From: Paul McGill <mcgill@mbari.org>
Subject: **Fwd: Camera tripod resolution**
Date: January 29, 2014 11:32:09 AM PST
To: Alana Sherman <alana@mbari.org>
Cc: Christine Huffard <chuffard@mbari.org>, Ken Smith <ksmith@mbari.org>

Here's a correction to my last message. I incorrectly used the distances from a point on the seafloor directly under the camera to the bottom, middle, and top of the image. I should've used the straight-line distance from the camera to those points in the image, which are:

Straight-line distance from camera to centerline of image at
Bottom = 3.5 m
Center = 5.0 m
Top = 10.7 m

This gives corrected object size resolutions of
Bottom = 0.67 mm
Center = 0.96 mm
Top = 2.1 mm

This doesn't change the final answer to your question but I wanted to correct my mistake in case we use these numbers later.

Paul

Begin forwarded message:

> **From:** Paul McGill <mcgill@mbari.org>
> **Subject:** **Re: Camera tripod resolution**
> **Date:** January 29, 2014 11:02:19 AM PST
> **To:** Alana Sherman <alana@mbari.org>
>
> No, I haven't figured this out but I suppose I could. I'm even going to document it here so we don't have to figure it out again later.
>
> Of course the answer depends on how far away the object is. Here's all the info we need from my camera calibration work:
>
> H image size = 4368 pixels
> V image size = 2912 pixels
> H field of view = 48 deg
> V field of view = 34 deg
> Distances to centerline of image at
> Bottom = 2.3 m
> Center = 4.3 m

Top = 10.5 m

Now we can calculate:
H angular resolution is 48 deg / 4368 pixels = 0.011 deg
V angular resolution is 34 deg / 2912 pixels = 0.012 deg

Let's just use the H angular resolution because they're almost the same. To find the size of an object with that angular size, just multiply the tangent of the angle by the distance from the camera:

Size of object on centerline of image at
Bottom is Tan(0.011 deg) x 2.3 m = 0.44 mm
Center is Tan(0.011 deg) x 4.3 m = 0.83 mm
Top is Tan(0.011 deg) x 10.5 m = 2.0 mm

I'm sure your eyes have glazed over by now and you're skipping to the bottom for the answer. Given the added effects of light scattering in the water and lens distortion, I would say that our resolution is "a couple of millimeters."

Hope that helps,
Paul

On Jan 29, 2014, at 10:29 AM, Alana Sherman wrote:

> Hi Paul, Crissy
> I think one of you figured this out already but what is the on bottom resolution we can claim with the camera tripod- i.e. the smallest thing we could resolve on the seafloor??
> Thanks
> Alana
> Alana Sherman
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