**1. Plotting Multiple Logs Horizontally**

**Problem**: Needed to display 6 different well logs (Caliper, Gamma Ray, SP, Resistivity, Neutron-Density, Sonic) side-by-side.  
**Solution**: Used *plt.subplots(1, 6)* to create a 1×6 grid of subplots.  
**Issue**: Titles/axes overlapped.  
**Fix**: Adjusted *figsize=(10, 6)* and *plt.subplots\_adjust(wspace=0.1)* to control spacing.

**2. Shared Depth (Y-Axis) Across All Logs**

**Problem**: Depth values (Y-axis) must align perfectly across all logs.  
**Solution**: Added sharey=True in plt.subplots() to synchronize the Y-axis.  
**Challenge**: Inverted depth (surface at top) required *ax.set\_ylim(max\_depth, min\_depth).*

**3. Resistivity Logs on One Plot**

**Problem**: Three resistivity curves (Deep/Medium/Shallow) needed different colors but shared the Y-axis.  
**Solution**: Plotted all three on the same subplot (log\_3) with:

*python*

*log\_4.plot("RILD", "Depth", color="red", label="Deep")*

*log\_4.plot("RILM", "Depth", color="green", label="Medium")*

*log\_4.plot("RMSF", "Depth", color="blue", label="Shallow")*

**Added**: Logarithmic X-axis (*log\_4.set\_xscale("log")*) for resistivity.

**4. Neutron-Density Dual-Axis Plot**

**Problem**: Neutron (CNS) and Density (RHOB) have different units but share depth.  
**Solution**: Created a twin X-axis using *log\_5b = log\_5.twiny()*:

* **Density**: Primary X-axis (purple, bottom, units: g/cc)
* **Neutron**: Secondary X-axis (cyan, top, units: v/v)  
  **Standard Scales**:

*python*

*log\_5.set\_xlim(1.95, 2.95) # Density range*

*log\_5b.set\_xlim(45, -15) # Neutron range (limestone units)*

**5. Legend Overlap in Neutron-Density Plot**

**Problem**: Two legends (Neutron/Density) conflicted.  
**Solution**: Combined legends manually:

*python*

*lines = log\_5.get\_legend\_handles\_labels()*

*lines2 = log\_5b.get\_legend\_handles\_labels()*

*log\_5.legend(lines + lines2, loc='upper right', prop={'size': 6})*

**6. Interactive Depth Selection**

**Problem**: Static plots couldn’t zoom to specific depths.  
**Initial Approach**: Tried in .py file → **failed** (VS Code doesn’t render widgets).  
**Solution**: Switched to Jupyter Notebook (.ipynb) with:

*python*

*from ipywidgets import interact, IntSlider*