Photogeology in Terrain Evaluation (Part – 1)
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Lecture – 05
Stereo-photos and their Importance

Welcome back. So, in last lecture we discussed about the pattern of aerial photography.

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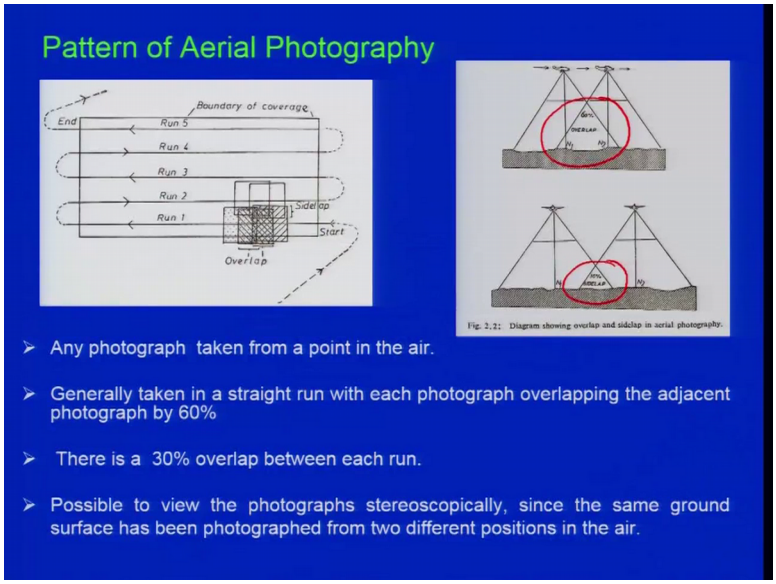

And the information collected for generating the stereographic images, where we can which can help us in viewing the terrain in 3 dimensional.

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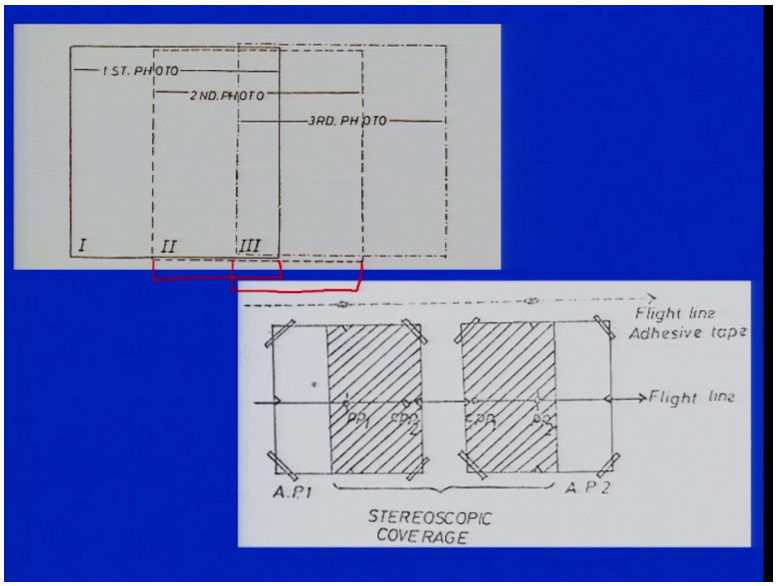

So, this is the if you have a multiple photograph collected and the same direction in a line of flight, then you have the overlap here what has been shown between photograph 1, and photograph 2, and photograph 3, it is almost you can have the overlap here of 60 percent between this, and then you have an overlap of 60 percent between photograph 2 and 3.

And we will look at now a few more important points about at what exactly this photograph can tell us, and how in the future lectures are coming up lectures we can talk about, and how you can even measure the height of any object because you can will be able to view the object in 3 dimensional. So, you can also calculate the height of the object, and the scale of the photographs because the scale of the photograph is not available. So, we will talk about then how to calculate the scale of the photograph, and how to identify or measure the objects in terms of their height and distance.

