```python
In [95]: import itertools

         # Assuming B_r data is stored in the variable y1_1

         # Find sign changes in B_r
         sign_changes = np.diff(np.sign(y1_1))
         sign_changes = np.concatenate(([0], sign_changes))  # Pad with a zero at the beginning

         # Find consecutive groups of sign changes
         groups = [(key, len(list(group))) for key, group in itertools.groupby(sign_changes)]

         # Filter regions based on criteria
         min_sign_changes = 2  # Minimum number of consecutive sign changes
         min_duration = 10  # Minimum duration in minutes
         max_duration = 45  # Maximum duration in minutes
         threshold = 10  # Threshold for absolute value of B_r

         # Find regions where absolute value of B_r is less than 10 for a period of 10-30 minutes
         low_br_regions = []
         for key, count in groups:
             if count >= min_sign_changes and count <= (max_duration / duration_minutes):
                 indices = np.where(sign_changes == key)[0]
                 for i in range(0, len(indices)-count+1):
                     region_indices = indices[i:i+count]
                     region_br = y1_1[region_indices]
                     if np.all(np.abs(region_br) < threshold) and np.any(region_br < 0):
                         low_br_regions.append(region_indices)

         # Find regions where the sign of B_r changes at least 4 times in a span of 10-30 minutes
         sign_change_regions = []
         for key, count in groups:
             if count >= min_sign_changes and count <= (max_duration / duration_minutes):
                 indices = np.where(sign_changes == key)[0]
                 for i in range(0, len(indices)-count+1):
                     region_indices = indices[i:i+count]
                     if len(np.unique(sign_changes[region_indices])) >= min_sign_changes and np.any(y1_1[
                         sign_change_regions.append(region_indices)

         # Plot B_r
         fig = plt.figure(figsize=(12, 1))
         plt.plot(x1, y1_1, color='k', linewidth=1)

         # Plot shaded regions where absolute value of B_r is less than 10 for a period of 10-30 minutes
         for region_indices in low_br_regions:
             start_index = region_indices[0]
             end_index = region_indices[-1]
             plt.axvspan(x1[start_index], x1[end_index], color='blue', alpha=0.2)

         # Plot shaded regions where the sign of B_r changes at least 4 times in a span of 10-30 minutes
         for region_indices in sign_change_regions:
             start_index = region_indices[0]
             end_index = region_indices[-1]
             plt.axvspan(x1[start_index], x1[end_index], color='red', alpha=0.2)

         # Set plot labels and properties
         plt.xlabel('Time')
         plt.ylabel('B_r')
         plt.title('B_r with Highlighted Regions')
         plt.grid(True)

         # Show the plot
         plt.show()
```

B_r with Highlighted Regions