

The 30 Minute Hubble Ultra Deep Field Experience

L. Low – 3/21/2004 rev6/16/04

1. Print up two copies of the Hubble Ultra Deep Field (HUDF) in the best resolution you can manage and color if possible and make it 8 inches square.
2. Mount one of these images in the center of a 2 foot x 2 foot piece of white poster board.
3. Depending on the audience, preface the experience with a little discussion of what a galaxy is.
4. Obtain two walkie-talkies. Keep one and give one to the person or group doing the experience.
5. Obtain a copy of “Portrait of a Million” from Sky Publishing (Sky and Telescope) and give it to the audience for reference.
6. Leave a copy of the HUDF image with the group and take the one mounted on the poster board with you.
7. If this is being done at night, have flashlights for yourself and the group and (unless you are an octopus) plan to have an assistant with a flashlight go with you since you need to hold the walkie-talkie, this paper with a flashlight shining on it and the HUDF board with a flashlight shining on it.
8. The HUDF image is actually 3 arc minutes on a side, so to view the printed copy in proper perspective (i.e. 3 arc minutes square) it must be viewed from a distance of [8 inches divided by the tan of 3 arc minutes] which is 9167 inches or 762 feet.
9. Walk 254 paces (762 feet) away from the group and hold up (or have your assistant hold up) the copy of the HUDF image on the poster board.
10. Say over the walkie-talkie:

Please observe closely the image I am holding up which was taken by the Hubble Advanced Camera for Surveys recently. Concentrate on the size of the dark square in the middle of the white sheet.

--pause--

Imagine moving just the small dark square slowly up into the sky to an empty space above the trees.

--pause--

Now create in your mind another identical square and place it right next to the first one.

--pause briefly--

Continue this process, adding squares to the sides, top and bottom until you have mentally created a patch in the sky about the size of the nail on your last finger held at arms length. Hold your finger up to check. When completed, this will be a rough square 20 images by 20 images for a total of about 400 images.

--pause--

If you were to continue doing this, then to cover the entire sky above the horizon you would have to create and distribute over 8 million of those tiny squares.

--pause briefly--

Open the big white folded sheet. Inside it you will see two pages covered with tiny dots. The total number of these dots is 1 million. Study them and try to get some feel for how many that is.

--pause--

You would need to have 8 of these sheets to see 8 million dots. Do your best to imagine that number of dots evenly covering up the entire sky.

--pause--

Now remember that each of those dots represents ONE of the HUDF sized pieces of sky. Look at the picture you have there of the HUDF and contemplate the fact that visible in it are about (--pause for suspense--) 10,000 galaxies!

--pause--

Again imagine the sky filled with those 8 million dots but now have each dot represent a completely unique set of 10,000 galaxies.

--pause--

We have filled the entire visible sky with galaxies, but that is only half of the whole sky. The other half is below the horizon and it is just as full of galaxies.

--pause--

Now hold up your last finger again at arms length so you can see your fingernail. Wherever you are holding it, that fingernail is covering about 4 million galaxies.

--pause--

You have now experienced the number of galaxies visible with the Hubble’s best camera. How many more do you think are out there, but are too dim and far away for the Hubble to see?

--pause--

Thank you very much for “Spacing Out” with us today (or this evening).