Photogeology In Terrain Evaluation (Part-1)
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Lecture – 20
Exercise on Stereoscopic Parallax

So let us move to our next topic that is Stereoscopic Parallax. As you learn in the lecture that Stereoscopic Parallax means that the things which are the objects, which are closest to our eyes will move faster ok. When we look by left eye then by our right eye so, as you can see here in the in this is, on this is screen ok.

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So, you can see the objects which are placed to next to your eye are moving very faster and the object which are placed behind this square cube ok; the rounded was these are moving very slowly.

So, this is the, this is because of the effect of stereoscopic parallax. And the reason as I, as I noticed in the lecture that when you see the bottle would behind your pencil or your finger. So, when you look at by your left eye in the bottle is on the left side and the right eye it is, it went on the right side ok.

So, this is the effect of parallax. But your finger is moving faster; the position of the bottle was changing slowly, but the position of your finger is changing very fast ok. So

here, this is the Stereoscopic Parallax ok; if you can see here. So, this is this equipment is called the Parallax bar which we used to get rate Stereoscopic Parallax ok.

And we can also use this equipment for measuring the object hides with the help of the photographs is stereo pair ok. So, let us learn something about this parallax bar first; then, we will move to our practical. So, focus on this if the parallax bar ok.

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So, this equipment is used with the mirror stereoscope. So, when you place your photograph, the arrear photograph the stereo pair under this mirror stereoscope and then, do the orientation of this photographs fix your photographs. Then, you will put your parallax bar over this photographs to do measurements ok, measurements of the objects or any type of geomorphic landforms. You can take the heights, the measurement of the bottom and top of the those objectives ok.

So, in this parallax bar as you can see, this is the main scale this one.

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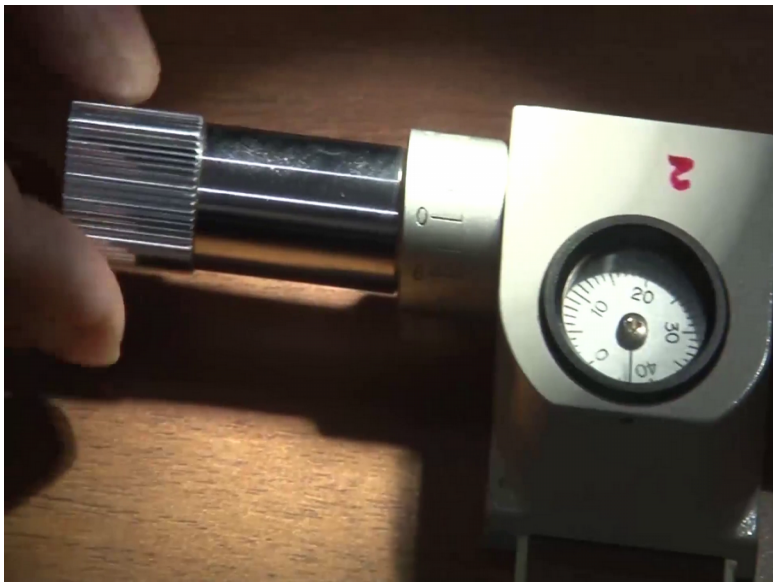

So, this will give you the reading. This is, this and this rod, this bar can be slided. They there are 2 graticules of glass ; number 1 and number 2. One is on the left side another on the right side. So, this graticule is more or less fixed with the on this bar. But this graticule you can move by the slider on this rod. So, this is the main scale given inside from 0 to 40 and this your Vermeer scale having a 0 count of 0.01.

So suppose, you are having a reading here like 5 meter or 5 centimeter ok. So, then you can multiplied by this 0.01 factor and then, you will get your the difference or in the object height ok. The top and bottom of the object and here, on this a little screw is set and with the help of this screw you can set your parallax bar.

