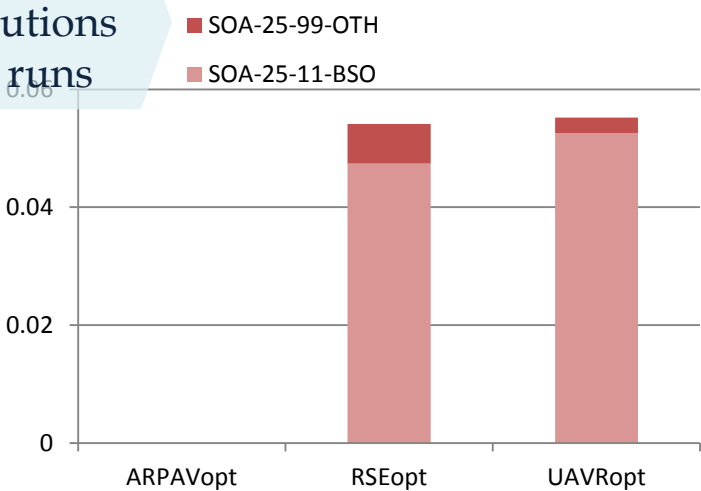
### Winter

Man



Different contributions among runs

Opt



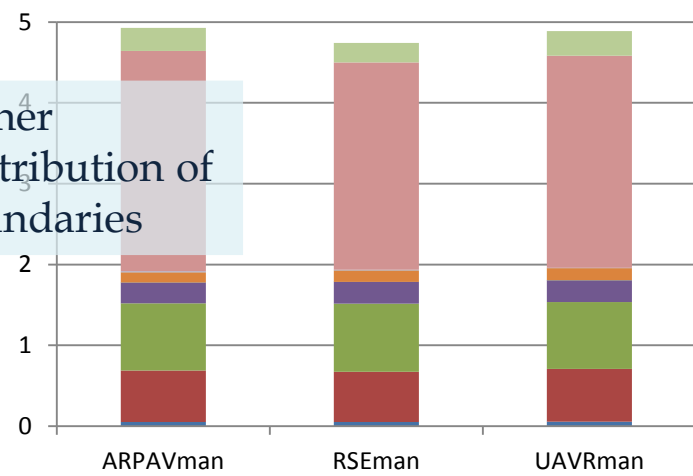
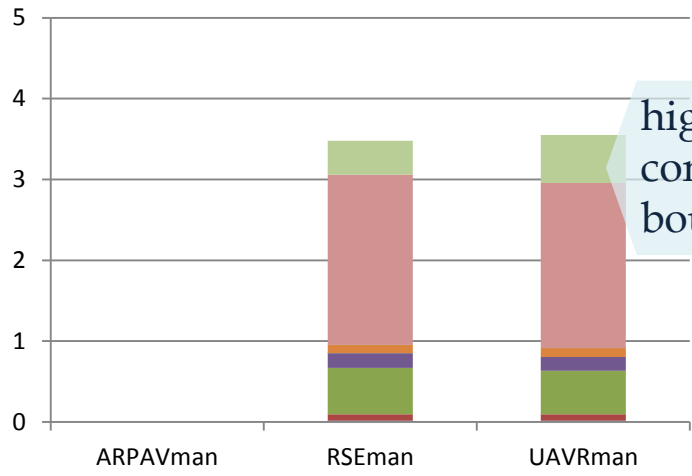
# Results @LENS

## OPA10

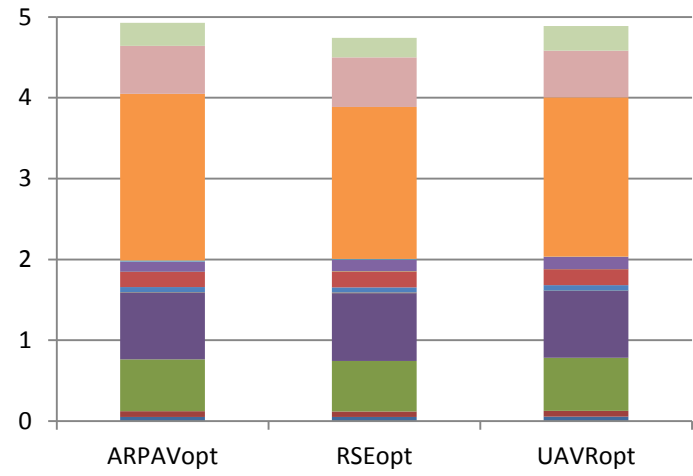
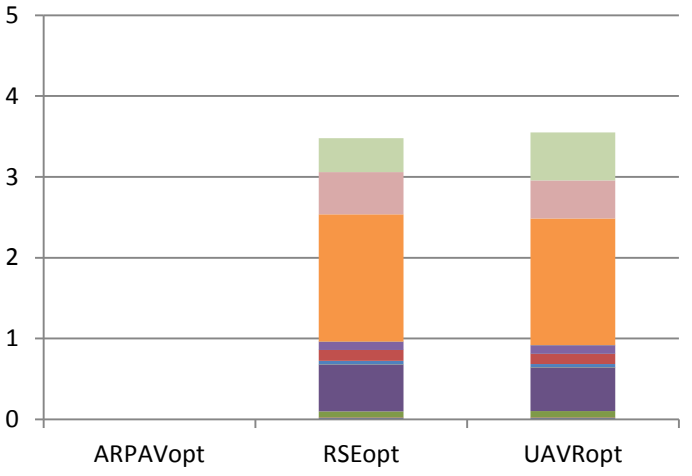
Summer

Winter

Man



Opt



- OPA-10-ALLBC
- OPA-10-99-OTH
- OPA-10-11-DST
- OPA-10-10-AGR
- OPA-10-08-SHP
- OPA-10-07-RTR
- OPA-10-34-IND
- OPA-10-02-BIO
- OPA-10-01-ENI
- OPA-10-11-BSO
- OPA-10-11-SLT
- OPA-10-75-RTW
- OPA-10-72-RTD
- OPA-10-71-RTG
- OPA-10-07-RTR
- OPA-10-34-IND
- OPA-10-02-BIO
- OPA-10-02-OTH
- OPA-10-01-ENI

