real_experiment_5G_B1

May 29, 2025

```python
[20]: import importlib
      import src.plots

      importlib.reload(src.plots)
```

```
[20]: <module 'src.plots' from '/Users/milenaangelova/git-
      repo/FedCluLearn/src/plots.py'>
```

```python
[21]: from src.plots import plot_plotly, preprocessing_results, plot_plotly_real
```

```python
[22]: local_FedCluLearn = 'results/results_FedCluLearn_2025-02-25 09:52:06.632308.txt'
      global_FedCluLearn = 'results/global_model_evaluation_FedCluLearn_2025-02-25 09:
       ↪52:06.632308.txt'

      local_FedCluLearn = 'results/results_FedCluLearn_2025-02-25 10:46:05.736246.txt'
      global_FedCluLearn = 'results/global_model_evaluation_FedCluLearn_2025-02-25 10:
       ↪46:05.736246.txt'

      local_FedAvg = 'results/results_FedAvg_2025-02-25 10:41:23.649440.txt'
      global_FedAvg = 'results/global_model_evaluation_FedAvg_2025-02-25 10:41:23.
       ↪649440.txt'

      local_FedAtt = 'results/results_FedAtt_2025-02-25 10:46:18.152654.txt'
      global_FedAtt = 'results/global_model_evaluation_FedAtt_2025-02-25 10:46:18.
       ↪152654.txt'

      local_FedProx = 'results/results_FedProx_2025-02-25 10:46:26.787383.txt'
      global_FedProx = 'results/global_model_evaluation_FedProx_2025-02-25 10:46:26.
       ↪787383.txt'

      local_FedCluLearn_recent = 'results/results_FedCluLearn_2025-02-25 10:54:24.
       ↪530009.txt'
      global_FedCluLearn_recent = 'results/
