

# Problem of increase PR and SN with nCat=2,3...

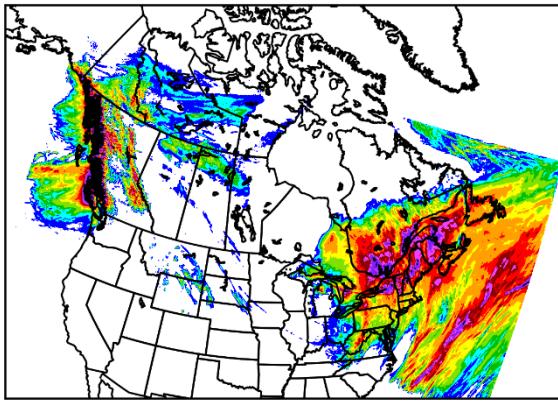
Melissa Cholette

March 2023

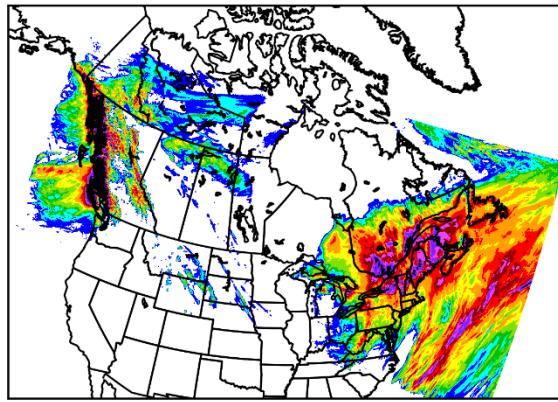
# 2MOM\_N2

- HRDPS Freezing rain case: 2020022700 (48-h accumulation)

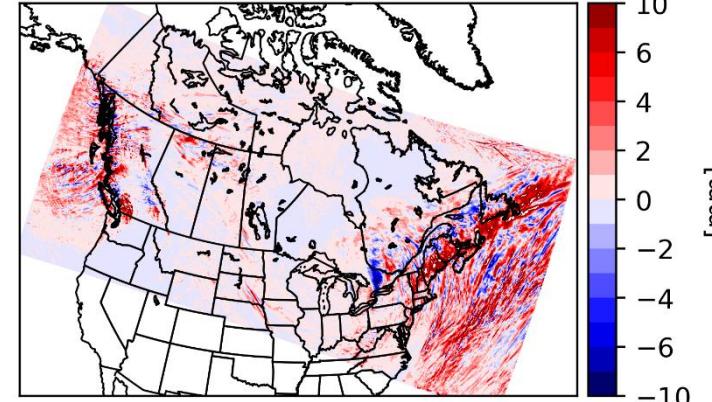
PR\_2MOM\_noLF\_n2



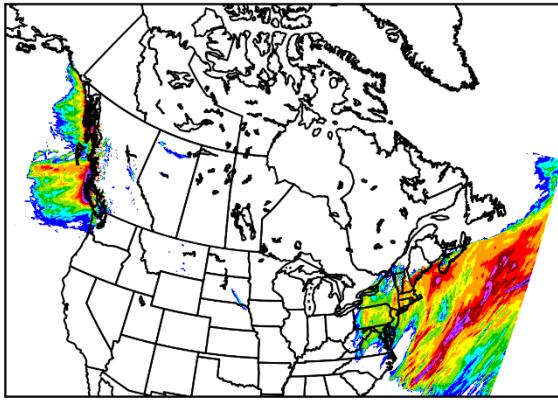
PR\_2MOM\_noLF\_n2\_murfix



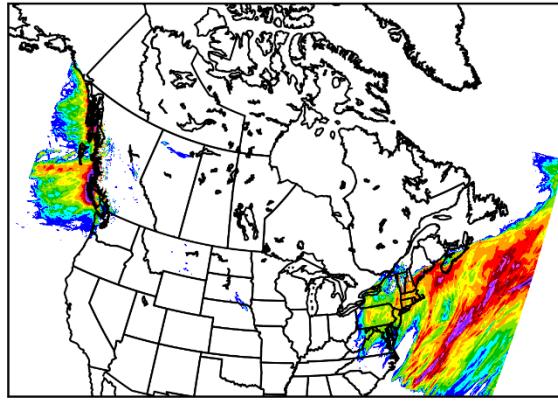
PR\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2



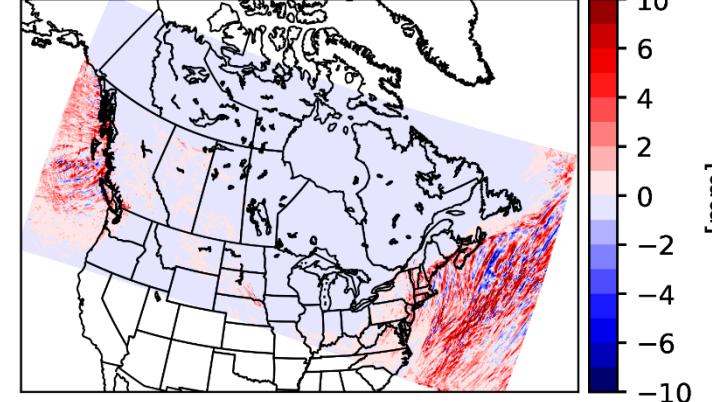
RN\_2MOM\_noLF\_n2



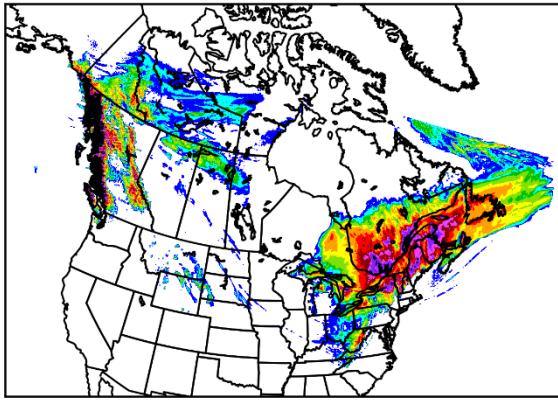
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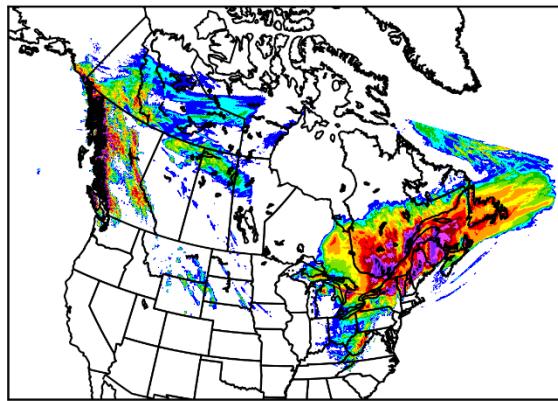
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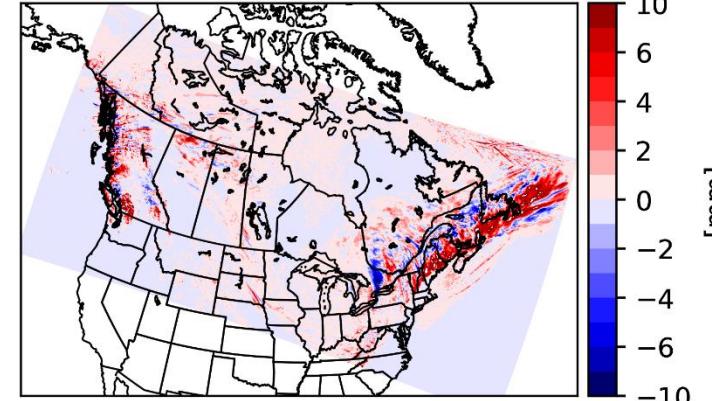
SN\_2MOM\_noLF\_n2