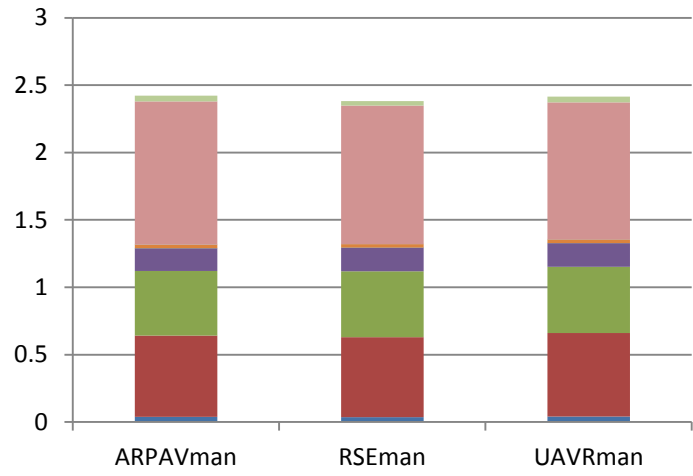
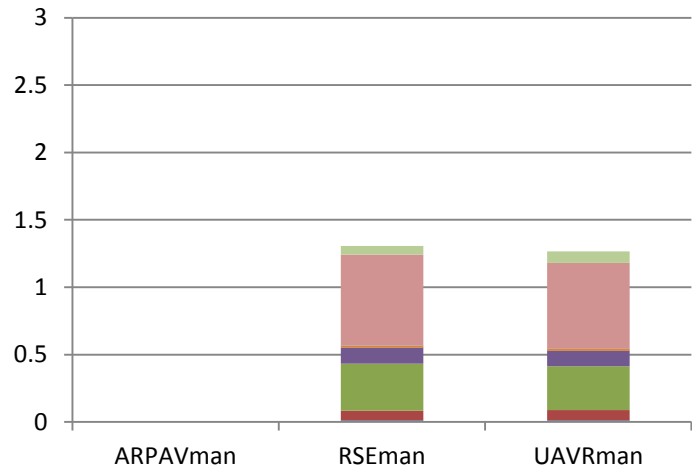
# Results @LENS

## OPA2.5

Summer

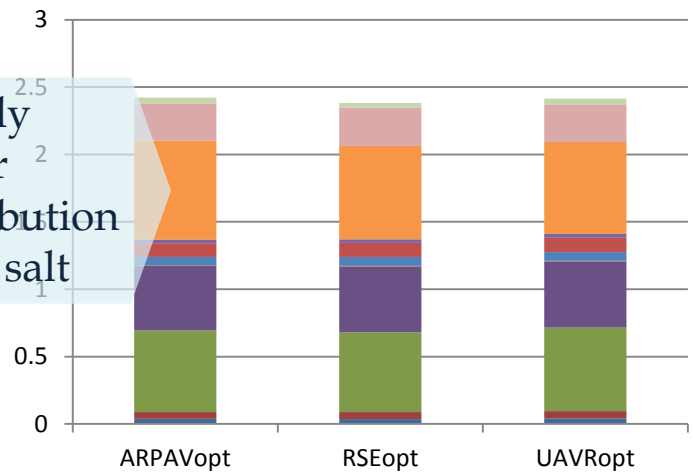
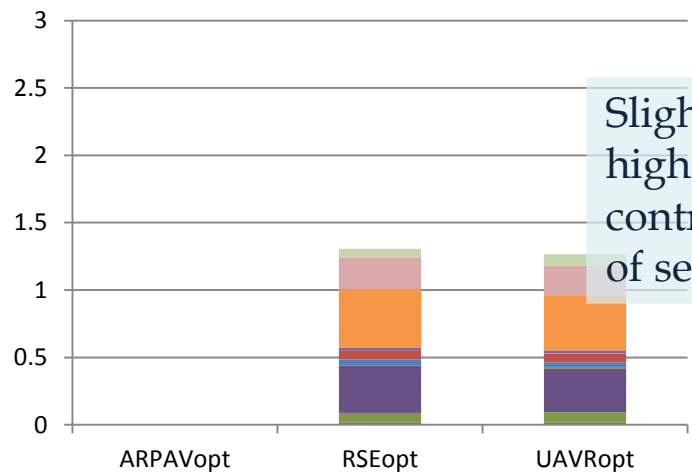
Winter

Man



- OPA-25-ALLBC
- OPA-25-99-OTH
- OPA-25-11-DST
- OPA-25-10-AGR
- OPA-25-08-SHP
- OPA-25-07-RTR
- OPA-25-34-IND
- OPA-25-02-BIO
- OPA-25-01-ENI

Opt



- OPA-25-ALLBC
- OPA-25-99-OTH
- OPA-25-11-BSO
- OPA-25-11-SLT
- OPA-25-11-DST
- OPA-25-10-AGR
- OPA-25-08-SHP
- OPA-25-75-RTW
- OPA-25-72-RTD
- OPA-25-71-RTG
- OPA-25-07-RTR
- OPA-25-34-IND
- OPA-25-02-BIO
- OPA-25-02-OTH
- OPA-25-01-ENI