       ↪global_model_evaluation_FedCluLearn_2025-02-25 10:54:24.530009.txt'

      local_FedCluLearn_Prox_recent = 'results/results_FedCluLearn_Prox_2025-02-25 10:
       ↪59:22.761987.txt'
```

```
global_FedCluLearn_Prox_recent = 'results/
 ↪global_model_evaluation_FedCluLearn_Prox_2025-02-25 10:59:22.761987.txt'

local_FedCluLearn_Prox = 'results/results_FedCluLearn_Prox_2025-02-25 10:59:52.
 ↪753193.txt'
global_FedCluLearn_Prox = 'results/
 ↪global_model_evaluation_FedCluLearn_Prox_2025-02-25 10:59:52.753193.txt'

local_FedCluLearn_percentage = 'results/results_FedCluLearn_2025-02-25 11:11:35.
 ↪154727.txt'
global_FedCluLearn_percentage = 'results/
 ↪global_model_evaluation_FedCluLearn_2025-02-25 11:11:35.154727.txt'

local_FedCluLearn_Prox_percentage = 'results/
 ↪results_FedCluLearn_Prox_2025-02-25 11:11:59.005370.txt'
global_FedCluLearn_Prox_percentage = 'results/
 ↪global_model_evaluation_FedCluLearn_Prox_2025-02-25 11:11:59.005370.txt'

local_FedCluLearn_percentage_25 = 'results/
 ↪results_FedCluLearn_percentage_2025-03-03 15:00:50.321053.txt'
global_FedCluLearn_percentage_25 = 'results/
 ↪global_model_evaluation_FedCluLearn_percentage_2025-03-03 15:00:50.321053.
 ↪txt'

local_FedCluLearn_Prox_percentage_25 = 'results/
 ↪results_FedCluLearn_Prox_percentage_2025-03-03 15:01:00.960897.txt'
global_FedCluLearn_Prox_percentage_25 = 'results/
 ↪global_model_evaluation_FedCluLearn_Prox_percentage_2025-03-03 15:01:00.
 ↪960897.txt'

local_FedCluLearn_percentage_75 = 'results/
