Forecasting Model Similarity

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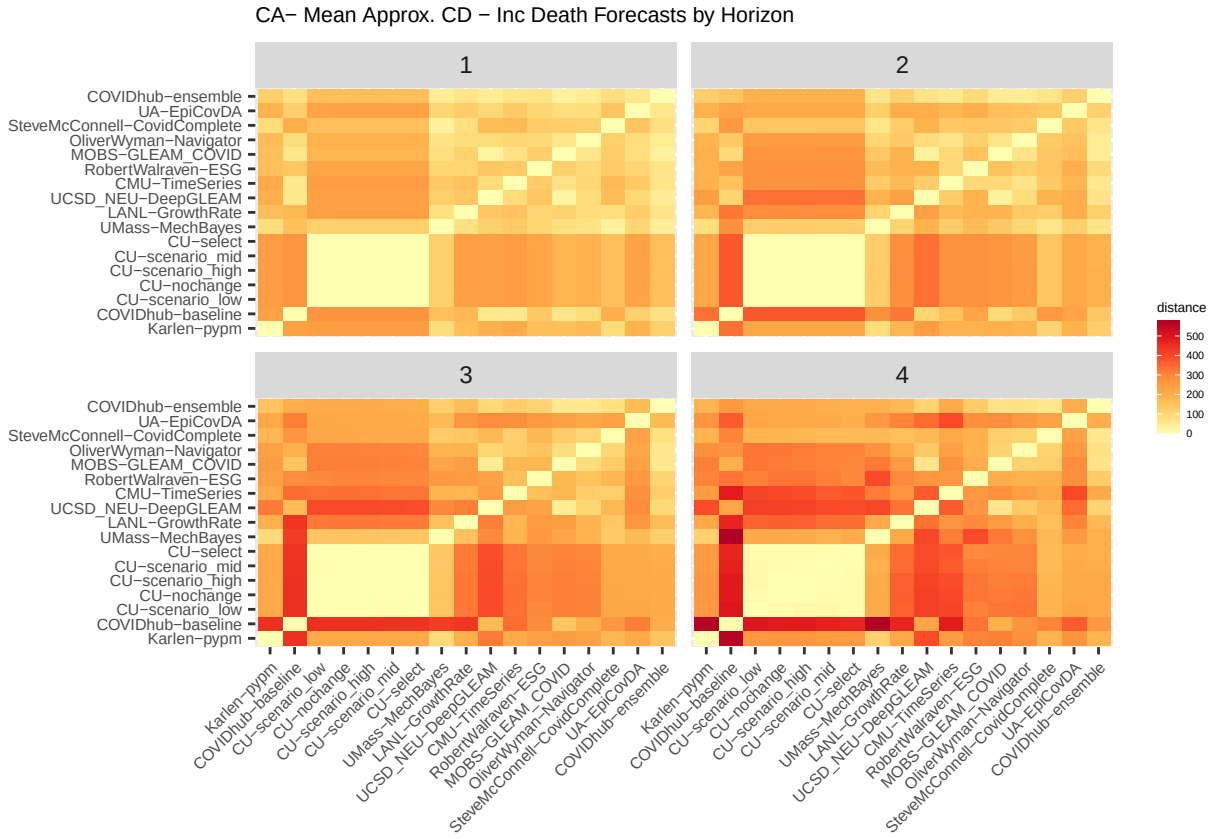
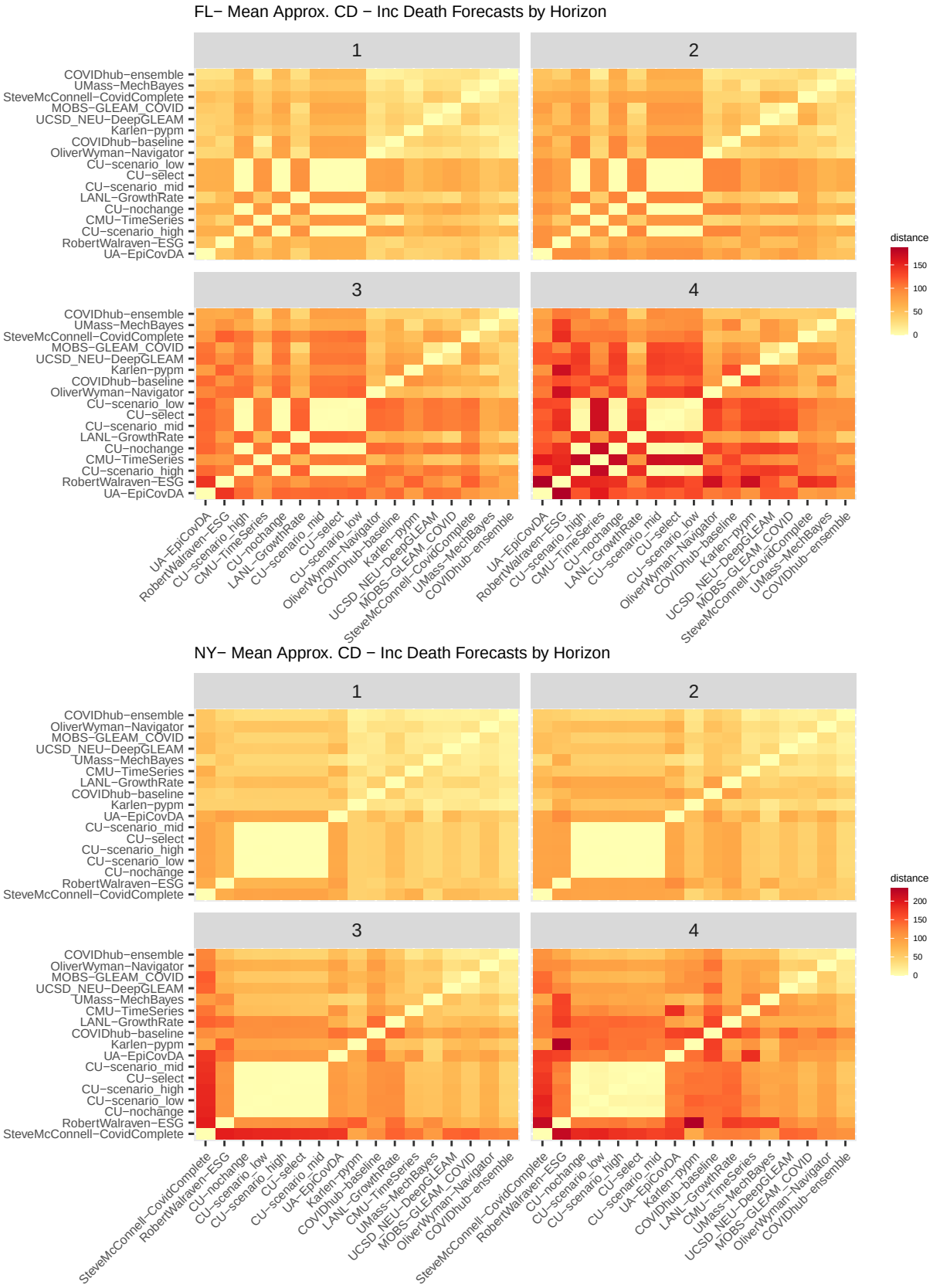
COVID-19 Forecasting Model Similarity Analysis for 1-4 Week Ahead Incident Death

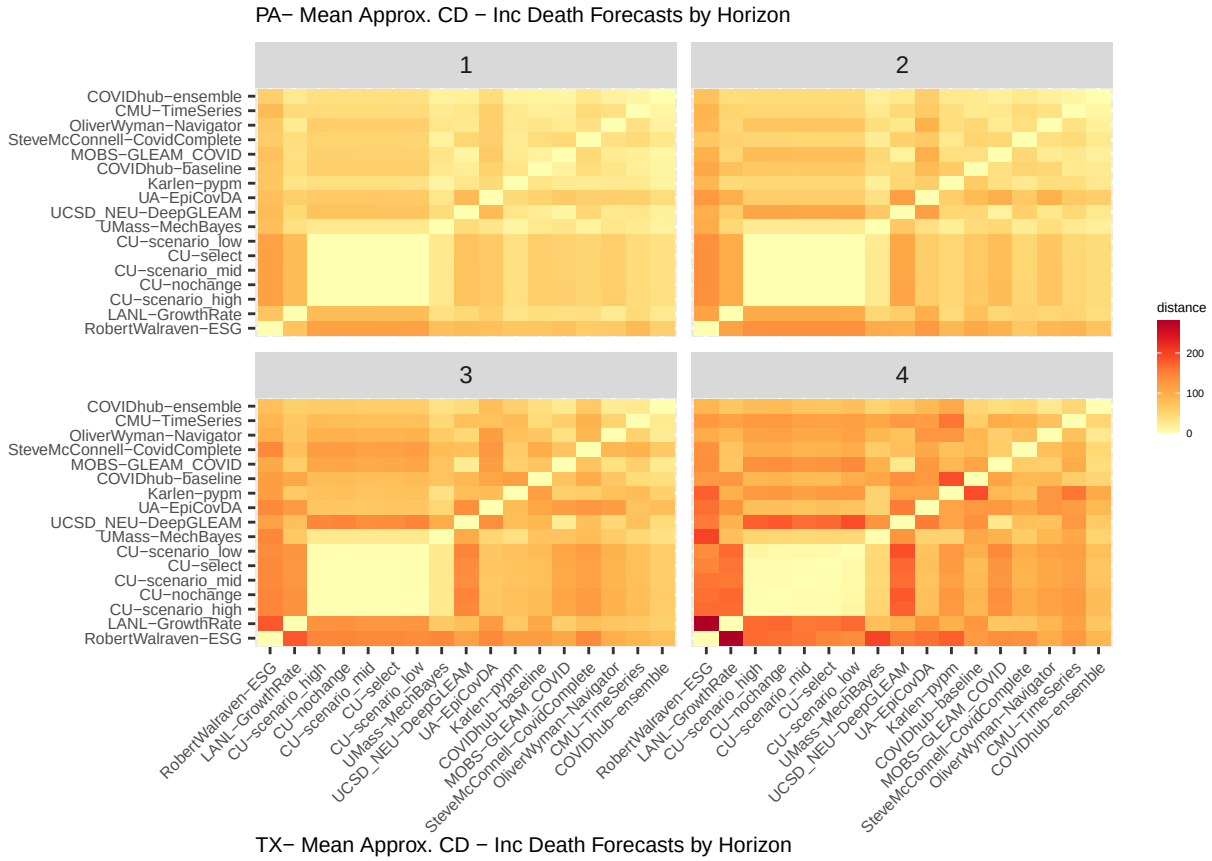
5 locations with the highest number of COVID-19 deaths by the end of February 2021

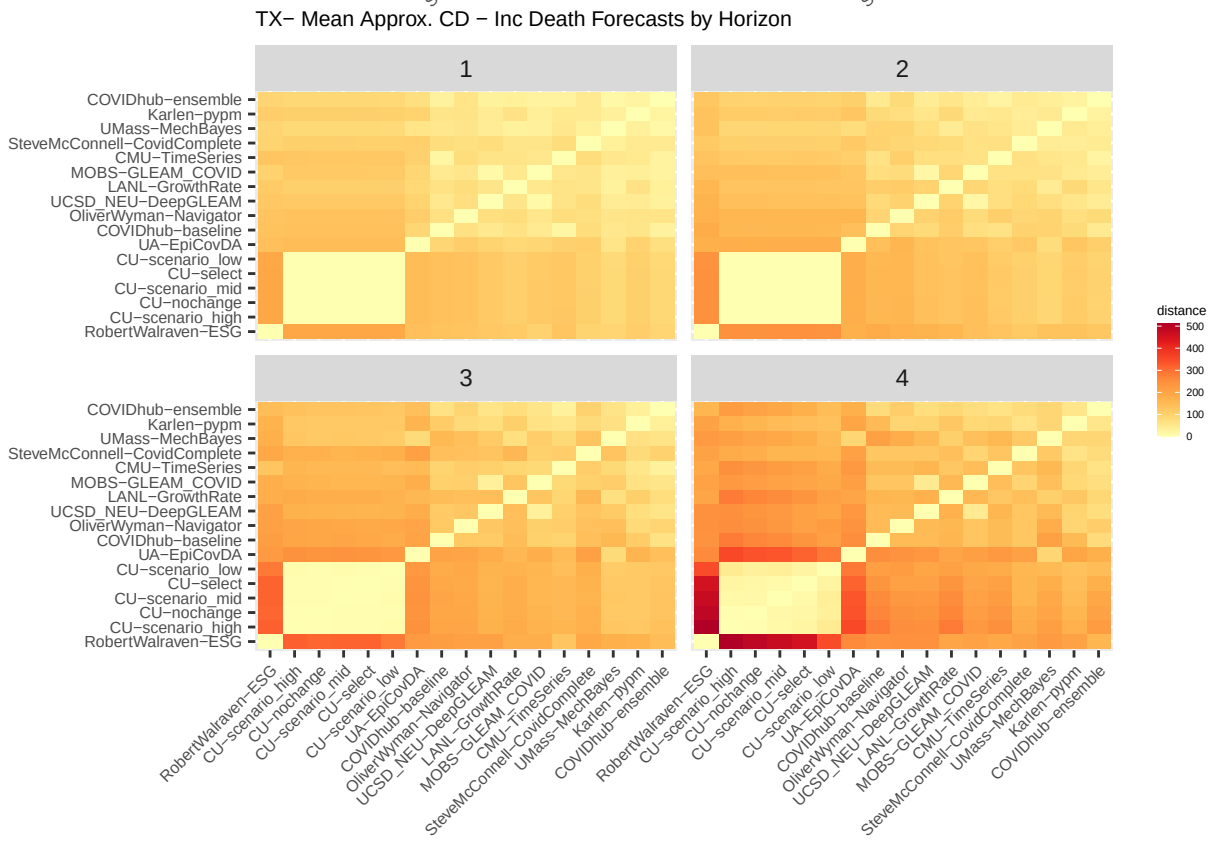
The pairwise approximated Cramer's distances are calculated for the models that have complete submissions for all target, all 5 locations with the highest number of COVID-19 deaths by the end of February 2021, all probability levels, from the target end date of October, 17th 2020 to May 29th, 2021 .

We can visualize the mean approximated pairwise distances across all time points in a heat map shown below. The distance from the model to itself is zero. The $x-$axis is arranged based in an ascending order of the model's approximate pairwise distance from the COVIDhub-ensemble. So, the first model is the model that is most dissimilar (on average) to the ensemble in this time frame.



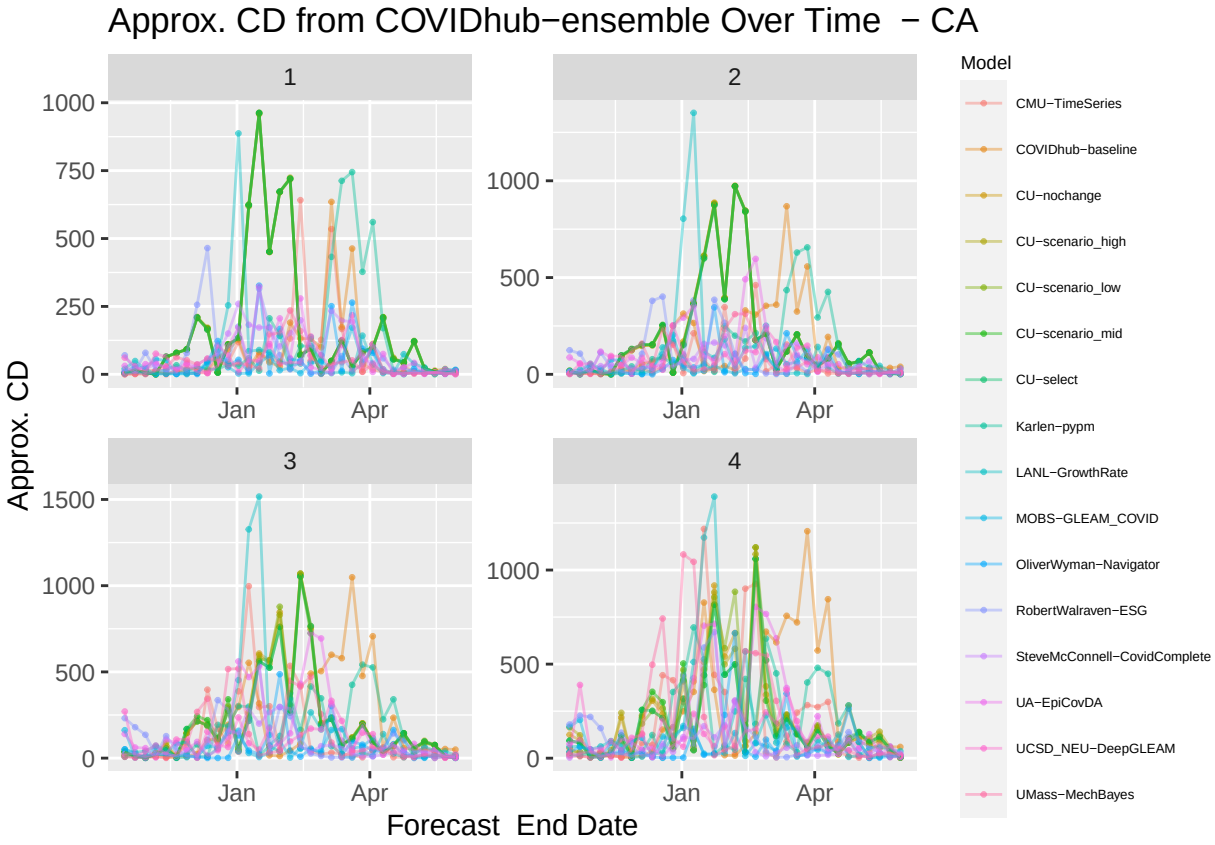

FL− Mean Approx. CD − Inc Death Forecasts by Horizon
1
2
3
4
COVIDhub−ensemble
UMass−MechBayes
SteveMcConnell−CovidComplete
MOBS−GLEAM_COVID
UCSD_NEU−DeepGLEAM
Karlen−pypm
COVIDhub−baseline
OliverWyman−Navigator
CU−scenario_low
CU−select
CU−scenario_mid
LANL−GrowthRate
CU−nochange
CMU−TimeSeries
CU−scenario_high
RobertWalraven−ESG
UA−EpiCovDA
distance
150
100
50
0
NY− Mean Approx. CD − Inc Death Forecasts by Horizon
1
2
3
4
COVIDhub−ensemble
OliverWyman−Navigator
MOBS−GLEAM_COVID
UCSD_NEU−DeepGLEAM
UMass−MechBayes
CMU−TimeSeries
LANL−GrowthRate
COVIDhub−baseline
Karlen−pypm
UA−EpiCovDA
CU−scenario_mid
CU−select
CU−scenario_high
CU−scenario_low
CU−nochange
RobertWalraven−ESG
SteveMcConnell−CovidComplete
distance
200
150
100
50
0

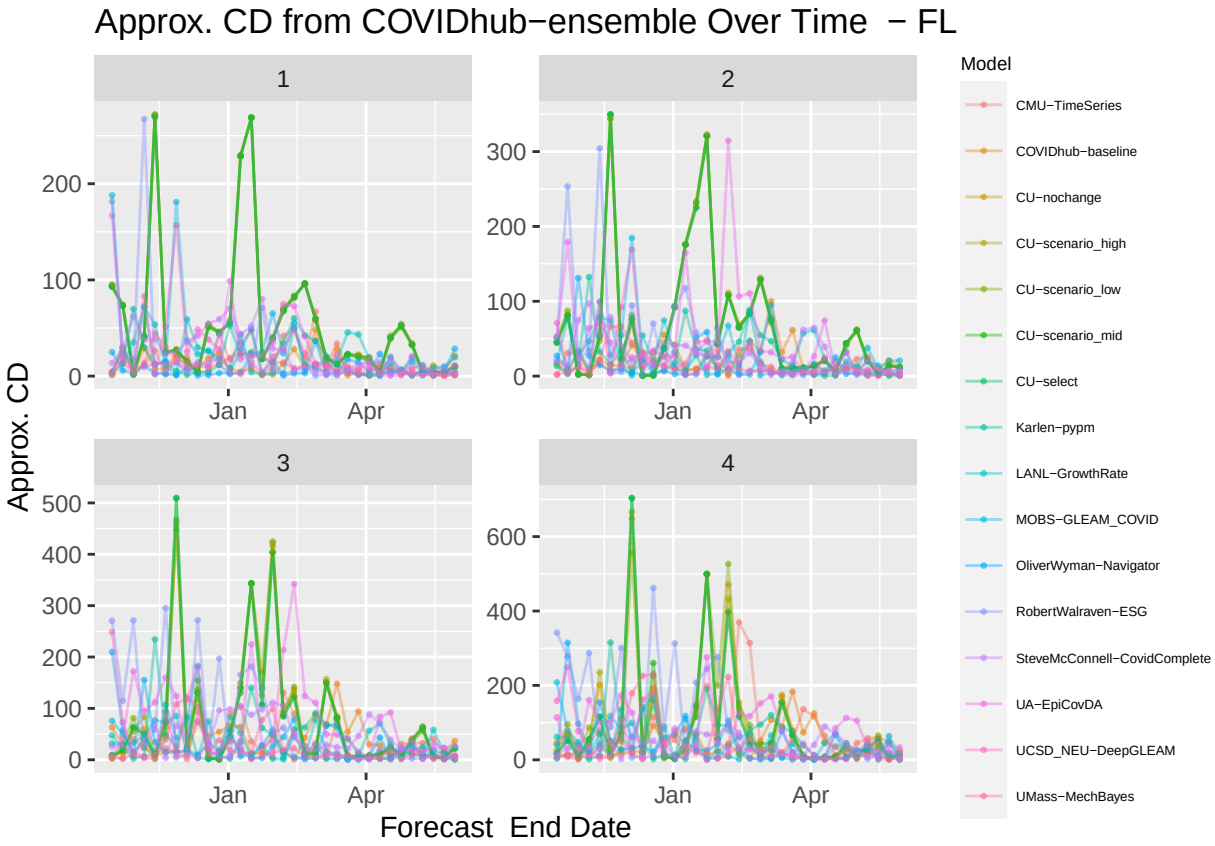


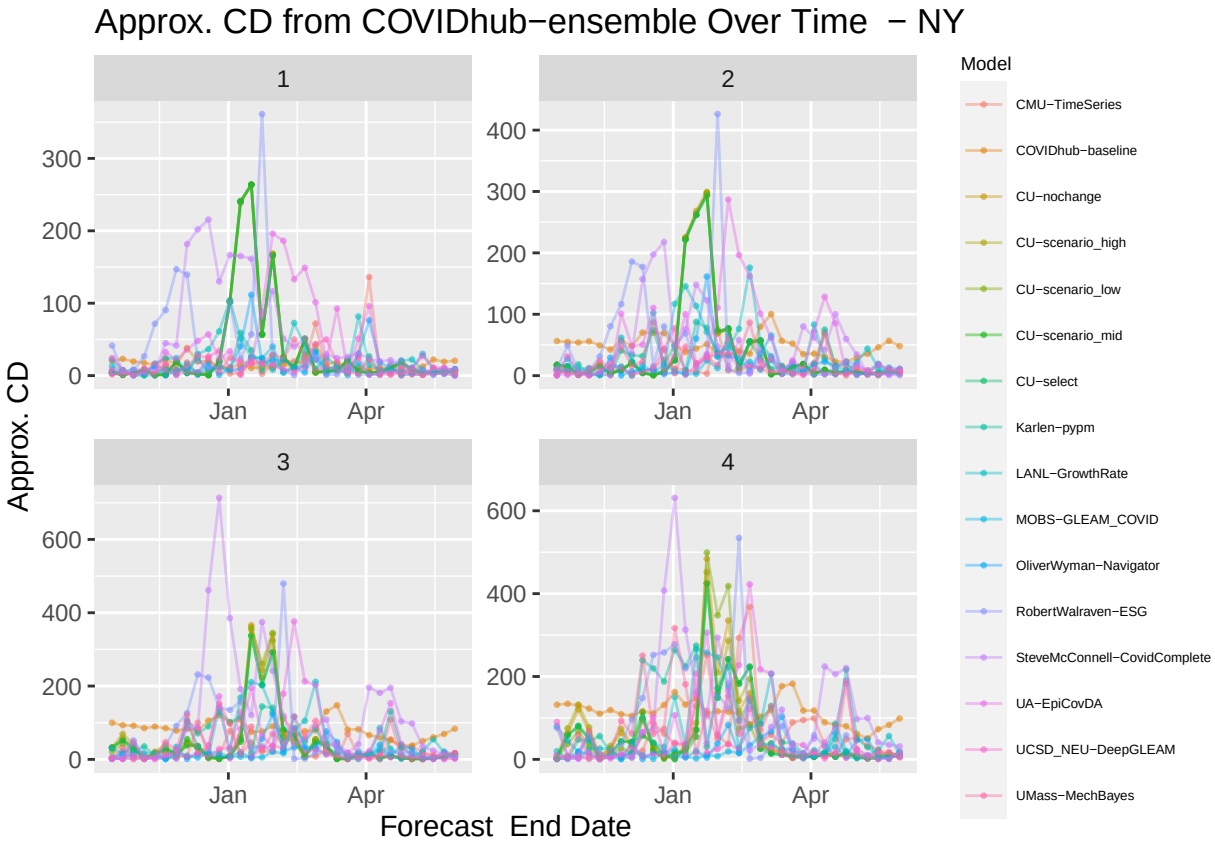


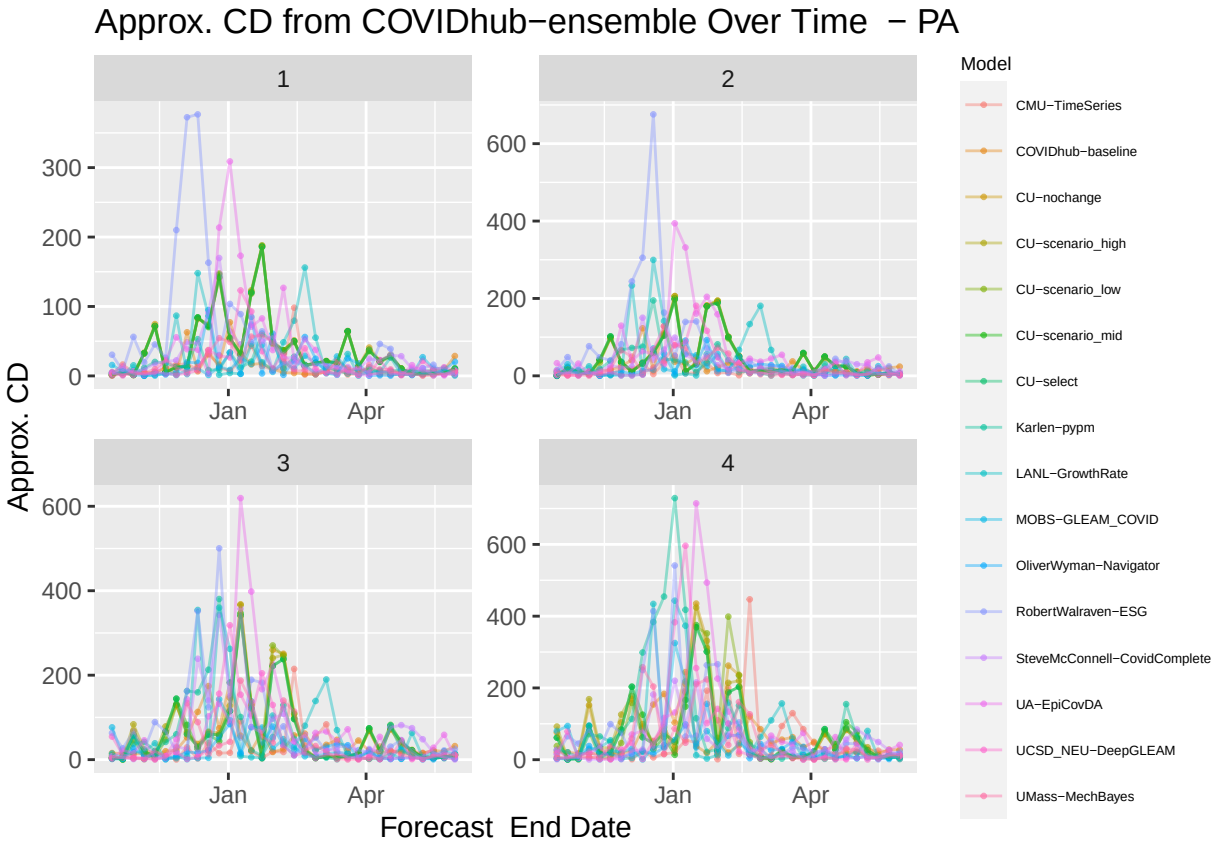
We can also look at the approximated pairwise distances to see how the models become more similar or