Slightly higher contribution of sea salt

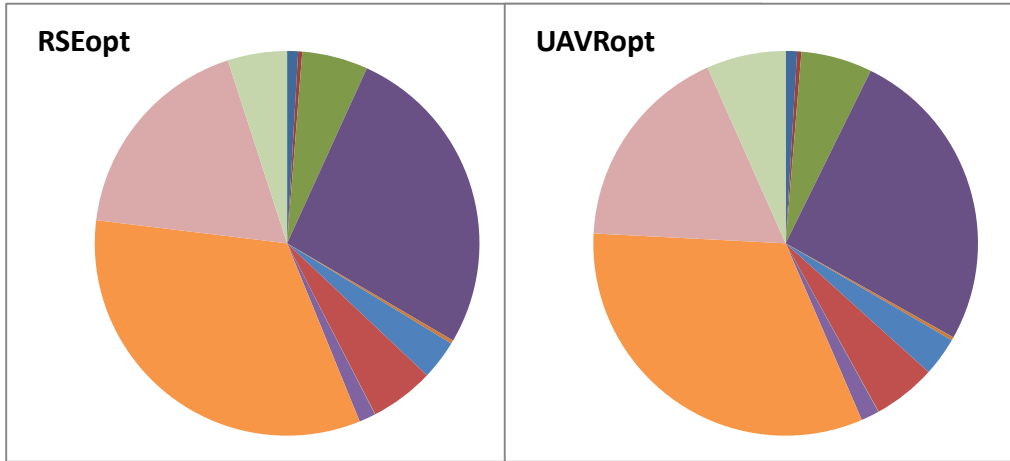
# Results

# @LENS

Opt

## OPA2.5

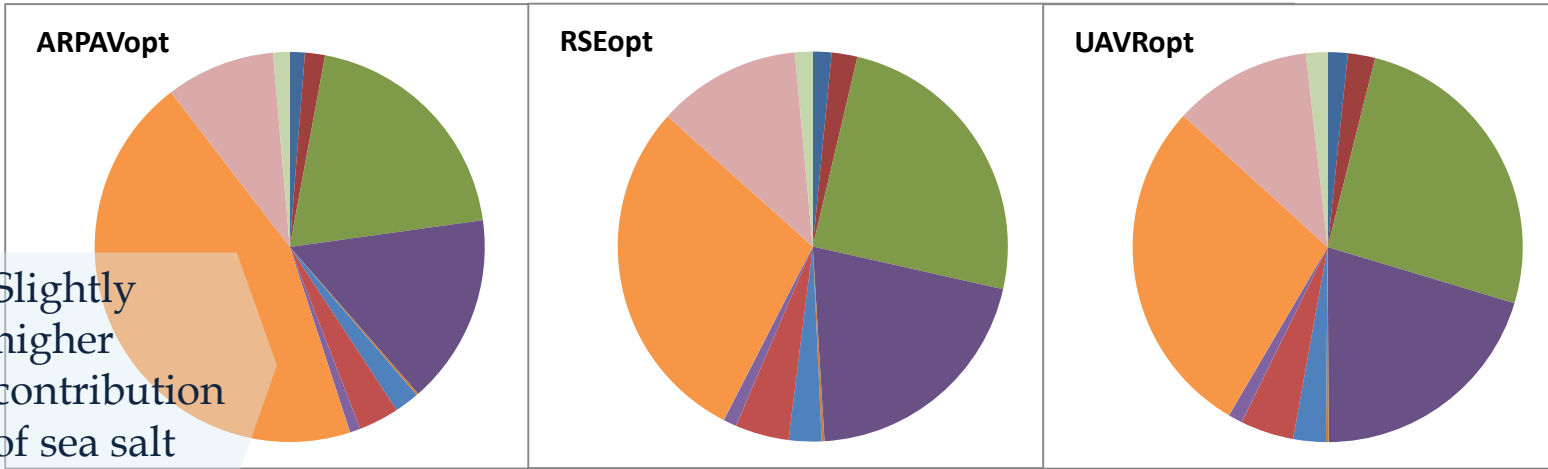
Summer



- OPA-25-01-ENI
- OPA-25-02-OTH
- OPA-25-02-BIO
- OPA-25-34-IND
- OPA-25-07-RTR
- OPA-25-71-RTG
- OPA-25-72-RTD
- OPA-25-75-RTW
- OPA-25-08-SHP
- OPA-25-10-AGR
- OPA-25-11-DST
- OPA-25-11-SLT
- OPA-25-11-BSO
- OPA-25-99-OTH
- OPA-25-ALLBC

Seasonal different contributions of biomass burning

Winter



Slightly higher contribution of sea salt



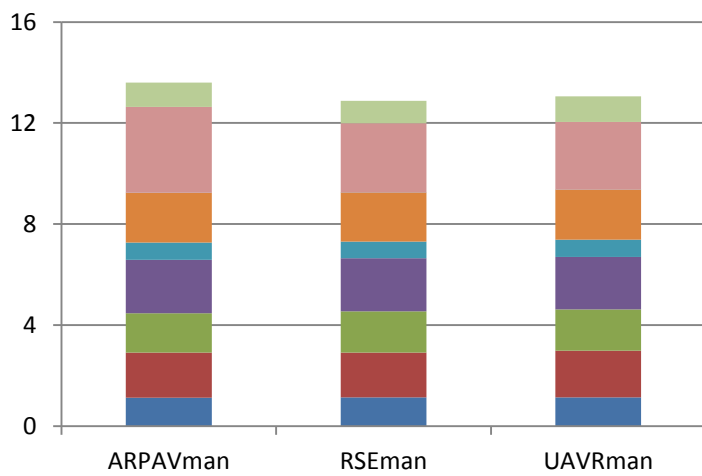
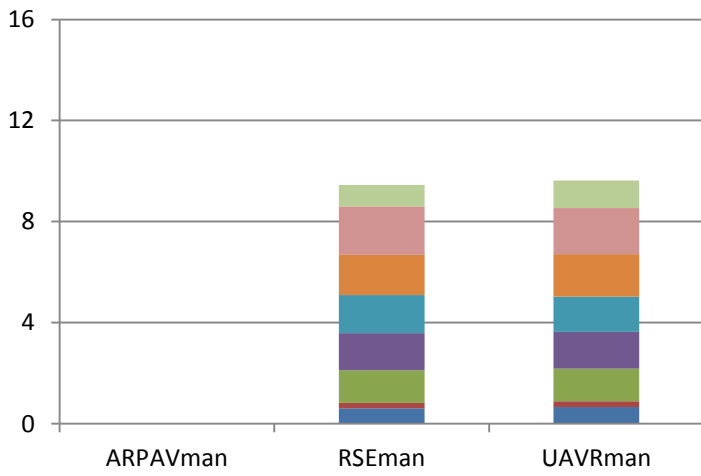
# Results @LENS

## PM2.5

Summer

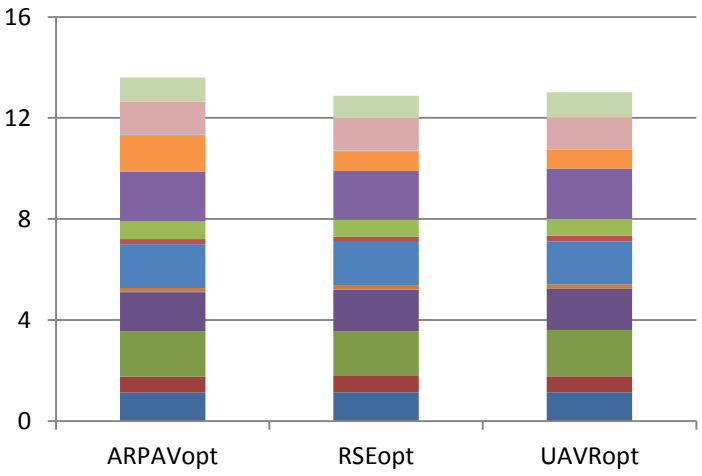
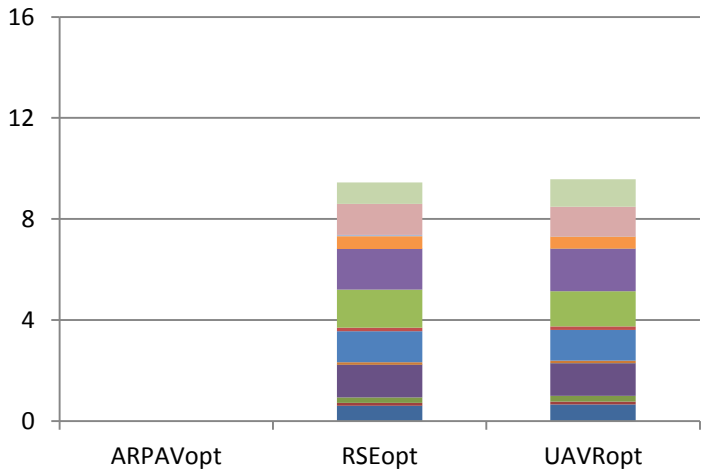
Winter

Man



- PM25-ALLBC
- PM25-99-OTH
- PM25-11-DST
- PM25-10-AGR
- PM25-08-SHP
- PM25-07-RTR
- PM25-34-IND
- PM25-02-BIO
- PM25-01-ENI