 ↪results_FedCluLearn_percentage_2025-03-03 15:01:21.724734.txt'
global_FedCluLearn_percentage_75 = 'results/
 ↪global_model_evaluation_FedCluLearn_percentage_2025-03-03 15:01:21.724734.
 ↪txt'

local_FedCluLearn_Prox_percentage_75 = 'results/
 ↪results_FedCluLearn_Prox_percentage_2025-03-03 15:01:32.557997.txt'
global_FedCluLearn_Prox_percentage_75 = 'results/
 ↪global_model_evaluation_FedCluLearn_Prox_percentage_2025-03-03 15:01:32.
 ↪557997.txt'
```
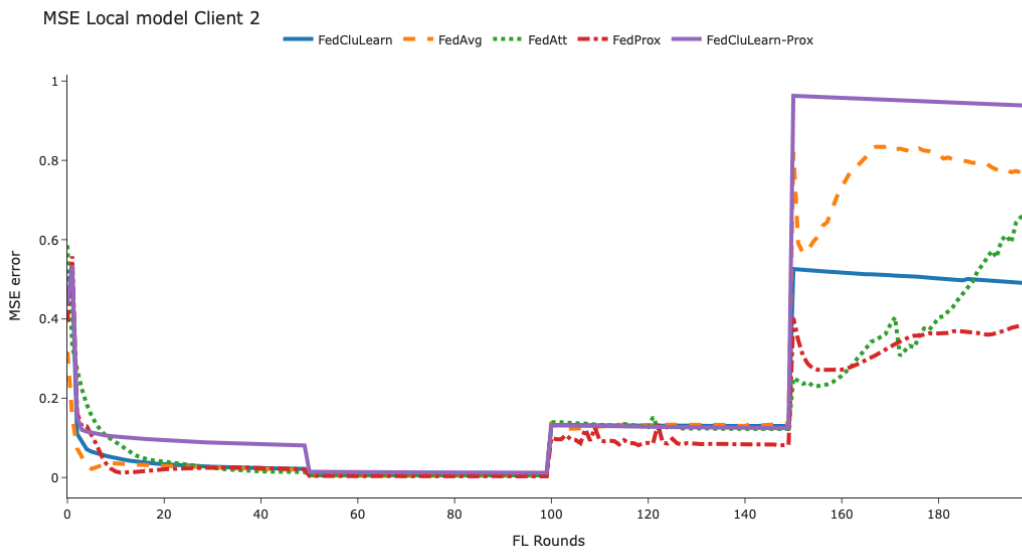
```
[23]: local_filenames = [local_FedCluLearn, local_FedAvg, local_FedAtt,␣
       ↪local_FedProx, local_FedCluLearn_Prox]
      global_filenames = [global_FedCluLearn, global_FedAvg, global_FedAtt,␣
       ↪global_FedProx, global_FedCluLearn_Prox]
```
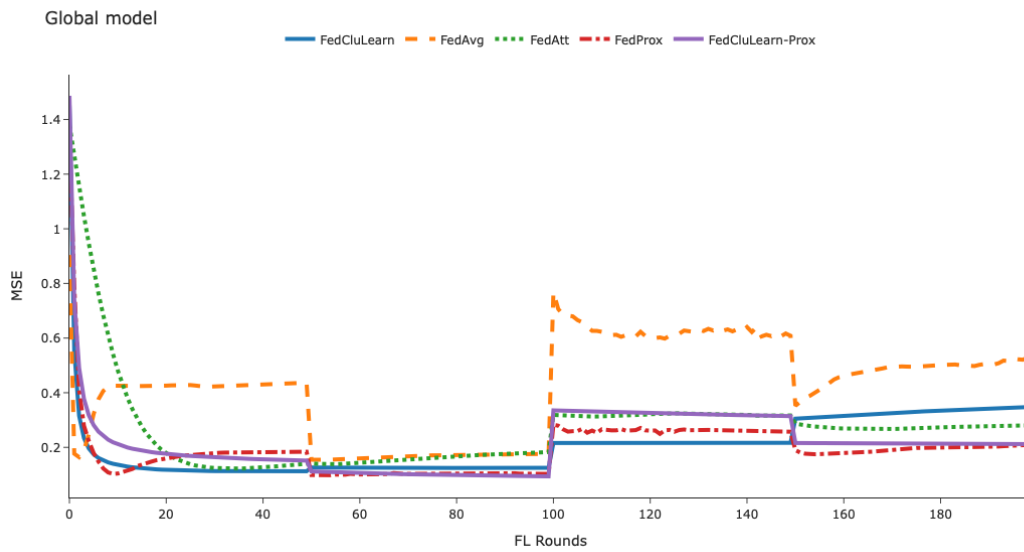
```
[24]: mse_column = 'mse'
      n_rounds, y = preprocessing_results(filenames=local_filenames,␣
       ↪mse_column=mse_column)
      plot_plotly(n_rounds, y, title='Avg MSE Local models',␣
       ↪y_axis_title=f'{mse_column.upper()} error', y_axis_max=0.3)
```
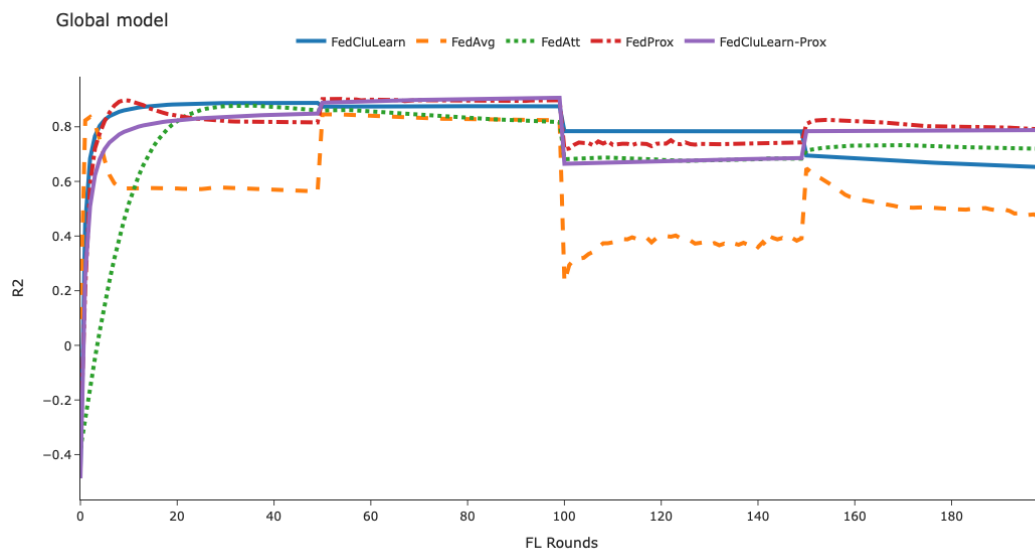
```
[25]: for client_id in [0,1,2]:
          n_rounds, y = preprocessing_results(filenames=local_filenames,␣
       ↪client_id=client_id, mse_column='mse')
          plot_plotly(n_rounds, y, title=f'MSE Local model Client {client_id}',␣
       ↪y_axis_title='MSE error')
```
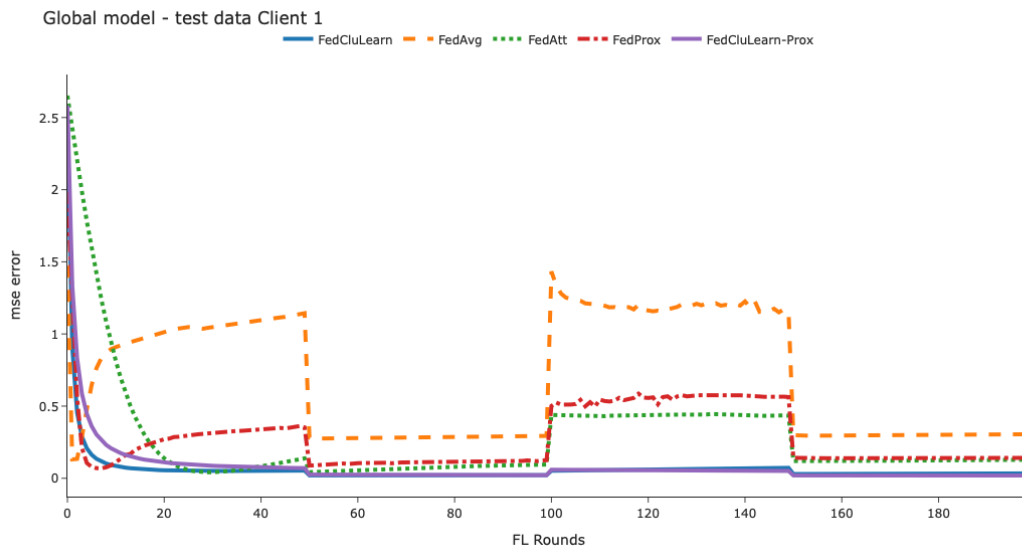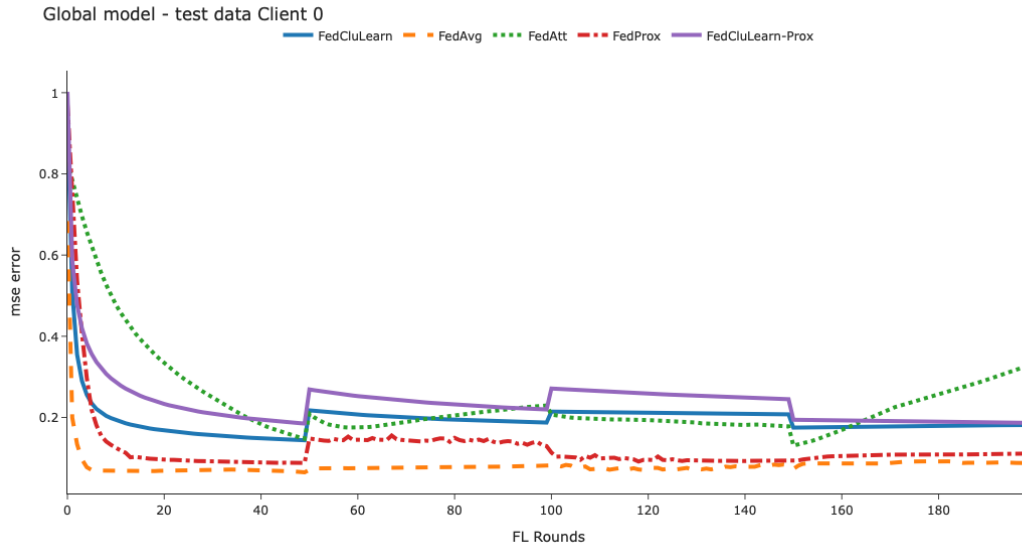