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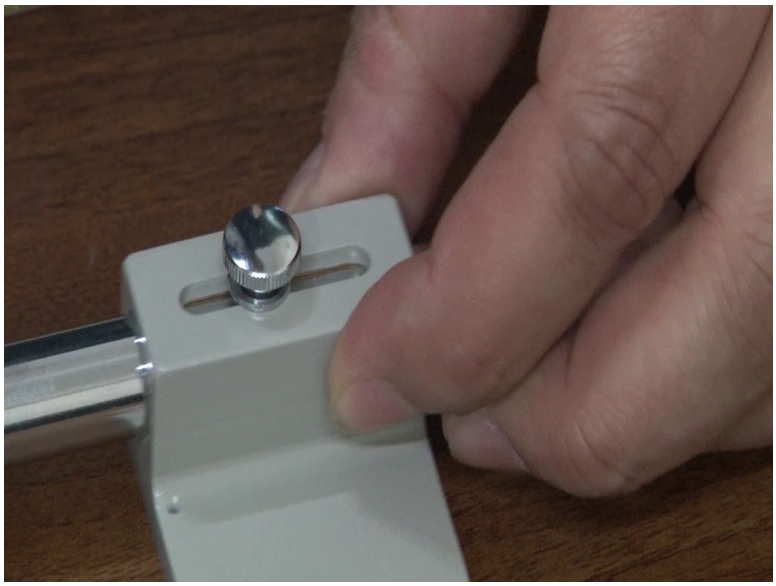

Up to this location ; from 35 mm to 14 mm ok, like this.

So, once you are able to set it as per your need, the area covered on the photograph; you can set it, you can fix it and then, after fixing it, you can move this. You can move this bar by rotating this large screw. As you can see as we are moving it, this reading is having some different reading ok.

This circular is scale is also rotating and it is this parallax bar is also termed as a Stereo meter and it is used to measure the difference of parallax between any 2 points more accurately and precisely. It consists of a pair of glass graticules. One is on the left side, another on the another side to a rigid bar ok, such that the lower surface of each graticule is in contact with one of the pair of stereo photographs. A small opic circular dot is marked at the center of each glass graticules.

So, here is the glass ok. So, here is the red dot in between this; if I put my white color pressing sheet below this. So, then, may be your able to see it. Yeah. Now it is little more clear.

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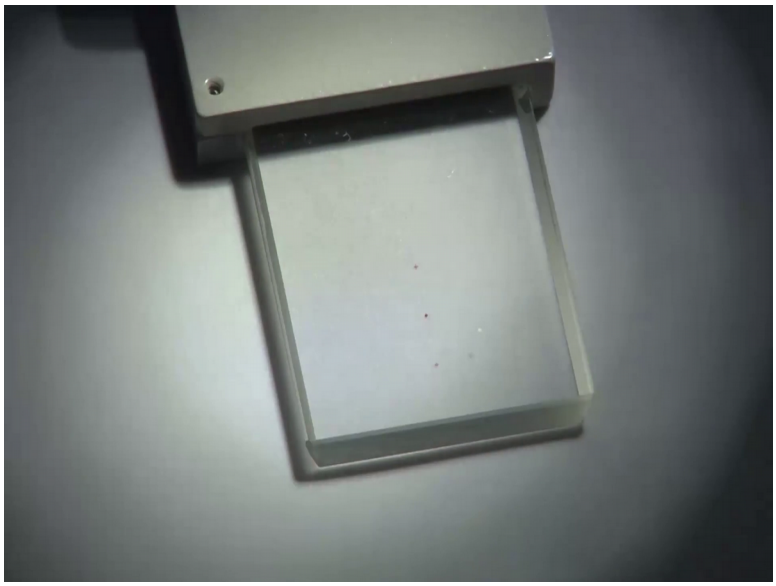

Now it is more clear on the glass graticule. So, you will be able to see here, 1 red dot in the center and there are 2 plus marks; one is on the top side and one is at the bottom side.

So, these 2 cross or plus points are for the references and this red dot in the middle is your measuring dot ok. So, this is also called the Floating mark. So, this then, you are able to generate 3D on the stereo player and you put on this parallax bar, you put this parallax bar over the 3D generated positions. So, then, you will be able to see this floating marked as it is moving up and down.

So, this dot is with the purpose of taking the vertical readings ok. Vertical reading means suppose your building or any object is in the standing position. So, you need to know the lower coordinate and the upper coordinate at the top coordinates of that building. So, you will be able to determine or you will be able to measure the readings of the top and bottom points of that object or a building ok.

So, this middle red dot will act as a floating mark. So, it will means in the direction, in the vertical direction up and down ok. So, this is I will little detail about this parallax bar. Now, we will move to our parallax bar exercise.

So, as you know that we have already generated a 3D with the help of these 2 images.

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We have already generated 3D vision of this areas under the mirror stereoscopic. So, now, we are again fixing these images in the same manner. So, that they are correctly oriented with the same exercise by coinciding our fingers in this way ok. So, now, this 2 images are in the 3D position.