SN\_2MOM\_noLF\_n2\_murfix

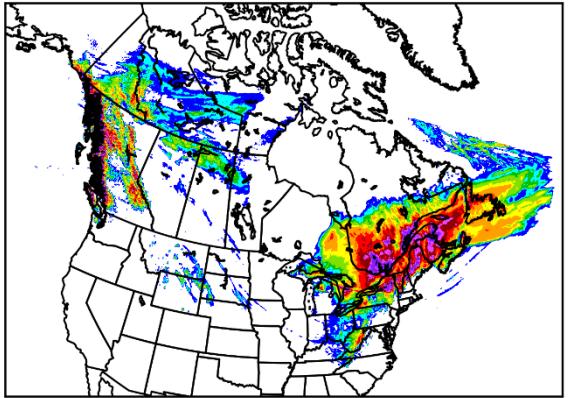


SN\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2

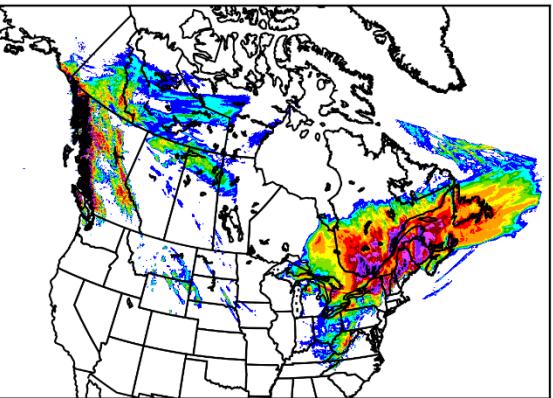


Large increase of PR and SN with nCat=2

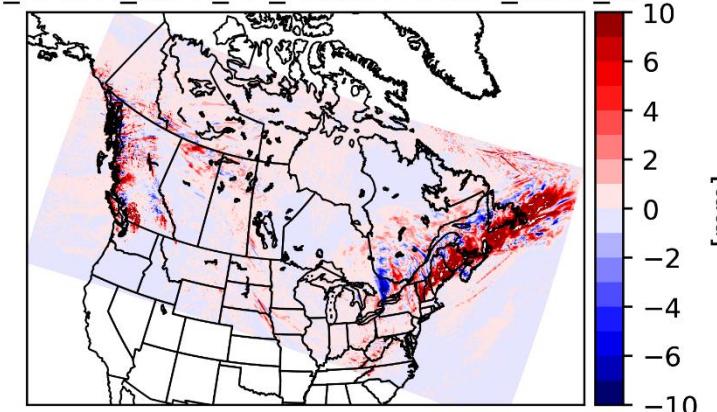
A4\_2MOM\_noLF\_n2



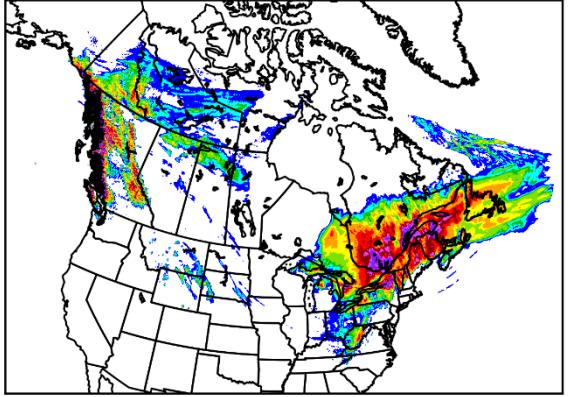
A4\_2MOM\_noLF\_n2\_murfix



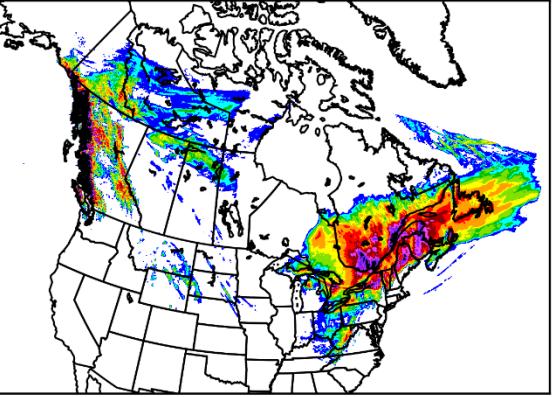
A4\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2