MSE Local model Client 2

```
[26]: mse_column = 'mse'
      # n_rounds, y = preprocessing_results(filenames=[global_FedCluLearn,␣
       ↪global_FedCluLearn_recent, global_FedCluLearn_percentage, global_FedAvg,␣
       ↪global_FedAtt, global_FedProx, global_FedCluLearn_Prox,␣
       ↪global_FedCluLearn_Prox_recent, None], mse_column=mse_column)
      # global_filenames = [global_FedCluLearn, global_FedAvg, global_FedAtt,␣
       ↪global_FedProx, global_FedCluLearn_Prox]
      global_filenames = [global_FedCluLearn, global_FedAvg, global_FedAtt,␣
       ↪global_FedProx, global_FedCluLearn_Prox]
      n_rounds, y = preprocessing_results(filenames=global_filenames,␣
       ↪mse_column=mse_column)
      #Avg {mse_column.upper()} Global model
      plot_plotly(n_rounds, y, title=f'Global model', y_axis_title=f'{mse_column.
       ↪upper()}', y_axis_max=1)
```
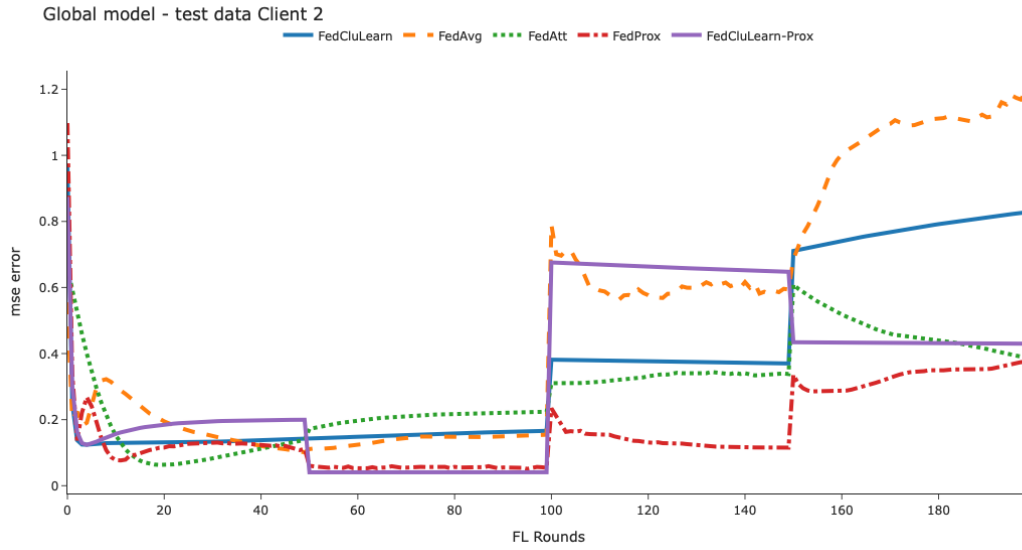
Global model

```
[27]: mse_column = 'r2'
      global_filenames = [global_FedCluLearn, global_FedAvg, global_FedAtt,␣
        ↪global_FedProx, global_FedCluLearn_Prox]
      n_rounds, y = preprocessing_results(filenames=global_filenames,␣
        ↪mse_column=mse_column)
      plot_plotly(n_rounds, y, title=f'Global model', y_axis_title=f'{mse_column.
        ↪upper()}', y_axis_max=1)
```
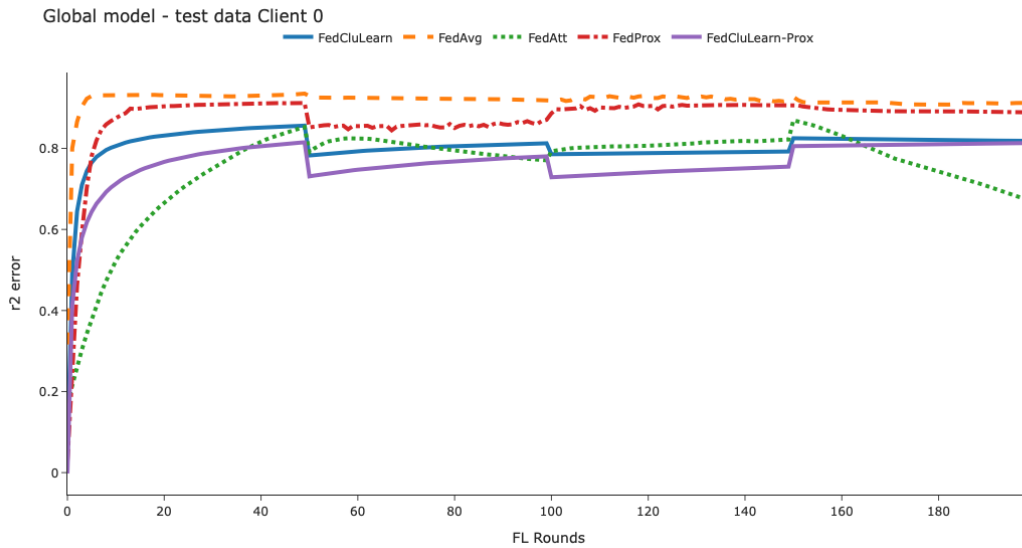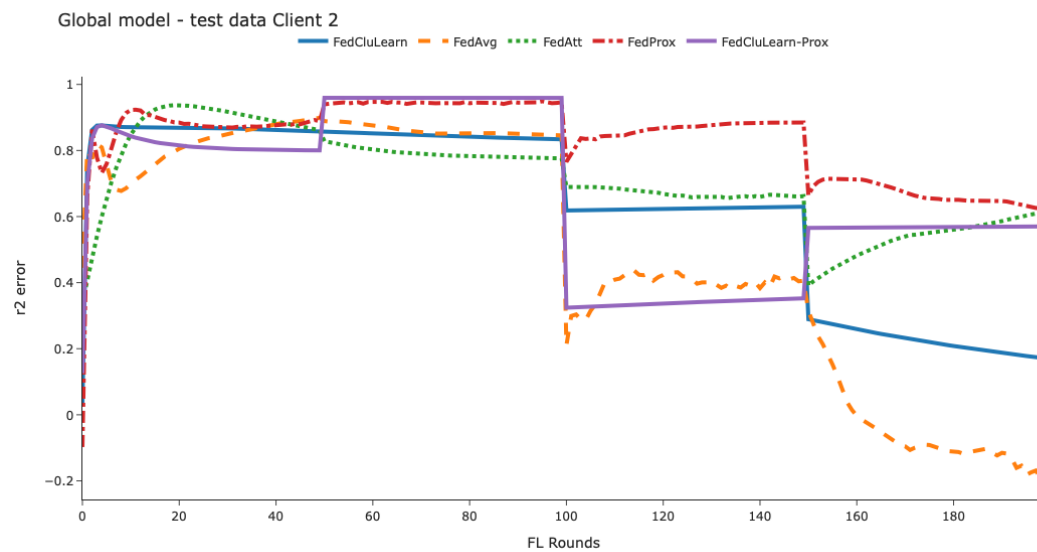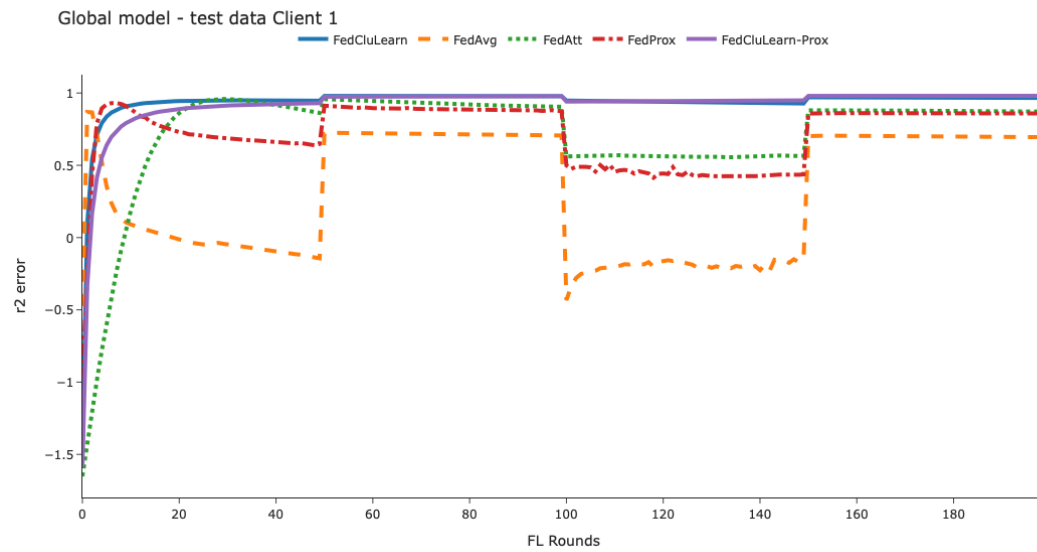

