Site_8_Col_Tuned_8020

October 12, 2025

[9]:
```
# CSV-based plotting with user-controlled MAE/RMSE decimals in the metrics box.
# How to control decimals:
#   - Set `metrics_fmt_mae` and/or `metrics_fmt_rmse` to a Python format string.
#   - Examples:
#       metrics_fmt_mae="{:.1f}", metrics_fmt_rmse="{:.1f}"   -> 1 decimal (e.g., 6.2, 9.4)
#       metrics_fmt_mae="{:.2f}", metrics_fmt_rmse="{:.3f}"   -> 2 and 3 decimals
#       metrics_fmt_mae="{:g}",   metrics_fmt_rmse="{:g}"     -> trimmed (no trailing zeros)
#
# You can ALSO force the legend locations and keep all prior behavior (red markers for True==0 dates).

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import matplotlib.dates as mdates
from matplotlib.offsetbox import AnchoredText
from typing import Optional
from math import sqrt

def _legend_dedup(ax, loc="best"):
    handles, labels = ax.get_legend_handles_labels()
    if not labels:
        return
    dd = {}
    for h, l in zip(handles, labels):
        if l not in dd:
            dd[l] = h
    ax.legend(list(dd.values()), list(dd.keys()), loc=loc)

def plot_test_series_csv(csv_path: str,
                         title: str = "Adults_8_Col",
                         # If not provided, will try CSV columns 'MAE'/'RMSE'; else compute
                         mae: Optional[float] = None,
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                        rmse: Optional[float] = None,
                        # >>> Set your decimals here (format strings) <<<
                        metrics_fmt_mae: Optional[str] = "{:g}",
                        metrics_fmt_rmse: Optional[str] = "{:g}",
                        # Layout / formatting
                        date_pad_days: int = 3,
                        scatter_pad_frac: float = 0.06,
                        scatter_min_pad: float = 0.5,
                        metrics_loc: str = "upper right",      # MAE/RMSE box␣
↪position
                        time_legend_loc: str = "upper left",   # regular legend␣
↪on Plot 1
                        other_legend_loc: str = "best",        # legend on␣
↪other plots
                        parse_dates_col: str = "Date"):
    # ---- ingest CSV (auto-sep sniff) ----
    df = pd.read_csv(csv_path, sep=None, engine="python")
    if parse_dates_col not in df.columns:
        raise ValueError(f"Column '{parse_dates_col}' not found in CSV.")
    df[parse_dates_col] = pd.to_datetime(df[parse_dates_col])
    df.columns = [c.strip() for c in df.columns]
    req = {"True", "Predicted"}
    if not req.issubset(df.columns):
        raise ValueError(f"CSV must contain columns: {sorted(list(req))}")
    df = df.sort_values(parse_dates_col, ignore_index=True)

    # Mask for "Residual NaN  True was 0 (held-out on TEST)"
    if "was_missing" in df.columns:
        mask_nan = df["was_missing"].astype(str).str.lower().map({"true": True,␣
↪"false": False}).fillna(False)
    else:
        mask_nan = (df["True"] == 0)

    # Residuals (recompute if missing)
    if "Residual" not in df.columns or df["Residual"].isna().all():
        df["Residual"] = np.where(~mask_nan, df["Predicted"] - df["True"], np.