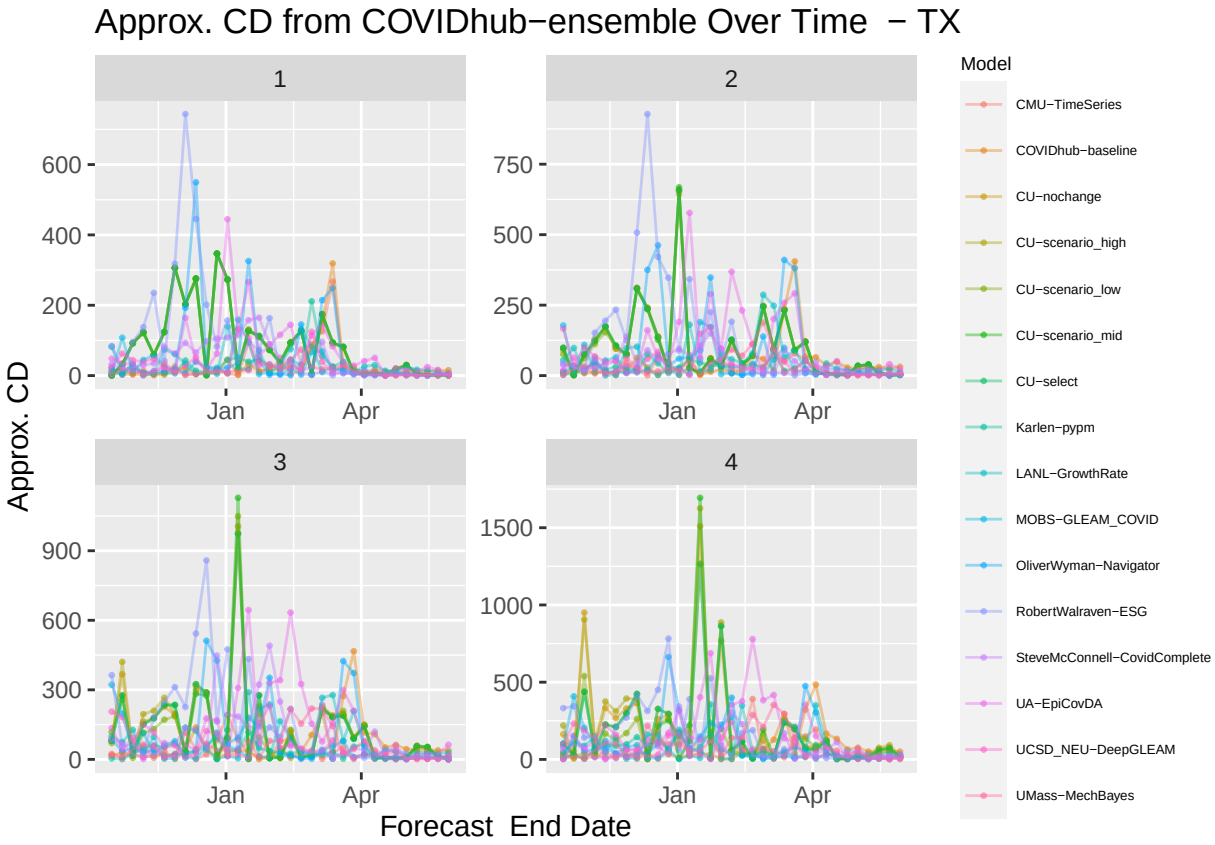
dissimilar over time.



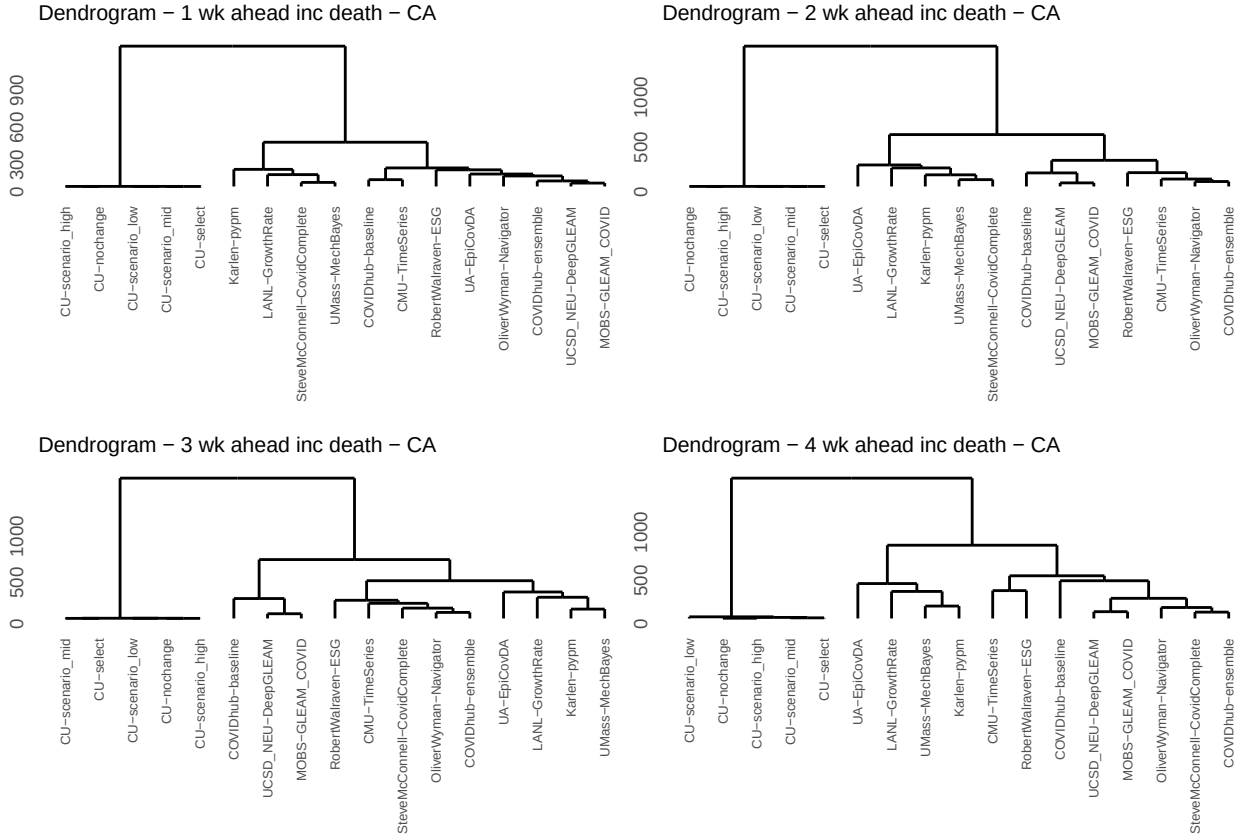

Approx. CD from COVIDhub−ensemble Over Time − FL
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CMU−TimeSeries
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
RobertWalraven−ESG
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

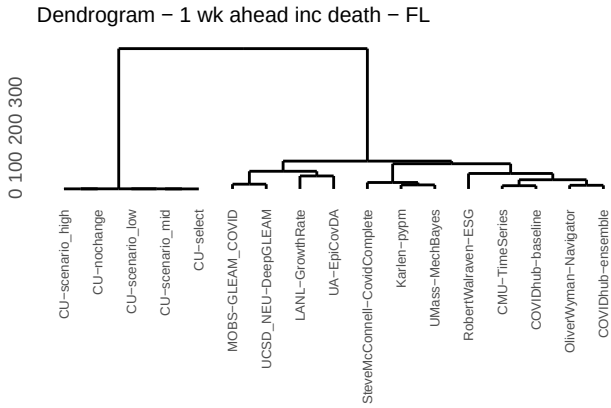

Approx. CD from COVIDhub−ensemble Over Time − NY
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CMU−TimeSeries
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
RobertWalraven−ESG
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

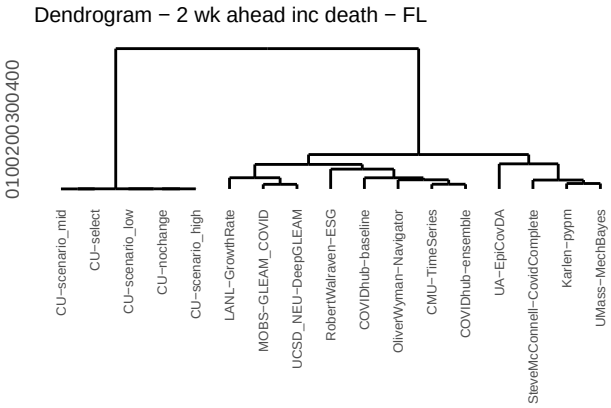

Approx. CD from COVIDhub−ensemble Over Time − PA
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CMU−TimeSeries
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
RobertWalraven−ESG
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

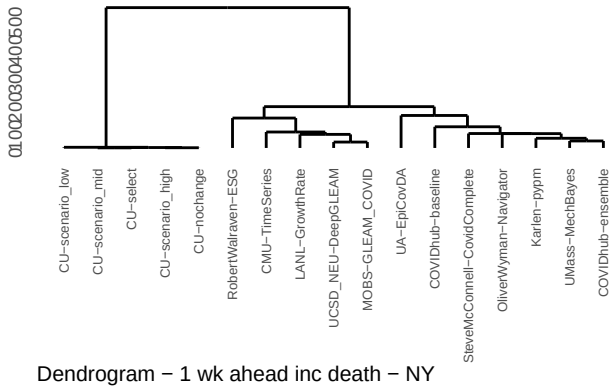

Approx. CD from COVIDhub−ensemble Over Time − TX
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CMU−TimeSeries
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
RobertWalraven−ESG
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

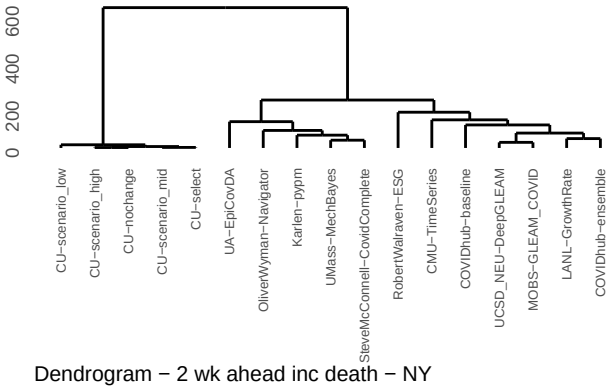
We can cluster the distances using hierarchical clustering. Different linkages will result in different clusters, we probably should investigate more later.




Dendrogram − 1 wk ahead inc death − FL
0 100 200 300
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select
MOBS−GLEAM_COVID
UCSD_NEU−DeepGLEAM
LANL−GrowthRate
UA−EpiCovDA
SteveMcConnell−CovidComplete
Karlen−pypm
UMass−MechBayes
RobertWalraven−ESG
CMU−TimeSeries
COVIDhub−baseline
OliverWyman−Navigator
COVIDhub−ensemble


Dendrogram − 2 wk ahead inc death − FL
0 100 200 300 400
CU−scenario_mid
CU−select
CU−scenario_low
CU−nochange
CU−scenario_high
LANL−GrowthRate
MOBS−GLEAM_COVID
UCSD_NEU−DeepGLEAM
RobertWalraven−ESG
COVIDhub−baseline
OliverWyman−Navigator
CMU−TimeSeries
COVIDhub−ensemble
UA−EpiCovDA
SteveMcConnell−CovidComplete
Karlen−pypm
UMass−MechBayes


Dendrogram − 3 wk ahead inc death − FL
0 100 200 300 400 500
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
RobertWalraven−ESG
CMU−TimeSeries
LANL−GrowthRate
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
UA−EpiCovDA
COVIDhub−baseline
SteveMcConnell−CovidComplete
OliverWyman−Navigator
Karlen−pypm
UMass−MechBayes
COVIDhub−ensemble


Dendrogram − 4 wk ahead inc death − FL
0 200 400 600
CU−scenario_low
CU−scenario_high
CU−nochange
CU−scenario_mid
CU−select
UA−EpiCovDA
OliverWyman−Navigator
Karlen−pypm
UMass−MechBayes
SteveMcConnell−CovidComplete
RobertWalraven−ESG
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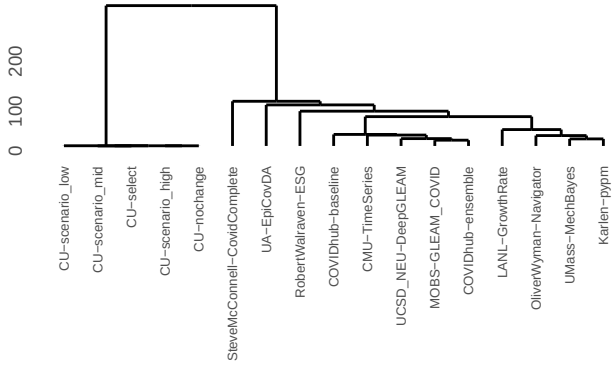
COVIDhub−baseline
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
LANL−GrowthRate
COVIDhub−ensemble


Dendrogram − 1 wk ahead inc death − NY
0 100 200
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
SteveMcConnell−CovidComplete
UA−EpiCovDA
RobertWalraven−ESG
COVIDhub−baseline
CMU−TimeSeries
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
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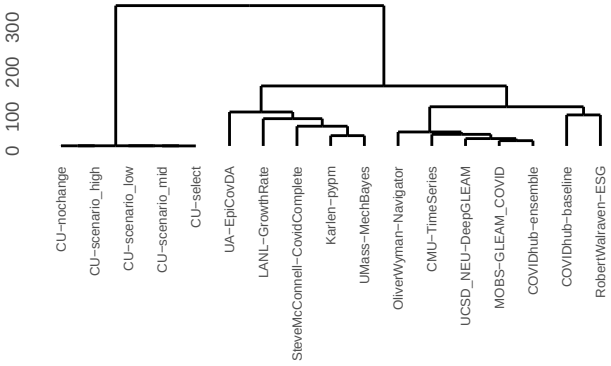
Karlen−pypm


Dendrogram − 2 wk ahead inc death − NY
0 100 200 300
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
UA−EpiCovDA
LANL−GrowthRate
SteveMcConnell−CovidComplete
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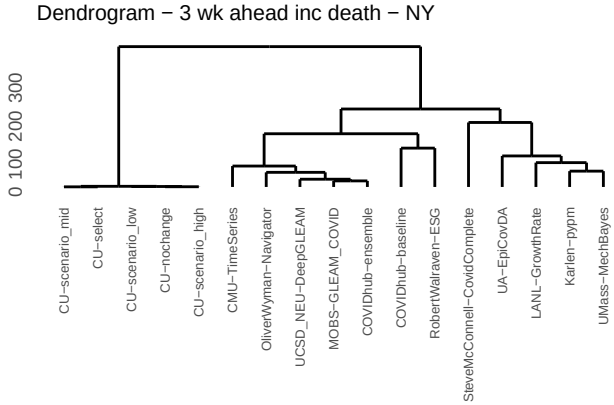
MOBS−GLEAM_COVID
COVIDhub−ensemble
COVIDhub−baseline
RobertWalraven−ESG


Dendrogram − 3 wk ahead inc death − NY
0 100 200 300
CU−scenario_mid
CU−select
CU−scenario_low
CU−nochange
CU−scenario_high
CMU−TimeSeries
OliverWyman−Navigator
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
COVIDhub−ensemble
COVIDhub−baseline
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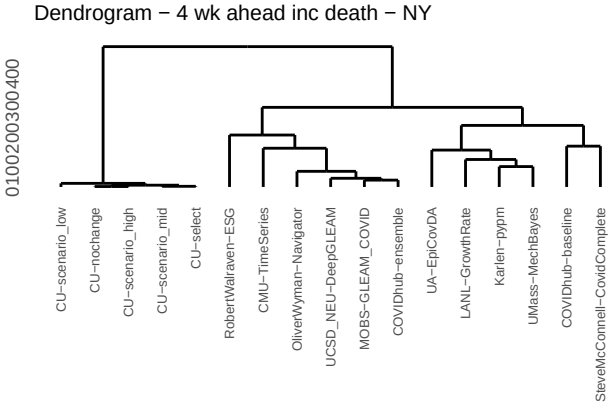
SteveMcConnell−CovidComplete
UA−EpiCovDA
LANL−GrowthRate
Karlen−pypm
UMass−MechBayes


Dendrogram − 4 wk ahead inc death − NY
0 100 200 300 400
CU−scenario_low
CU−nochange
CU−scenario_high
CU−scenario_mid
CU−select
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CMU−TimeSeries
OliverWyman−Navigator
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
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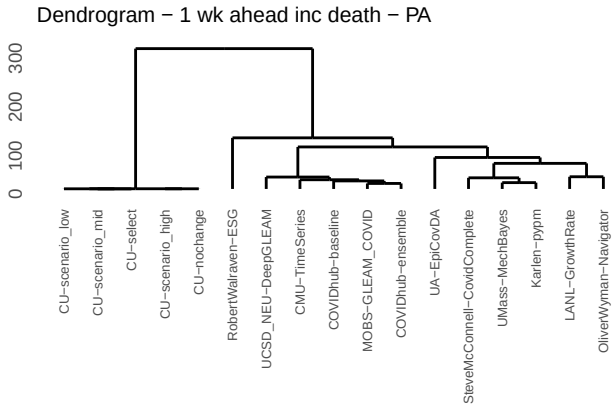
Dendrogram − 1 wk ahead inc death − PA
0 100 200 300
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
RobertWalraven−ESG
UCSD_NEU−DeepGLEAM
CMU−TimeSeries
COVIDhub−baseline
MOBS−GLEAM_COVID
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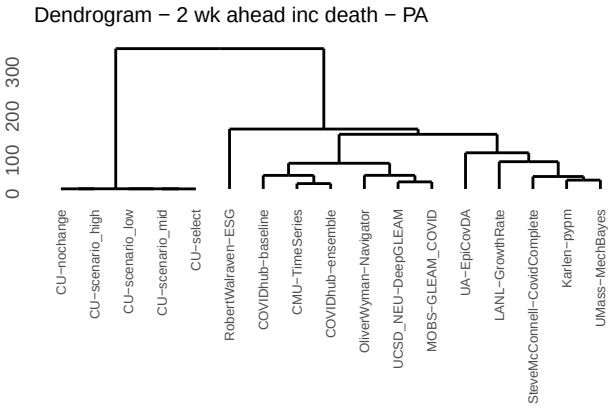
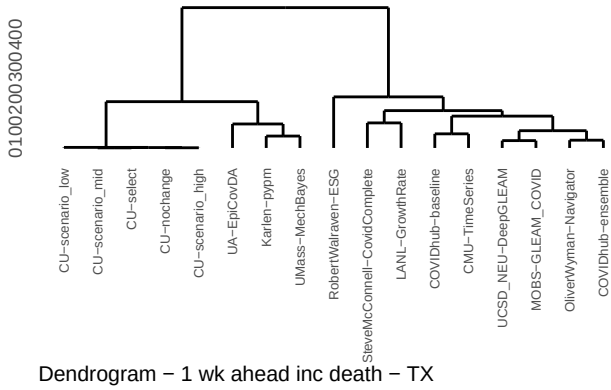
LANL−GrowthRate
OliverWyman−Navigator


Dendrogram − 2 wk ahead inc death − PA
0 100 200 300
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
RobertWalraven−ESG
COVIDhub−baseline
CMU−TimeSeries
COVIDhub−ensemble
OliverWyman−Navigator
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
UA−EpiCovDA
LANL−GrowthRate
SteveMcConnell−CovidComplete
Karlen−pypm
UMass−MechBayes


Dendrogram − 3 wk ahead inc death − PA
0 100 200 300 400
CU−scenario_low
CU−scenario_mid
CU−select
CU−nochange
CU−scenario_high
UA−EpiCovDA
Karlen−pypm
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RobertWalraven−ESG
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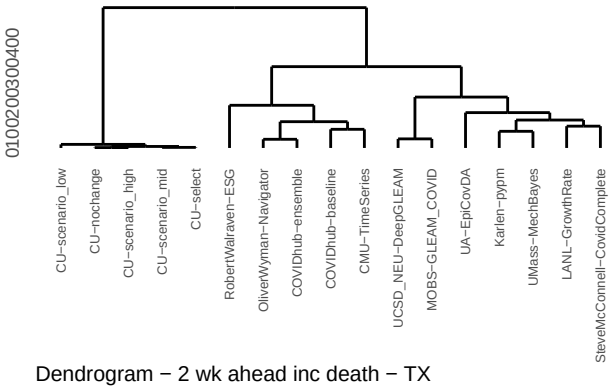
MOBS−GLEAM_COVID
OliverWyman−Navigator
COVIDhub−ensemble


Dendrogram − 4 wk ahead inc death − PA
0 100 200 300 400
CU−scenario_low
CU−nochange
CU−scenario_high
CU−scenario_mid
CU−select
RobertWalraven−ESG
OliverWyman−Navigator
COVIDhub−ensemble
COVIDhub−baseline
CMU−TimeSeries
UCSD_NEU−DeepGLEAM
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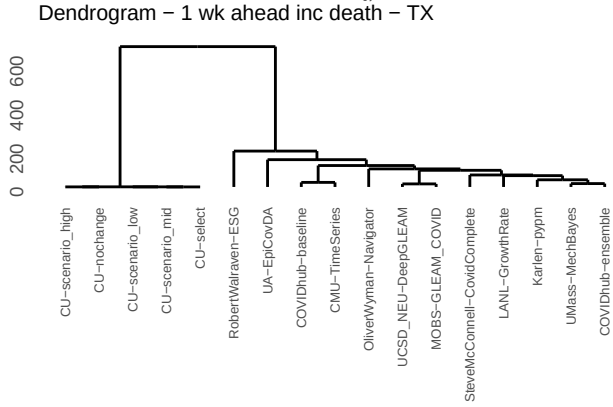
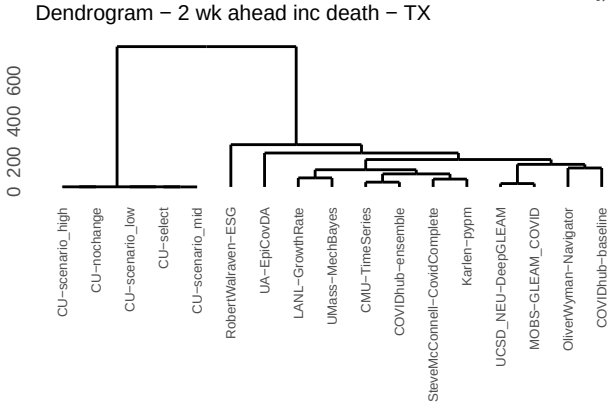
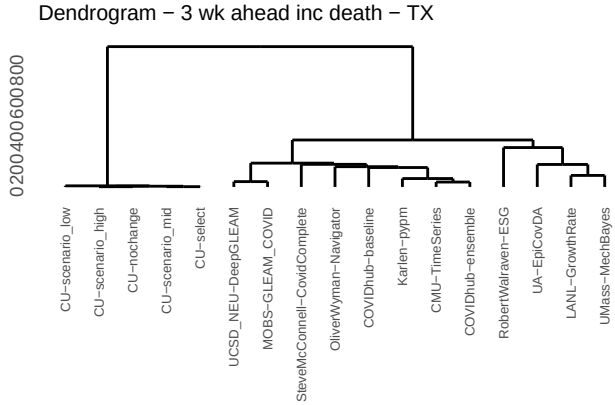
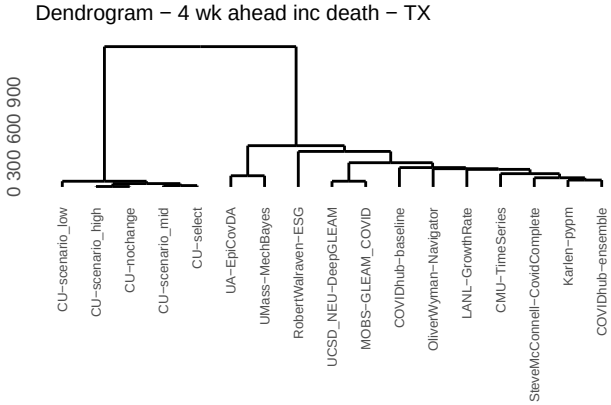
UMass−MechBayes
LANL−GrowthRate
SteveMcConnell−CovidComplete


