Freesound URL:
https://freesound.org/people/xserra/sounds/217543/

Window sizes used for computation: 8191, 2047, 255
Band edges: 1000, 5000, 22050

The band edges were selected based on the context of the problem. Since we're using three separations, the low and low-mid frequency spectrum were analysed with the biggest window (8191), providing more frequency resolution and discarding; for the mid range frequency spectrum 1000 - 5000 a window size of 2047 was needed to create a good enough reconstruction of the input sound. For the high-mid and high frequency spectrum, I had to get to window size as low as 255 to get good attack representations. For the most part of the experimentation process, it was all about getting the correct time resolution for the high frequency content analysis and that was only able by reducing the window size quite drastically.

The advantages I can find by using the multi resolution practice are a bigger and more personalised level of detail when it comes to analyzing and synthesizing the input file. By having the option of multiple window and fit sizes as well of chosen bandwidth, aspects of the sound such as the attacks or the specific frequency content can be best characterized, because of the time-frequency compromise flexibility. It seems that this technique comes with a small price however, by being more computational expensive, having to perform the cycle 3 times (in this case), one for each bandwidth.

When it comes to extending this concept to the HpS and HpR models, I believe that it could allow best sinusoid tracking and f0 estimation, by getting a better analysis of the different spectrum regions, because of the use of different analysis windows (smaller windows allow best high frequency representations and bigger windows suit low frequencies better).