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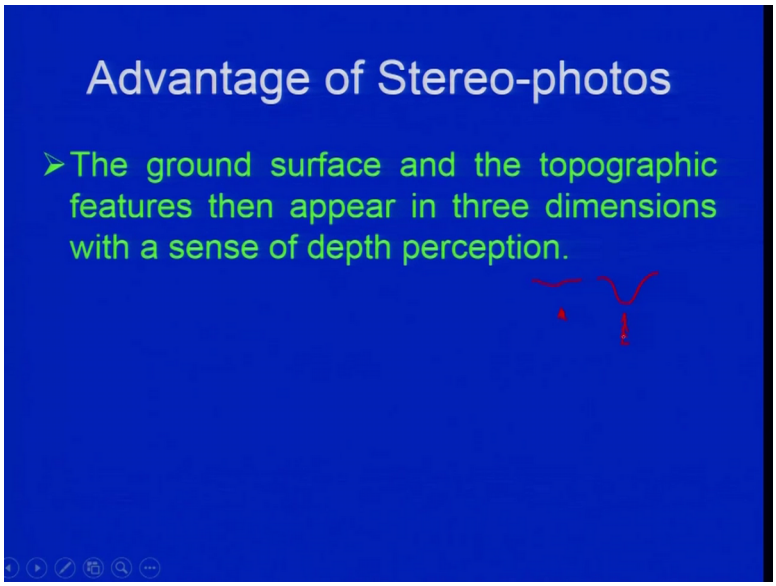

So, advantage of stereophotographs in particular where we were talking about 30 percent overlap on sideways, and 60 percent overlap on the along d in the direction of line of flight, the ground surface and the topographic features then appears in 3 dimension with a sense of that perception. So, you will be able to makeout easily for example, you are having in valley. So, if you if you are having in for example, 2 d photographs you may be able to see something like this, but if you are having a 3-d view or 3 d vision and you will be able to understand that the value is in size or not.

And then of course, any if you are having it for example, the tree then you may have a simpler point here like this, but if you have in 3 d vision, then you will be able to make out that this is having in height some height. So, these are the advantages of having even in terms of the building or in the terms of the terrain, you will be able to sense the area in terms of depth perception.

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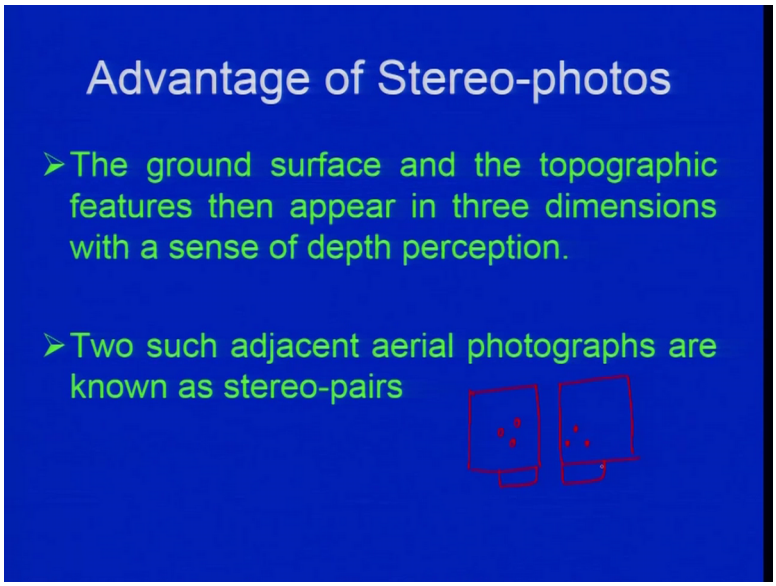

2 such adjacent aerial photographs are known as stereo pairs. So, if you are having one photograph and for example, you are having this area here, and you are having another photograph which will also have this information. So, this overlap having any photograph having the overlap of 6 percent and 30 percent sideways, are termed as your stereo photographs.