Global model

```
[28]: mse_column='mse'
      for client_id in [0,1,2]:
          n_rounds, y = preprocessing_results(filenames=global_filenames,␣
      ↪client_id=client_id,mse_column=mse_column)
          plot_plotly(n_rounds, y, title=f'Global model - test data Client␣
      ↪{client_id}', y_axis_title=f'{mse_column} error')
```

Global model - test data Client 0

FedCluLearn ――― FedAvg ― ― ― FedAtt ･････ FedProx ―・―・ FedCluLearn-Prox ―――

Global model - test data Client 1

FedCluLearn ――― FedAvg ― ― ― FedAtt ･････ FedProx ―・―・ FedCluLearn-Prox ―――

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Global model - test data Client 2

```
[29]: mse_column='r2'
      for client_id in [0,1,2]:
          n_rounds, y = preprocessing_results(filenames=global_filenames,␣
      ↪client_id=client_id,mse_column=mse_column)
          plot_plotly(n_rounds, y, title=f'Global model - test data Client␣
      ↪{client_id}', y_axis_title=f'{mse_column} error')
```


Global model - test data Client 0

Global model - test data Client 1


Global model - test data Client 2

```
[30]: mse_column='mse'
      for client_id in [0,1,2]:
          n_rounds, y = preprocessing_results(filenames=[local_FedCluLearn,
      ↪global_FedCluLearn, None, None, None],
      ↪client_id=client_id,mse_column=mse_column)
```

```
   plot_plotly(n_rounds, y, title=f'Local vs Global Client {client_id}',
↪y_axis_title=f'{mse_column} error', algo_name1='Local FedCluLearn',
↪algo_name4='Global FedCluLearn')
```