So now, we can do the same thing ; we can take the principle point and the conjugate principle point and same for this photograph, we can take the principle point and the conjugate principle point as we did in the exercise of determination of line of flight. So, in the same manner after creating 3D vision of this area, we can measure the principle point and conjugate principle points and in the same manner, we can take the readings of these 2 points ok.

So, now what is stereoscopic parallax and how we can measure it ? So you first, note down this formula ok.

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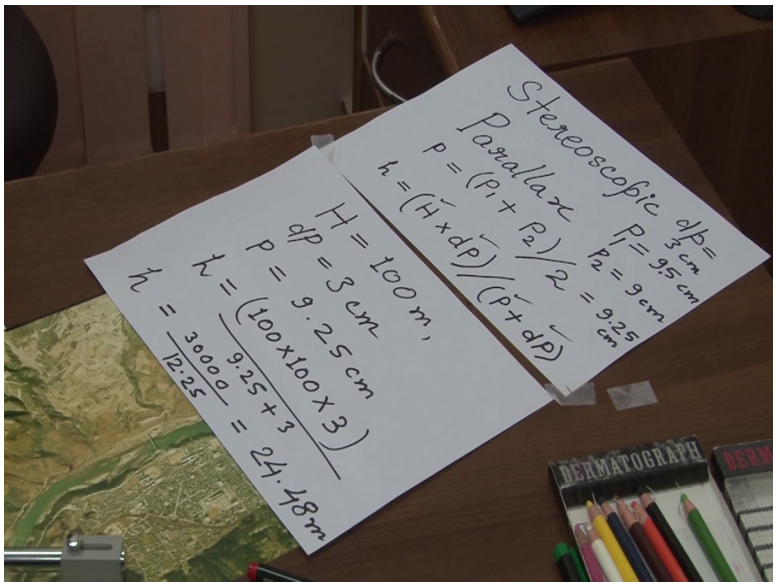

So, please focus on this formula, Stereoscopic Parallax. So, this, in this, this P, P 1 and P 2. This P 1 is actually the distance between the principle point and the conjugate principle point over a photograph and this P 2 is the principle point is the distance between the principle point and conjugate principle point on the second photograph ok.

So, by adding this 2 and taking the average of this distance, you will be able to calculate the absolute parallax. So, this P is called Absolute parallax. What is the meaning of Absolute parallax? That in actual this much of the parallax we can, we notice on our photographs in the orientation or in which they were taken; as you can see here on the slide.

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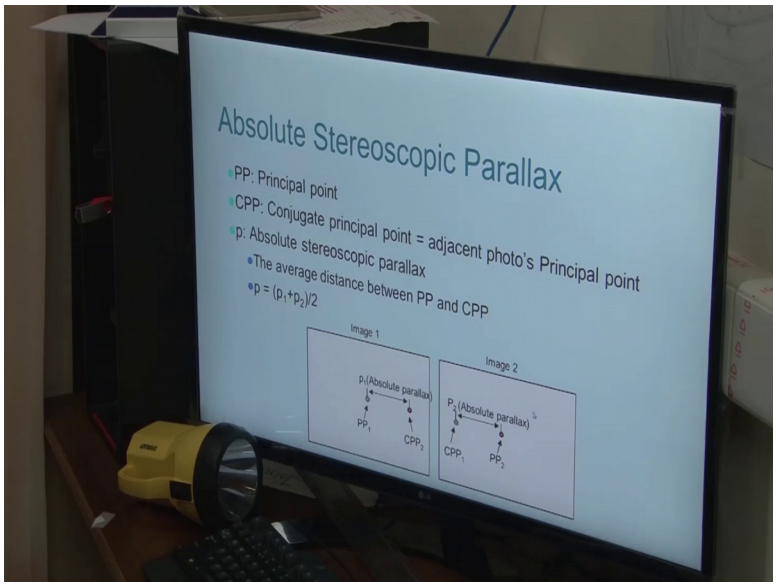

Ok. PP 1 and PP 2. So, the principle point and conjugate principle point and the distance between these 2 on the Image 1 and Image 2.

So, by adding these 2 divided by 2, will give you the Absolute stereoscopic parallax ok.