↪nan)

    # ---- resolve metrics (prefer args, else CSV, else compute) ----
    def _first_numeric(col):
        if col in df.columns:
            s = pd.to_numeric(df[col], errors="coerce").dropna()
            if not s.empty:
                return float(s.iloc[0])
        return None

    mae_val = float(mae) if mae is not None else (_first_numeric("MAE"))
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    rmse_val = float(rmse) if rmse is not None else (_first_numeric("RMSE"))

    y_true = df.loc[~mask_nan, "True"].to_numpy()
    y_pred = df.loc[~mask_nan, "Predicted"].to_numpy()
    if mae_val is None:
        mae_val = float(np.mean(np.abs(y_pred - y_true))) if y_true.size else␣
↪float("nan")
    if rmse_val is None:
        rmse_val = float(sqrt(np.mean((y_pred - y_true) ** 2))) if y_true.size␣
↪else float("nan")

    # ---- metrics box helper (uses your per-metric formats) ----
    def _fmt(x, fmt):
        try:
            return fmt.format(float(x)) if fmt is not None else f"{float(x):g}"
        except Exception:
            return str(x)

    def _metrics_box(ax):
        txt = f"MAE: {_fmt(mae_val, metrics_fmt_mae)}\nRMSE: {_fmt(rmse_val,␣
↪metrics_fmt_rmse)}"
        at = AnchoredText(txt, loc=metrics_loc, prop=dict(size=17),␣
↪frameon=True, borderpad=0.8)
        at.patch.set_alpha(0.75)
        ax.add_artist(at)

    # ---- axis pads ----
    date_pad = pd.Timedelta(days=int(date_pad_days))
    x_min = df[parse_dates_col].min() - date_pad
    x_max = df[parse_dates_col].max() + date_pad