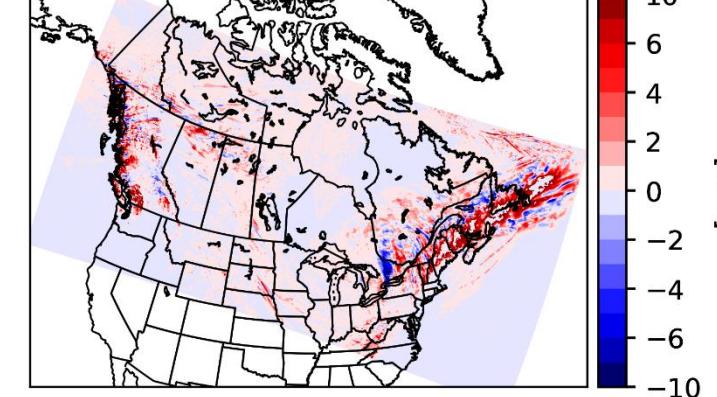
SN2\_2MOM\_noLF\_n2



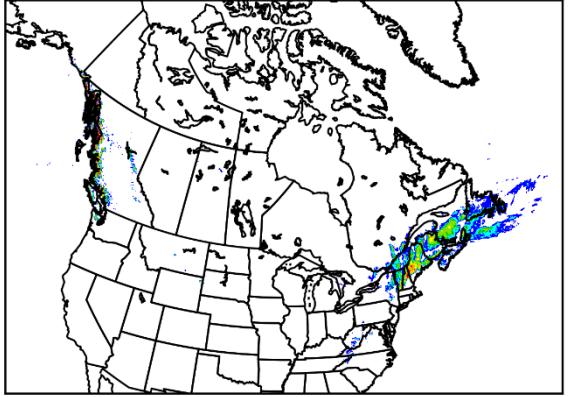
SN2\_2MOM\_noLF\_n2\_murfix



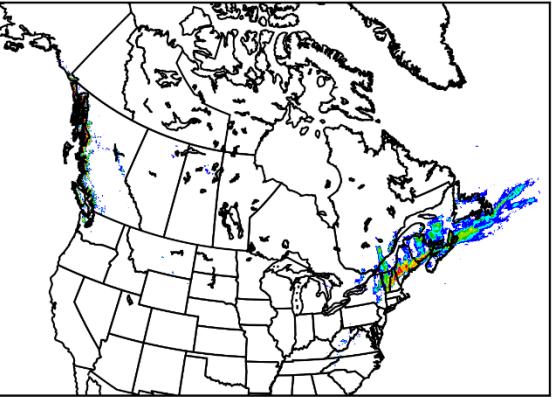
SN2\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2



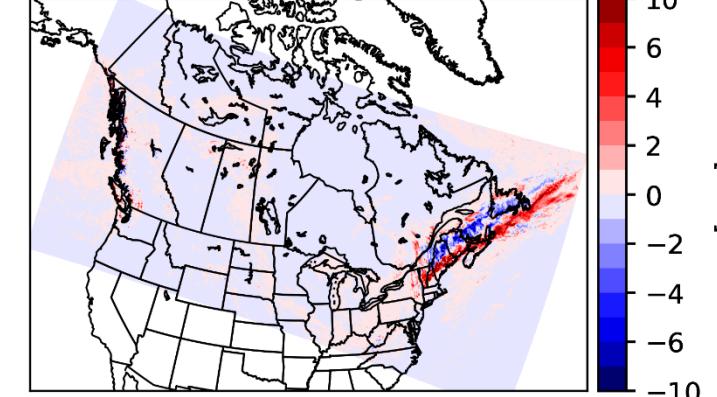
SN3\_2MOM\_noLF\_n2



SN3\_2MOM\_noLF\_n2\_murfix

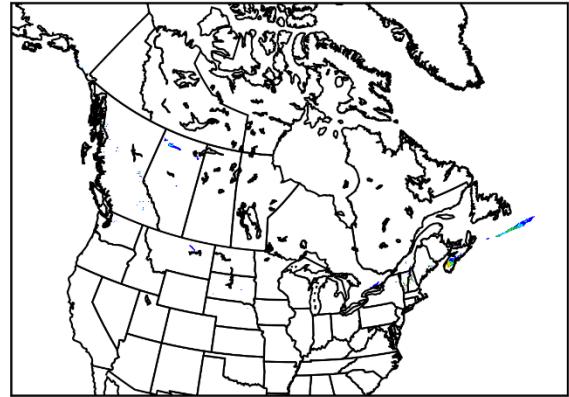


SN3\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2

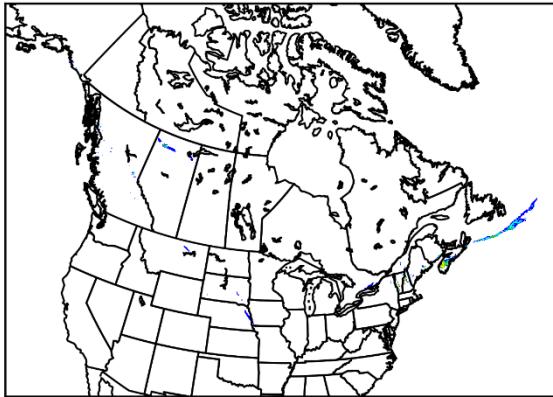


Large  
increase of  
A4, SN2 and  
SN3 with  
nCat=2

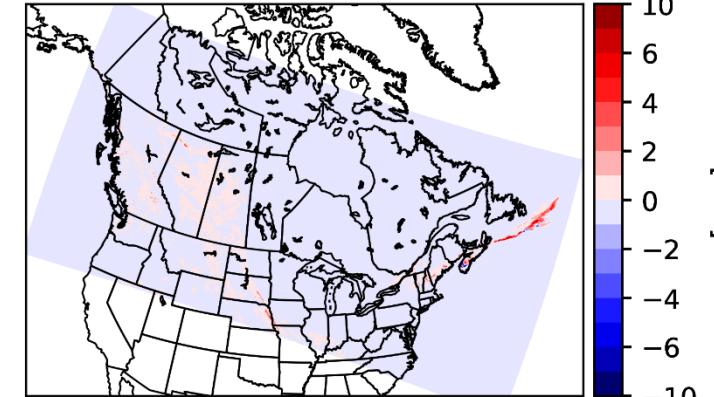
FR\_2MOM\_noLF\_n2



FR\_2MOM\_noLF\_n2\_murfix



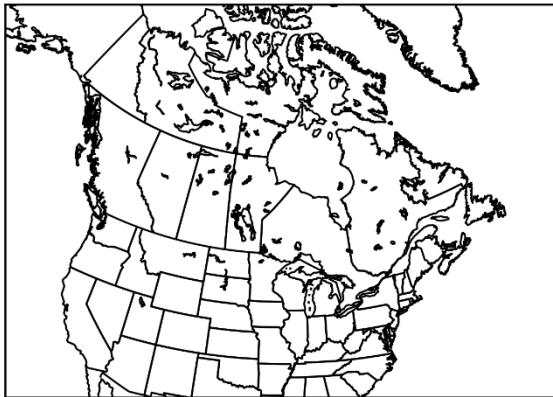
FR\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2