Local vs Global Client 0

Local vs Global Client 1

Local vs Global Client 2
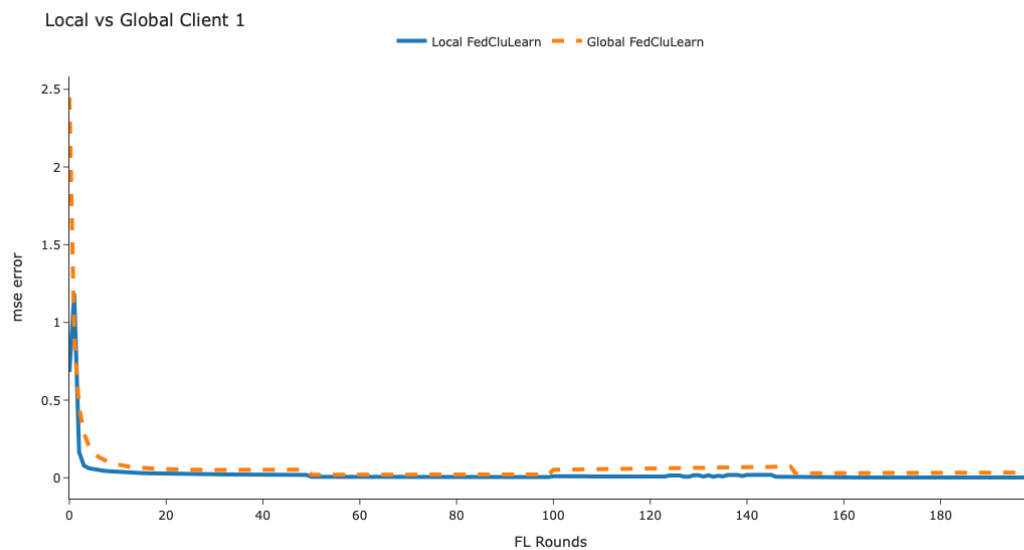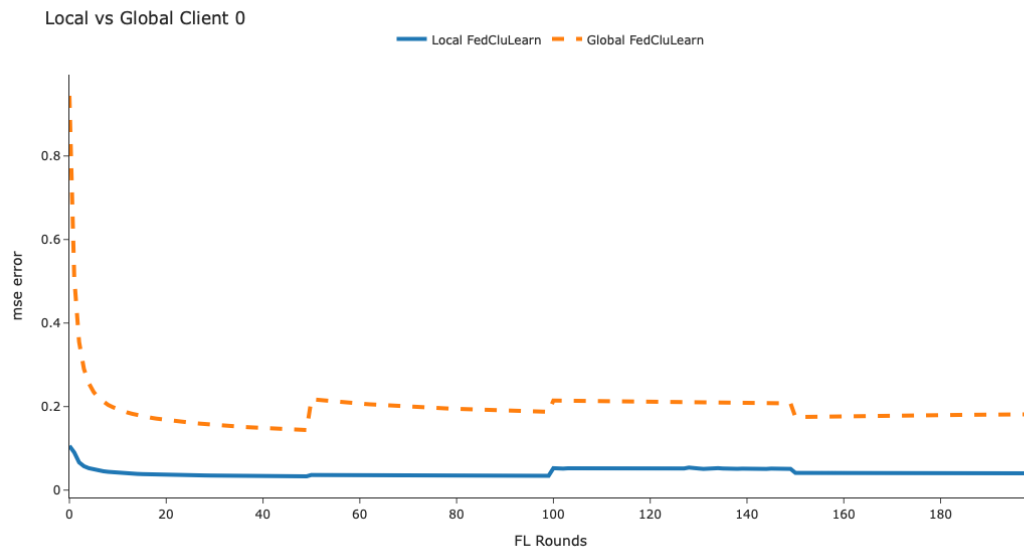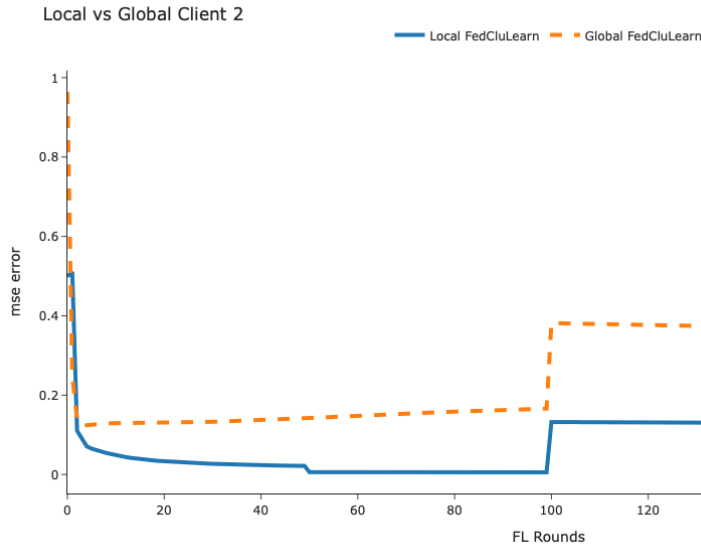
```
[31]: mse_column = 'mse'
      # n_rounds, y = preprocessing_results(filenames=[global_FedCluLearn,
       ↪global_FedCluLearn_recent, global_FedCluLearn_percentage, global_FedAvg,
       ↪global_FedAtt, global_FedProx, global_FedCluLearn_Prox,
       ↪global_FedCluLearn_Prox_recent, None], mse_column=mse_column)
      global_filenames = [None, None, global_FedCluLearn_percentage, global_FedAvg,
       ↪global_FedAtt, global_FedProx, None, None,
       ↪global_FedCluLearn_Prox_percentage, None, None, None, None]
      # global_filenames = [None, None, None, global_FedAvg, global_FedAtt,
       ↪global_FedProx, None, None, None, global_FedCluLearn_percentage_25, None,
       ↪global_FedCluLearn_Prox_percentage_25, None]
      n_rounds, y = preprocessing_results(filenames=global_filenames,
       ↪mse_column=mse_column)
      plot_plotly_real(n_rounds, y, title=f'', y_axis_title=f'{mse_column.upper()}
       ↪error', y_axis_max=1, name='real_mse_air_all_5_parts',
       ↪algo_name3='FedCluLearn-50%', algo_name9='FedCluLearn-Prox-50%')  #Avg
       ↪{mse_column.upper()} Global model
```
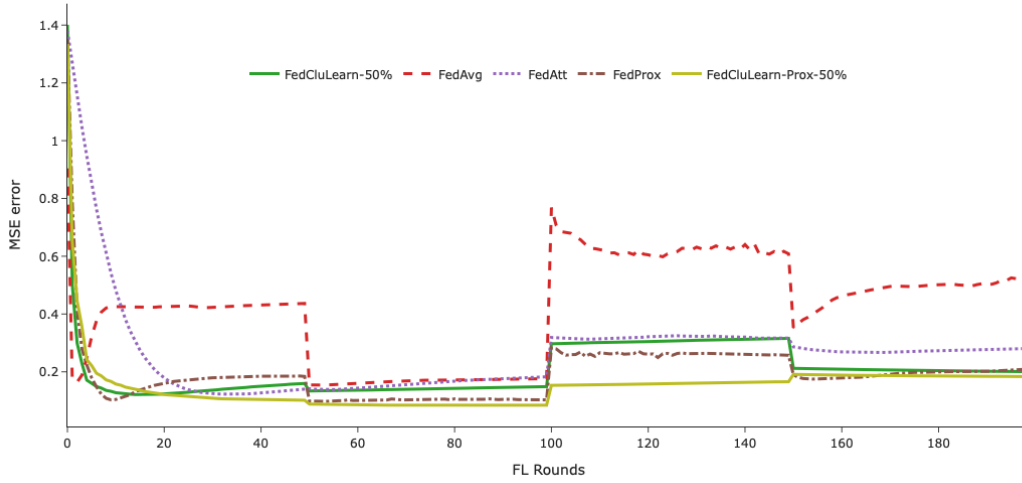
Legend: FedCluLearn-50% — FedAvg — FedAtt — FedProx — FedCluLearn-Prox-50%

