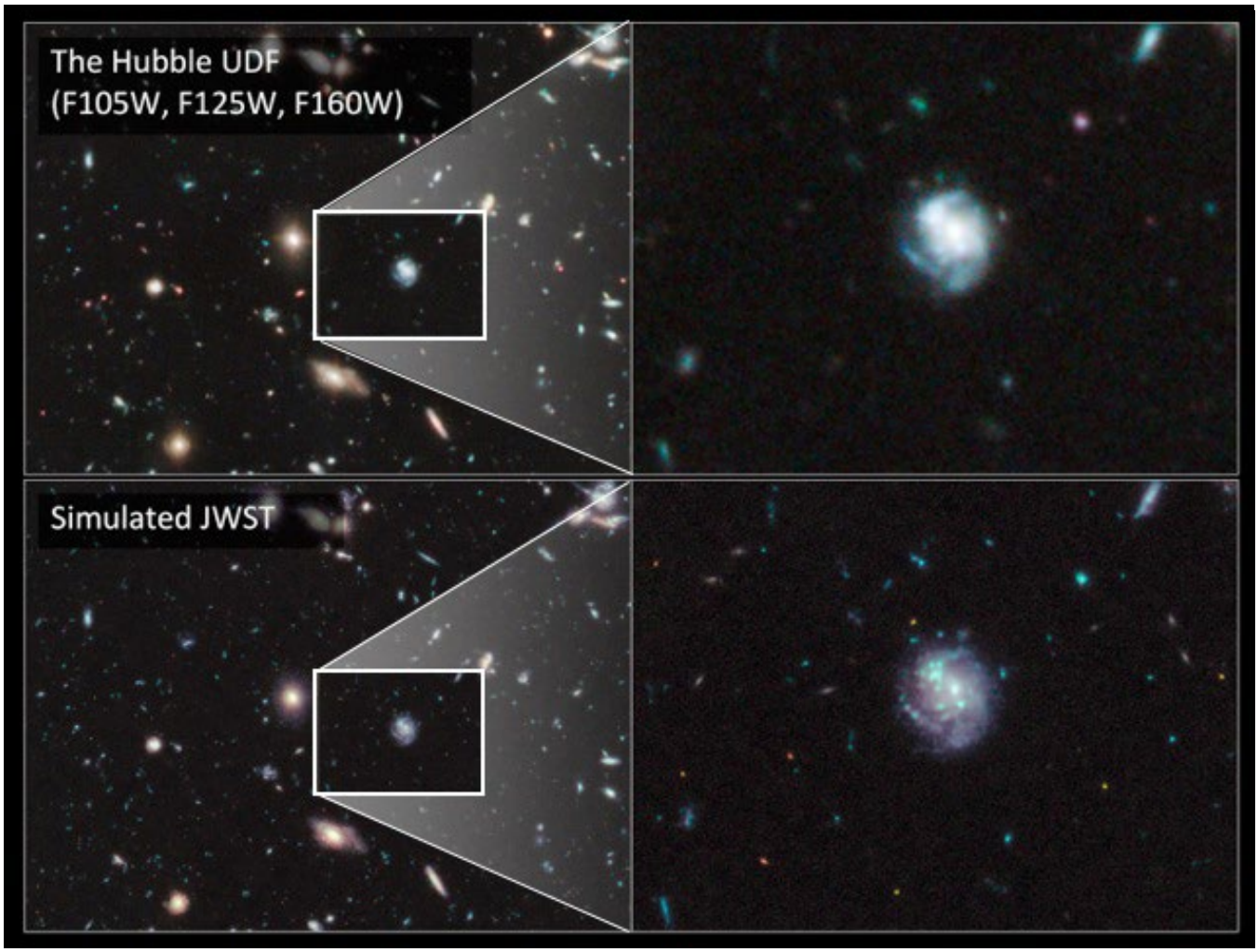