Dendrogram − 1 wk ahead inc death − TX
0 200 400 600
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select
RobertWalraven−ESG
UA−EpiCovDA
COVIDhub−baseline
CMU−TimeSeries
OliverWyman−Navigator
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
SteveMcConnell−CovidComplete
LANL−GrowthRate
Karlen−pypm
UMass−MechBayes
COVIDhub−ensemble


Dendrogram − 2 wk ahead inc death − TX
0 200 400 600
CU−scenario_high
CU−nochange
CU−scenario_low
CU−select
CU−scenario_mid
RobertWalraven−ESG
UA−EpiCovDA
LANL−GrowthRate
UMass−MechBayes
CMU−TimeSeries
COVIDhub−ensemble
SteveMcConnell−CovidComplete
Karlen−pypm
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
OliverWyman−Navigator
COVIDhub−baseline

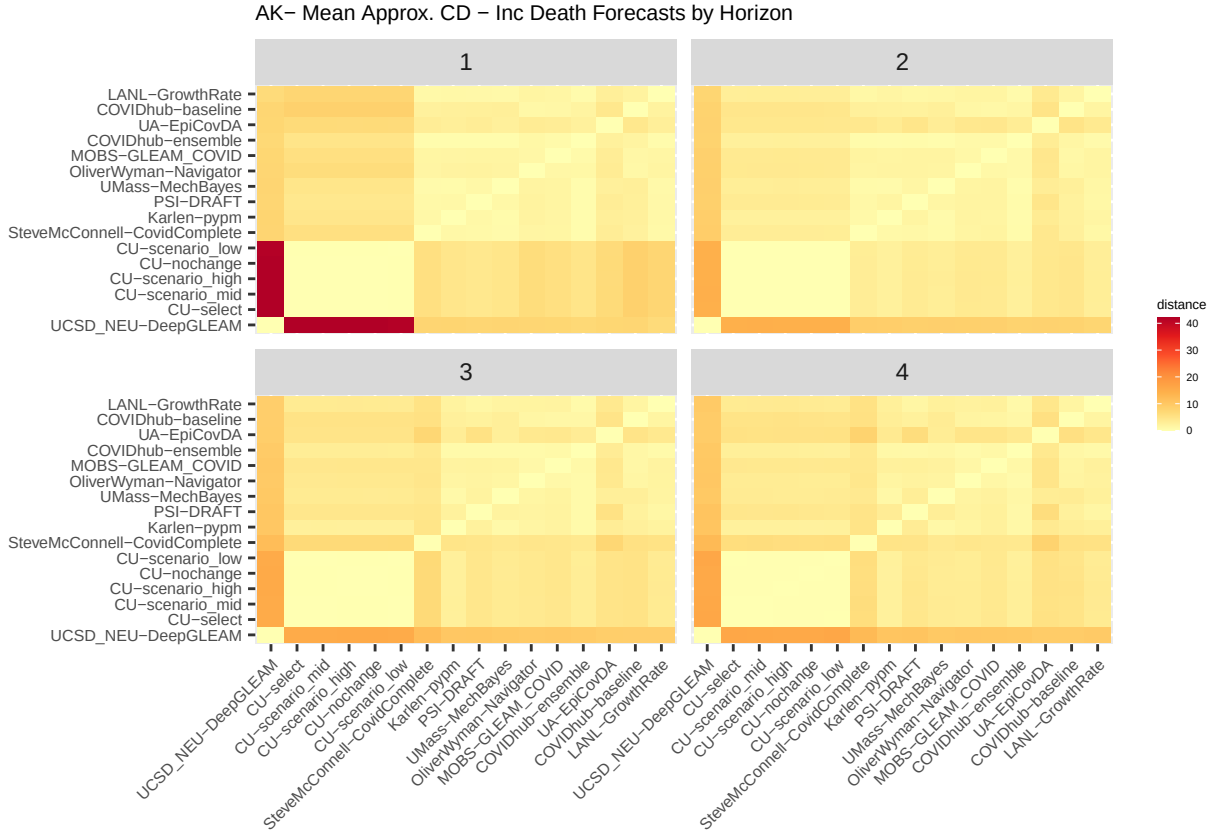

Dendrogram − 3 wk ahead inc death − TX
0 200 400 600 800
CU−scenario_low
CU−scenario_high
CU−nochange
CU−scenario_mid
CU−select
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
SteveMcConnell−CovidComplete
OliverWyman−Navigator
COVIDhub−baseline
Karlen−pypm
CMU−TimeSeries
COVIDhub−ensemble
RobertWalraven−ESG
UA−EpiCovDA
LANL−GrowthRate
UMass−MechBayes


Dendrogram − 4 wk ahead inc death − TX
0 300 600 900
CU−scenario_low
CU−scenario_high
CU−nochange
CU−scenario_mid
CU−select
UA−EpiCovDA
UMass−MechBayes
RobertWalraven−ESG
UCSD_NEU−DeepGLEAM
MOBS−GLEAM_COVID
COVIDhub−baseline
OliverWyman−Navigator
LANL−GrowthRate
CMU−TimeSeries
SteveMcConnell−CovidComplete
Karlen−pypm
COVIDhub−ensemble

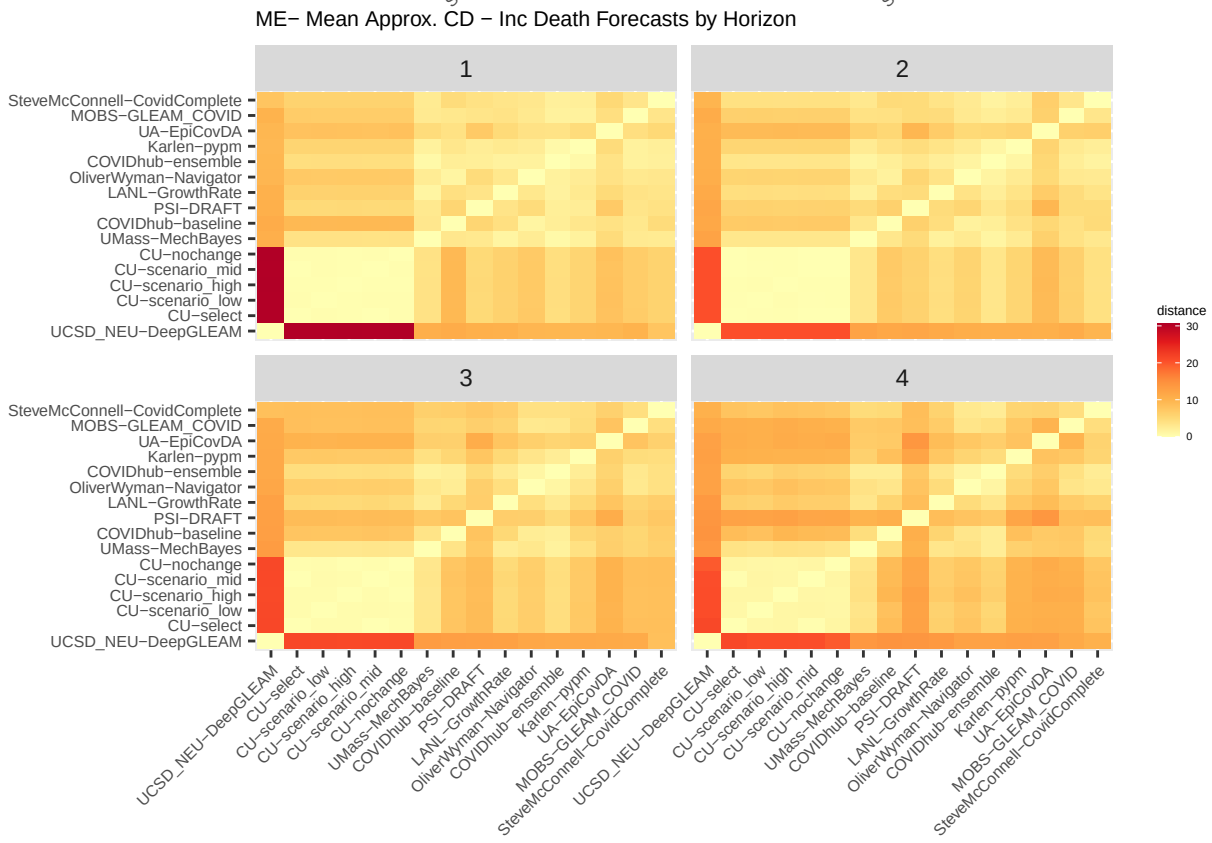
5 locations with the lowest number of COVID-19 deaths by the end of February 2021

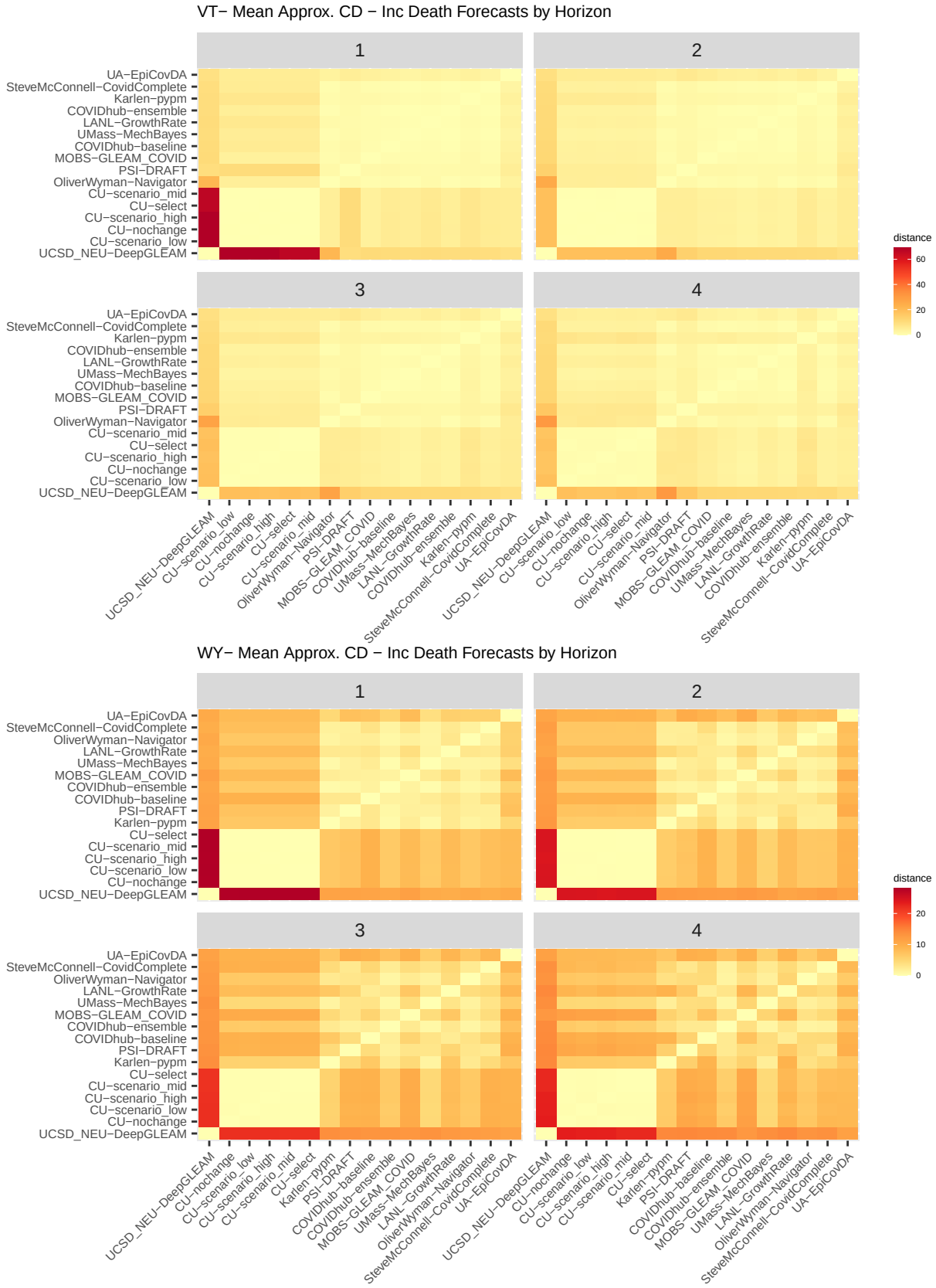
The pairwise approximated Cramer's distances are calculated for the models that have complete submissions for all target, all 5 locations with the lowest number of COVID-19 deaths by the end of February 2021, all probability levels, from the target end date of October, 17th 2020 to May 29th, 2021 .

We can visualize the mean approximated pairwise distances across all time points in a heat map shown below. The distance from the model to itself is zero. The $x-$axis is arranged based in an ascending order of the model's approximate pairwise distance from the COVIDhub-ensemble. So, the first model is the model that is most dissimilar (on average) to the ensemble in this time frame.



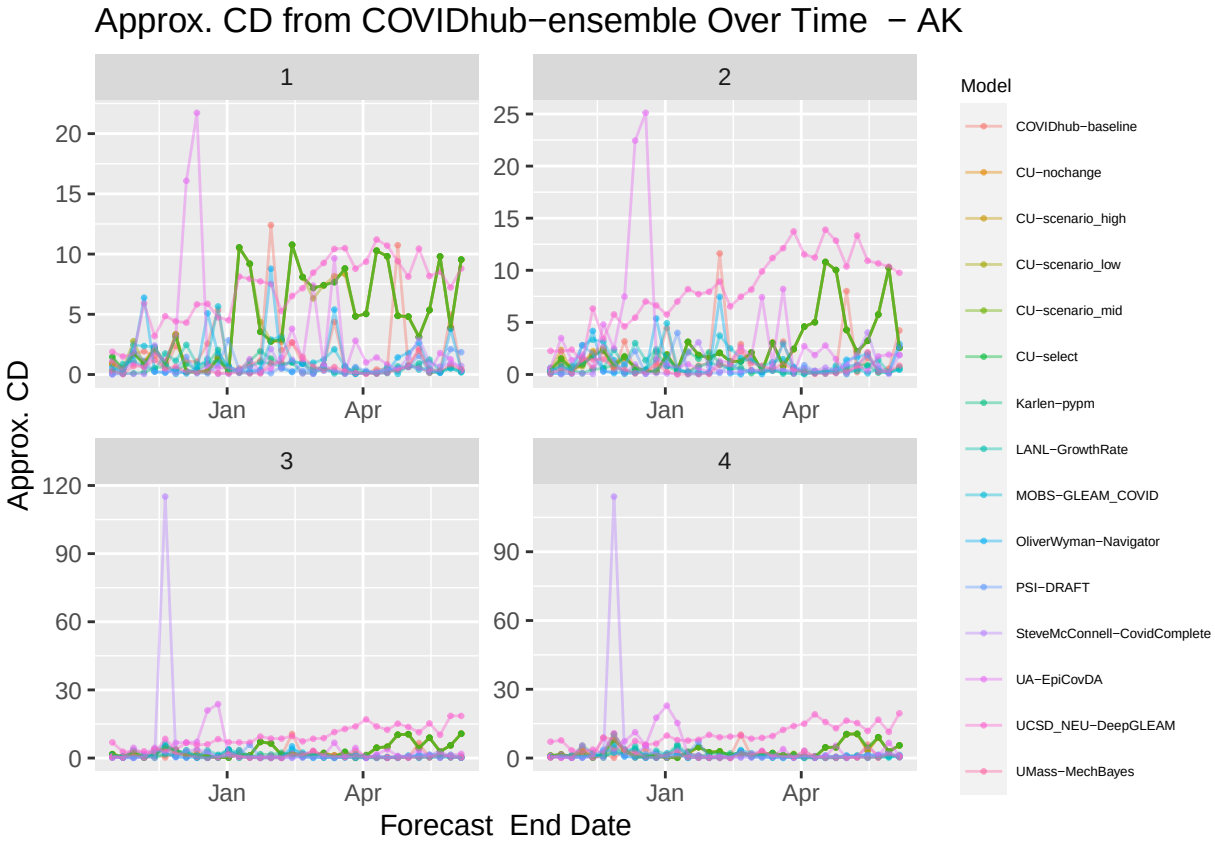

HI− Mean Approx. CD − Inc Death Forecasts by Horizon
1
2
3
4
UA−EpiCovDA
COVIDhub−baseline
SteveMcConnell−CovidComplete
COVIDhub−ensemble
UMass−MechBayes
PSI−DRAFT
MOBS−GLEAM_COVID
Karlen−pypm
OliverWyman−Navigator
LANL−GrowthRate
CU−scenario_mid
CU−scenario_high
CU−nochange
CU−select
CU−scenario_low
UCSD_NEU−DeepGLEAM
distance
20
15
10
5
0

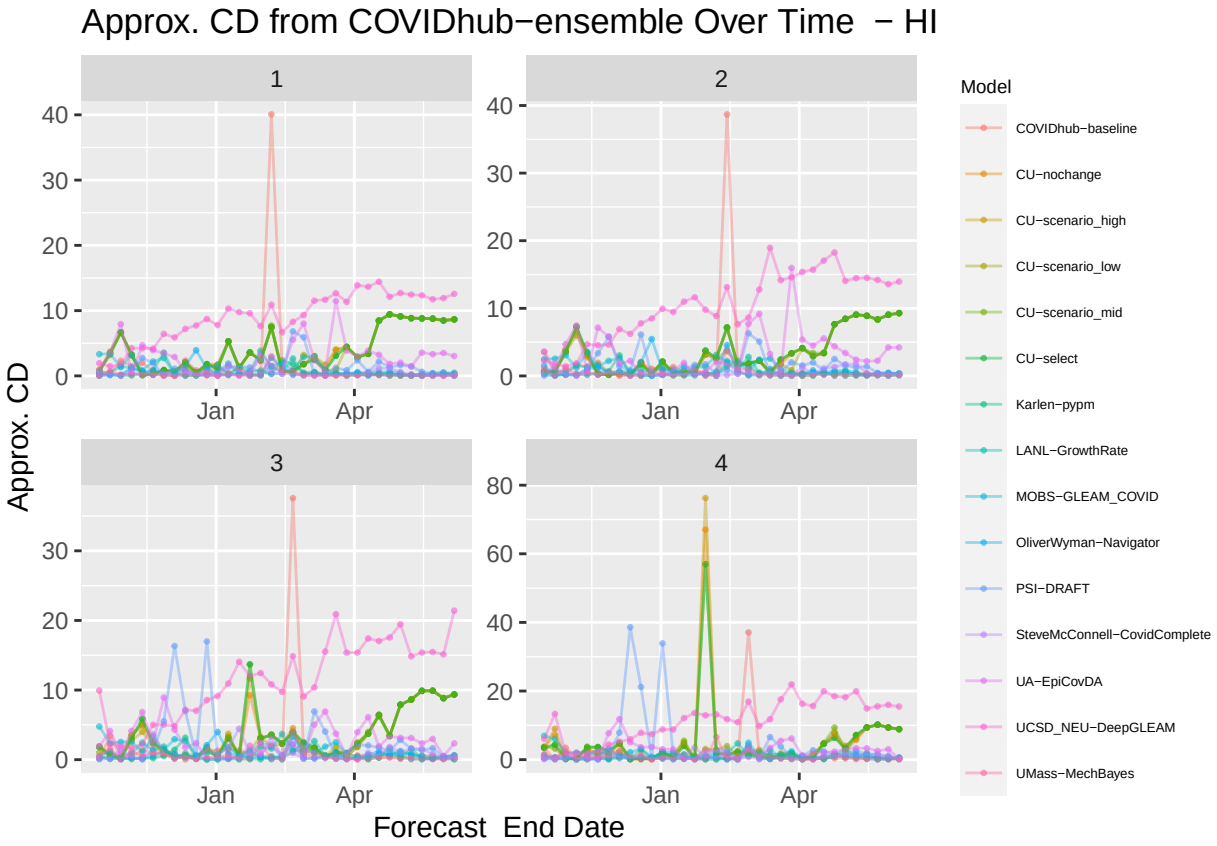

ME− Mean Approx. CD − Inc Death Forecasts by Horizon
1
2
3
4
SteveMcConnell−CovidComplete
MOBS−GLEAM_COVID
UA−EpiCovDA
Karlen−pypm
COVIDhub−ensemble
OliverWyman−Navigator
LANL−GrowthRate
PSI−DRAFT
COVIDhub−baseline
UMass−MechBayes
CU−nochange
CU−scenario_mid
CU−scenario_high
CU−scenario_low
CU−select
UCSD_NEU−DeepGLEAM
distance
30
20
10
0

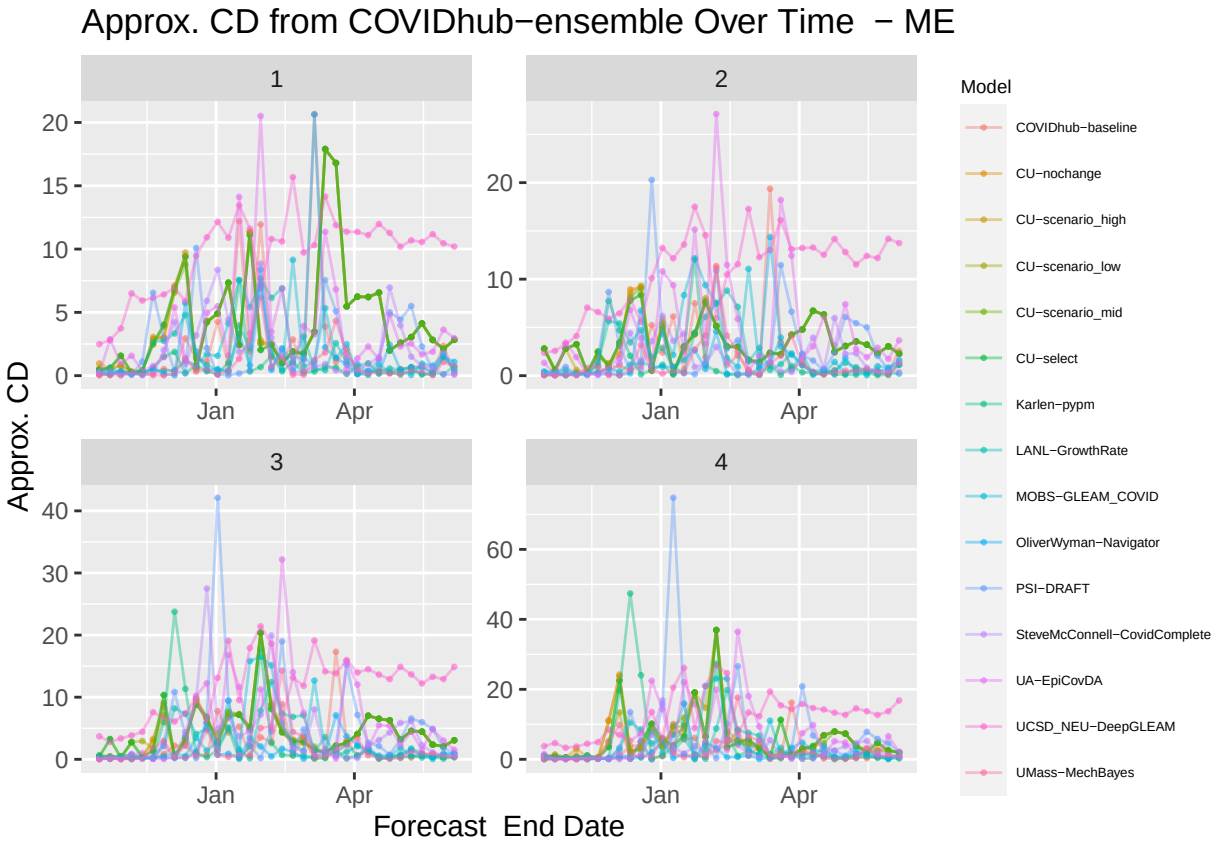


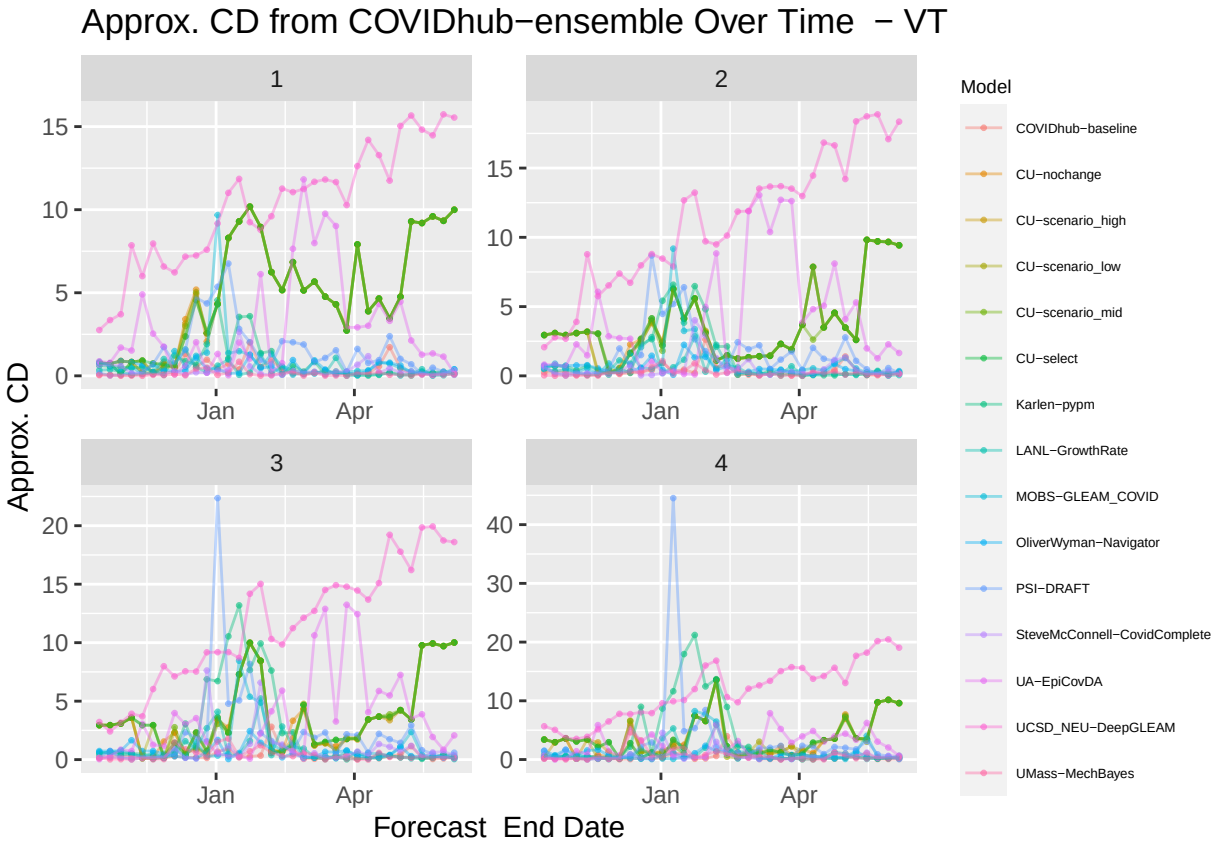
We can also look at the approximated pairwise distances to see how the models become more similar or