Opt



- PM25-ALLBC
- PM25-99-OTH
- PM25-11-BSO
- PM25-11-SLT
- PM25-11-DST
- PM25-10-AGR
- PM25-08-SHP
- PM25-75-RTW
- PM25-72-RTD
- PM25-71-RTG
- PM25-07-RTR
- PM25-34-IND
- PM25-02-BIO
- PM25-02-OTH
- PM25-01-ENI

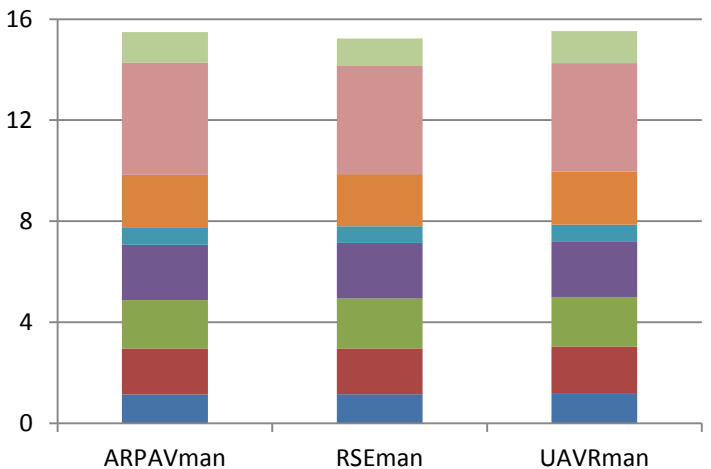
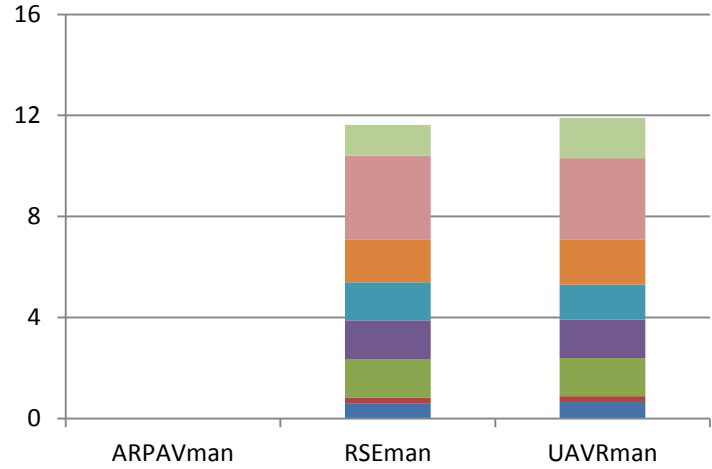
# Results @LENS

## PM10

Summer

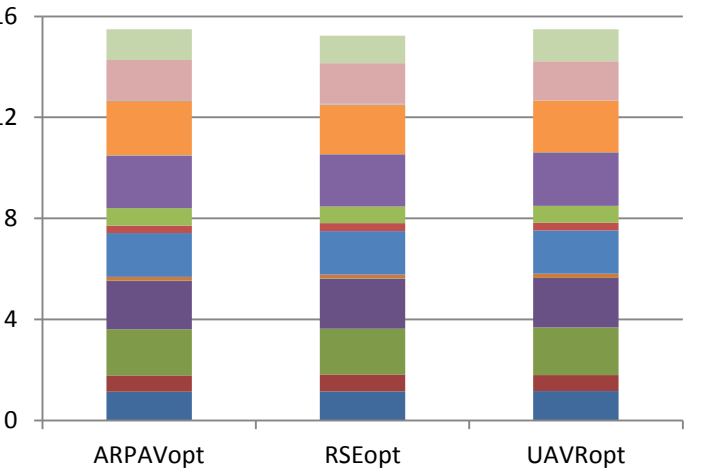
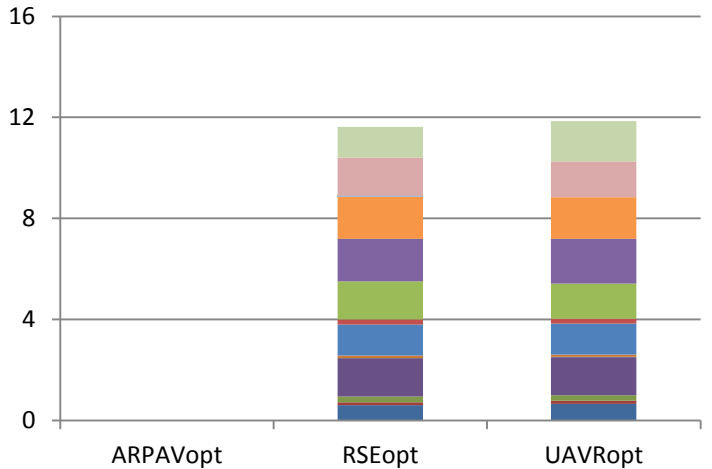
Winter

Man



- PM10-ALLBC
- PM10-99-OTH
- PM10-11-DST
- PM10-10-AGR
- PM10-08-SHP
- PM10-07-RTR
- PM10-34-IND
- PM10-02-BIO
- PM10-01-ENI

Opt



- PM10-ALLBC
- PM10-99-OTH
- PM10-11-BSO
- PM10-11-SLT
- PM10-11-DST
- PM10-10-AGR
- PM10-08-SHP
- PM10-07-RTR
- PM10-75-RTW
- PM10-72-RTD
- PM10-71-RTG
- PM10-07-RTR
- PM10-34-IND
- PM10-02-BIO
- PM10-02-OTH
- PM10-01-ENI

# Detailed Results

**@ PARIS**

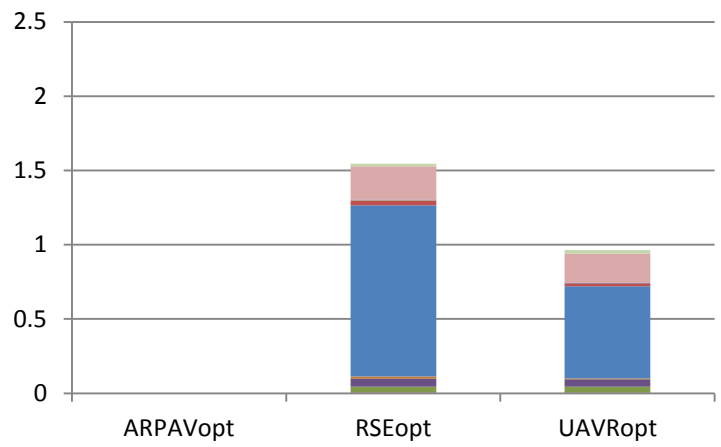
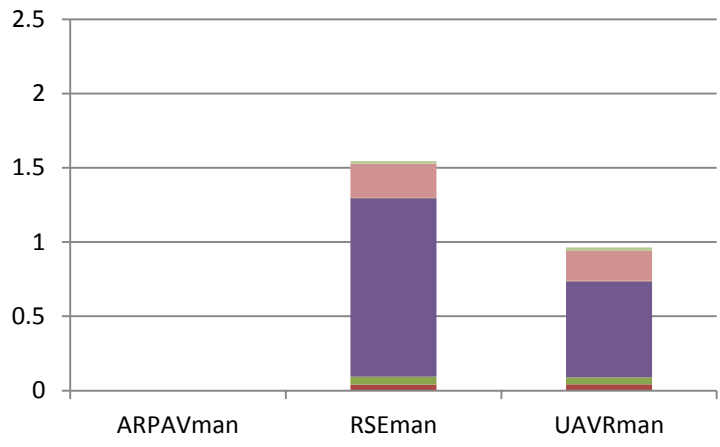
# Results @PARIS