    # ---------- Plot 1: True vs Predicted over time ----------
    fig, ax = plt.subplots(figsize=(11, 5))
    ax.plot(df[parse_dates_col], df["True"], marker="o", linewidth=1.5,␣
↪label="True")
    ax.plot(df[parse_dates_col], df["Predicted"], marker="s", linewidth=1.5,␣
↪label="Predicted")
    if mask_nan.any():
        ax.scatter(df.loc[mask_nan, parse_dates_col], df.loc[mask_nan, "True"],
                   marker="o", s=90, color="red", zorder=5, label="True=0␣
↪(Residual NaN)")
        ax.scatter(df.loc[mask_nan, parse_dates_col], df.loc[mask_nan,␣
↪"Predicted"],
                   marker="s", s=90, color="red", zorder=5, label="Predicted at␣
↪True=0")
    ax.set_xlim(x_min, x_max)
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    ax.margins(x=0.0, y=0.06)
    ax.set_title(f"{title}: True vs Predicted")
    ax.set_xlabel("Date")
    ax.set_ylabel("Count")
    ax.xaxis.set_major_locator(mdates.MonthLocator())
    ax.xaxis.set_major_formatter(mdates.DateFormatter("%b"))
    ax.grid(True, alpha=0.3)
    _metrics_box(ax)
    _legend_dedup(ax, loc=time_legend_loc)
    plt.tight_layout()

    # ---------- Plot 2: Residuals over time ----------
    fig, ax = plt.subplots(figsize=(11, 4))
    ax.axhline(0, linestyle="--", linewidth=1)
    ax.plot(df.loc[~mask_nan, parse_dates_col], df.loc[~mask_nan, "Residual"],␣
↪marker="o", linewidth=1.5)
    ax.set_xlim(x_min, x_max)
    ax.margins(x=0.0, y=0.08)
    ax.set_title(f"{title}: Residuals Over Time (Predicted - True)")
    ax.set_xlabel("Date")
    ax.set_ylabel("Residual")
    ax.xaxis.set_major_locator(mdates.MonthLocator())