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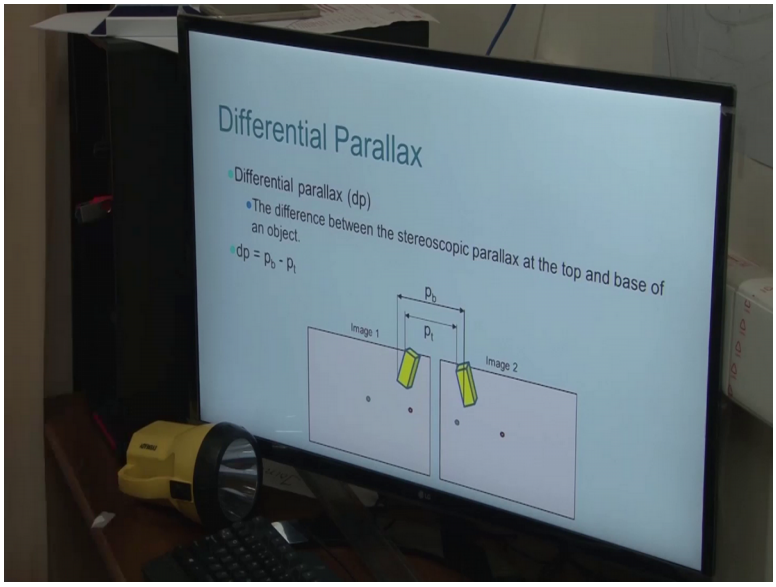

So, in our case, now again, we will focus on our on our photographs. So, we will take the readings.

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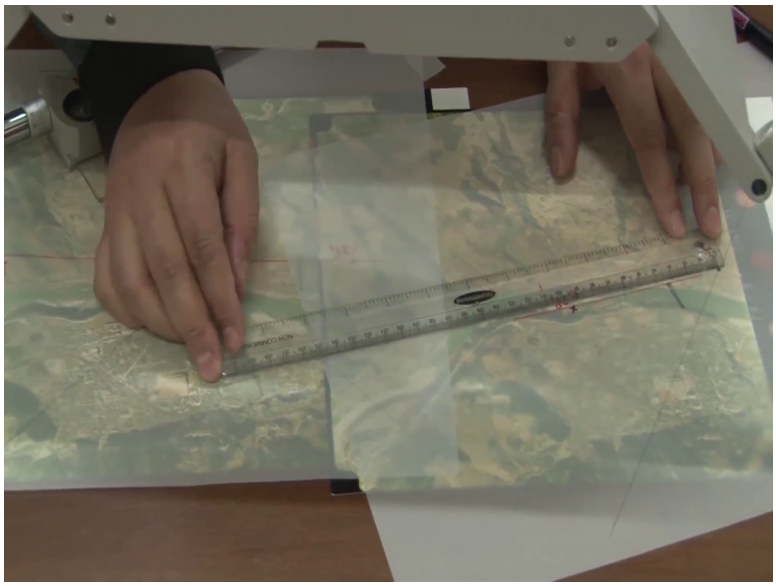

Whatever readings, we have already taken. So, the reading will be the same ok. So, distance between the PP and CPP 1, PP 1 and CPP 1, PP 2 and CPP 1 is around 9.5 as you can see.

If you see this in zone image. So, you can note down that the distance between this is around. So, this will be your PP 1. This will be your sorry P 1 ok. So, P one is 9.5 centimeter ; P 1 is 9.5 centimeter and now we will measure P 2. So, P 2 means that the distance between the corresponding principle points and conjugate principle points. So, logically they must be same or near about this nearby readings; this should has a similar readings.

So, here this is coming up as 9 centimeter. This much of accuracy, we have with us; P 1 and P 2. So, now, we will do; what we will do? We will first calculate the stereoscopic parallax by adding this P 1 and P 2 and dividing it by 2. So, 9.5 plus 9 by 2 will be 9.25 in centimeter ok. So, it will be in centimeter. So, this will be your Absolute parallax. So, what we will do now in the next? Now we will calculate our Differential Parallax. What is Differential Parallax? If you see on the screen you have your Differential Parallax that is dp ok.

So, the this is the difference of the readings of distances between the top points of the object and bottom points of the object. So, P t is the distance between the top points of the objects and P b is this is the distance between the bottom point of the objects. So, the

difference between these distances will give you the Differential Parallax as you can notice on this photograph. So here, what we will do now? We will measure the difference. These differences with our parallax bar ok.

So, now we can remove our tracing sheets. Because now, we have to take measurements with our parallax bar. You can see now, focus on this and you can see a light over here. So, let us take some high rise object. So, like this building you can see here that this building is a high building and it is having some height. So, we can measure it with our parallax.