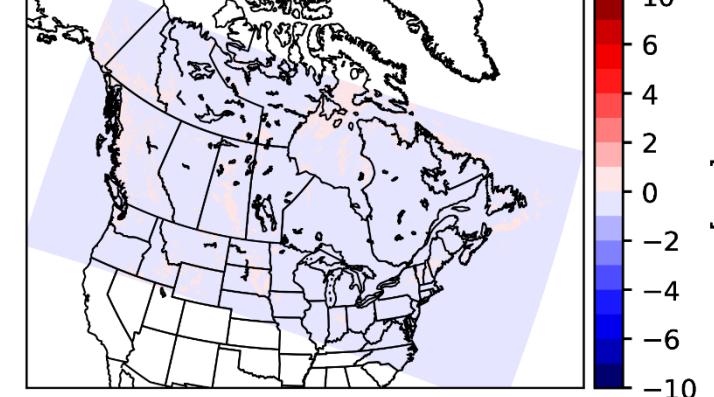
FR1\_2MOM\_noLF\_n2



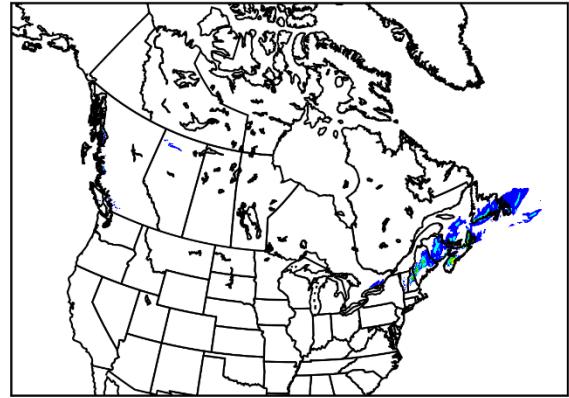
FR1\_2MOM\_noLF\_n2\_murfix



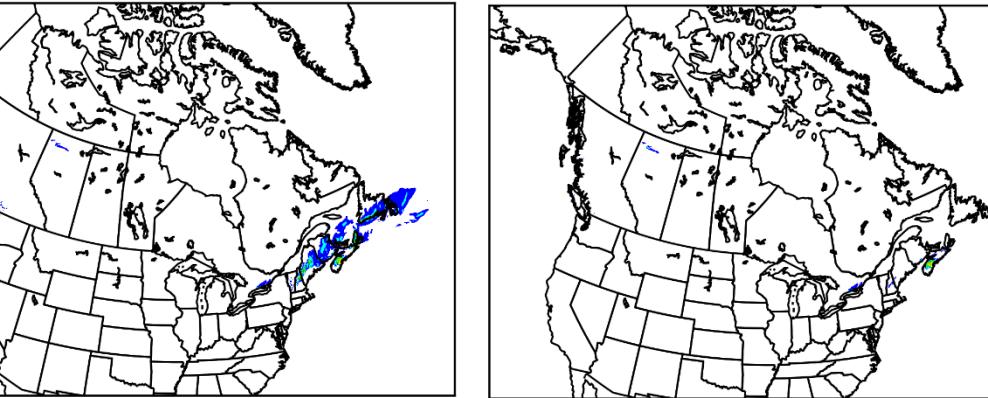
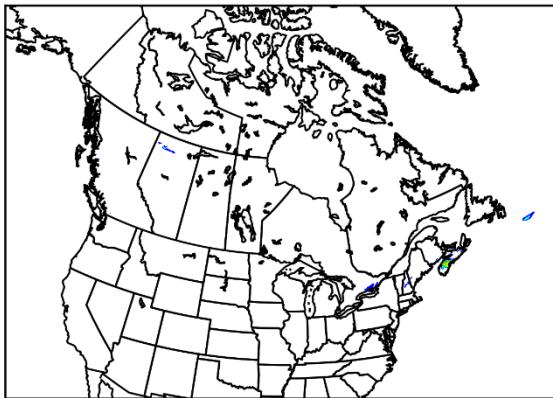
FR1\_2MOM\_noLF\_n2\_murfix-2MOM\_noLF\_n2



FR2\_2MOM\_noLF\_n2

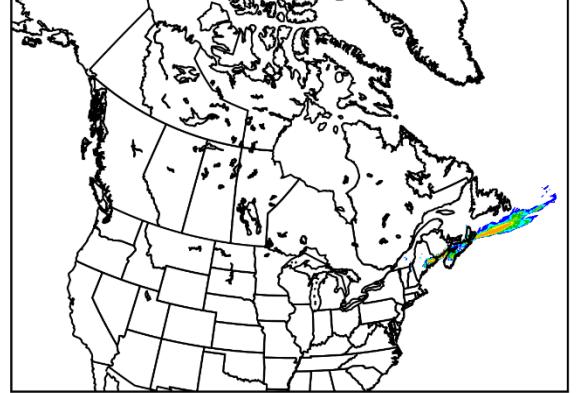


FR2\_2MOM\_noLF\_n2\_murfix

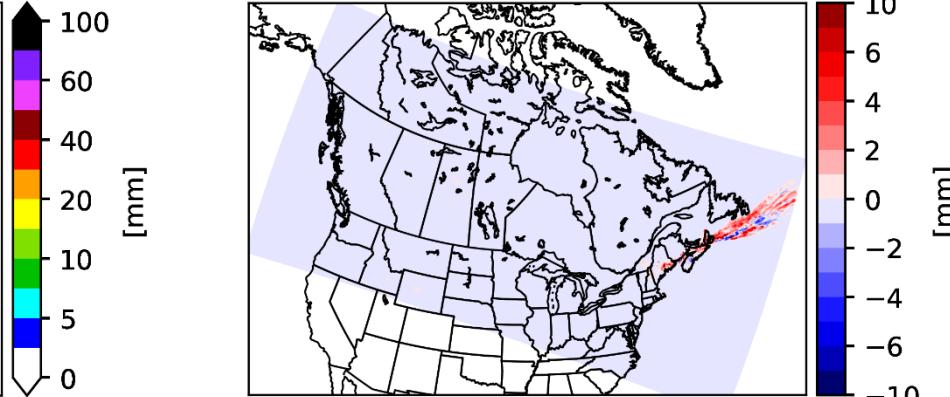
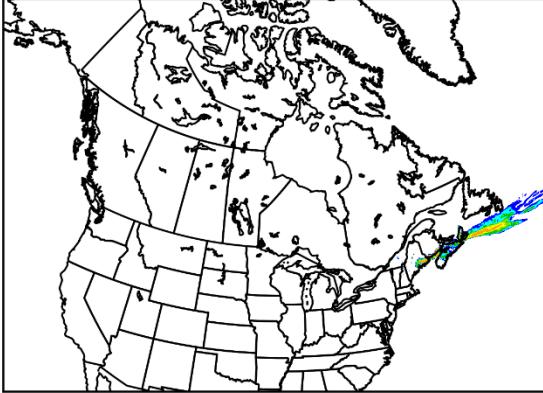