## EC

Summer

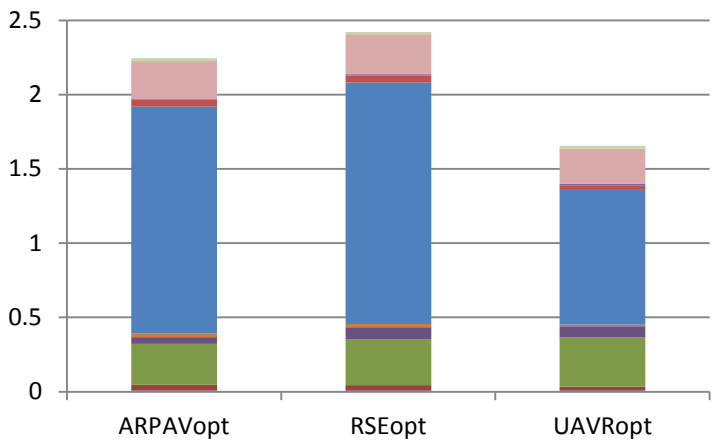
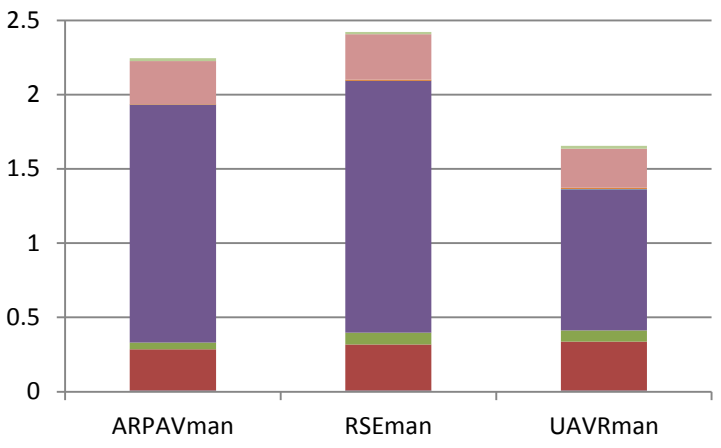
Winter

Man



- EC-25-ALLBC
- EC-25-99-OTH
- EC-25-11-BSO
- EC-25-11-SLT
- EC-25-11-DST
- EC-25-10-AGR
- EC-25-08-SHP
- EC-25-75-RTW
- EC-25-72-RTD
- EC-25-71-RTG
- EC-25-07-RTR
- EC-25-34-IND
- EC-25-02-BIO
- EC-25-02-OTH
- EC-25-01-ENI

Opt



- EC-25-ALLBC
- EC-25-99-OTH
- EC-25-11-BSO
- EC-25-11-SLT
- EC-25-11-DST
- EC-25-10-AGR
- EC-25-08-SHP
- EC-25-75-RTW
- EC-25-72-RTD
- EC-25-71-RTG
- EC-25-07-RTR
- EC-25-34-IND
- EC-25-02-BIO
- EC-25-02-OTH
- EC-25-01-ENI