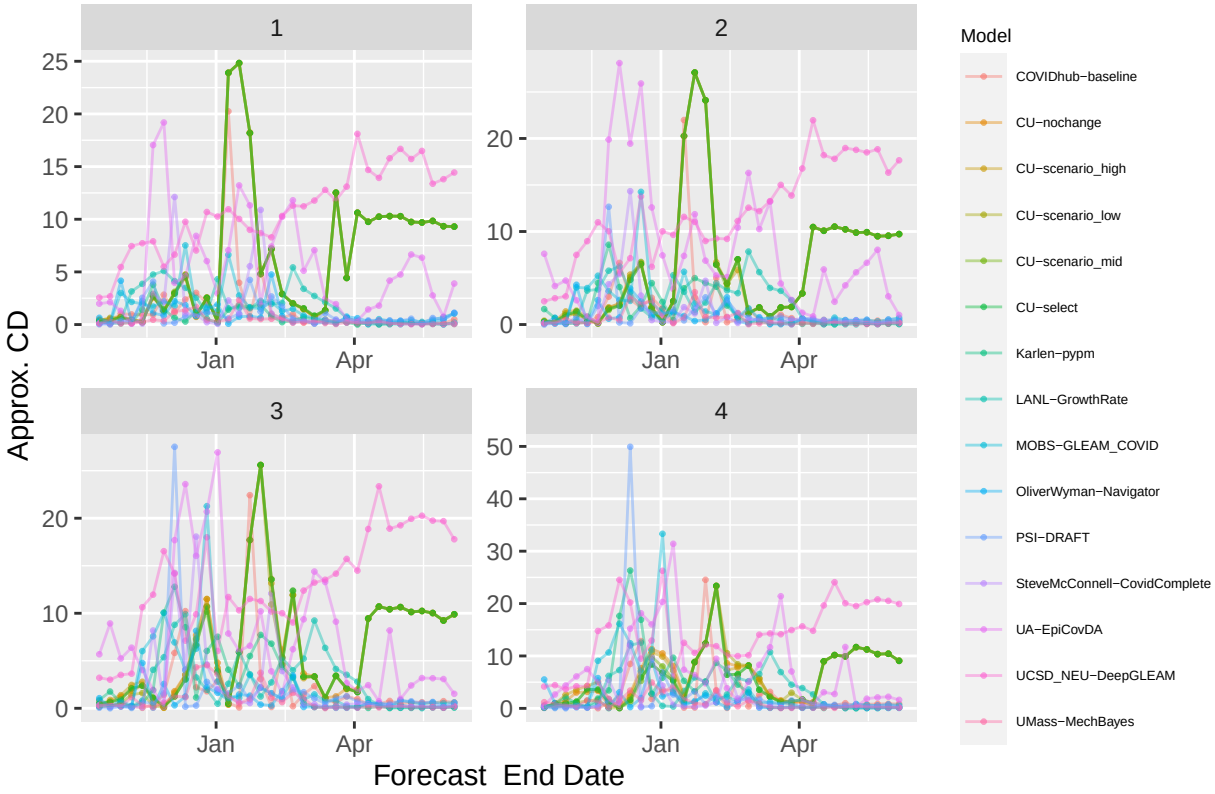
dissimilar over time.



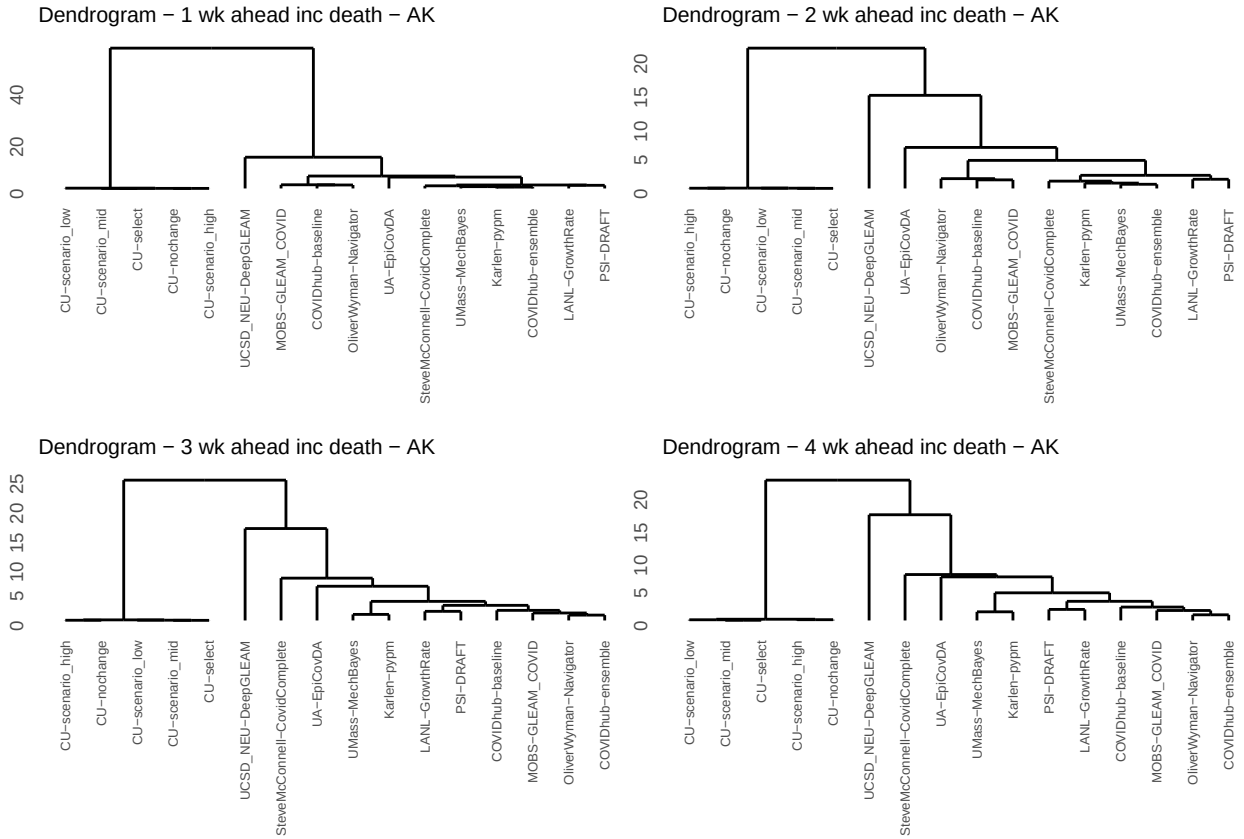

Approx. CD from COVIDhub−ensemble Over Time − HI
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
PSI−DRAFT
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

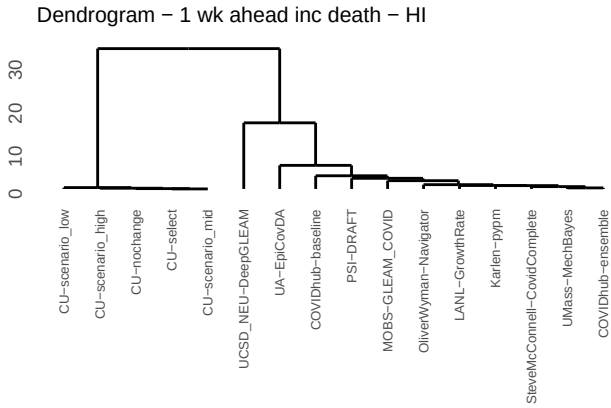

Approx. CD from COVIDhub−ensemble Over Time − ME
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
PSI−DRAFT
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

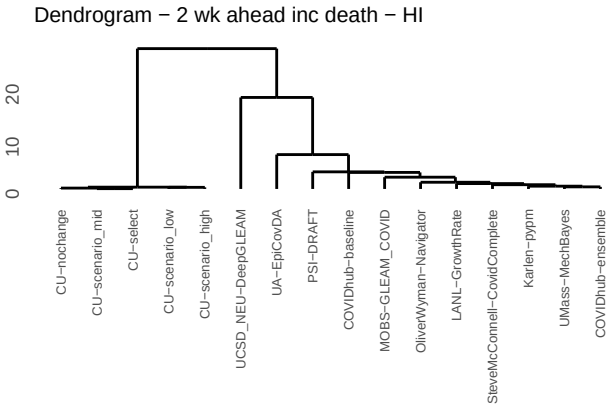

Approx. CD from COVIDhub−ensemble Over Time − VT
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
PSI−DRAFT
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

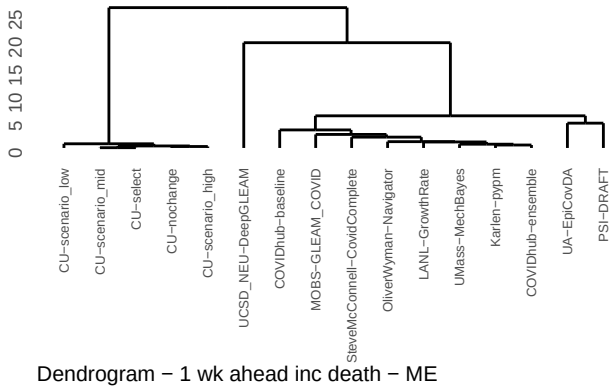

Approx. CD from COVIDhub−ensemble Over Time − WY
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
LANL−GrowthRate
MOBS−GLEAM_COVID
OliverWyman−Navigator
PSI−DRAFT
SteveMcConnell−CovidComplete
UA−EpiCovDA
UCSD_NEU−DeepGLEAM
UMass−MechBayes

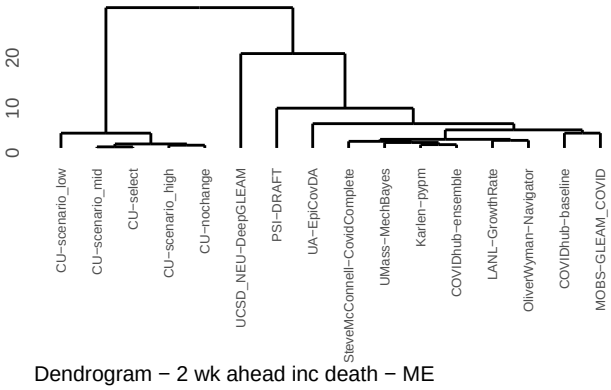
We can cluster the distances using hierarchical clustering. Different linkages will result in different clusters, we probably should investigate more later.

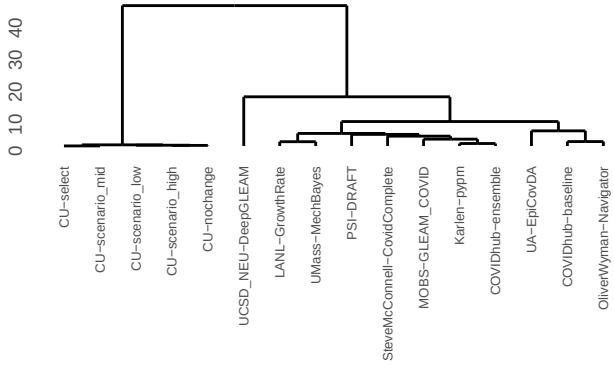


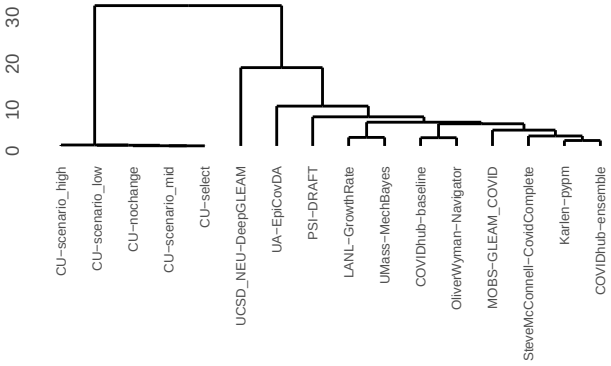

Dendrogram − 1 wk ahead inc death − HI
0 10 20 30
CU−scenario_low
CU−scenario_high
CU−nochange
CU−select
CU−scenario_mid
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
COVIDhub−baseline
PSI−DRAFT
MOBS−GLEAM_COVID
OliverWyman−Navigator
LANL−GrowthRate
Karlen−pypm
SteveMcConnell−CovidComplete
UMass−MechBayes
COVIDhub−ensemble

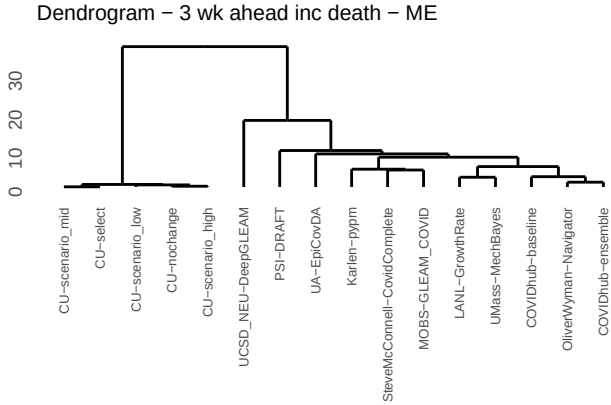

Dendrogram − 2 wk ahead inc death − HI
0 10 20
CU−nochange
CU−scenario_mid
CU−select
CU−scenario_low
CU−scenario_high
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
PSI−DRAFT
COVIDhub−baseline
MOBS−GLEAM_COVID
OliverWyman−Navigator
LANL−GrowthRate
SteveMcConnell−CovidComplete
Karlen−pypm
UMass−MechBayes
COVIDhub−ensemble

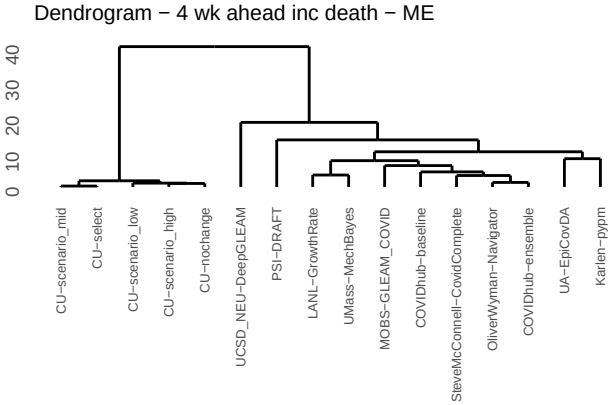

Dendrogram − 3 wk ahead inc death − HI
0 5 10 15 20 25
CU−scenario_low
CU−scenario_mid
CU−select
CU−nochange
CU−scenario_high
UCSD_NEU−DeepGLEAM
COVIDhub−baseline
MOBS−GLEAM_COVID
SteveMcConnell−CovidComplete
OliverWyman−Navigator
LANL−GrowthRate
UMass−MechBayes
Karlen−pypm
COVIDhub−ensemble
UA−EpiCovDA
PSI−DRAFT

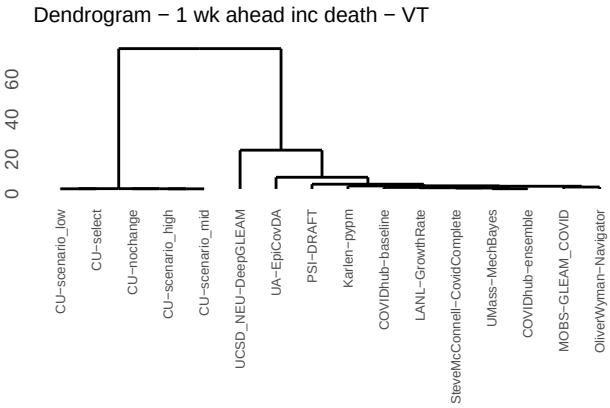

Dendrogram − 4 wk ahead inc death − HI
0 10 20
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
UCSD_NEU−DeepGLEAM
PSI−DRAFT
UA−EpiCovDA
SteveMcConnell−CovidComplete
UMass−MechBayes
Karlen−pypm
COVIDhub−ensemble
LANL−GrowthRate
OliverWyman−Navigator
COVIDhub−baseline
MOBS−GLEAM_COVID

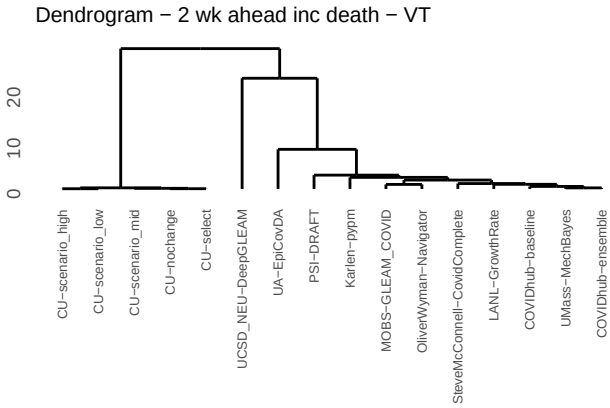

Dendrogram − 1 wk ahead inc death − ME
0 10 20 30 40
CU−select
CU−scenario_mid
CU−scenario_low
CU−scenario_high
CU−nochange
UCSD_NEU−DeepGLEAM
LANL−GrowthRate
UMass−MechBayes
PSI−DRAFT
SteveMcConnell−CovidComplete
MOBS−GLEAM_COVID
Karlen−pypm
COVIDhub−ensemble
UA−EpiCovDA
COVIDhub−baseline
OliverWyman−Navigator

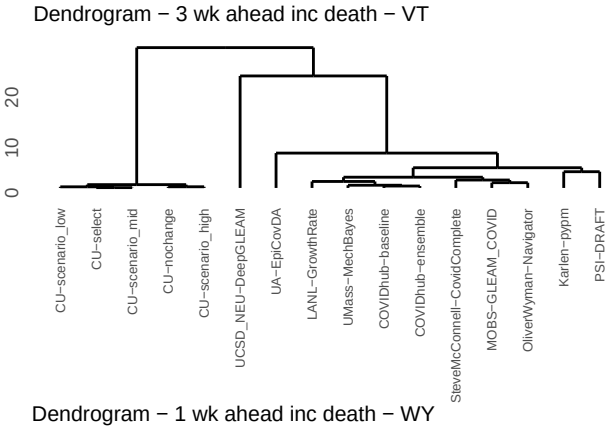

Dendrogram − 2 wk ahead inc death − ME
0 10 20 30
CU−scenario_high
CU−scenario_low
CU−nochange
CU−scenario_mid
CU−select
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
PSI−DRAFT
LANL−GrowthRate
UMass−MechBayes
COVIDhub−baseline
OliverWyman−Navigator
MOBS−GLEAM_COVID
SteveMcConnell−CovidComplete
Karlen−pypm
COVIDhub−ensemble

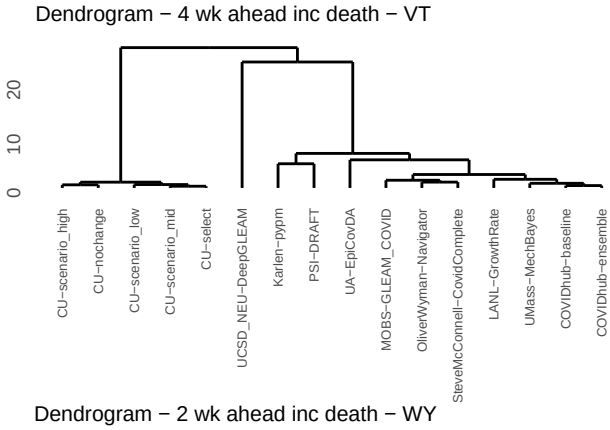

Dendrogram − 3 wk ahead inc death − ME
0 10 20 30
CU−scenario_mid
CU−select
CU−scenario_low
CU−nochange
CU−scenario_high
UCSD_NEU−DeepGLEAM
PSI−DRAFT
UA−EpiCovDA
Karlen−pypm
SteveMcConnell−CovidComplete
MOBS−GLEAM_COVID
LANL−GrowthRate
UMass−MechBayes
COVIDhub−baseline
OliverWyman−Navigator
COVIDhub−ensemble

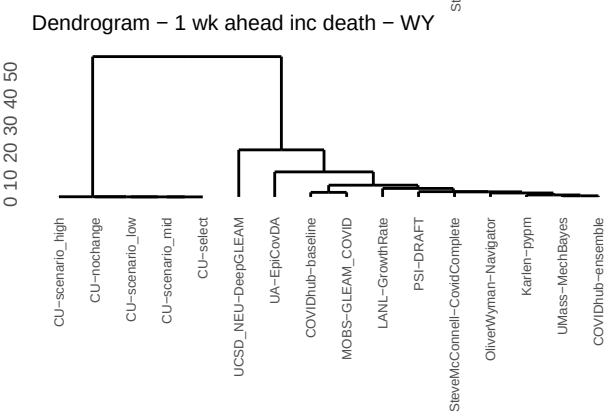

Dendrogram − 4 wk ahead inc death − ME
0 10 20 30 40
CU−scenario_mid
CU−select
CU−scenario_low
CU−scenario_high
CU−nochange
UCSD_NEU−DeepGLEAM
PSI−DRAFT
LANL−GrowthRate
UMass−MechBayes
MOBS−GLEAM_COVID
COVIDhub−baseline
SteveMcConnell−CovidComplete
OliverWyman−Navigator
COVIDhub−ensemble
UA−EpiCovDA
Karlen−pypm

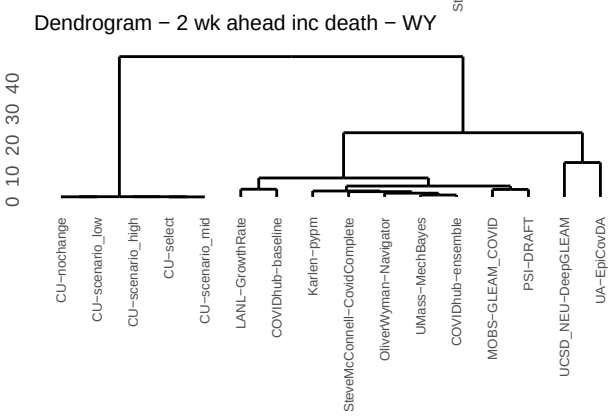

Dendrogram − 1 wk ahead inc death − VT
0 20 40 60
CU−scenario_low
CU−select
CU−nochange
CU−scenario_high
CU−scenario_mid
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
PSI−DRAFT
Karlen−pypm
COVIDhub−baseline
LANL−GrowthRate
SteveMcConnell−CovidComplete
UMass−MechBayes
COVIDhub−ensemble
MOBS−GLEAM_COVID
OliverWyman−Navigator

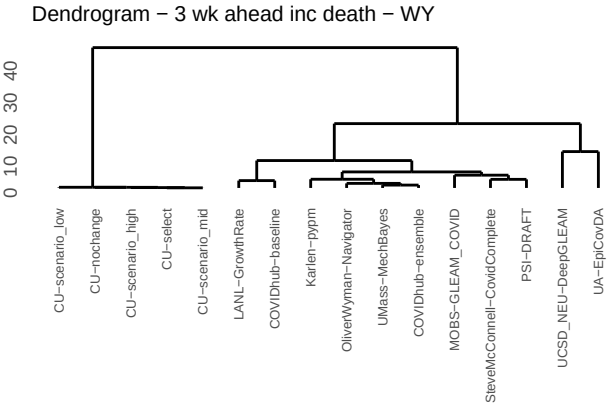

Dendrogram − 2 wk ahead inc death − VT
0 10 20
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−nochange
CU−select
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
PSI−DRAFT
Karlen−pypm
MOBS−GLEAM_COVID
OliverWyman−Navigator
SteveMcConnell−CovidComplete
LANL−GrowthRate
COVIDhub−baseline
UMass−MechBayes
COVIDhub−ensemble