Increase in  
FR, but  
decrease in  
FR2

PE\_2MOM\_noLF\_n2

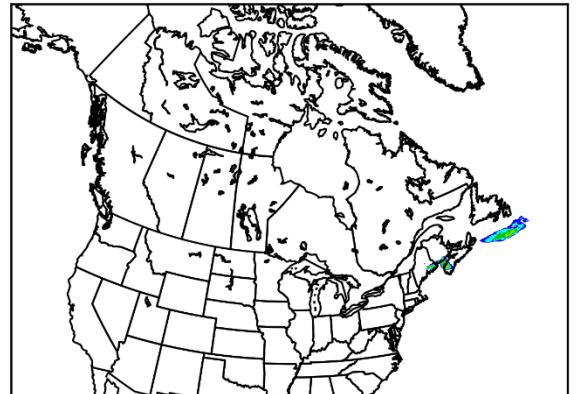


PE\_2MOM\_noLF\_n2\_murfix

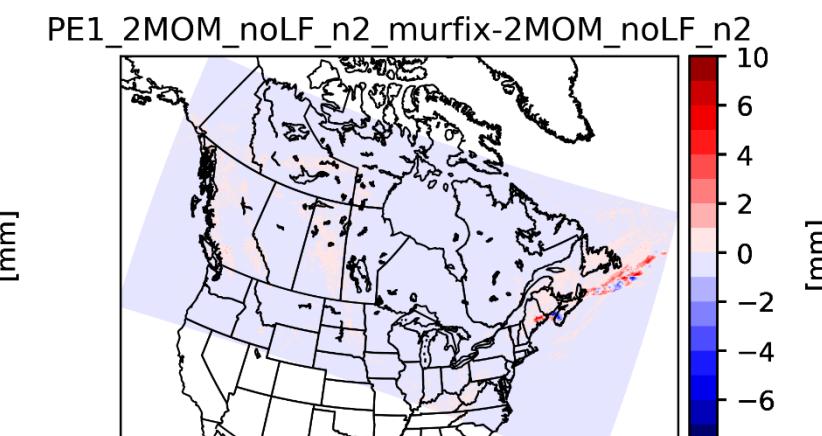
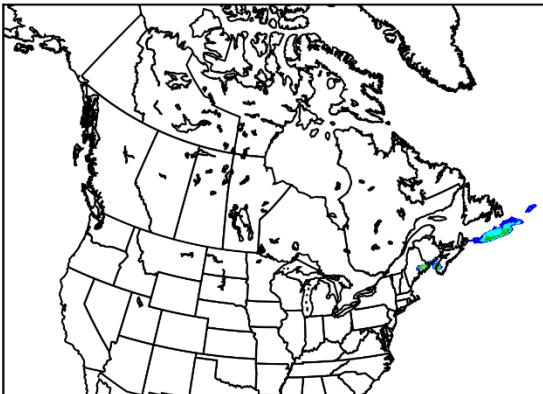


Increase of  
ice pellets

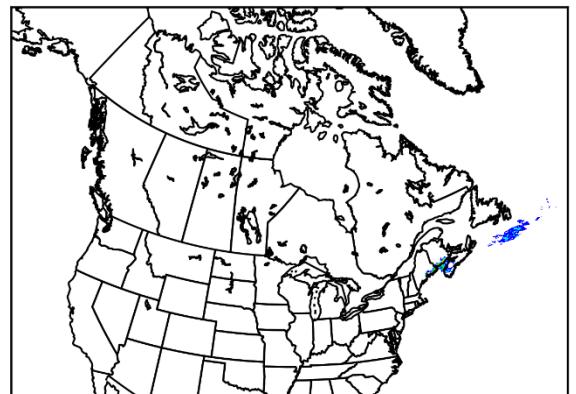
PE1\_2MOM\_noLF\_n2



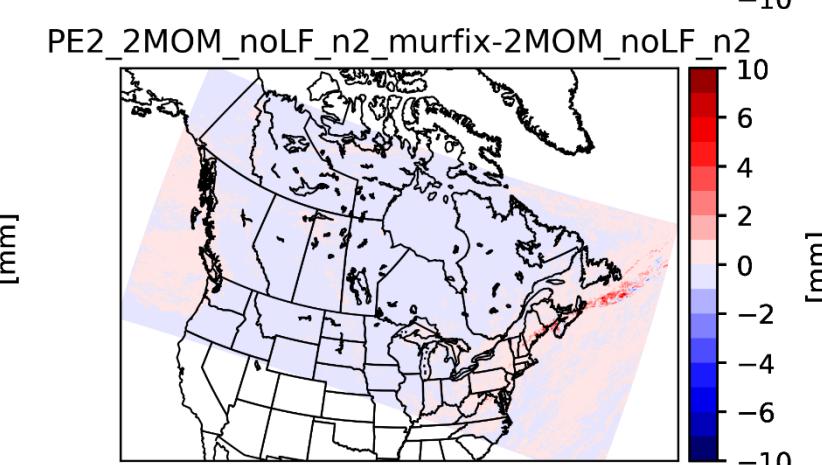
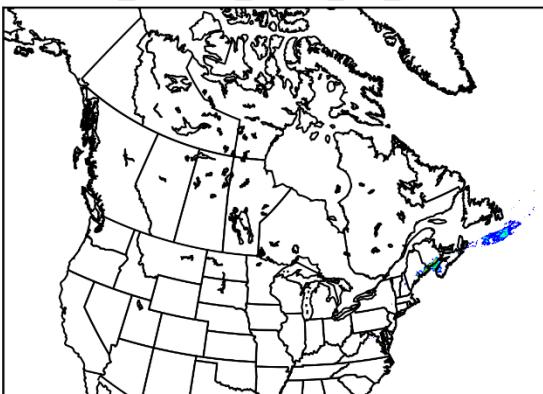
PE1\_2MOM\_noLF\_n2\_murfix