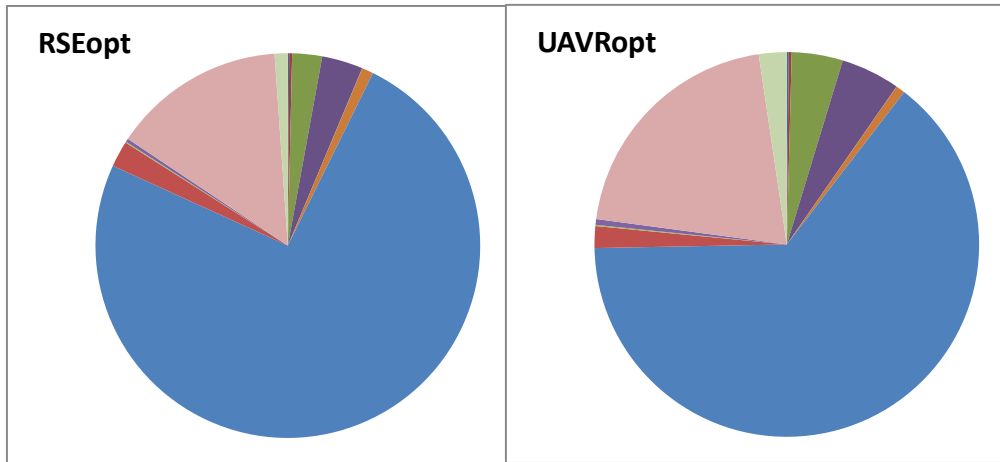
# Results

# @PARIS

Opt

EC

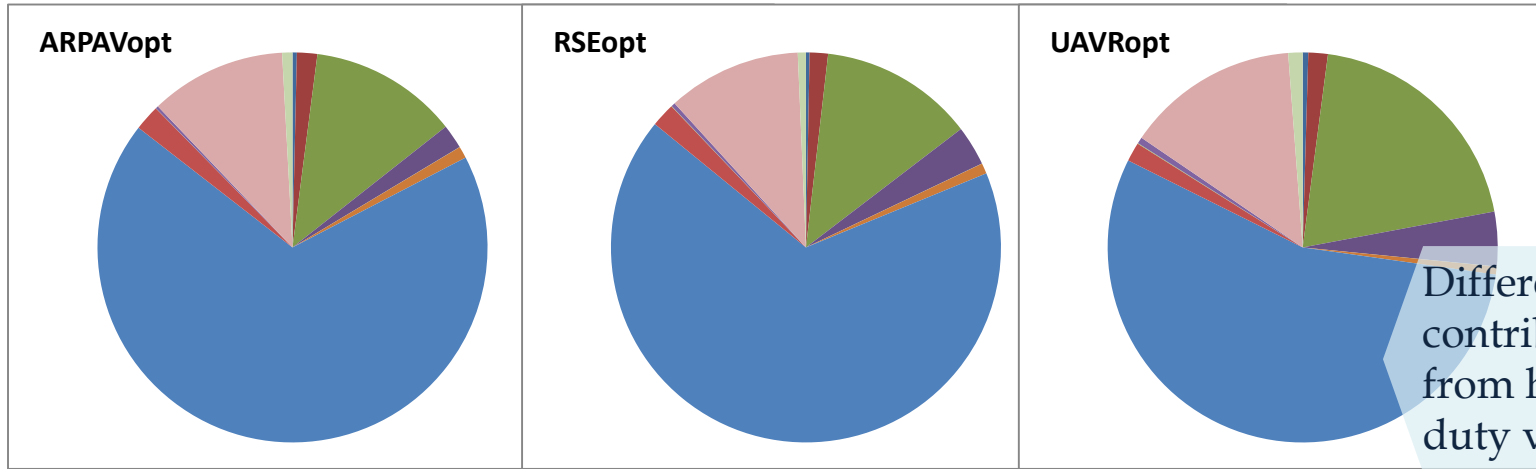
Summer



- EC-25-01-ENI
- EC-25-02-OTH
- EC-25-02-BIO
- EC-25-34-IND
- EC-25-07-RTR
- EC-25-71-RTG
- EC-25-72-RTD
- EC-25-75-RTW
- EC-25-08-SHP
- EC-25-10-AGR
- EC-25-11-DST
- EC-25-11-SLT
- EC-25-11-BSO
- EC-25-99-OTH
- EC-25-ALLBC

Seasonal different contributions of biomass burning

Winter



Different contribution from heavy duty vehicles

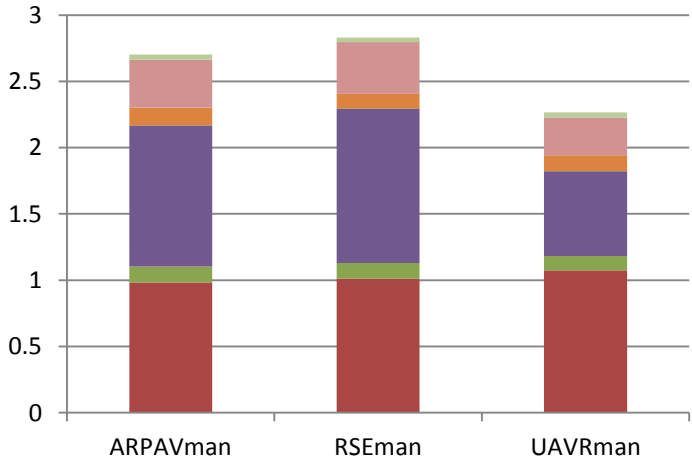
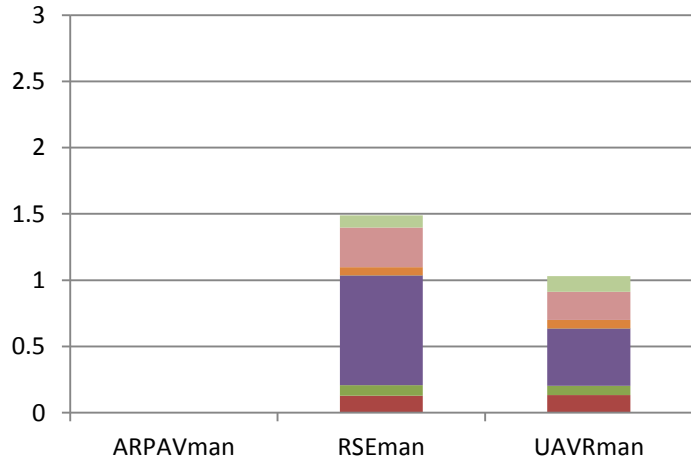
# Results @PARIS

## POA

Summer

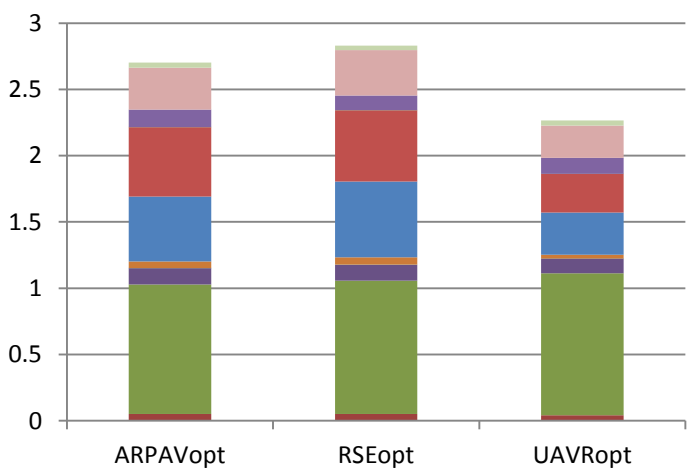
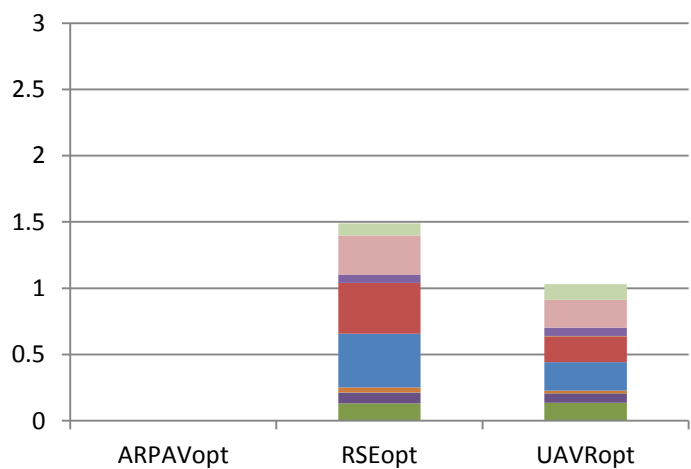
Winter

Man



- POA-25-ALLBC
- POA-25-99-OTH
- POA-25-11-DST
- POA-25-10-AGR
- POA-25-08-SHP
- POA-25-07-RTR
- POA-25-34-IND
- POA-25-02-BIO
- POA-25-01-ENI

Opt



- POA-25-ALLBC
- POA-25-99-OTH
- POA-25-11-BSO
- POA-25-11-SLT
- POA-25-11-DST
- POA-25-10-AGR
- POA-25-08-SHP
- POA-25-75-RTW
- POA-25-72-RTD
- POA-25-71-RTG
- POA-25-07-RTR
- POA-25-34-IND
- POA-25-02-BIO
- POA-25-02-OTH
- POA-25-01-ENI