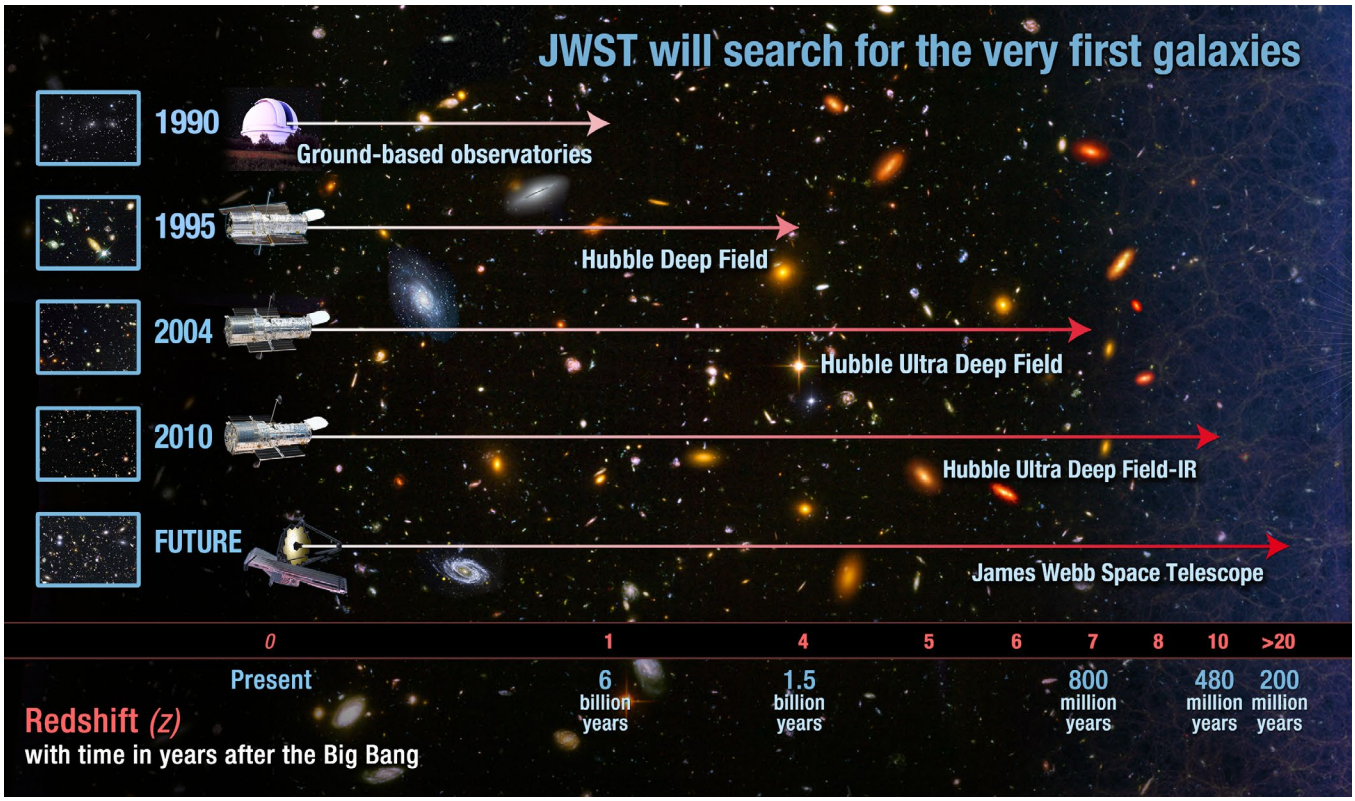
# NASA's James Webb Space Telescope:

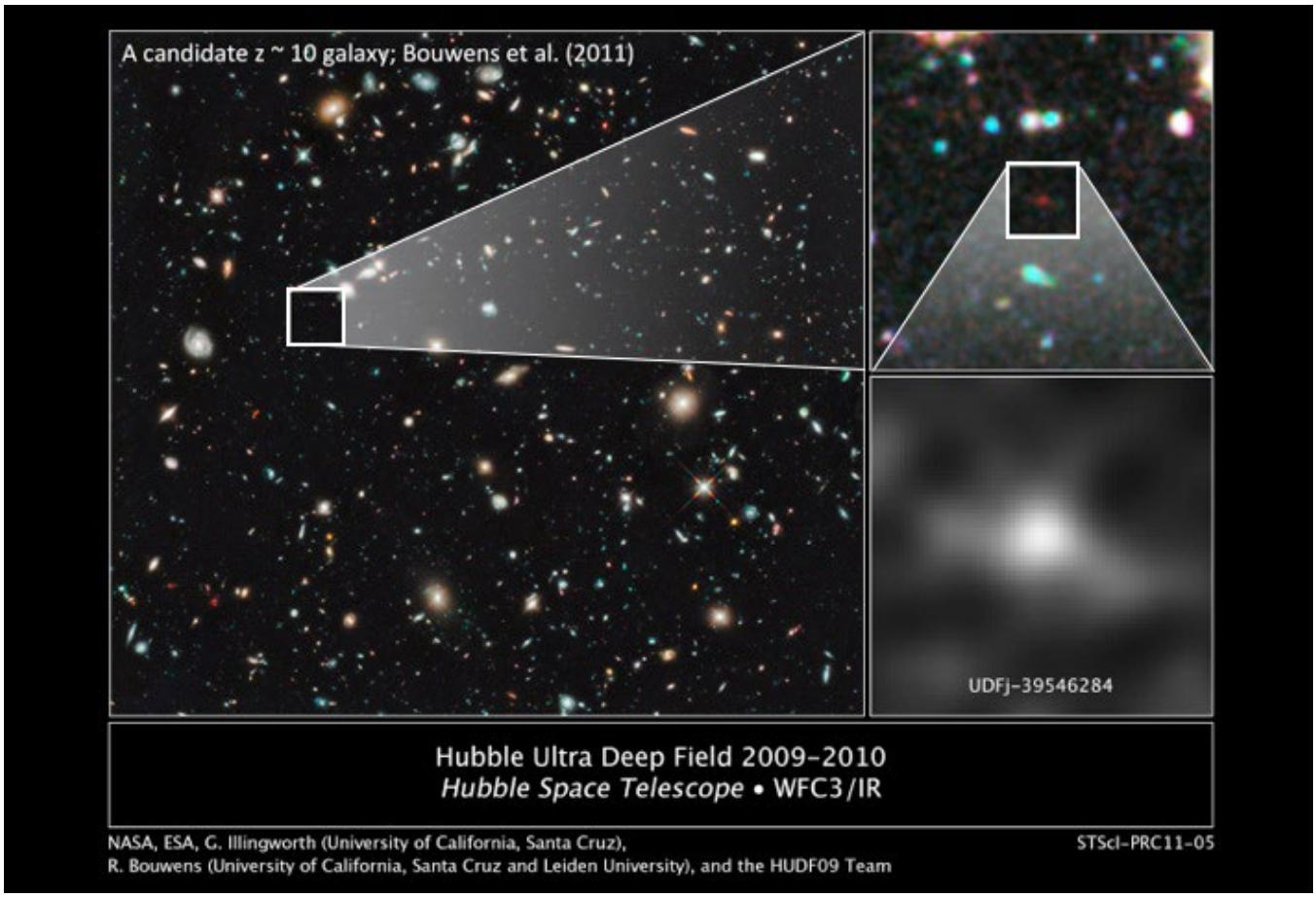
## First Galaxies

The search for high redshift galaxies is one of the primary quests of observational astronomy. Recent advances in infrared imaging capabilities have reinvigorated this field, leading to, for example, the recent discovery of a z = 10 galaxy candidate in the WFC3/IR Hubble Ultra Deep Field. Based on the HST results, we have obtained a glimpse of the early star formation rate density of the Universe. Infrared imaging with JWST will provide a robust picture of the high-redshift galaxy luminosity function. These objects, which formed in the Universe's first billion years, represent the seeds of today's galaxies. The dark matter halos of massive galaxies and a significant number of metals also formed during this epoch, the period that covers the reionization of the Universe. In addition to measuring luminosity functions, JWST will resolve ambiguities from Hubble and Spitzer in fitting SEDs by spectroscopically characterizing early systems at z = 9, and characterizing stellar contributions to z > 10.

The image below shows a simulated JWST Deep Field. The simulation demonstrates what the WFC3/IR Hubble Ultra Deep Field may look like through JWST's eyes. The HST image (top) was constructed by combining multiple WFC3 observations in F105W, F125W, and F160W, and the JWST simulation (bottom) backs out the HST point spread function and reconvolves the frame with the (sharper) JWST point spread function. The clarity in the image is greatly enhanced.






See more at jwst.stsci.edu and jwst.nasa.gov
and do your own ETC calculations at jwst.etc.stsci.edu

Images courtesy of NASA