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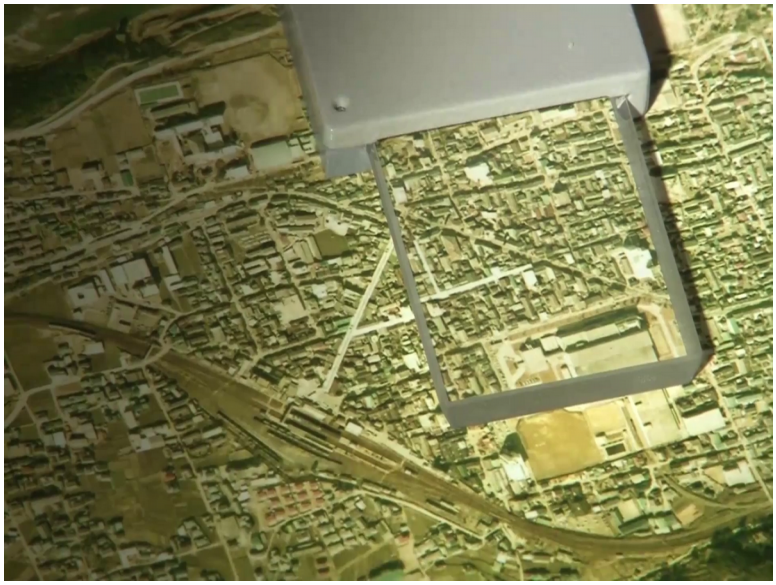

So, first we have to orient; our photograph our photograph should be in the correct orientation; otherwise, you will not be able to measure these stereoscopic parallax.

So, let us fix at least one photograph and then, you can move another photograph by putting your fingers like this. In the same manner, you can generate the 3D vision of the of this area. So, here at this point, my fingers are coinciding. When you will do practice you will learn how to generate a 3D ok. Then, very easily you will be able to do it; once you learn it. So, try to find a mirror is stereoscope in a nearby led to you whatever institute or universities available to you in your city.

So, now, our photograph are in the correct orientation. Now, we can fix these photographs on this table ok. So, now, we will calculate the differential parallax. So, see

I am looking over a single building; because I am looking through this mirror the stereoscope. So, I am I am having a 3D. So, I am looking on a single building. So, you fix your left graticule at the base of the building and then, you move your this floating mark this graticule towards the top of the building because you are able to see 3D of this area.

So, at this in this position, you will also have the 3D image of that floating mark ok. So, you will be able to see only 1 floating mark; 1 red dot ok, not 2 remember. So, so I have fixed the left red dot at the bottom of the building and moving my graticule towards. First you have to note down the reading ok. So, so I note down the reading that is 32, 32 ok. So, now, let us move it. So, now, it is on the top of the building. So, one rate. So, I started from the bottom of the building and now, it reaches the top of the building.

So, where it reaches now? And it is given now reading of 29 around 29 ok. So, difference is 3 centimeter, 29 to 32 and may be multiplied by the vernier reading of 0.01 that is the 0 count of this scale. So, that will be a still common. So, the reading of differential parallax will be 3 centimeter. So, we have now measured our dp. So, this is the dp. So, the reading of dp is now we got is 3 centimeter and we know the height of the flight the flying height that is altitude capital H, we know that it was around 100 meter.

So, let us take it aside. So, that it can do the calculations. Now you have that you know that the flying height was 100 meter and you know dP that is differential parallax ok. So, differential parallax is 3 centimeter. Let us note down dP is 3 centimeter and your absolute parallax that is P is 9. 25 centimeter from this calculation ok; 9.25, 3 centimeter and. So, you know this, you know this and you know all these 4 readings.

Now, you can calculate the height of this building very easily by putting these values in this formula ok. So, what you will get? You will get H is equal to 100 into 100; because it should be in centimeter we are measuring, we have other measurements in centimeter to normalize this gets multiply by 100. So, into dP that is 3 centimeter and you can divide it by 9.25 plus 3 centimeter.

So, you will have now H is equal to 100 100 100 ok. Then, 12. 25. So, this will come around 20. 24.48 meter. This will come around 24. 48 meter. You can calculate it, the whatever reading you will get from here that will be in centimeter then divided by 100's 100. So, you will get 24.48 meter of height. So, that will be the height of this building.

Now, you learn from this exercise that you can easily calculate the height of the objects or any building located on the surface ok. So, this Stereoscopic Parallax of course, is important to generate 3D, stereo vision with the help of this stereo pair. So, it has implications in calculating various dimensions for different objects over the over the ground which we have covered with our stereo photographs. So, hope this helps you in future so.

Thank you very much. We will meet in the next lecture.