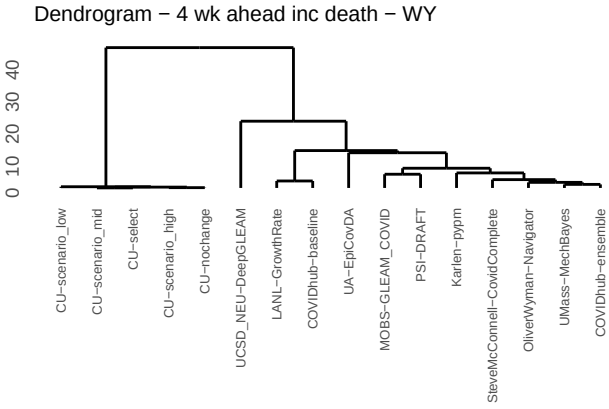

Dendrogram − 3 wk ahead inc death − VT
0 10 20
CU−scenario_low
CU−select
CU−scenario_mid
CU−nochange
CU−scenario_high
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
LANL−GrowthRate
UMass−MechBayes
COVIDhub−baseline
COVIDhub−ensemble
SteveMcConnell−CovidComplete
MOBS−GLEAM_COVID
OliverWyman−Navigator
Karlen−pypm
PSI−DRAFT


Dendrogram − 4 wk ahead inc death − VT
0 10 20
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select
UCSD_NEU−DeepGLEAM
Karlen−pypm
PSI−DRAFT
UA−EpiCovDA
MOBS−GLEAM_COVID
OliverWyman−Navigator
SteveMcConnell−CovidComplete
LANL−GrowthRate
UMass−MechBayes
COVIDhub−baseline
COVIDhub−ensemble


Dendrogram − 1 wk ahead inc death − WY
0 10 20 30 40 50
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select
UCSD_NEU−DeepGLEAM
UA−EpiCovDA
COVIDhub−baseline
MOBS−GLEAM_COVID
LANL−GrowthRate
PSI−DRAFT
SteveMcConnell−CovidComplete
OliverWyman−Navigator
Karlen−pypm
UMass−MechBayes
COVIDhub−ensemble


Dendrogram − 2 wk ahead inc death − WY
0 10 20 30 40
CU−nochange
CU−scenario_low
CU−scenario_high
CU−select
CU−scenario_mid
LANL−GrowthRate
COVIDhub−baseline
Karlen−pypm
SteveMcConnell−CovidComplete
OliverWyman−Navigator
UMass−MechBayes
COVIDhub−ensemble
MOBS−GLEAM_COVID
PSI−DRAFT
UCSD_NEU−DeepGLEAM
UA−EpiCovDA


Dendrogram − 3 wk ahead inc death − WY
0 10 20 30 40
CU−scenario_low
CU−nochange
CU−scenario_high
CU−select
CU−scenario_mid
LANL−GrowthRate
COVIDhub−baseline
Karlen−pypm
OliverWyman−Navigator
UMass−MechBayes
COVIDhub−ensemble
MOBS−GLEAM_COVID
SteveMcConnell−CovidComplete
PSI−DRAFT
UCSD_NEU−DeepGLEAM
UA−EpiCovDA

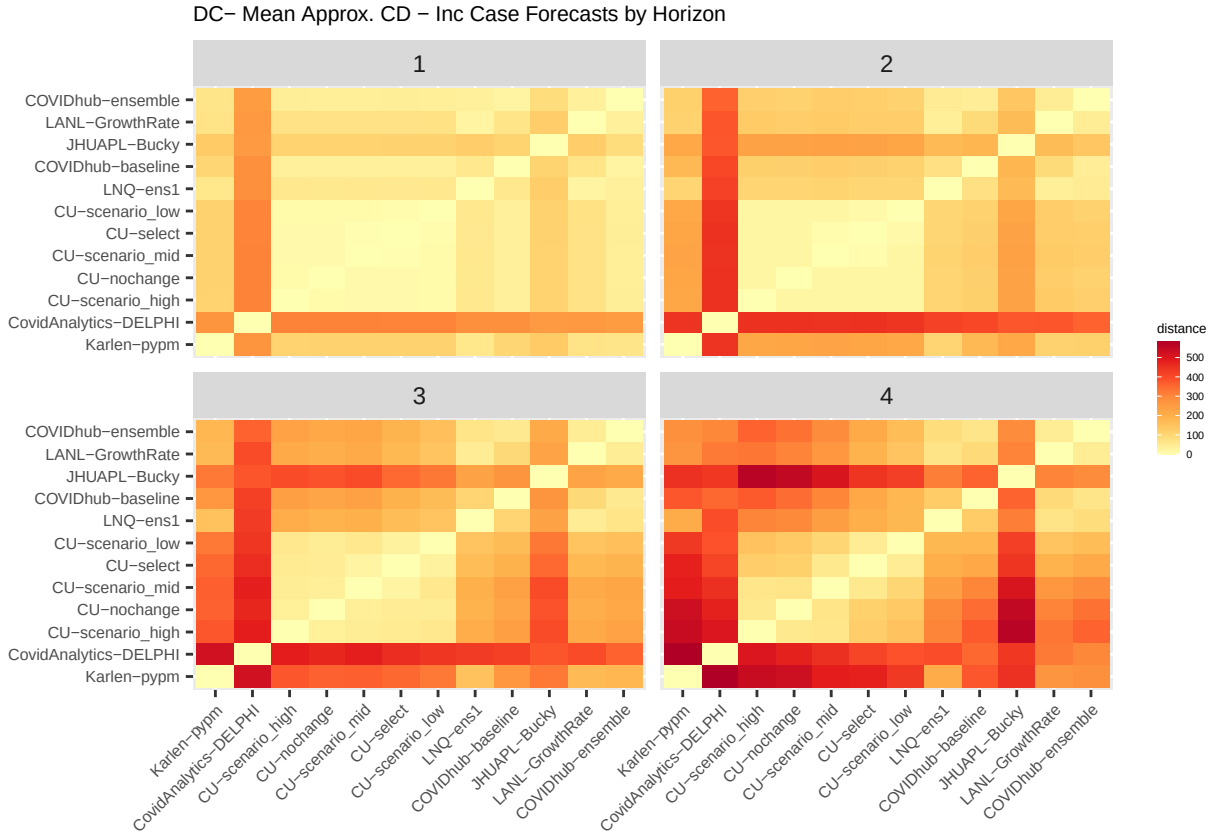

Dendrogram − 4 wk ahead inc death − WY
0 10 20 30 40
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
UCSD_NEU−DeepGLEAM
LANL−GrowthRate
COVIDhub−baseline
UA−EpiCovDA
MOBS−GLEAM_COVID
PSI−DRAFT
Karlen−pypm
SteveMcConnell−CovidComplete
OliverWyman−Navigator
UMass−MechBayes
COVIDhub−ensemble

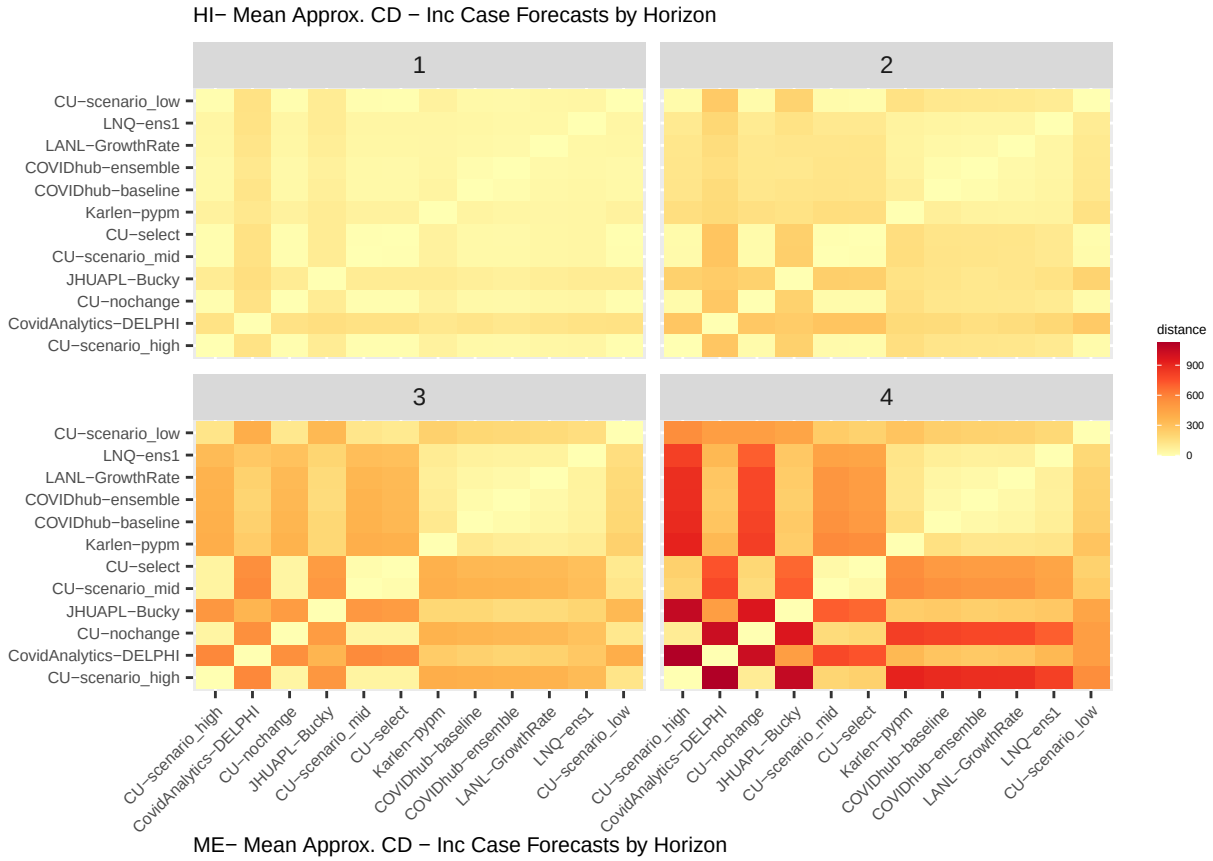
COVID-19 Forecasting Model Similarity Analysis for 1-4 Week Ahead Incident Case

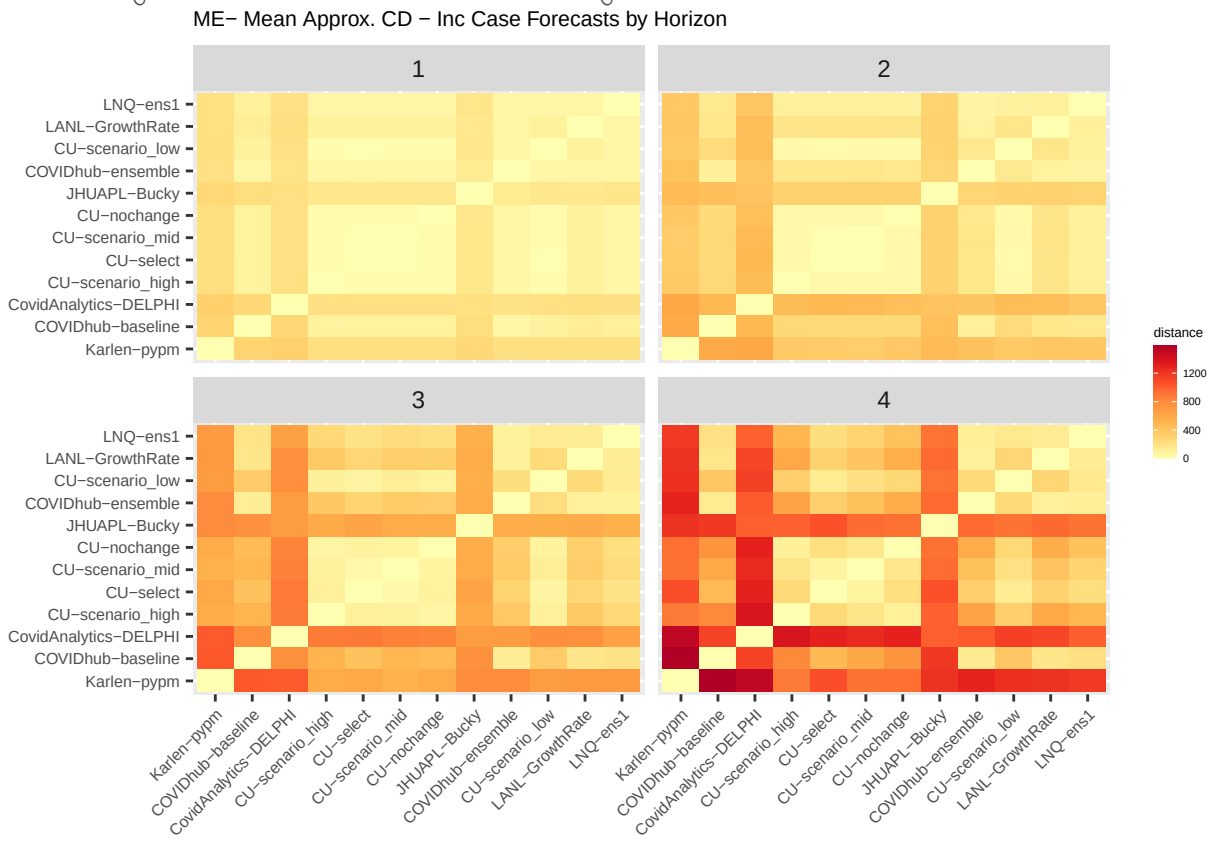
5 locations with the highest number of COVID-19 cumulative cases from 01/25/2020 to 02/07/2021

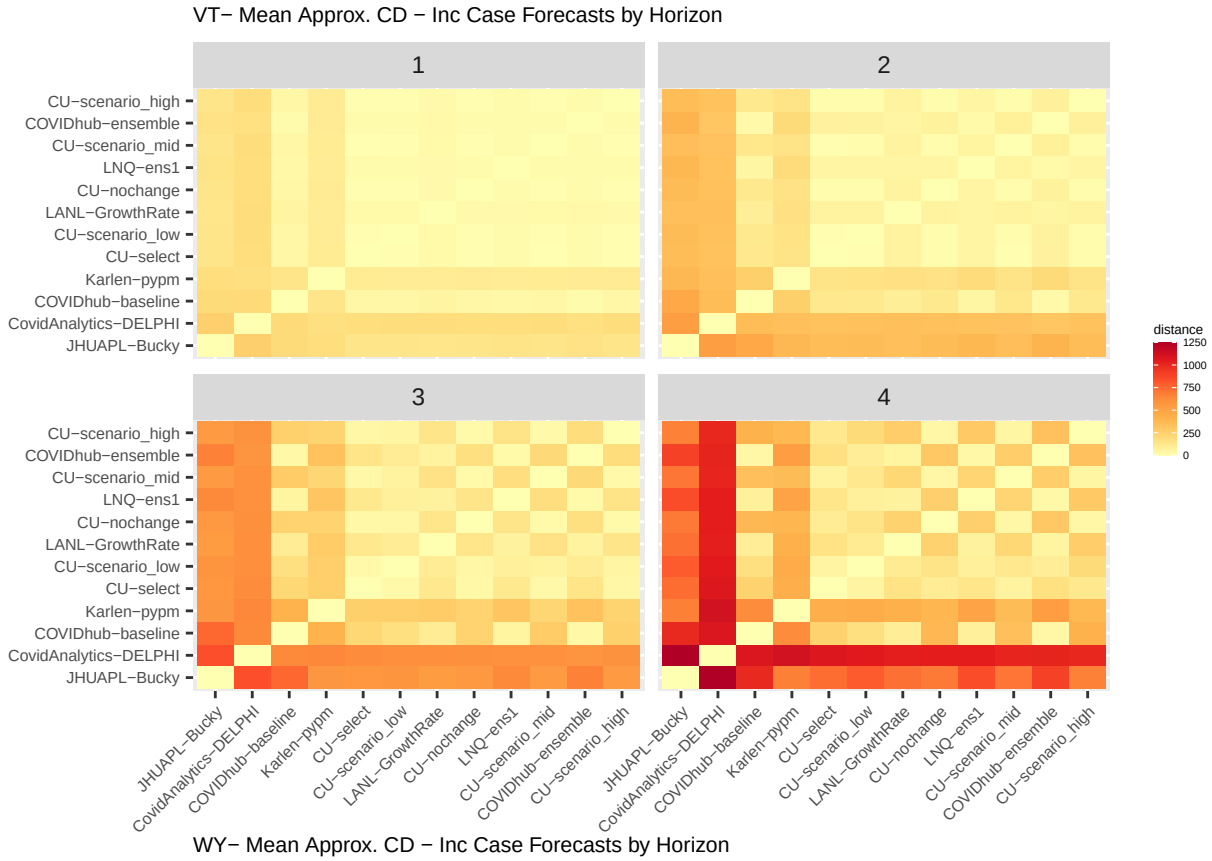
The pairwise approximated Cramer's distances are calculated for the models that have complete submissions for all target, all probability levels, from mid-October 2020 until May 24th,2021 for 5 locations with the highest cumulative cases.

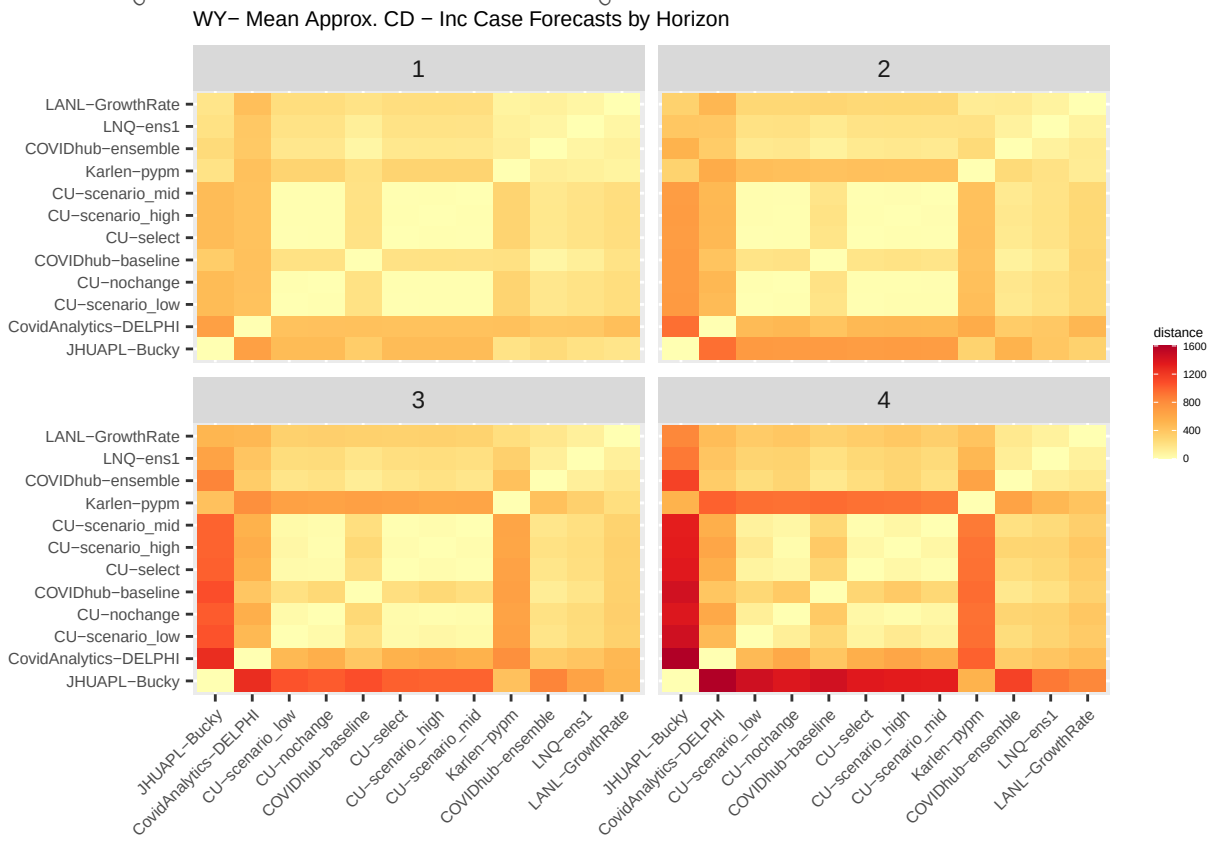
Below are the heat maps of mean approximated pairwise CD across time by location-target:




HI− Mean Approx. CD − Inc Case Forecasts by Horizon
1
2
3
4
CU−scenario_low
LNQ−ens1
LANL−GrowthRate
COVIDhub−ensemble
COVIDhub−baseline
Karlen−pypm
CU−select
CU−scenario_mid
JHUAPL−Bucky
CU−nochange
CovidAnalytics−DELPHI
CU−scenario_high
distance
900
600
300
0

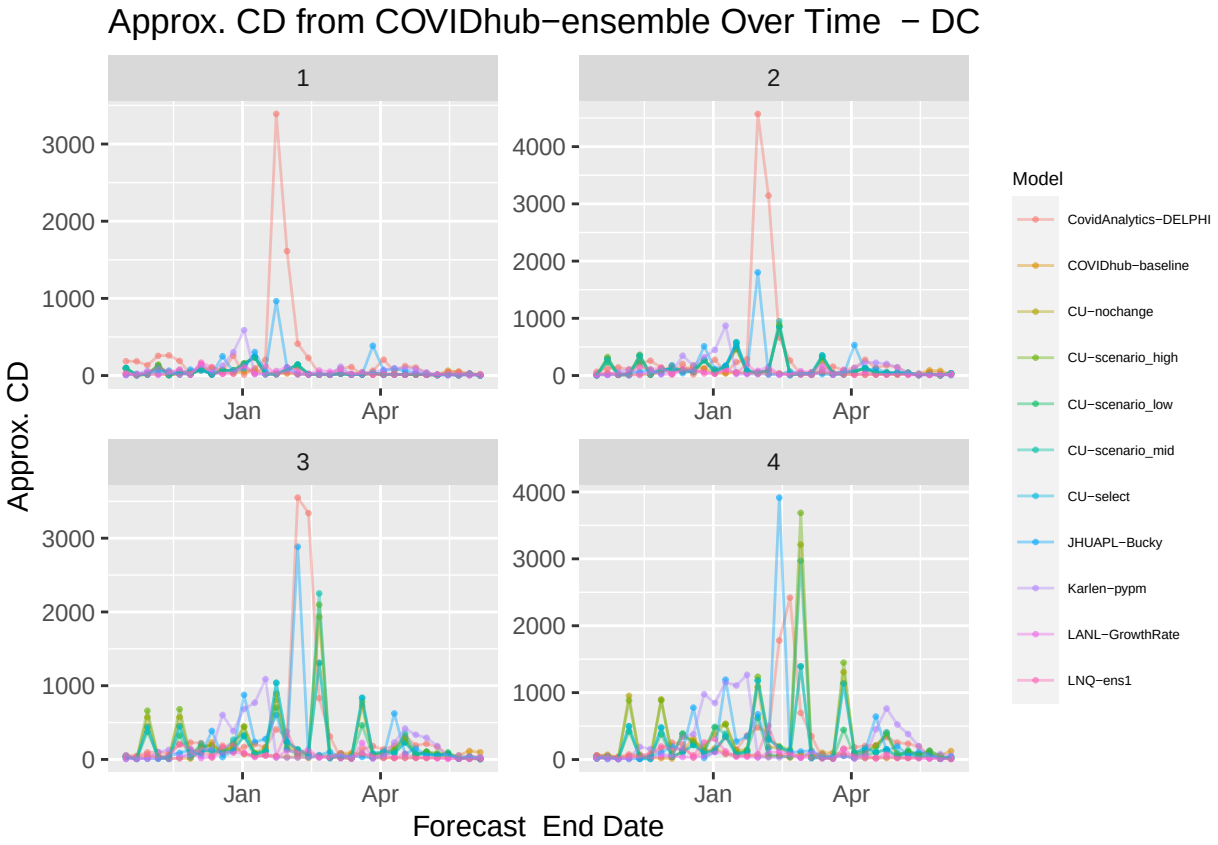

ME− Mean Approx. CD − Inc Case Forecasts by Horizon
1
2
3
4
LNQ−ens1
LANL−GrowthRate
CU−scenario_low
COVIDhub−ensemble
JHUAPL−Bucky
CU−nochange
CU−scenario_mid
CU−select
CU−scenario_high
CovidAnalytics−DELPHI
COVIDhub−baseline
Karlen−pypm
distance
1200
800
400
0