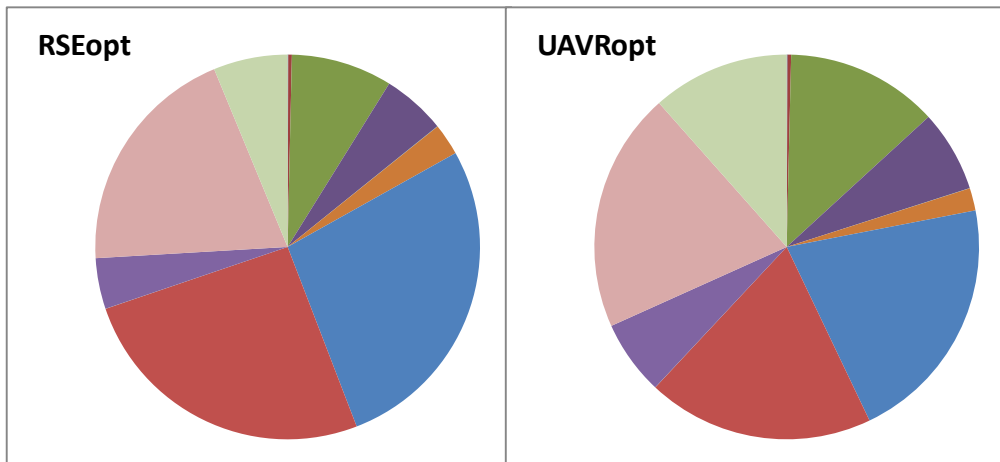
# Results

# @PARIS

Opt

# POA

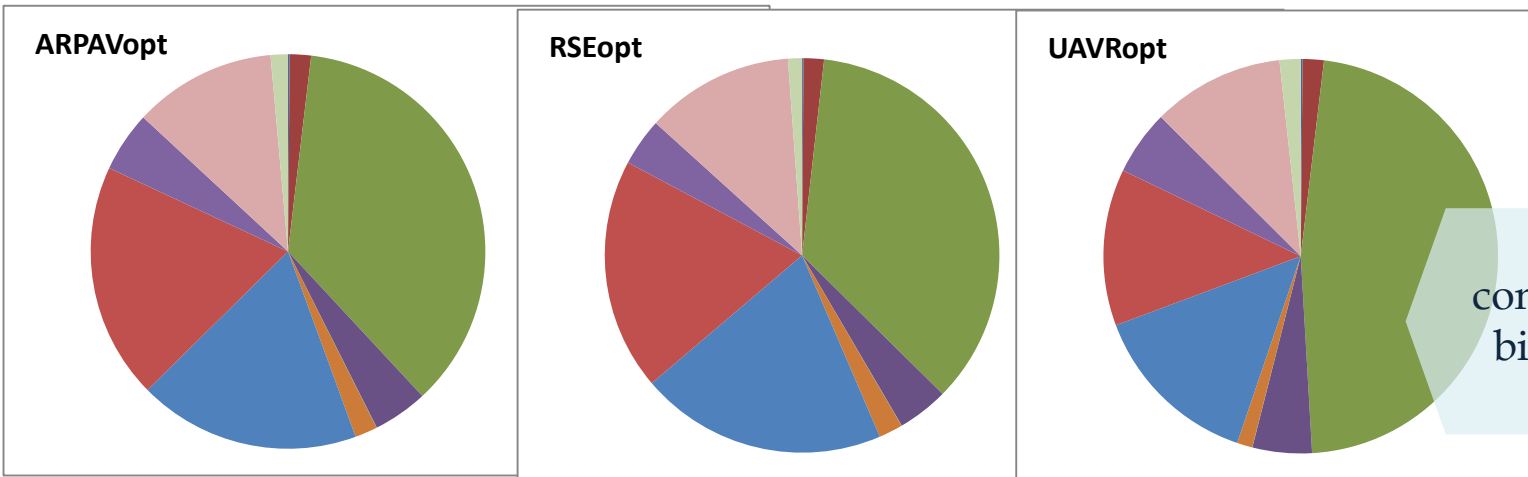
## Summer



- POA-25-01-ENI
- POA-25-02-OTH
- POA-25-02-BIO
- POA-25-34-IND
- POA-25-07-RTR
- POA-25-71-RTG
- POA-25-72-RTD
- POA-25-75-RTW
- POA-25-08-SHP
- POA-25-10-AGR
- POA-25-11-DST
- POA-25-11-SLT
- POA-25-11-BSO
- POA-25-99-OTH
- POA-25-ALLBC

Seasonal different contributions of biomass burning

## Winter



Different contribution from biomass burning among runs

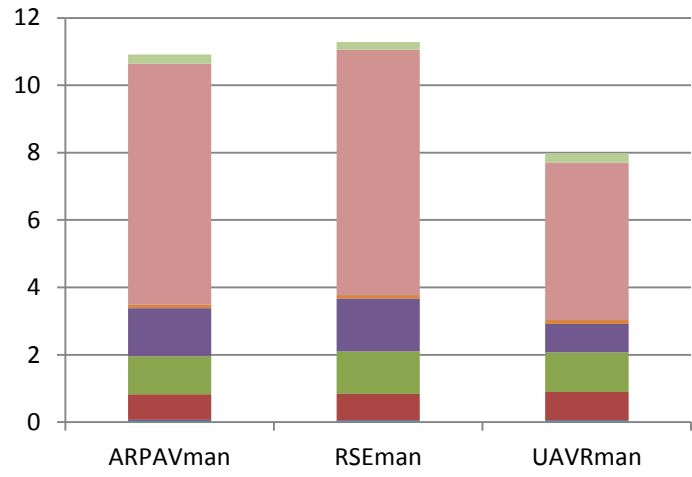
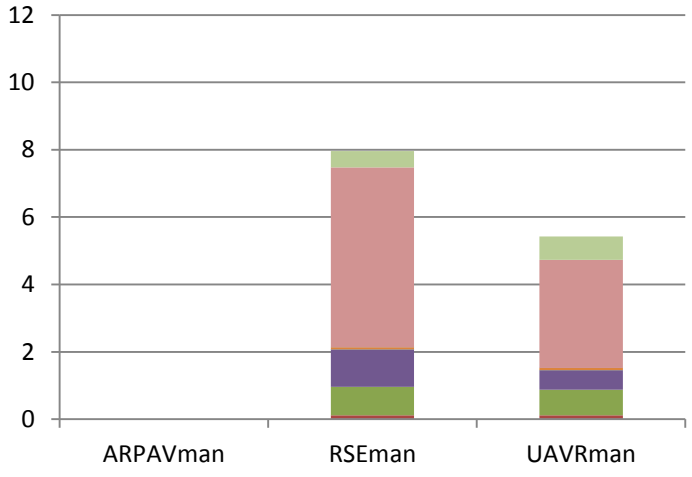
# Results @PARIS