[32]:
```python
mse_column = 'mse'
# n_rounds, y = preprocessing_results(filenames=[global_FedCluLearn,
#  global_FedCluLearn_recent, global_FedCluLearn_percentage, global_FedAvg,
#  global_FedAtt, global_FedProx, global_FedCluLearn_Prox,
#  global_FedCluLearn_Prox_recent, None], mse_column=mse_column)
global_filenames = [global_FedCluLearn, global_FedCluLearn_recent,
 global_FedCluLearn_percentage, None, None, None, None, None, None,
 global_FedCluLearn_percentage_25, global_FedCluLearn_percentage_75, None,
 None]
n_rounds, y = preprocessing_results(filenames=global_filenames,
 mse_column=mse_column)
plot_plotly_real(n_rounds, y, title=f'Global model FedCluLearn',
 y_axis_title=f'{mse_column.upper()} error', y_axis_max=1,
 name='real_mse_air_fedclulearn_5_parts')  # Avg {mse_column.upper()} Global
 model
```

Global model FedCluLearn
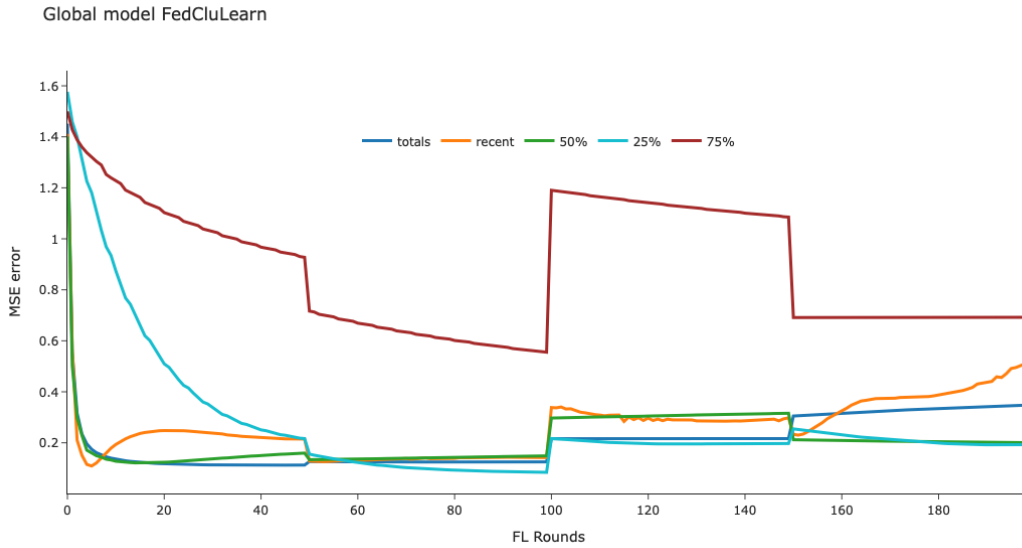
```
[33]: mse_column = 'mse'
      # n_rounds, y = preprocessing_results(filenames=[global_FedCluLearn,↵
       ↪global_FedCluLearn_recent, global_FedCluLearn_percentage, global_FedAvg,↵
       ↪global_FedAtt, global_FedProx, global_FedCluLearn_Prox,↵
       ↪global_FedCluLearn_Prox_recent, None], mse_column=mse_column)
      global_filenames = [None, None, None, None, None, None,↵
       ↪global_FedCluLearn_Prox, global_FedCluLearn_Prox_recent,↵
       ↪global_FedCluLearn_Prox_percentage, None, None,↵
       ↪global_FedCluLearn_Prox_percentage_25, global_FedCluLearn_Prox_percentage_75]
      n_rounds, y = preprocessing_results(filenames=global_filenames,↵
       ↪mse_column=mse_column)
      plot_plotly_real(n_rounds, y, title=f'Global model FedCluLearn-Prox',↵
       ↪y_axis_title=f'{mse_column.upper()} error', y_axis_max=1,↵
       ↪name='real_mse_air_fedclulearn_prox_5_parts')  # Avg {mse_column.upper()}↵
       ↪Global model
```

Global model FedCluLearn-Prox