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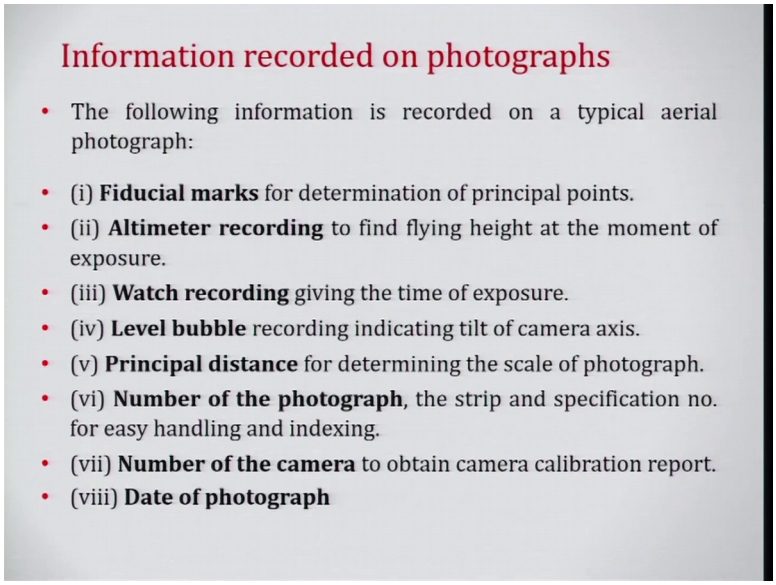

So, information recorded on photographs this is also important you can distract a lot of information out of that, the following information is recorded on a typical aerial photos.

So, one is fiducial marks for determination of principal points, then you have altimeter recording at what altitude you your aircraft was flying, that also you can record or the information will be available on the photographs, this I am talking about the aerial photographs mainly.

Then watch recording that is the time at what which time, or what time you have taken the photographs of the information, then level bubble whether your camera was tilted or it was absolutely vertical, then principal distance for determining the scale of the photograph so, you can also make out we calculate the scale if you are having almost vertical photographs taken, and you can compare either based on that information or the object on ground or on the map.

Number of the photographs are important because this indexing will help us and also putting all the photographs in a in a catalog, or maybe you can also identify the line of flight, and that also helps in picking of the photographs whether the photograph was taken in a particular line of flight. So, forward after off forward after like that, otherwise you may have a negative image. So, that is also important.

And again, indexing the photographs will be important, because you can also index in terms of which area those photographs are covering. So, you can do that also number of the camera to obtain camera calibration report. So, this will be also available because this will help us and knowing the focal length of the lengths, which was been used and the type of film which was been used on that and the date of the photograph. So, this is also you can have on the photograph.

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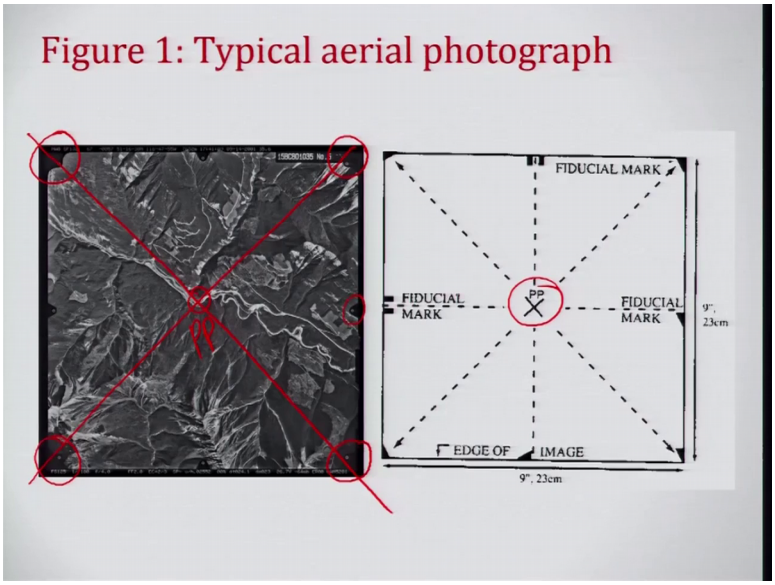

So, typical aerial photographs if you look at, you will be able to see the fiducial marks on either side these are the fiducial marks, which you can see here, and these are will filled within the frame of the camera. So, when you are taking the object or the photograph ofany area, you will be able to see this marks on the film itself. So, when they are printed you will have this marks there, and if you connect this points so, suppose your frame is having 2 points here again 2 points here then this will be your principal point of the photograph.