## OPA10

Summer

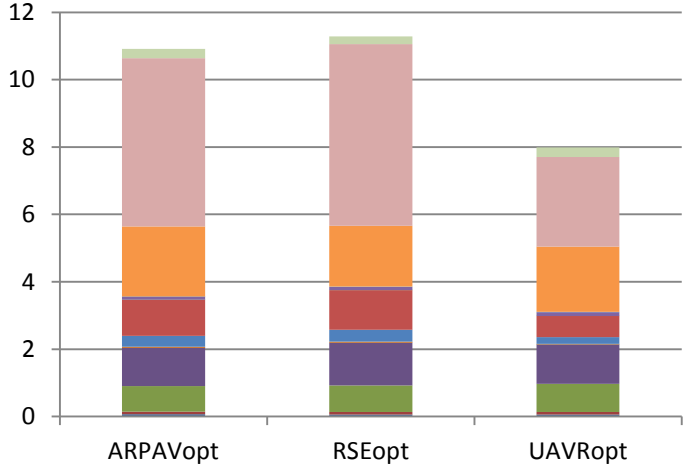
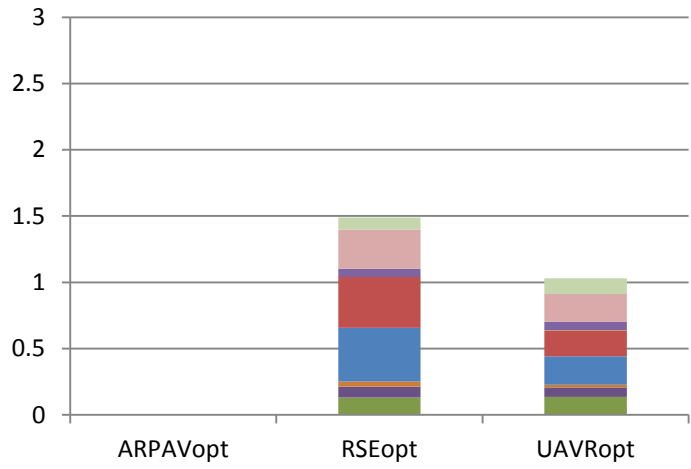
Winter

Man



- OPA-10-ALLBC
- OPA-10-99-OTH
- OPA-10-11-DST
- OPA-10-10-AGR
- OPA-10-08-SHP
- OPA-10-07-RTR
- OPA-10-34-IND
- OPA-10-02-BIO
- OPA-10-01-ENI

Opt



- OPA-10-ALLBC
- OPA-10-99-OTH
- OPA-10-11-BSO
- OPA-10-11-SLT
- OPA-10-11-DST
- OPA-10-10-AGR
- OPA-10-08-SHP
- OPA-10-75-RTW
- OPA-10-72-RTD
- OPA-10-71-RTG
- OPA-10-07-RTR
- OPA-10-34-IND
- OPA-10-02-BIO
- OPA-10-02-OTH
- OPA-10-01-ENI



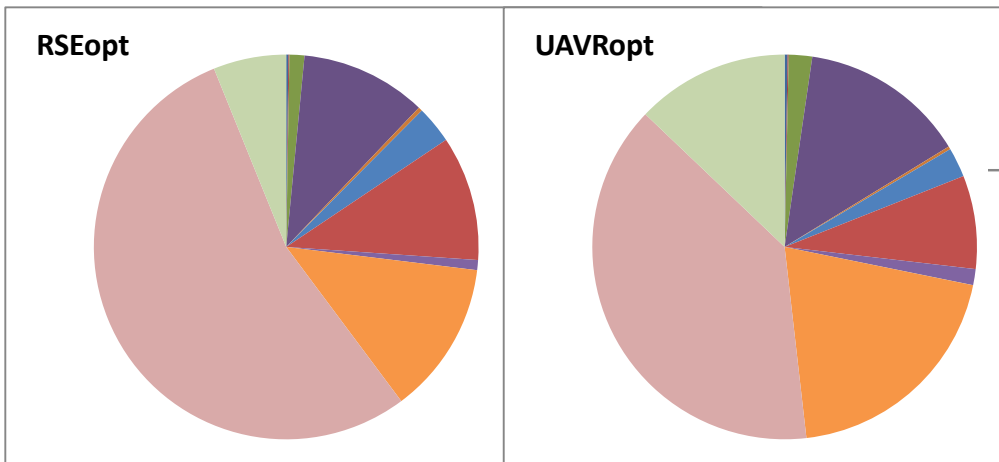
# Results

# @PARIS

Opt

## OPA10

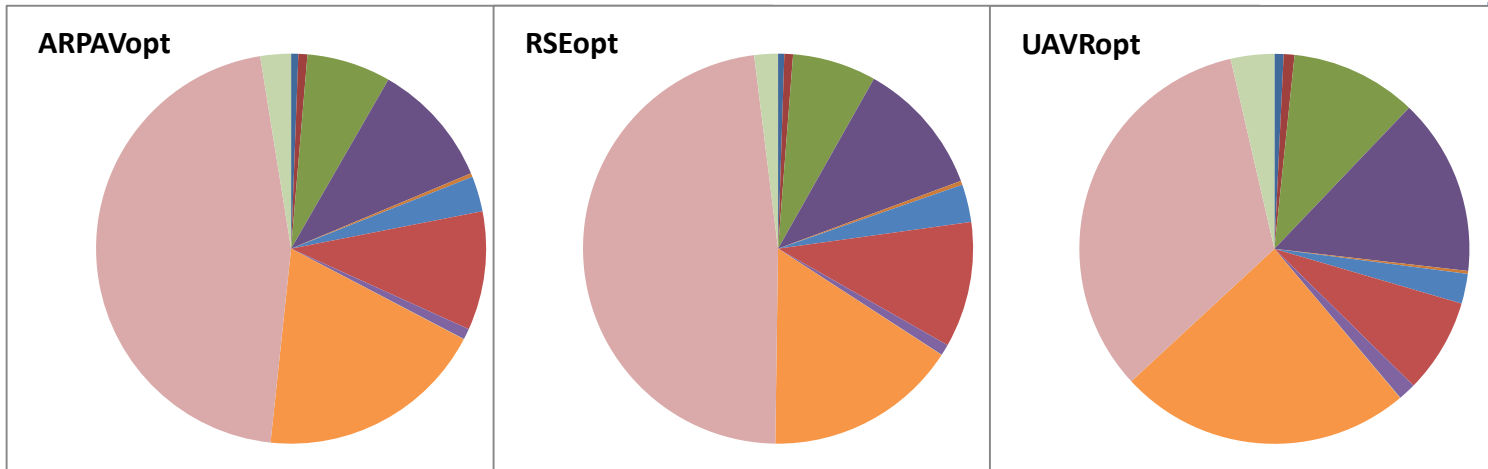
Summer



- OPA-10-01-ENI
- OPA-10-02-OTH
- OPA-10-02-BIO
- OPA-10-34-IND
- OPA-10-07-RTR
- OPA-10-71-RTG
- OPA-10-72-RTD
- OPA-10-75-RTW
- OPA-10-08-SHP
- OPA-10-10-AGR
- OPA-10-11-DST
- OPA-10-11-SLT
- OPA-10-11-BSO
- OPA-10-99-OTH
- OPA-10-ALLBC

Seasonal different contributions of biomass burning, industry, sea salt

Winter



# Thank you!

**Questions?**  
**Comments?**  
**Suggestions?**