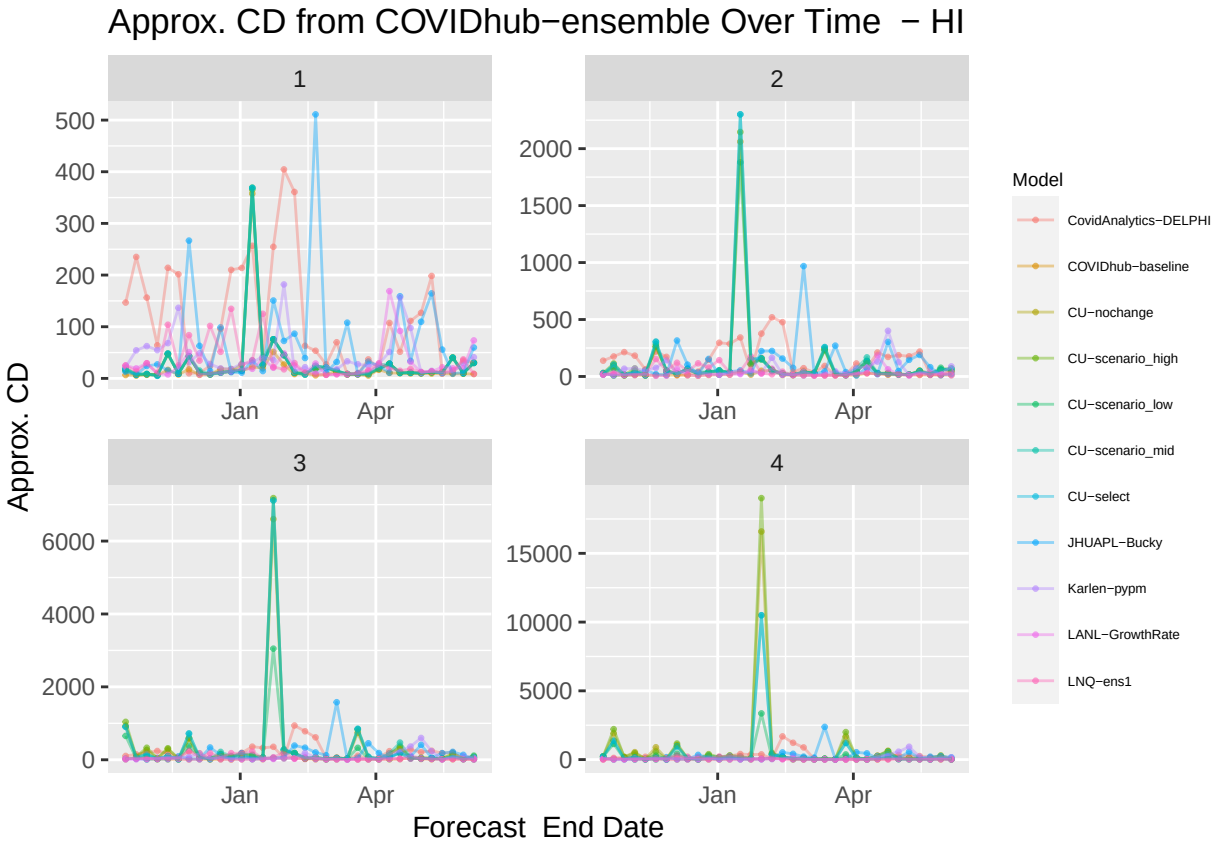


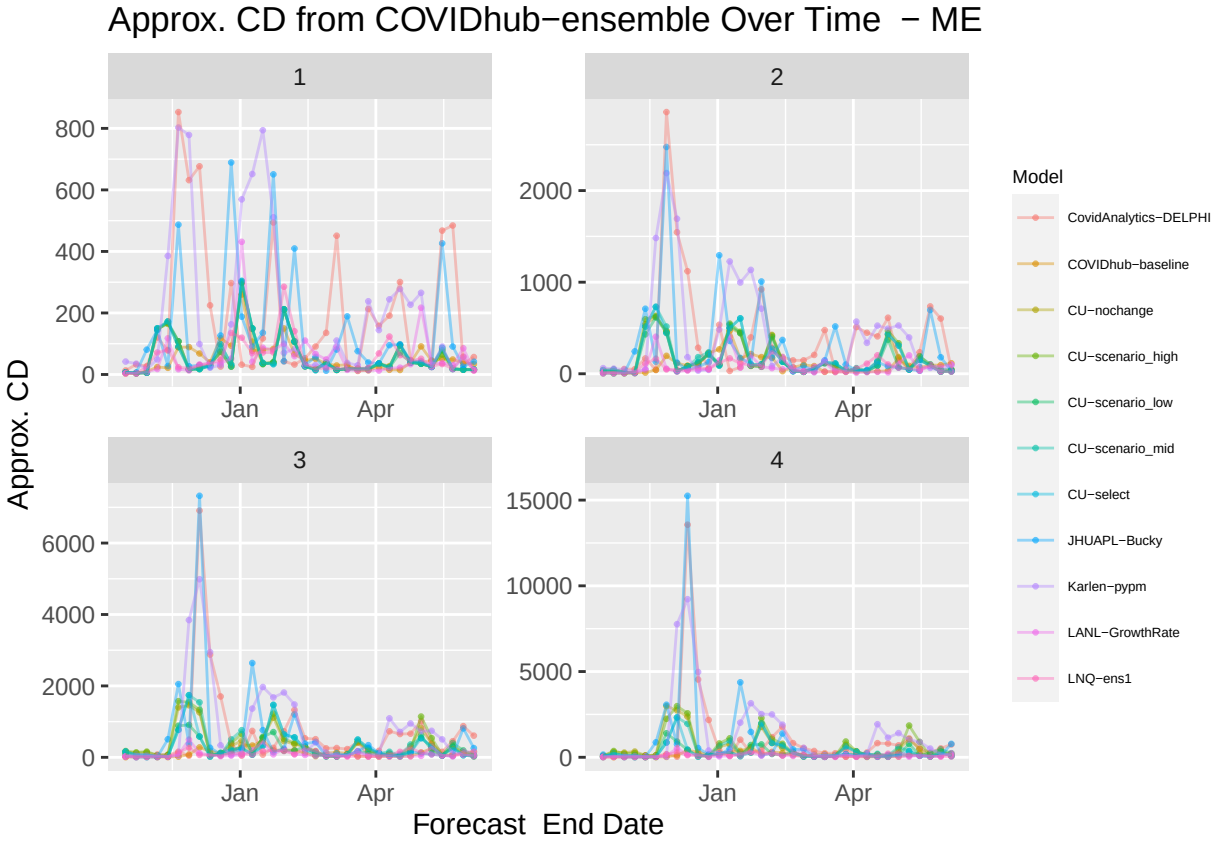


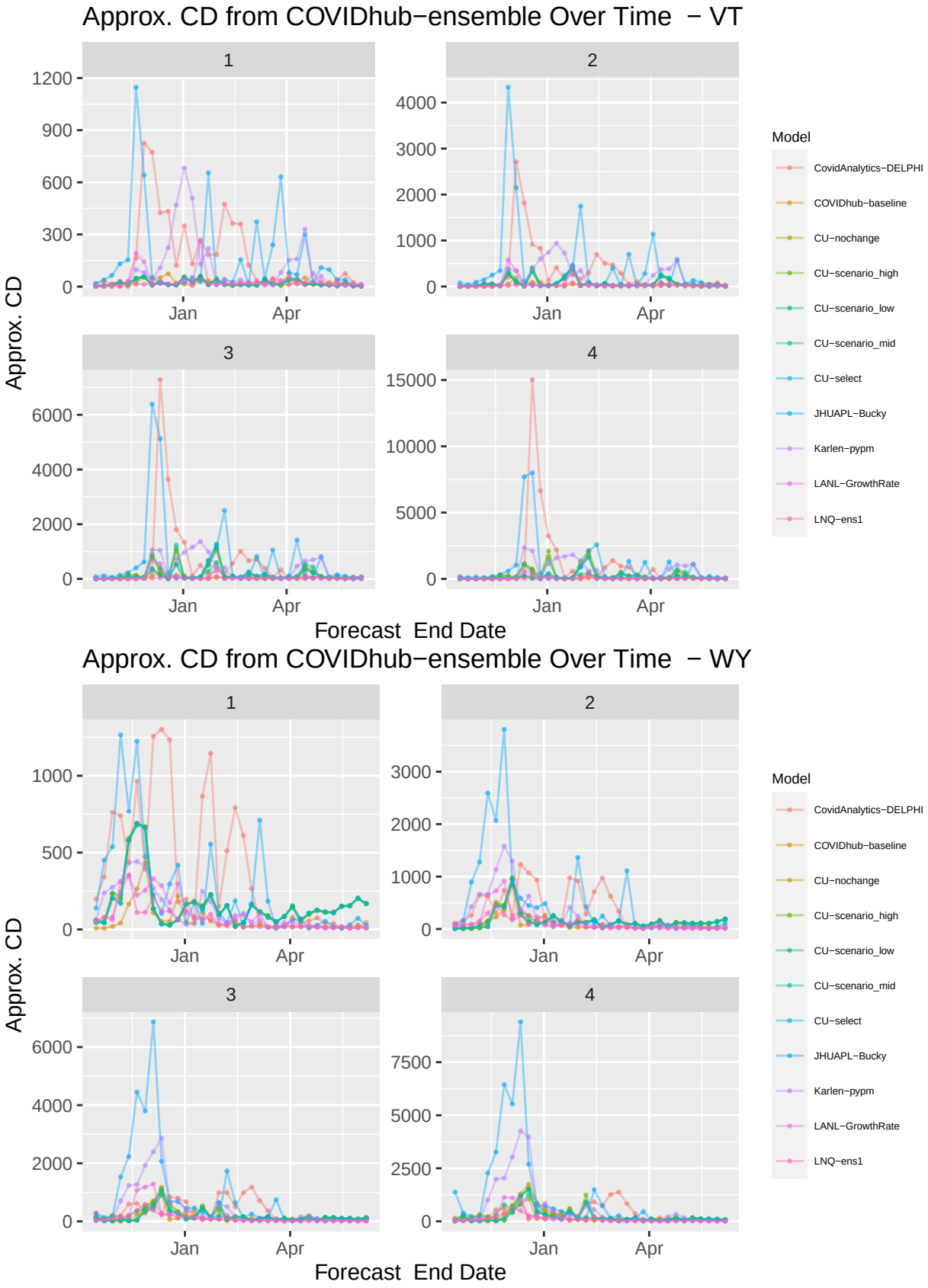
Below are the plots of approximated pairwise distances over time. Unlike indicent death targets, there are

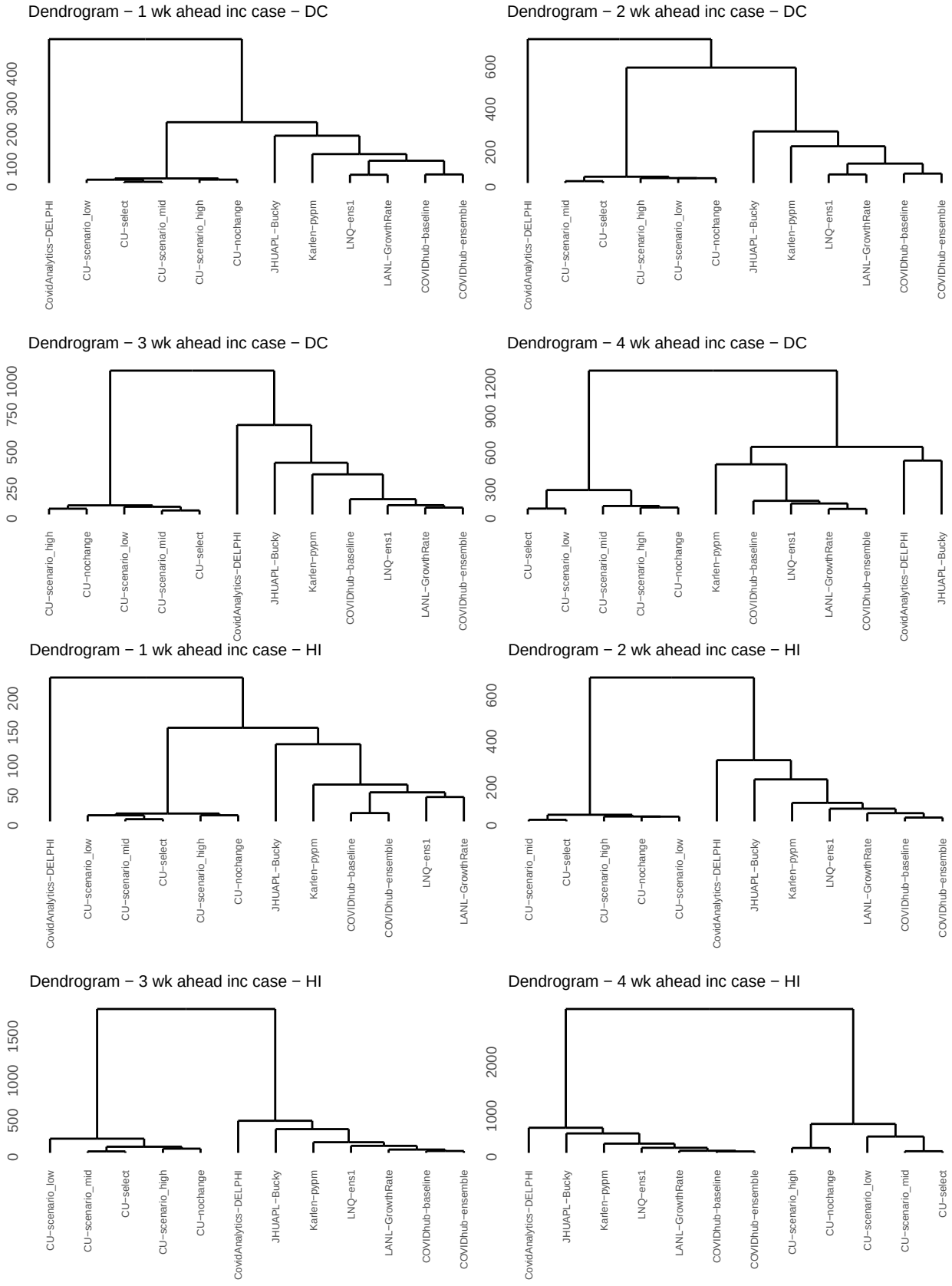
too many model pairs to show (12 models for inc death and 17 models for inc case, so we have a combination of 6 choose 2 with no repeats (15) vs a combination of 11 choose 2 with no repeats (55)). So, I only pick the first 15 of the combinations:

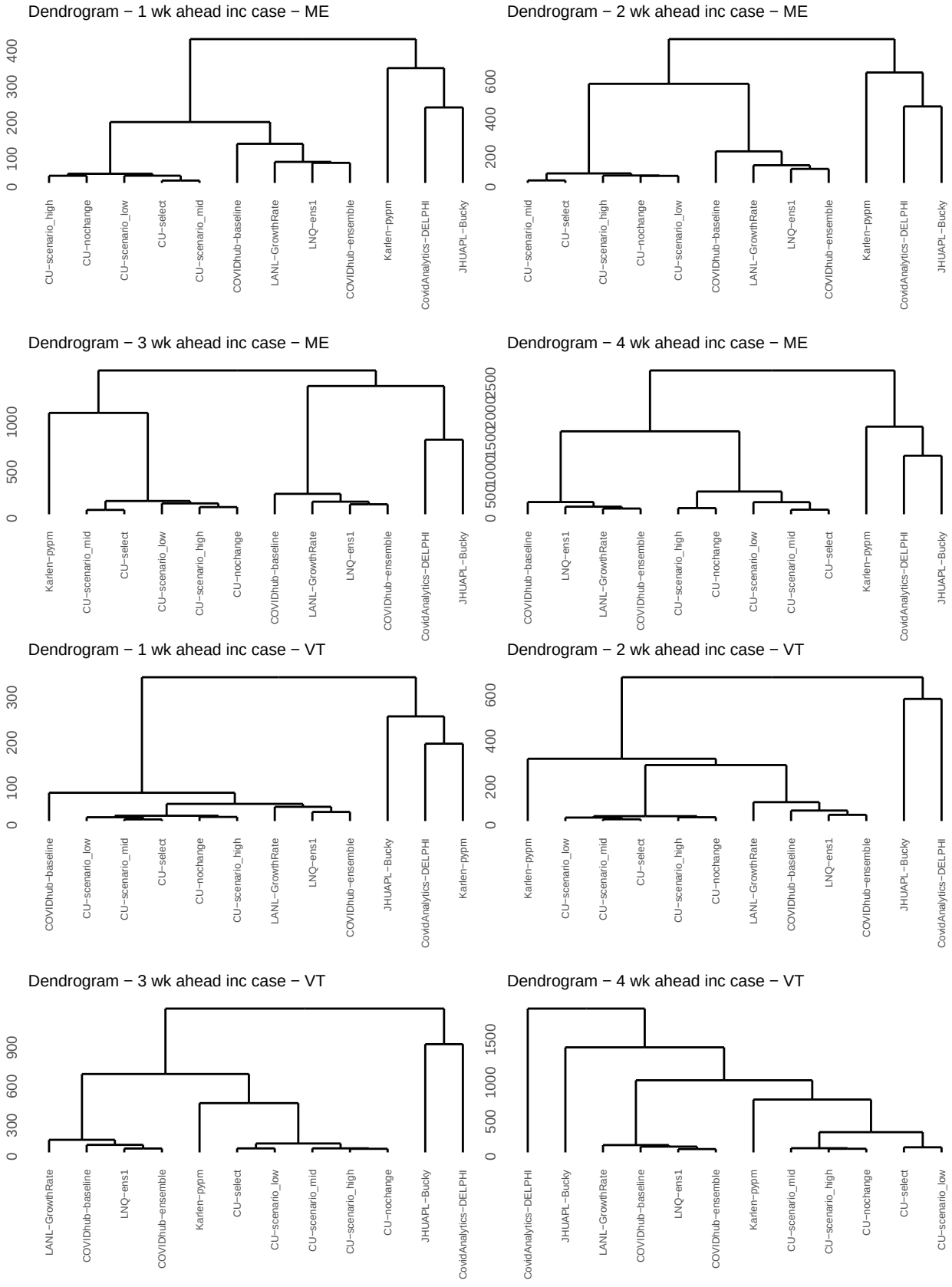


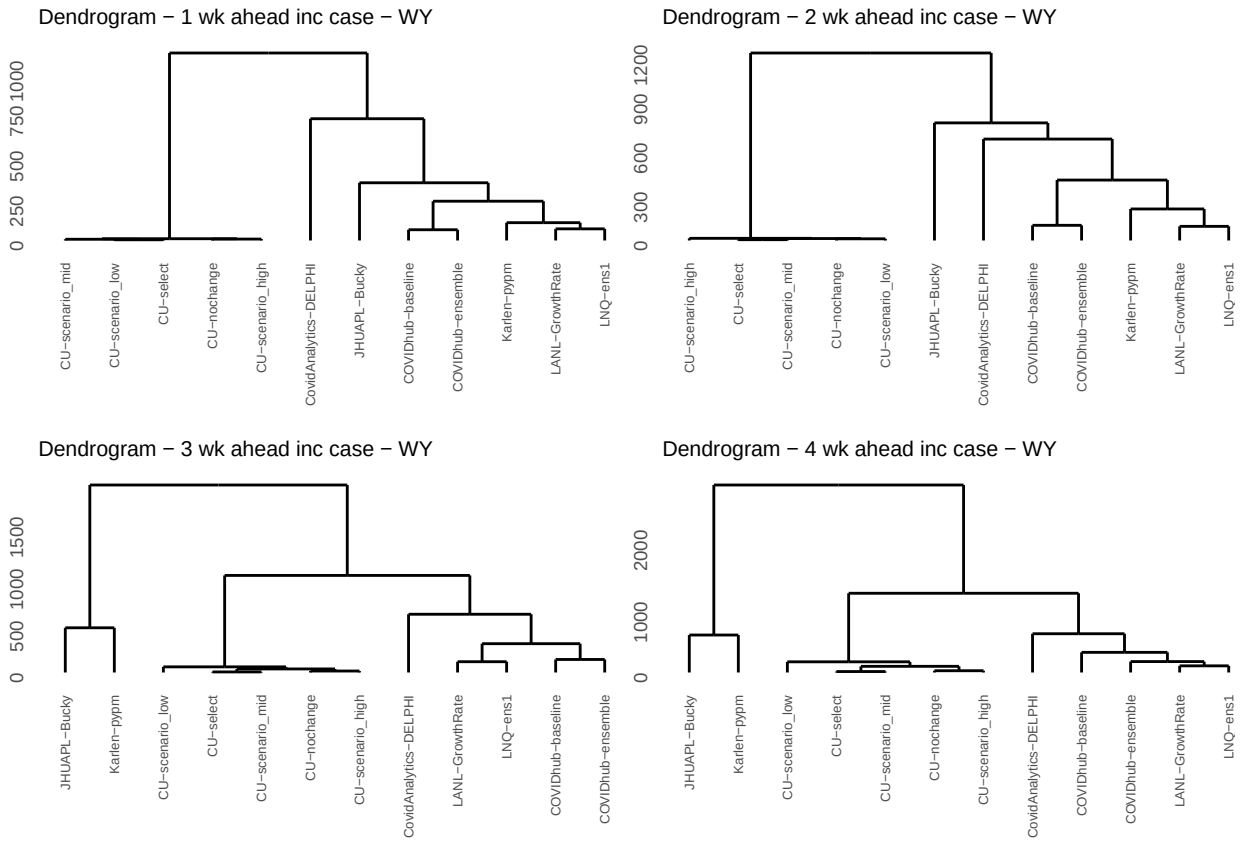

Approx. CD from COVIDhub−ensemble Over Time − HI
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CovidAnalytics−DELPHI
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
Karlen−pypm
LANL−GrowthRate
LNQ−ens1


Approx. CD from COVIDhub−ensemble Over Time − ME
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CovidAnalytics−DELPHI
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
Karlen−pypm
LANL−GrowthRate
LNQ−ens1


Approx. CD from COVIDhub−ensemble Over Time − VT
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CovidAnalytics−DELPHI
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
Karlen−pypm
LANL−GrowthRate
LNQ−ens1
Approx. CD from COVIDhub−ensemble Over Time − WY
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
CovidAnalytics−DELPHI
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
Karlen−pypm
LANL−GrowthRate
LNQ−ens1


Dendrogram − 1 wk ahead inc case − DC
0 100 200 300 400
CovidAnalytics−DELPHI
CU−scenario_low
CU−select
CU−scenario_mid
CU−scenario_high
CU−nochange
JHUAPL−Bucky
Karlen−pypm
LNQ−ens1
LANL−GrowthRate
COVIDhub−baseline
COVIDhub−ensemble
Dendrogram − 2 wk ahead inc case − DC
0 200 400 600
CovidAnalytics−DELPHI
CU−scenario_mid
CU−select
CU−scenario_high
CU−scenario_low
CU−nochange
JHUAPL−Bucky
Karlen−pypm
LNQ−ens1
LANL−GrowthRate
COVIDhub−baseline
COVIDhub−ensemble
Dendrogram − 3 wk ahead inc case − DC
0 250 500 750 1000
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select
CovidAnalytics−DELPHI
JHUAPL−Bucky
Karlen−pypm
COVIDhub−baseline
LNQ−ens1
LANL−GrowthRate
COVIDhub−ensemble
Dendrogram − 4 wk ahead inc case − DC
0 300 600 900 1200
CU−select
CU−scenario_low
CU−scenario_mid
CU−scenario_high
CU−nochange
Karlen−pypm
COVIDhub−baseline
LNQ−ens1
LANL−GrowthRate
COVIDhub−ensemble
CovidAnalytics−DELPHI
JHUAPL−Bucky
Dendrogram − 1 wk ahead inc case − HI
0 50 100 150 200
CovidAnalytics−DELPHI
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
Karlen−pypm
COVIDhub−baseline
COVIDhub−ensemble
LNQ−ens1
LANL−GrowthRate
Dendrogram − 2 wk ahead inc case − HI
0 200 400 600
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
CU−scenario_low
CovidAnalytics−DELPHI
JHUAPL−Bucky
Karlen−pypm
LNQ−ens1
LANL−GrowthRate
COVIDhub−baseline
COVIDhub−ensemble
Dendrogram − 3 wk ahead inc case − HI
0 500 1000 1500
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
CovidAnalytics−DELPHI
JHUAPL−Bucky
Karlen−pypm
LNQ−ens1
LANL−GrowthRate
COVIDhub−baseline
COVIDhub−ensemble
Dendrogram − 4 wk ahead inc case − HI
0 1000 2000
CovidAnalytics−DELPHI
JHUAPL−Bucky
Karlen−pypm
LNQ−ens1
LANL−GrowthRate
COVIDhub−baseline
COVIDhub−ensemble
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select

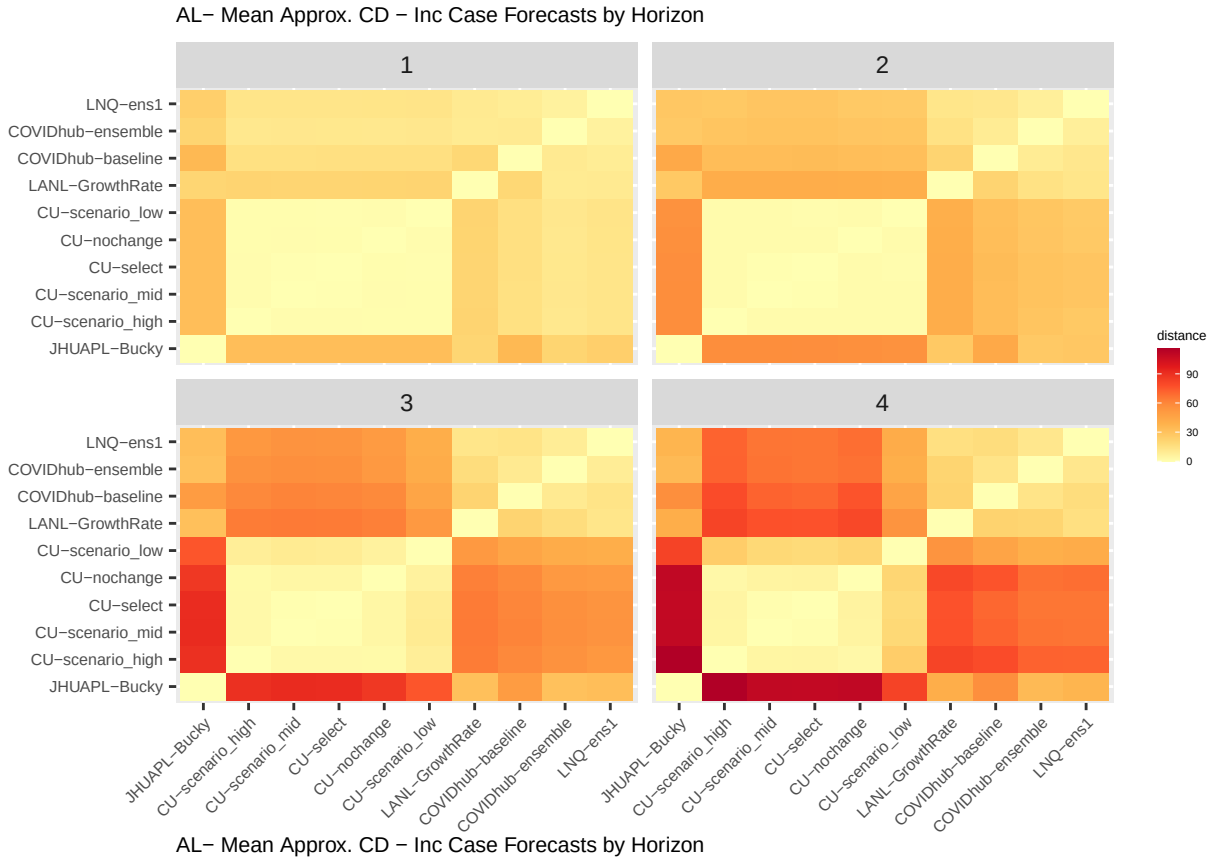

Dendrogram − 1 wk ahead inc case − ME
0 100 200 300 400
CU−scenario_high
CU−nochange
CU−scenario_low
CU−select
CU−scenario_mid
COVIDhub−baseline
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
Karlen−pypm
CovidAnalytics−DELPHI
JHUAPL−Bucky
Dendrogram − 2 wk ahead inc case − ME
0 200 400 600
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
CU−scenario_low
COVIDhub−baseline
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
Karlen−pypm
CovidAnalytics−DELPHI
JHUAPL−Bucky
Dendrogram − 3 wk ahead inc case − ME
0 500 1000
Karlen−pypm
CU−scenario_mid
CU−select
CU−scenario_low
CU−scenario_high
CU−nochange
COVIDhub−baseline
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
CovidAnalytics−DELPHI
JHUAPL−Bucky
Dendrogram − 4 wk ahead inc case − ME
0 500 1000 1500 2000 2500
COVIDhub−baseline
LNQ−ens1
LANL−GrowthRate
COVIDhub−ensemble
CU−scenario_high
CU−nochange
CU−scenario_low
CU−scenario_mid
CU−select
Karlen−pypm
CovidAnalytics−DELPHI
JHUAPL−Bucky
Dendrogram − 1 wk ahead inc case − VT
0 100 200 300
COVIDhub−baseline
CU−scenario_low
CU−scenario_mid
CU−select
CU−nochange
CU−scenario_high
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
JHUAPL−Bucky
CovidAnalytics−DELPHI
Karlen−pypm
Dendrogram − 2 wk ahead inc case − VT
0 200 400 600
Karlen−pypm
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble
JHUAPL−Bucky
CovidAnalytics−DELPHI
Dendrogram − 3 wk ahead inc case − VT
0 300 600 900
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble
Karlen−pypm
CU−select
CU−scenario_low
CU−scenario_mid
CU−scenario_high
CU−nochange
JHUAPL−Bucky
CovidAnalytics−DELPHI
Dendrogram − 4 wk ahead inc case − VT
0 500 1000 1500
CovidAnalytics−DELPHI
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble
Karlen−pypm
CU−scenario_mid
CU−scenario_high
CU−nochange
CU−select
CU−scenario_low