PE2\_2MOM\_noLF\_n2



PE2\_2MOM\_noLF\_n2\_murfix

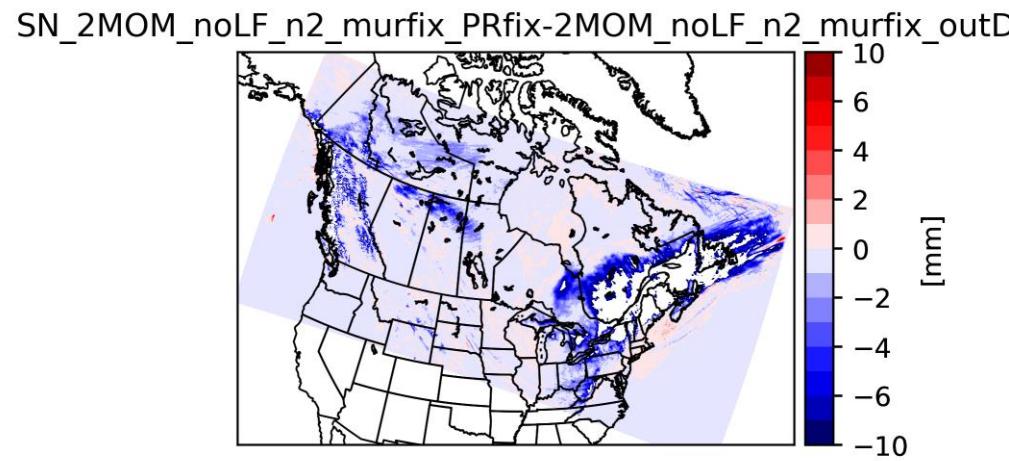
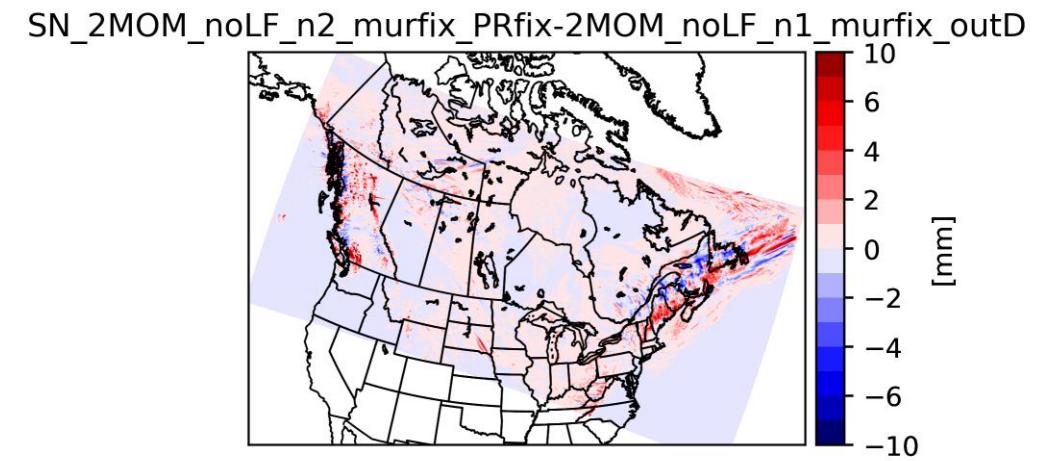
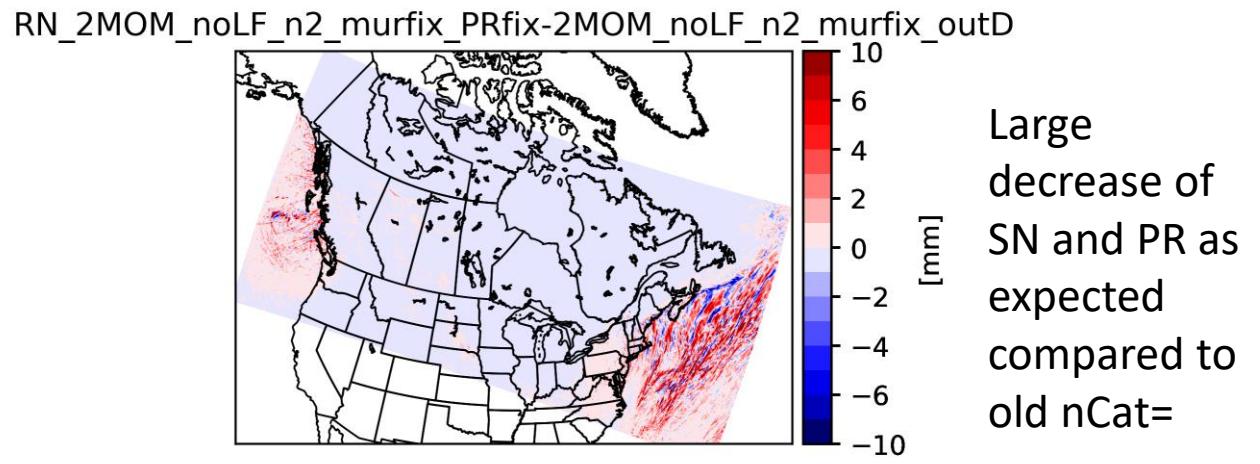
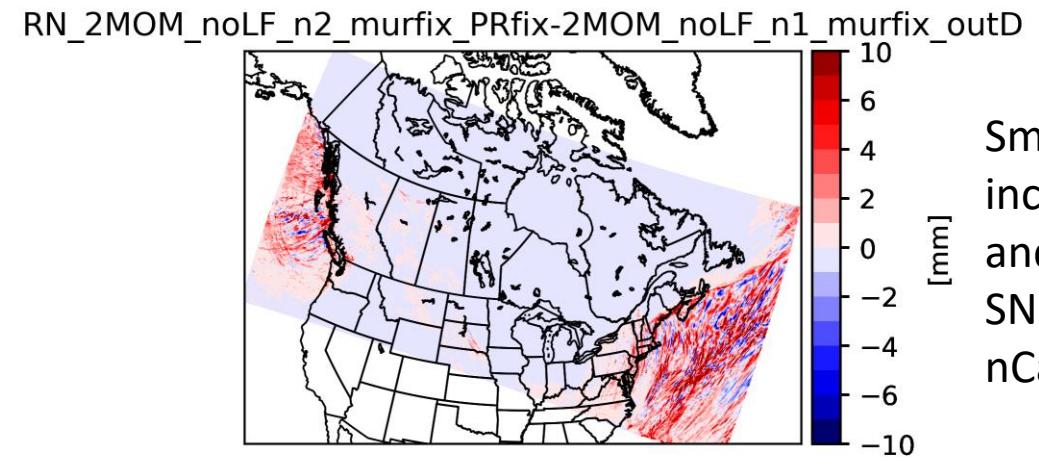
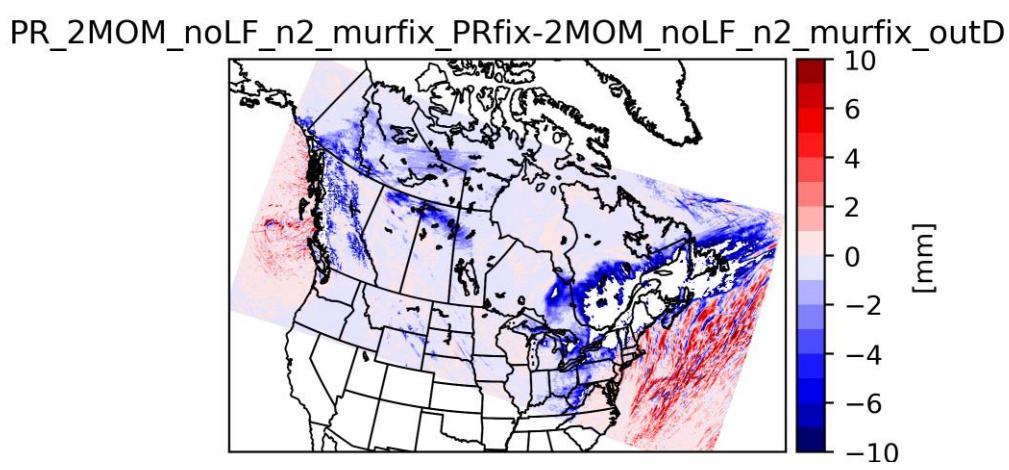
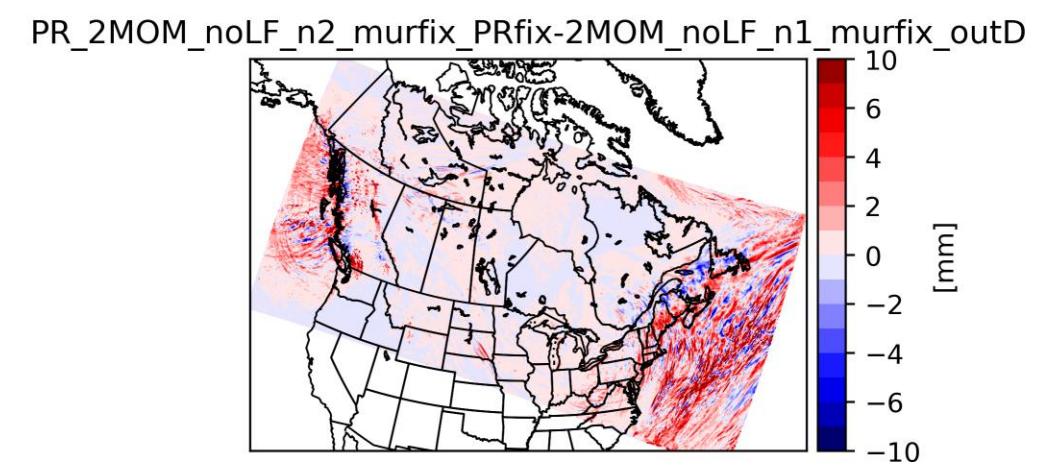