    ax.xaxis.set_major_formatter(mdates.DateFormatter("%b"))
    ax.grid(True, alpha=0.3)
    _metrics_box(ax)
    _legend_dedup(ax, loc=other_legend_loc)
    plt.tight_layout()

    # ---------- Plot 3: Residual distribution ----------
    fig, ax = plt.subplots(figsize=(7, 4))
    ax.hist(df.loc[~mask_nan, "Residual"].dropna(), bins="auto")
    ax.set_title(f"{title}: Residual Distribution (Predicted - True)")
    ax.set_xlabel("Residual")
    ax.set_ylabel("Frequency")
    ax.grid(True, alpha=0.3)
    _metrics_box(ax)
    _legend_dedup(ax, loc=other_legend_loc)
    plt.tight_layout()

    # ---------- Plot 4: True vs Predicted (scatter) ----------
    fig, ax = plt.subplots(figsize=(6.8, 6.8))
    x_true = df["True"].to_numpy()
    y_pred = df["Predicted"].to_numpy()
    ax.scatter(x_true[~mask_nan], y_pred[~mask_nan], marker="o", alpha=0.9,␣
↪label="Observed")
    if mask_nan.any():
```
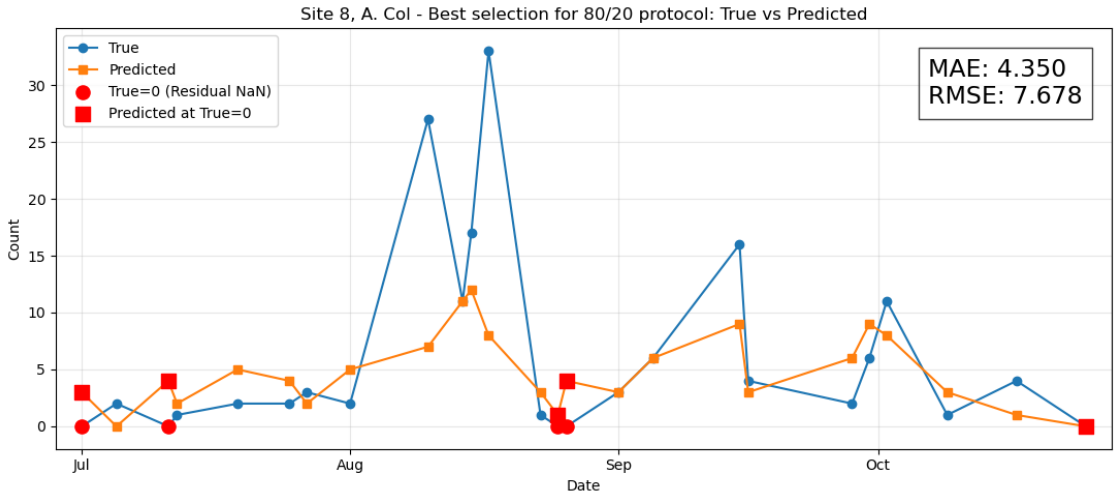
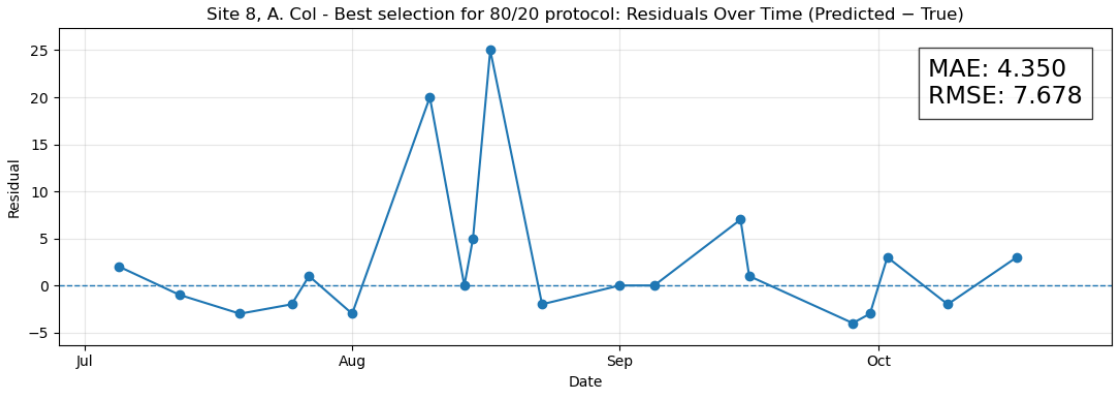
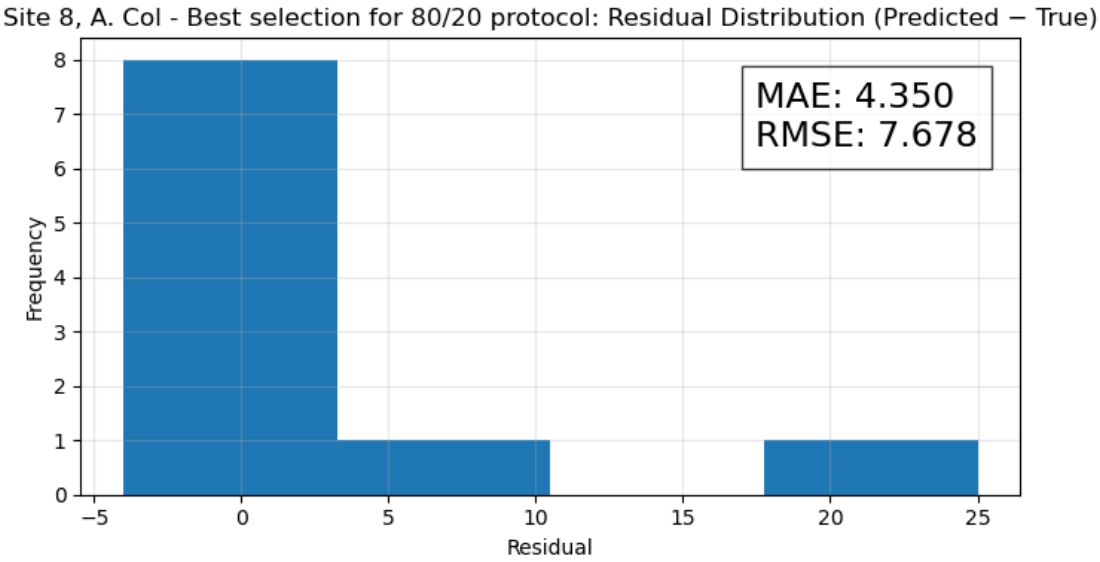
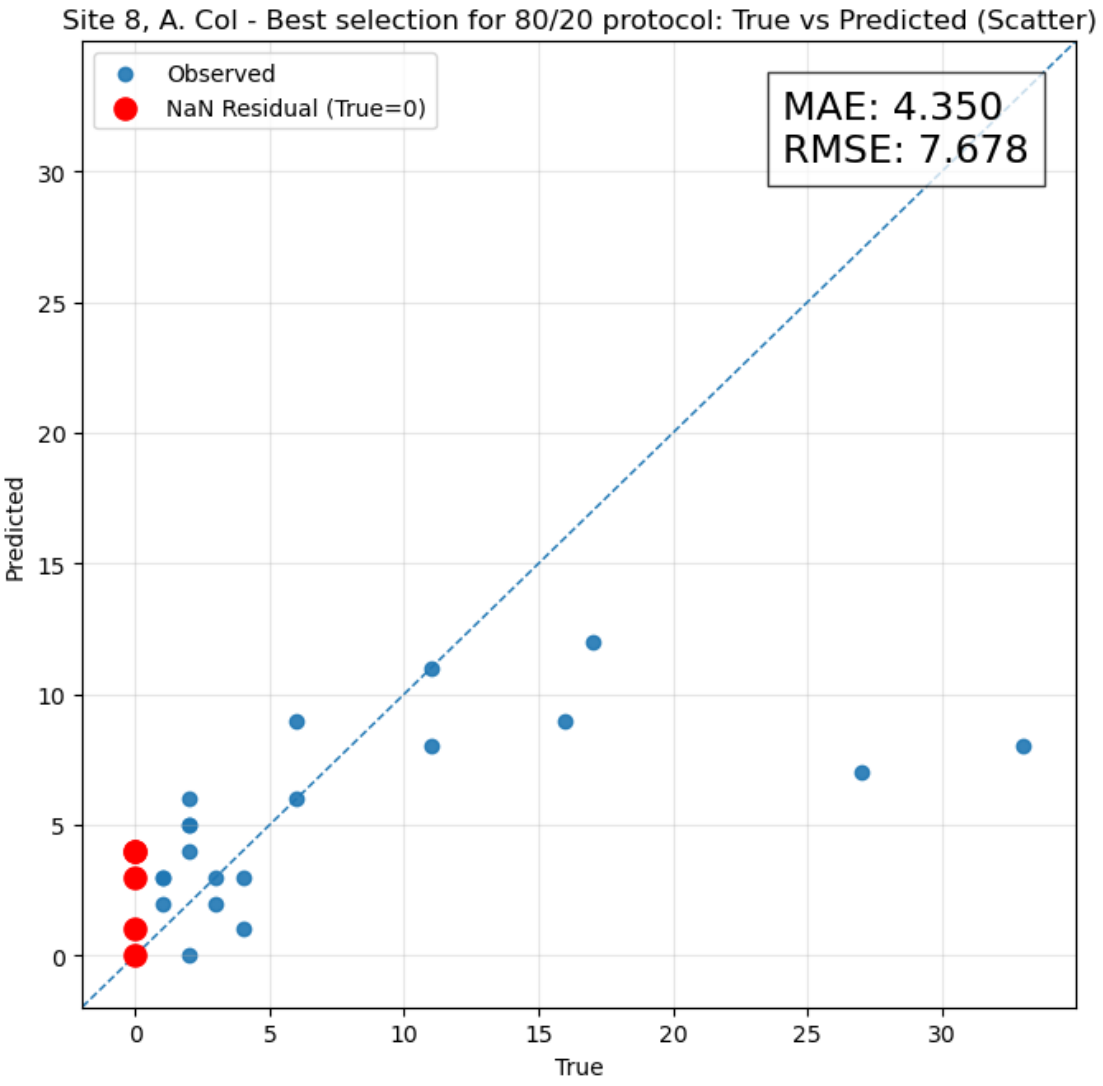

```
        ax.scatter(x_true[mask_nan], y_pred[mask_nan], marker="o", s=90,␣
↪color="red", zorder=5,
                   label="NaN Residual (True=0)")
    data_min = float(min(x_true.min(), y_pred.min()))
    data_max = float(max(x_true.max(), y_pred.max()))
    span = max(1e-9, data_max - data_min)
    pad_val = max(float(scatter_min_pad), float(scatter_pad_frac) * span)
    lims = (data_min - pad_val, data_max + pad_val)
    ax.plot(lims, lims, linestyle="--", linewidth=1)