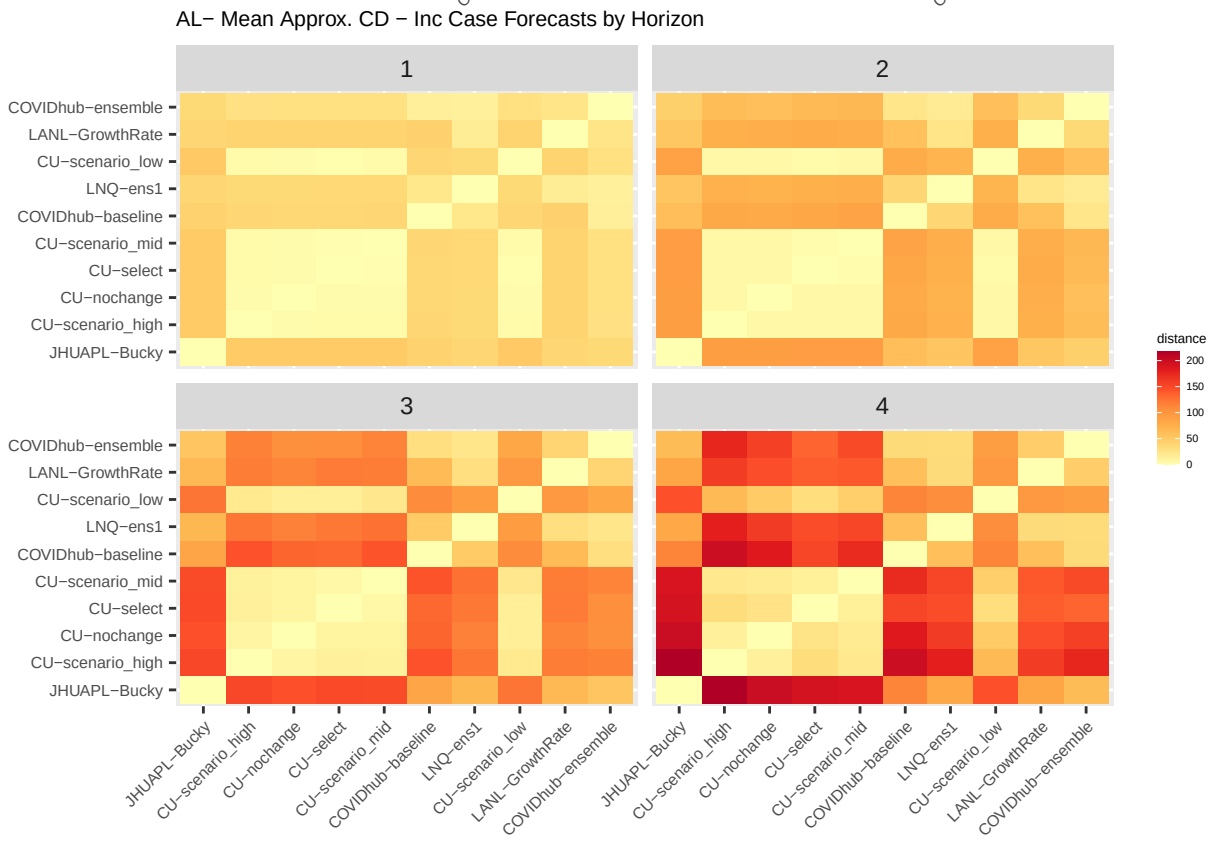


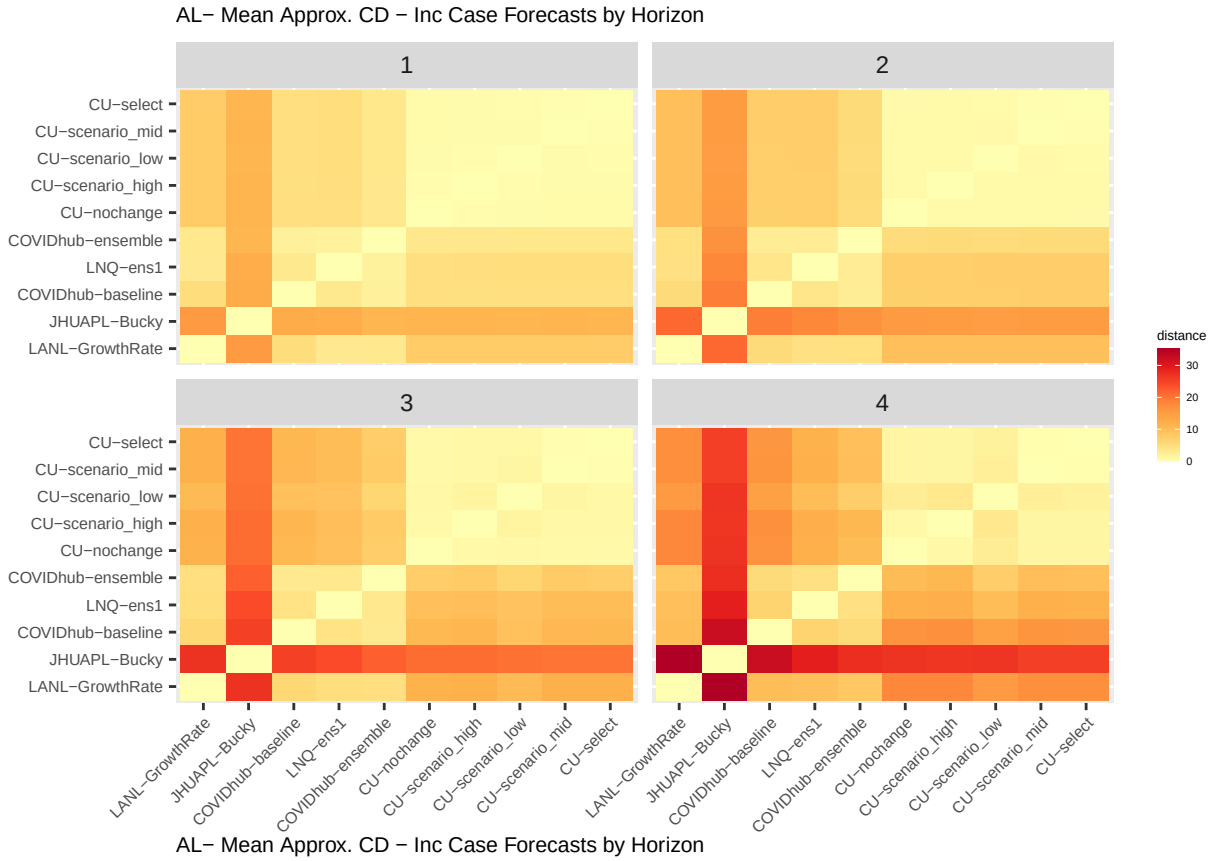
5 locations with the lowest number of COVID-19 cases from 01/25/2020 to 02/07/2021

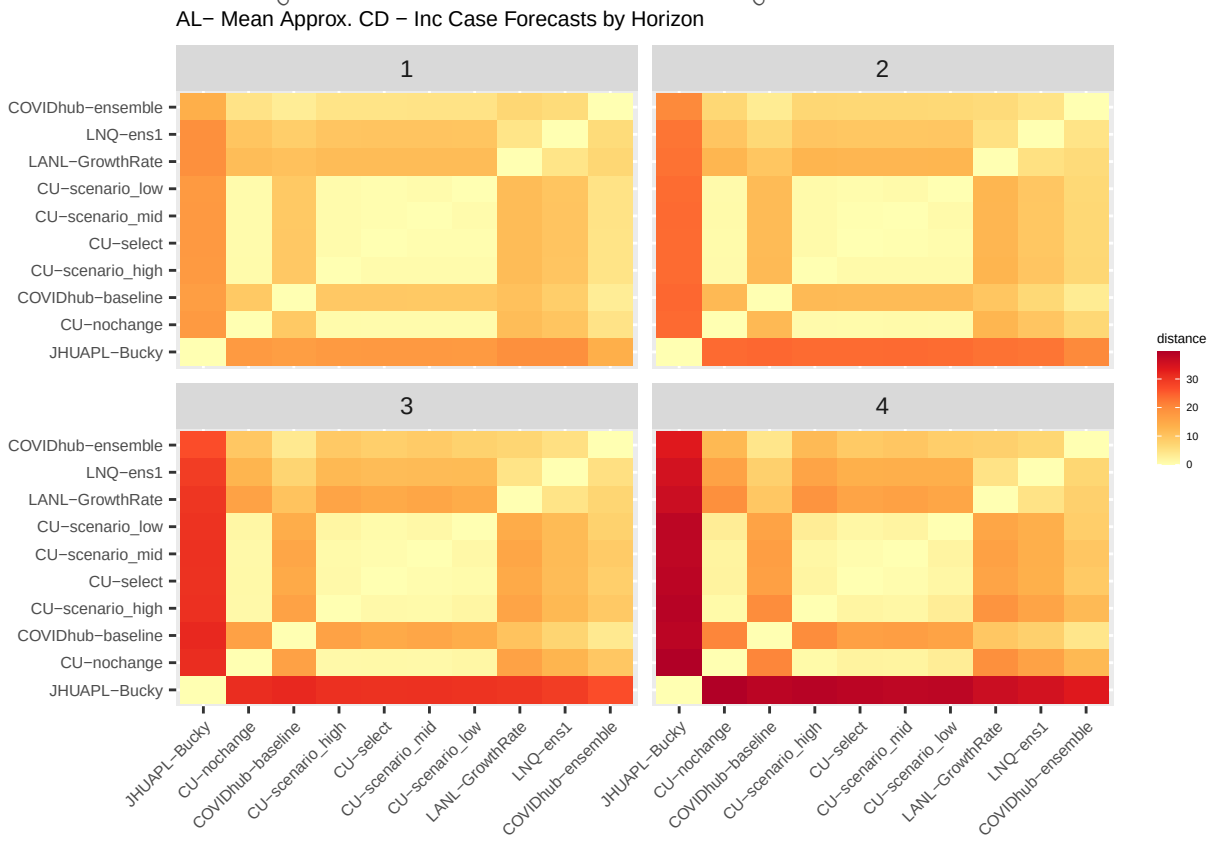
The pairwise approximated Cramer's distances are calculated for the models that have complete submissions for all target, all probability levels, from mid-October 2020 until May 24th,2021 for 5 locations with the lowest cumulative cases.

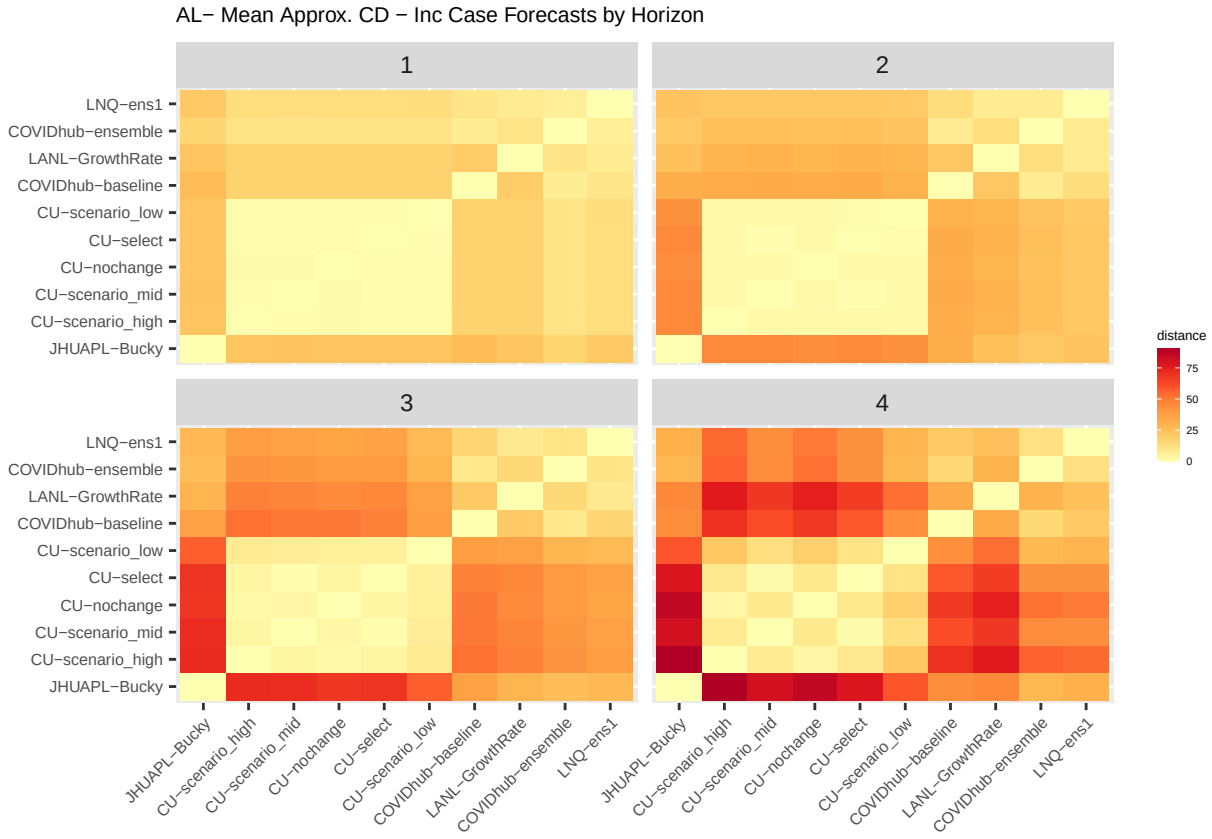
Below are the heatmaps of mean approximated pairwise CD across time by location-target:


AL− Mean Approx. CD − Inc Case Forecasts by Horizon
1
2
3
4
LNQ−ens1
COVIDhub−ensemble
COVIDhub−baseline
LANL−GrowthRate
CU−scenario_low
CU−nochange
CU−select
CU−scenario_mid
CU−scenario_high
JHUAPL−Bucky
distance
90
60
30
0

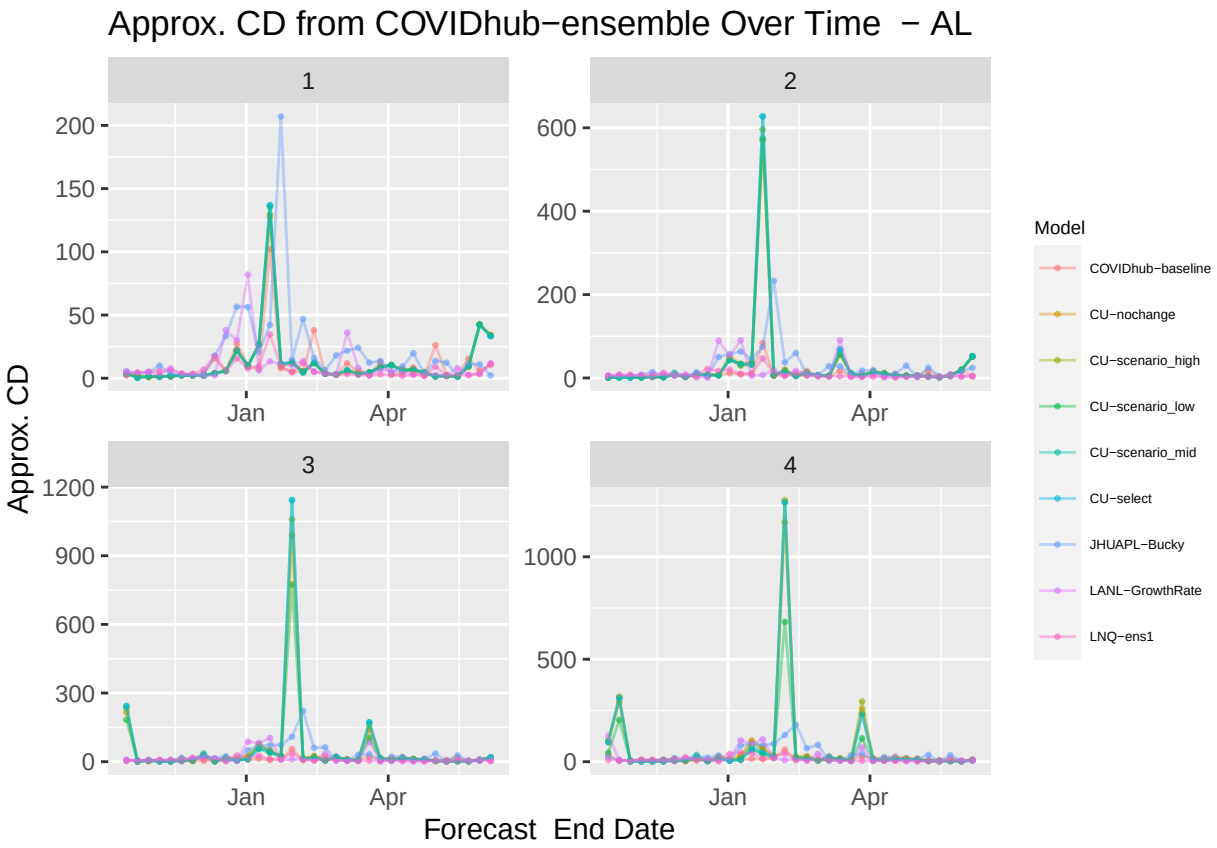

AL− Mean Approx. CD − Inc Case Forecasts by Horizon
1
2
3
4
COVIDhub−ensemble
LANL−GrowthRate
CU−scenario_low
LNQ−ens1
COVIDhub−baseline
CU−scenario_mid
CU−select
CU−nochange
CU−scenario_high
JHUAPL−Bucky
distance
200
150
100
50
0

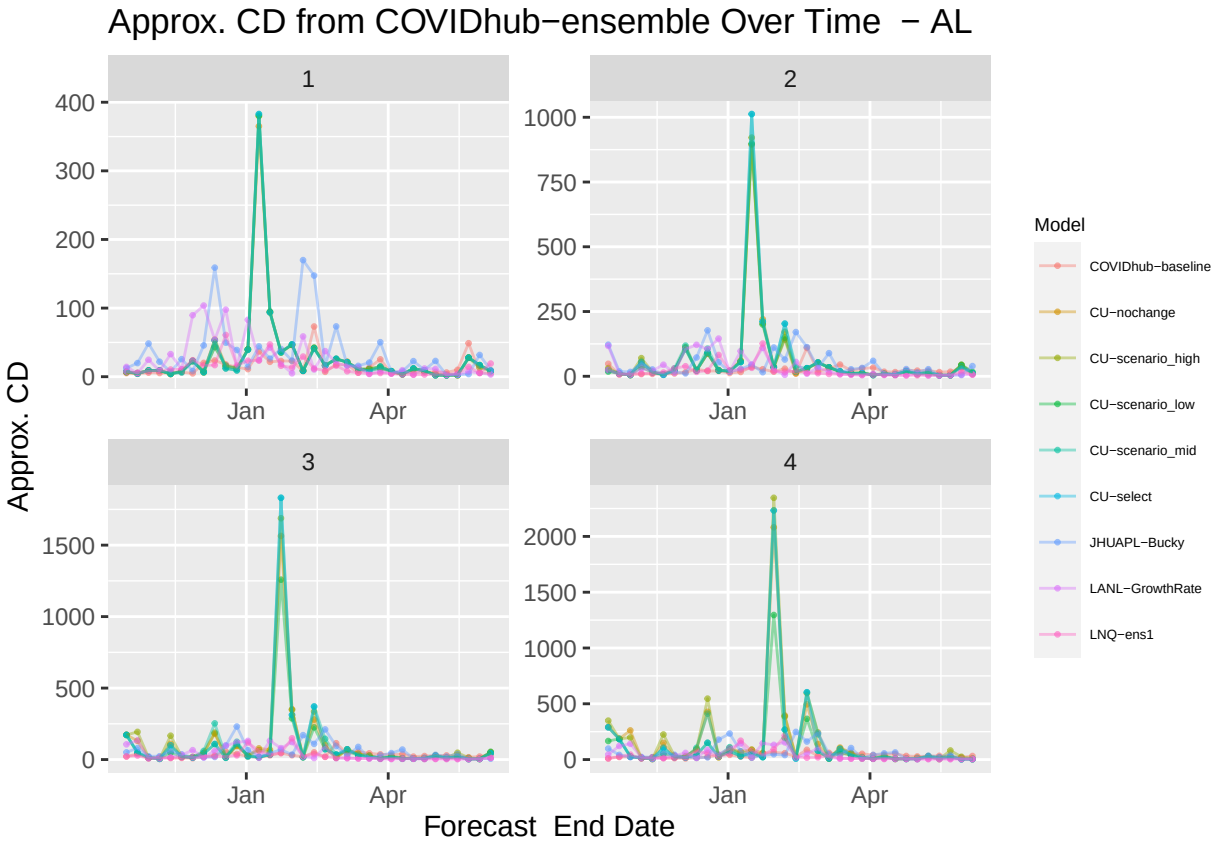

AL− Mean Approx. CD − Inc Case Forecasts by Horizon
1
2
3
4
CU−select
CU−scenario_mid
CU−scenario_low
CU−scenario_high
CU−nochange
COVIDhub−ensemble
LNQ−ens1
COVIDhub−baseline
JHUAPL−Bucky
LANL−GrowthRate
distance
30
20
10
0

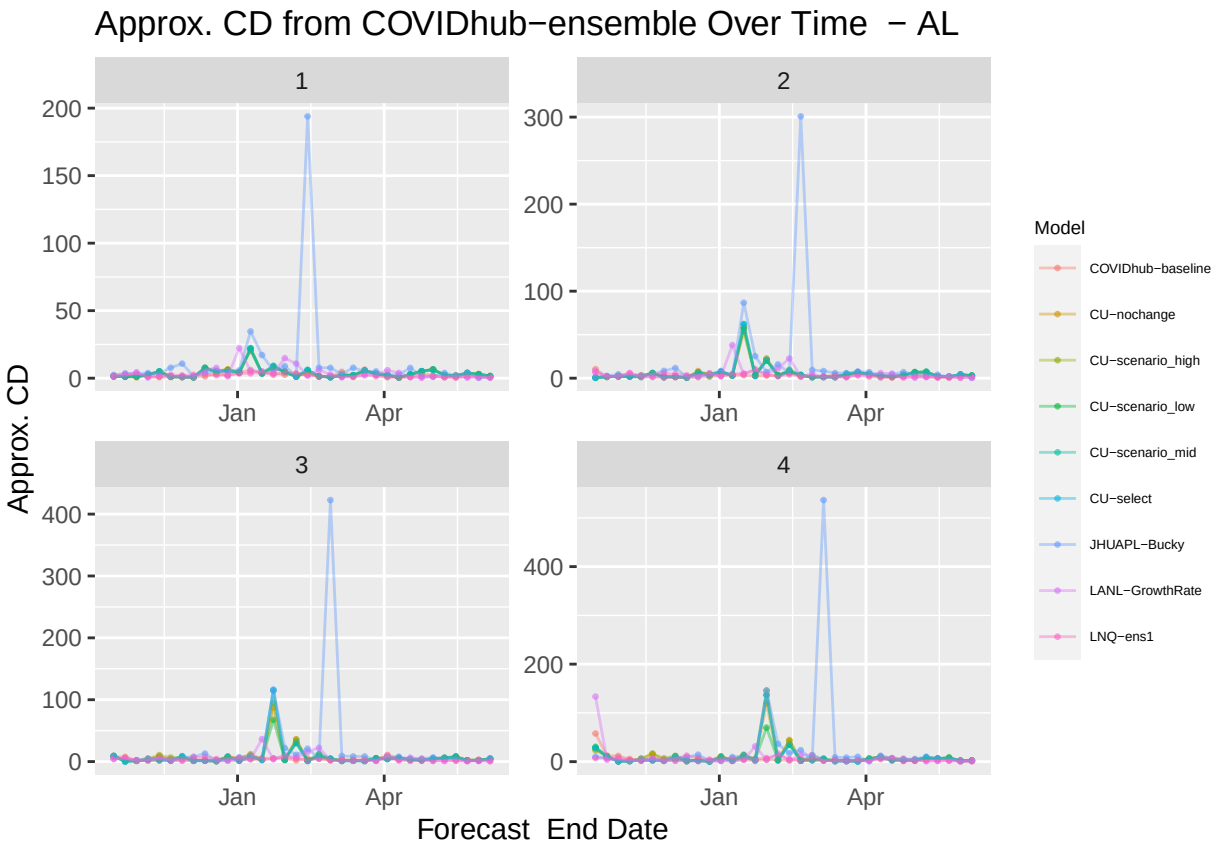

AL− Mean Approx. CD − Inc Case Forecasts by Horizon
1
2
3
4
COVIDhub−ensemble
LNQ−ens1
LANL−GrowthRate
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
COVIDhub−baseline
CU−nochange
JHUAPL−Bucky
distance
30
20
10
0