# Explications

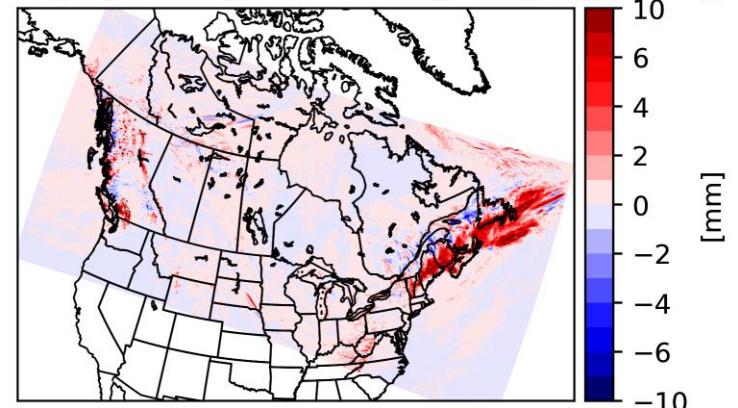
- Did not find this problem in 1D because we are using `prt_liq` and `prt_sol`
- In WRF → should not have this problem
- In GEM →  $ztss = sn1 + sn2 + sn3 + pe1 + pe2$  coming from the algo precipitation types.
- When taking  $ztss = ztss = \text{prt\_sol}$ , everything is fine and PR is similar to `nCat=1`
- The problem is in the diagnostic of ice types:
  - The use of `prt_sol(i)` in a `iice-loop`
  - Solution: the use of `prt_sol1(i,iice)` instead

## 2MOM N2 vs old N2

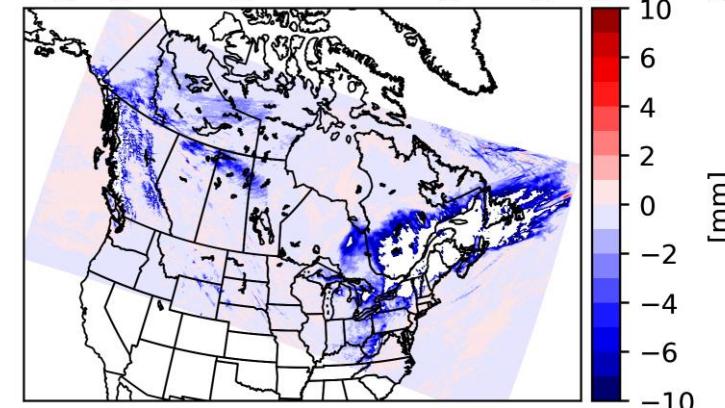
- Everything looks fine with the accumulation of precipitation types.



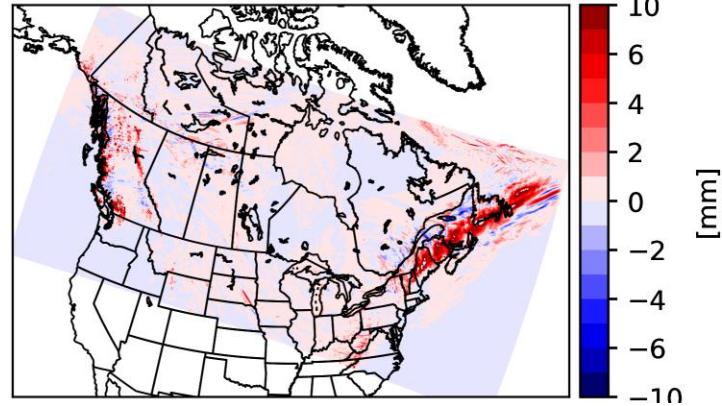
A4\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n1\_murfix\_outD



A4\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n2\_murfix\_outD

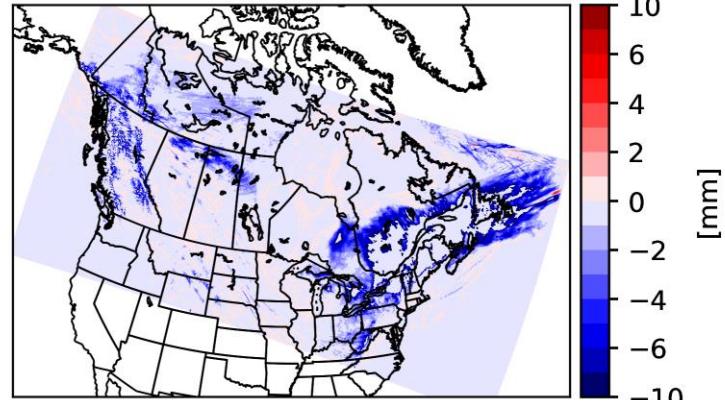


SN2\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n1\_murfix\_outD



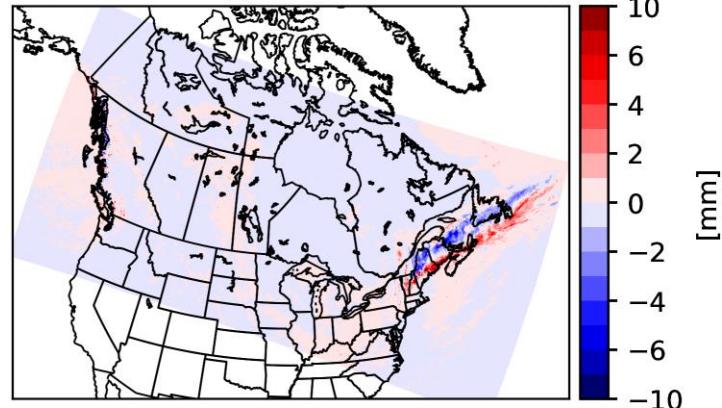
Increase in A4  
SN2 and  
mostly SN3  
compared  
nCat=1