    ax.set_xlim(lims)
    ax.set_ylim(lims)
    ax.set_xlabel("True")
    ax.set_ylabel("Predicted")
    ax.set_title(f"{title}: True vs Predicted (Scatter)")
    ax.grid(True, alpha=0.3)
    _metrics_box(ax)
    _legend_dedup(ax, loc=other_legend_loc)
    plt.tight_layout()

    plt.show()


# ---------------- Example usage ----------------
if __name__ == "__main__":
    # Example: 1 decimal for both MAE and RMSE (e.g., 6.2 and 9.4)
    plot_test_series_csv(
        "/Users/pradumchauhan/Desktop/MPI/Final_Data/Code/Pipeline_MICE/
↪pipeline_80_20_Tuned/pipeline_80_20_2015_S8_Tuned /results/
↪8020__precip_lags__train_keeps_zeros__2015-07-01_2015-10-31__tuned__Adults_8_Col__preds__20
↪csv",
        title="Site 8, A. Col - Best selection for 80/20 protocol",
        mae=4.350 ,
        rmse= 7.678,
        metrics_fmt_mae="{:.3f}",
        metrics_fmt_rmse="{:.3f}",
    )
```


Site 8, A. Col - Best selection for 80/20 protocol: True vs Predicted
True
Predicted
True=0 (Residual NaN)
Predicted at True=0
MAE: 4.350
RMSE: 7.678
Count
Jul
Aug
Sep
Oct
Date


Site 8, A. Col - Best selection for 80/20 protocol: Residuals Over Time (Predicted − True)
MAE: 4.350
RMSE: 7.678
Residual
Jul
Aug
Sep
Oct
Date


Site 8, A. Col - Best selection for 80/20 protocol: Residual Distribution (Predicted − True)
MAE: 4.350
RMSE: 7.678
Frequency
Residual


Site 8, A. Col - Best selection for 80/20 protocol: True vs Predicted (Scatter)
Observed
NaN Residual (True=0)
MAE: 4.350
RMSE: 7.678
Predicted
True
0
5
10
15
20
25
30

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