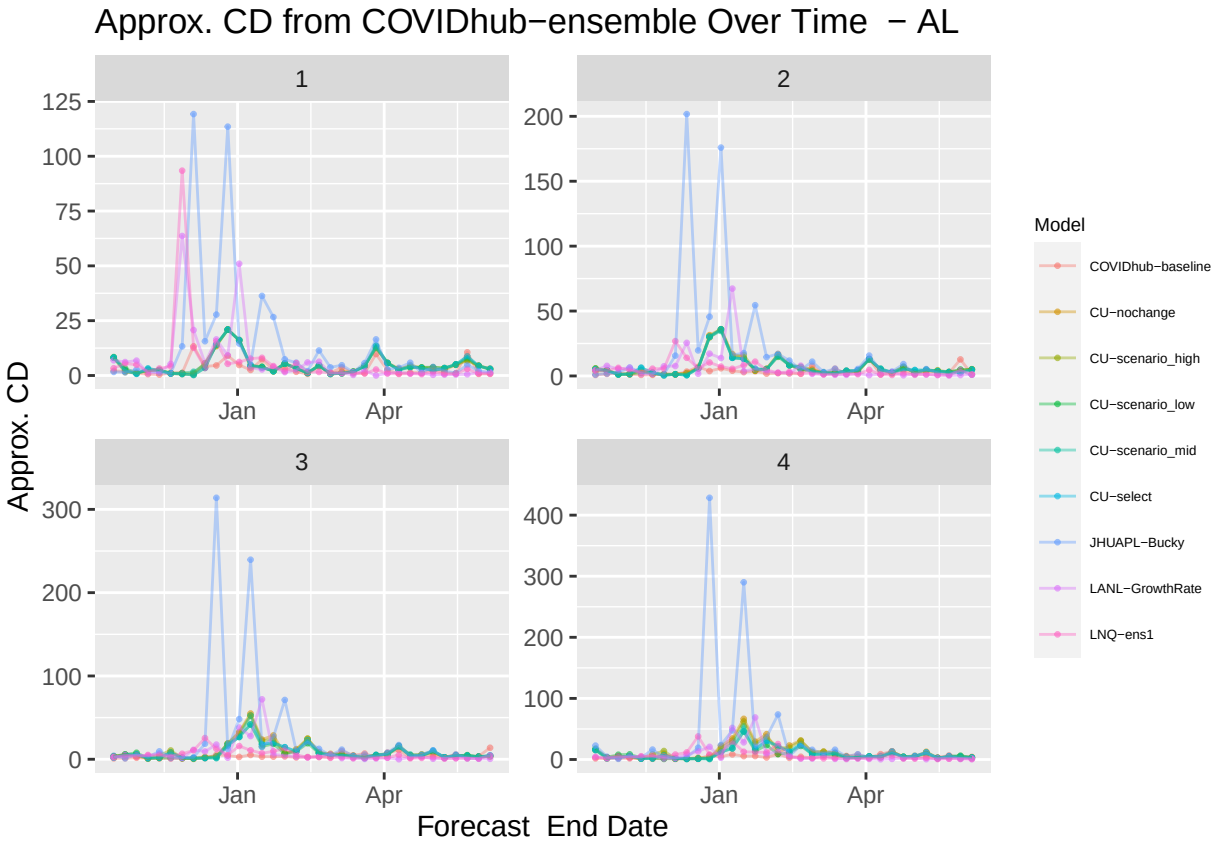


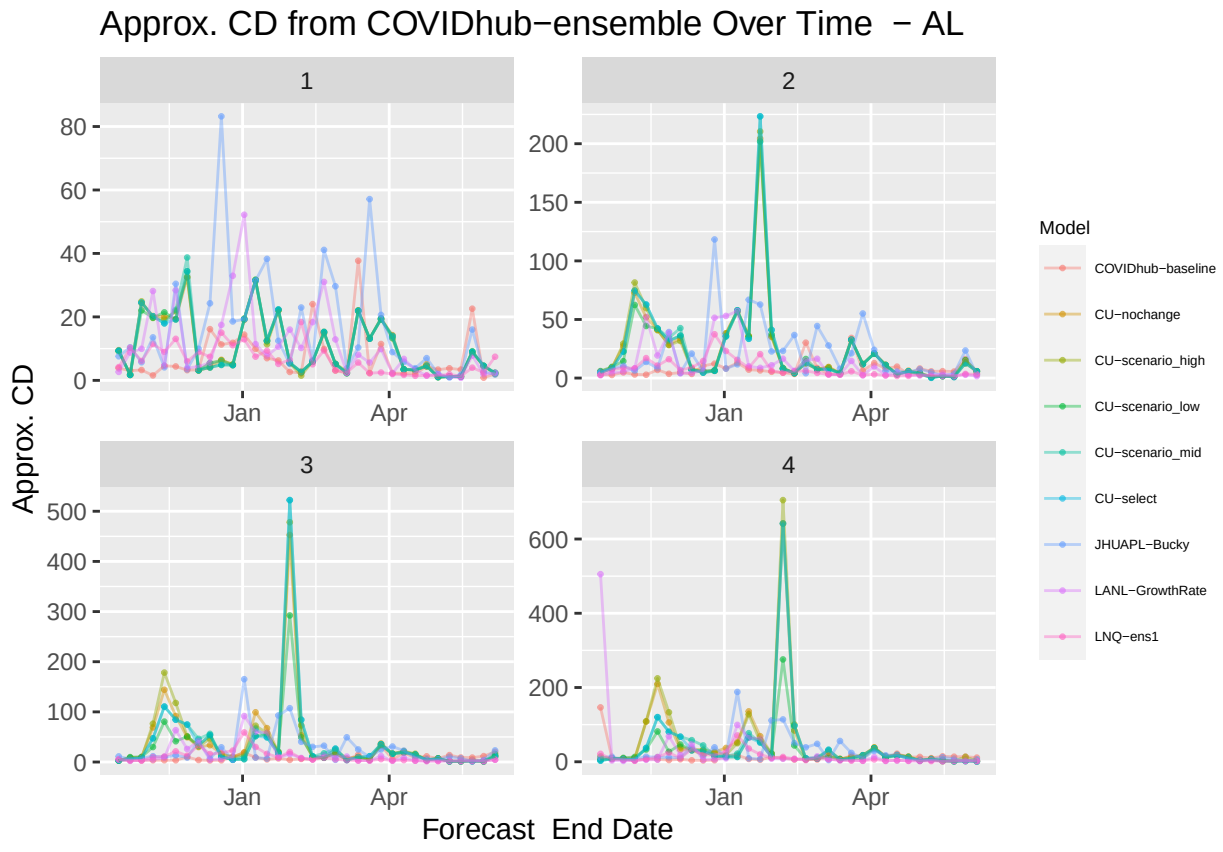
Below are the plots of approximated pairwise distances over time. Unlike indicent death targets, there are too many model pairs to show (12 models for inc death and 17 models for inc case, so we have a combination of 6 choose 2 with no repeats (15) vs a combination of 11 choose 2 with no repeats (55)). So, I only pick the first 15 of the combinations:

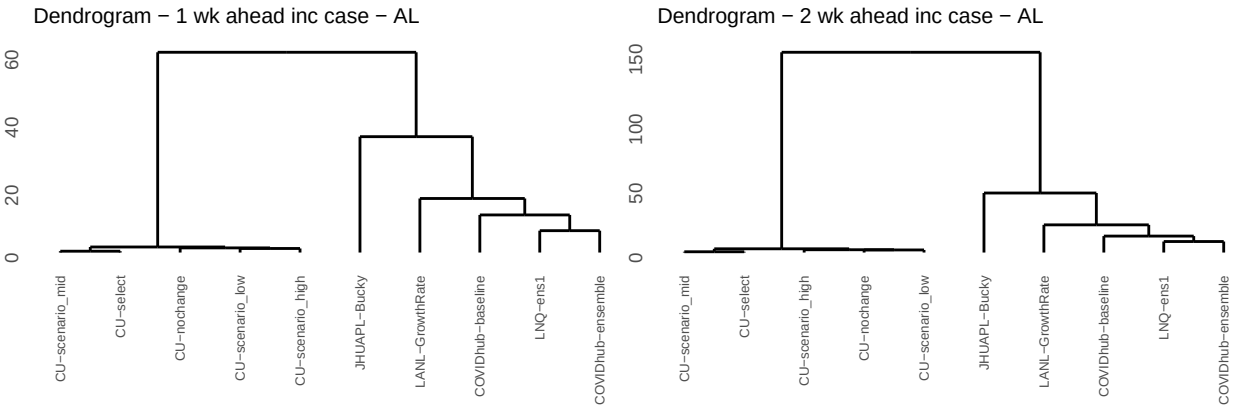

Approx. CD from COVIDhub−ensemble Over Time − AL
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
LANL−GrowthRate
LNQ−ens1


Approx. CD from COVIDhub−ensemble Over Time − AL
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
LANL−GrowthRate
LNQ−ens1

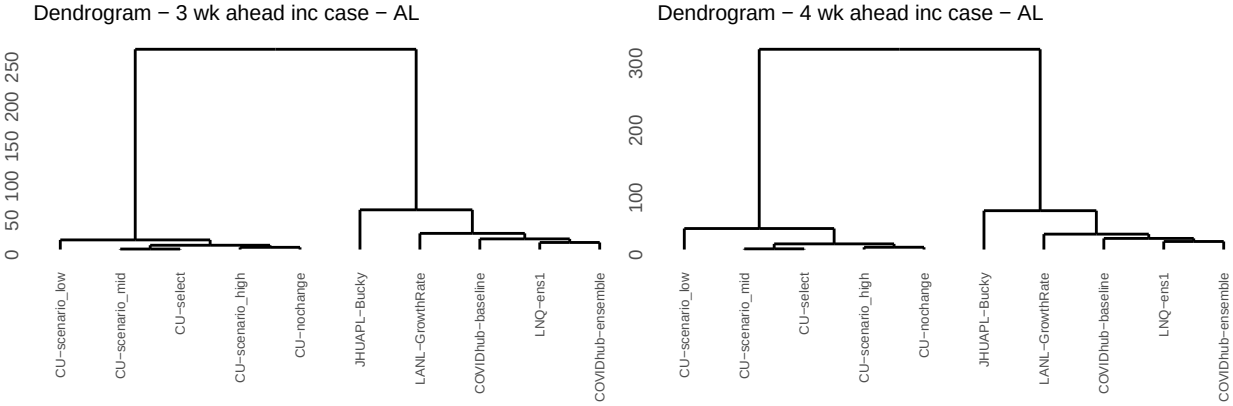

Approx. CD from COVIDhub−ensemble Over Time − AL
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
LANL−GrowthRate
LNQ−ens1


Approx. CD from COVIDhub−ensemble Over Time − AL
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
LANL−GrowthRate
LNQ−ens1

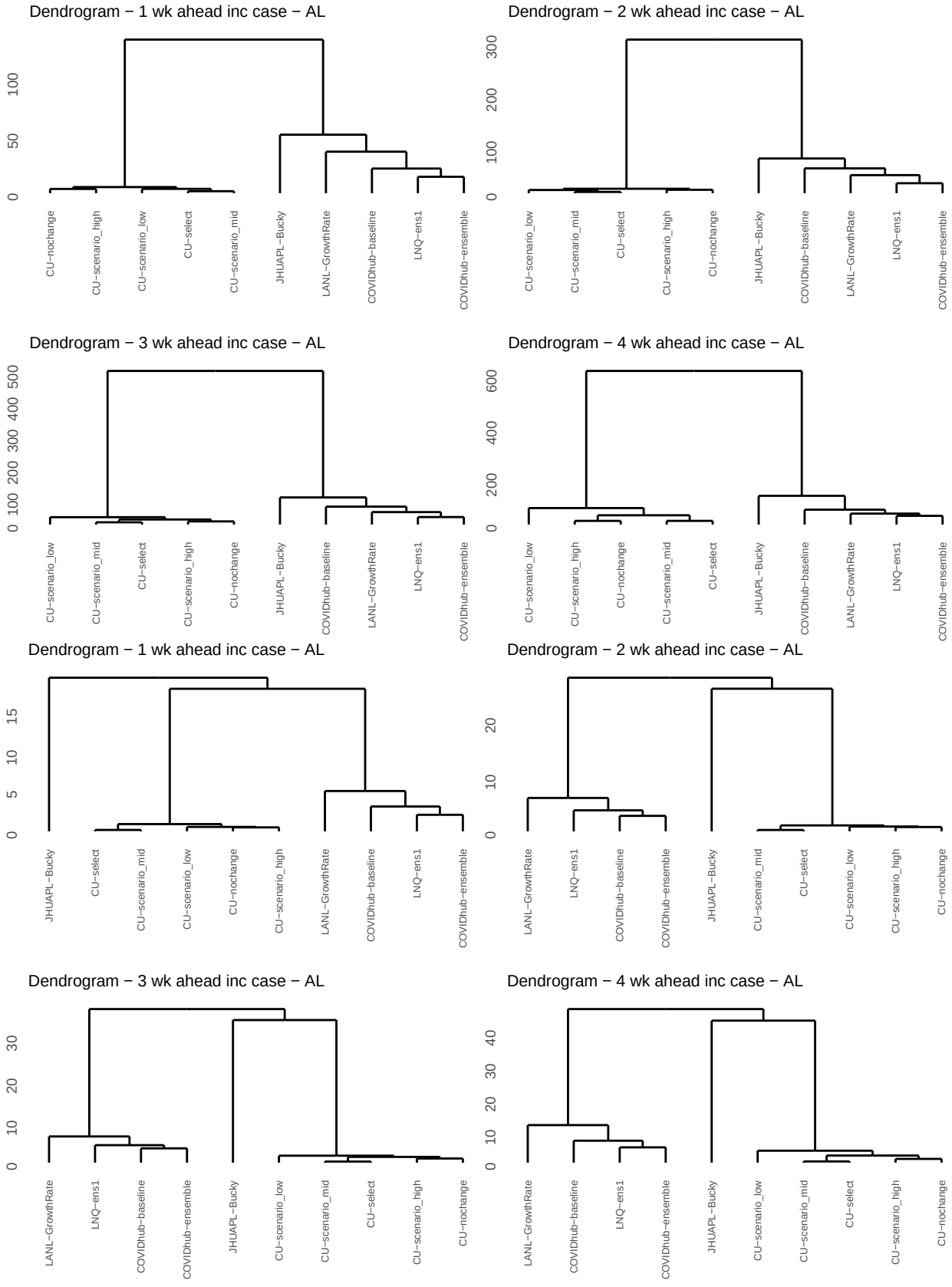

Approx. CD from COVIDhub−ensemble Over Time − AL
1
2
3
4
Approx. CD
Jan
Apr
Forecast End Date
Model
COVIDhub−baseline
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
LANL−GrowthRate
LNQ−ens1

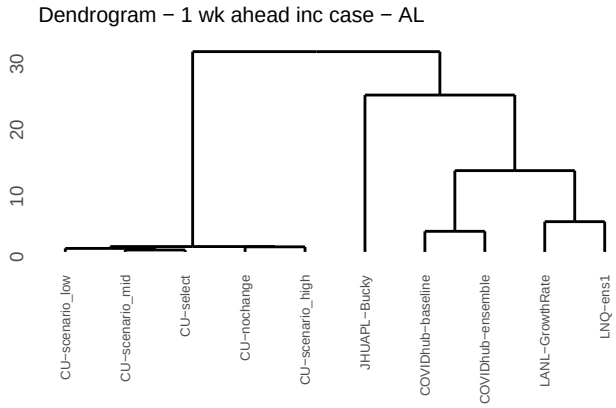

Dendrogram − 1 wk ahead inc case − AL
CU−scenario_mid
CU−select
CU−nochange
CU−scenario_low
CU−scenario_high
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble

Dendrogram − 2 wk ahead inc case − AL
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
CU−scenario_low
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble


Dendrogram − 3 wk ahead inc case − AL
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble

Dendrogram − 4 wk ahead inc case − AL
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble


Dendrogram − 1 wk ahead inc case − AL
0
50
100
CU−nochange
CU−scenario_high
CU−scenario_low
CU−select
CU−scenario_mid
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble
Dendrogram − 2 wk ahead inc case − AL
0
100
200
300
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
COVIDhub−baseline
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
Dendrogram − 3 wk ahead inc case − AL
0
100
200
300
400
500
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
COVIDhub−baseline
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
Dendrogram − 4 wk ahead inc case − AL
0
200
400
600
CU−scenario_low
CU−scenario_high
CU−nochange
CU−scenario_mid
CU−select
JHUAPL−Bucky
COVIDhub−baseline
LANL−GrowthRate
LNQ−ens1
COVIDhub−ensemble
Dendrogram − 1 wk ahead inc case − AL
0
5
10
15
JHUAPL−Bucky
CU−select
CU−scenario_mid
CU−scenario_low
CU−nochange
CU−scenario_high
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble
Dendrogram − 2 wk ahead inc case − AL
0
10
20
LANL−GrowthRate
LNQ−ens1
COVIDhub−baseline
COVIDhub−ensemble
JHUAPL−Bucky
CU−scenario_mid
CU−select
CU−scenario_low
CU−scenario_high
CU−nochange
Dendrogram − 3 wk ahead inc case − AL
0
10
20
30
LANL−GrowthRate
LNQ−ens1
COVIDhub−baseline
COVIDhub−ensemble
JHUAPL−Bucky
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
Dendrogram − 4 wk ahead inc case − AL
0
10
20
30
40
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble
JHUAPL−Bucky
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange


Dendrogram − 1 wk ahead inc case − AL
0
10
20
30
CU−scenario_low
CU−scenario_mid
CU−select
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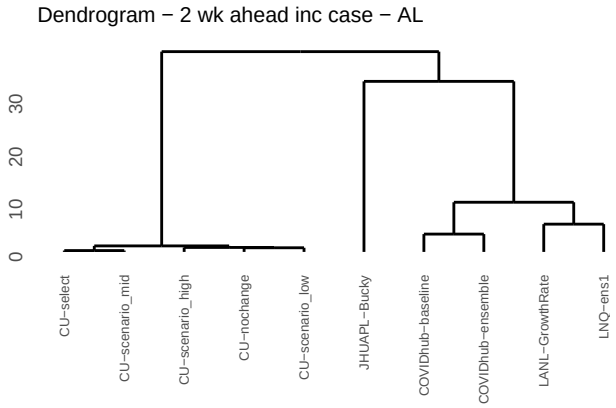
CU−scenario_high
JHUAPL−Bucky
COVIDhub−baseline
COVIDhub−ensemble
LANL−GrowthRate
LNQ−ens1


Dendrogram − 2 wk ahead inc case − AL
0
10
20
30
CU−select
CU−scenario_mid
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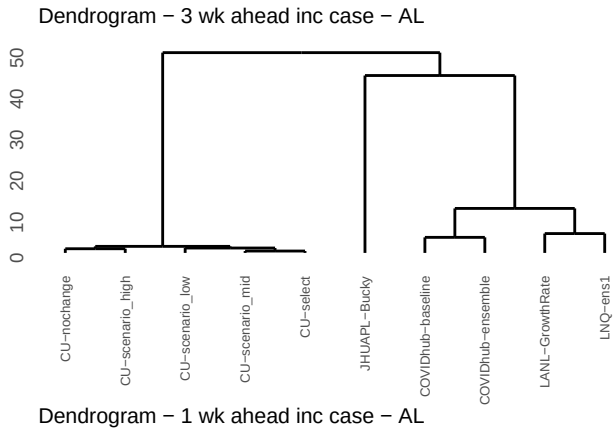
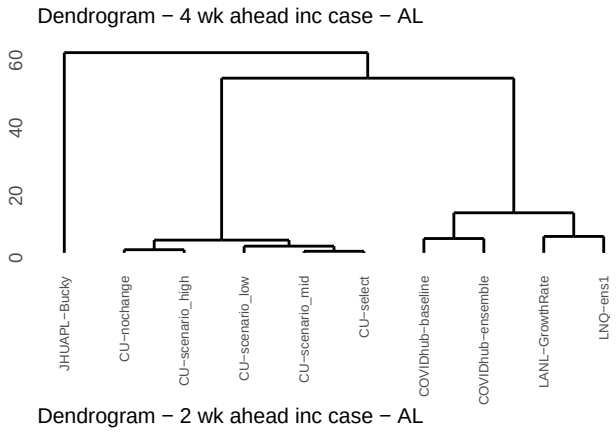
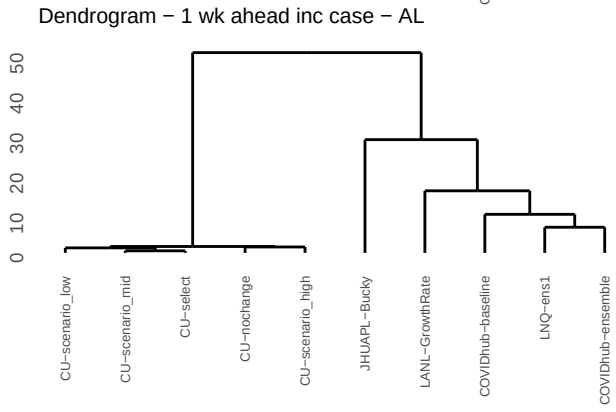
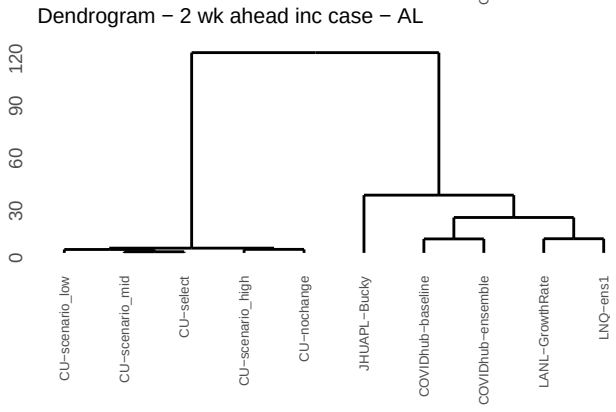
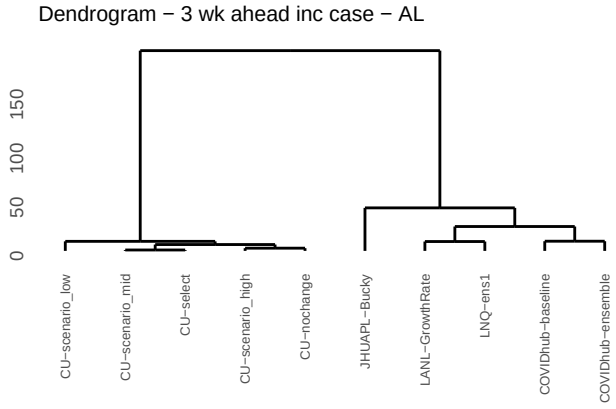
JHUAPL−Bucky
COVIDhub−baseline
COVIDhub−ensemble
LANL−GrowthRate
LNQ−ens1

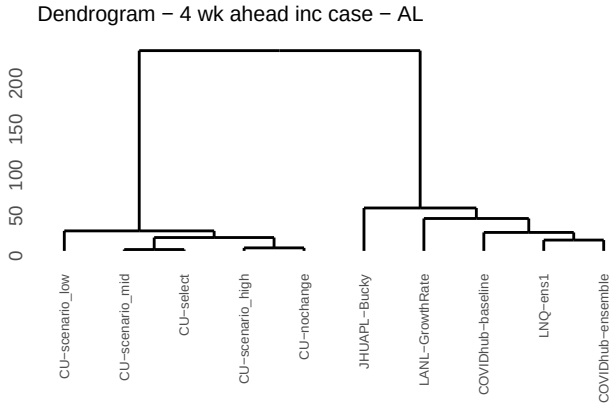

Dendrogram − 3 wk ahead inc case − AL
0
10
20
30
40
50
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
JHUAPL−Bucky
COVIDhub−baseline
COVIDhub−ensemble
LANL−GrowthRate
LNQ−ens1


Dendrogram − 4 wk ahead inc case − AL
0
20
40
60
JHUAPL−Bucky
CU−nochange
CU−scenario_high
CU−scenario_low
CU−scenario_mid
CU−select
COVIDhub−baseline
COVIDhub−ensemble
LANL−GrowthRate
LNQ−ens1


Dendrogram − 1 wk ahead inc case − AL
0
10
20
30
40
50
CU−scenario_low
CU−scenario_mid
CU−select
CU−nochange
CU−scenario_high
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble


Dendrogram − 2 wk ahead inc case − AL
0
30
60
90
120
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
COVIDhub−baseline
COVIDhub−ensemble
LANL−GrowthRate
LNQ−ens1


Dendrogram − 3 wk ahead inc case − AL
0
50
100
150
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
LANL−GrowthRate
LNQ−ens1
COVIDhub−baseline
COVIDhub−ensemble


Dendrogram − 4 wk ahead inc case − AL
0
50
100
150
200
CU−scenario_low
CU−scenario_mid
CU−select
CU−scenario_high
CU−nochange
JHUAPL−Bucky
LANL−GrowthRate
COVIDhub−baseline
LNQ−ens1
COVIDhub−ensemble