SN2\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n2\_murfix\_outD

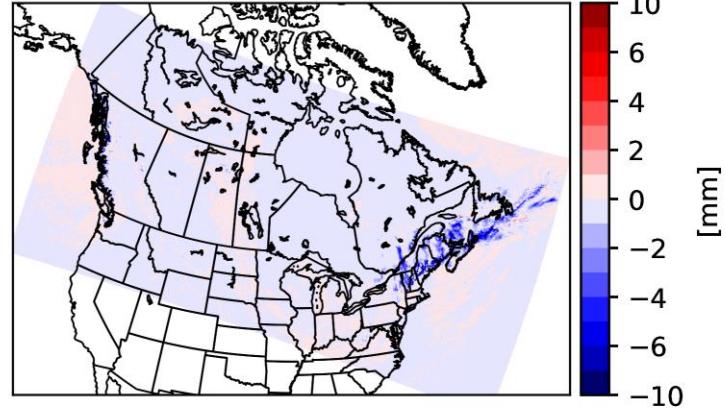


Large  
decrease of  
A4, SN2 and  
SN3 as  
expected  
compared to  
old nCat=2

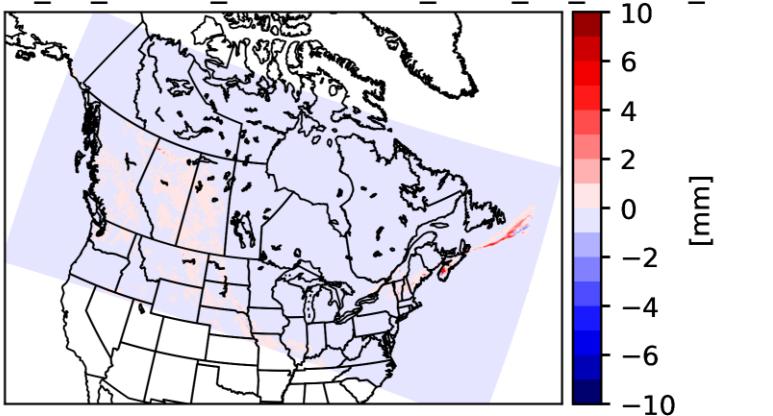
SN3\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n1\_murfix\_outD



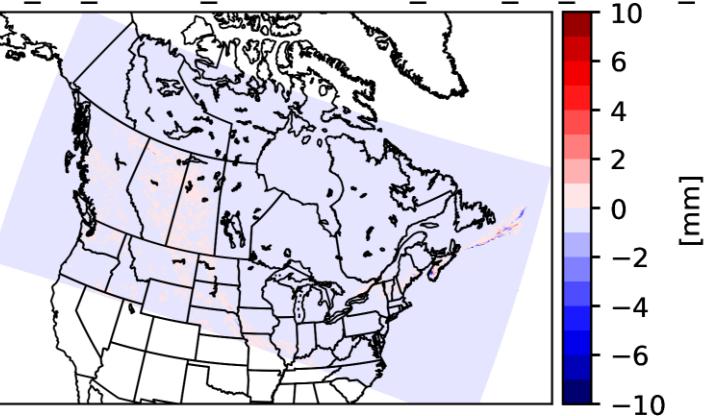
SN3\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n2\_murfix\_outD



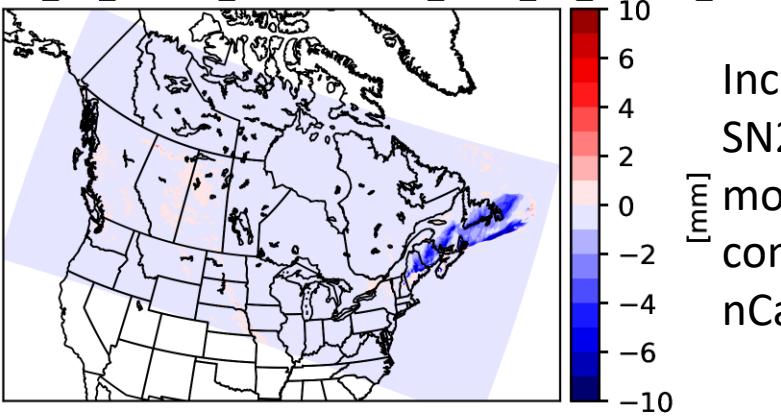
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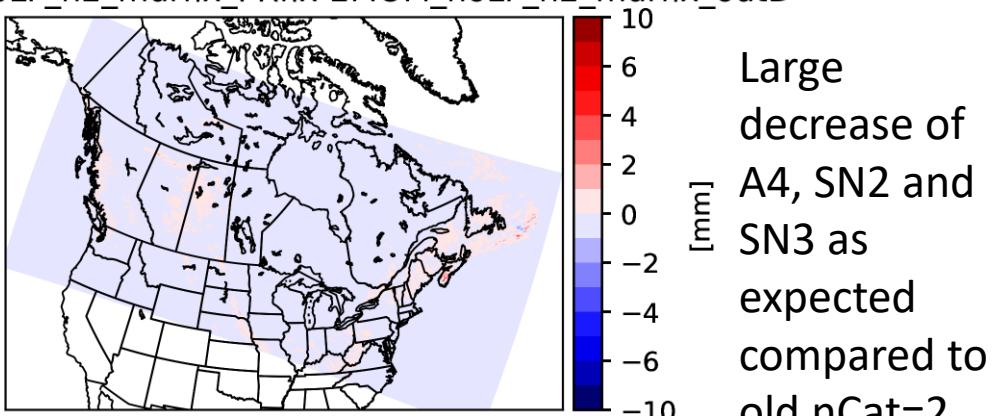
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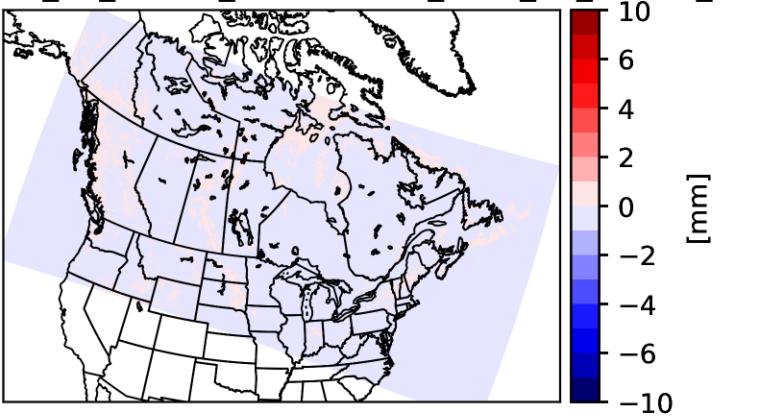
FR2\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n1\_murfix\_outD



FR2\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n2\_murfix\_outD



FR1\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n1\_murfix\_outD



FR1\_2MOM\_noLF\_n2\_murfix\_PRfix-2MOM\_noLF\_n2\_murfix\_outD