If you are not having this because some of the frames will not have this inter then you can connect the diagonal one here, and send this will give your principal point, now why this is important we will be talking very soon. So, these are termed as fiducial marks.

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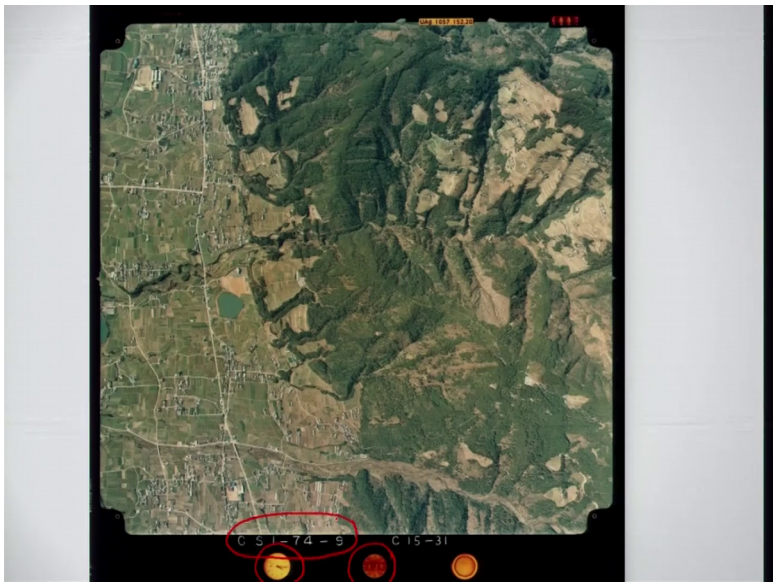

So, this is an aerial photograph colored one, which shows what we have already discussed. So, this is your elevation here, this is the time and these are the numbers which are been assigned to the photographs.

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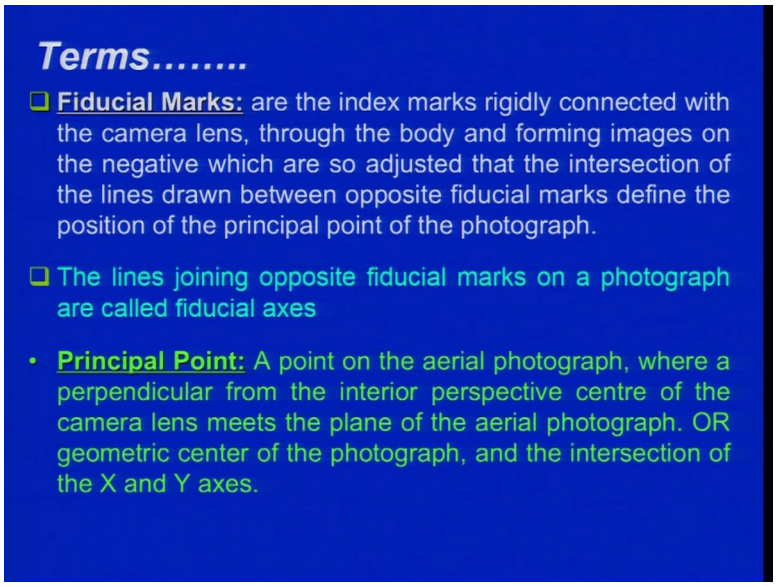

So, fiducial marks are the index marks rigidly connected with the camera lens, through the body and forming images on the negative, that is a framewhich we are having which will create an image on the negative which are so, adjusted that the interacts intersection

of the lines drawn between opposite fiducial marks, defines the position of the principal point principal point of the photograph.

The lines joining opposite fiducial mark on a photograph are called fiducial axes. Principal point a point on the aerial photograph where a perpendicular from the interior prospective center of the camera lens, meets the plane of aerial photograph or geometric center of the photograph and the intersection of the x and y axes.

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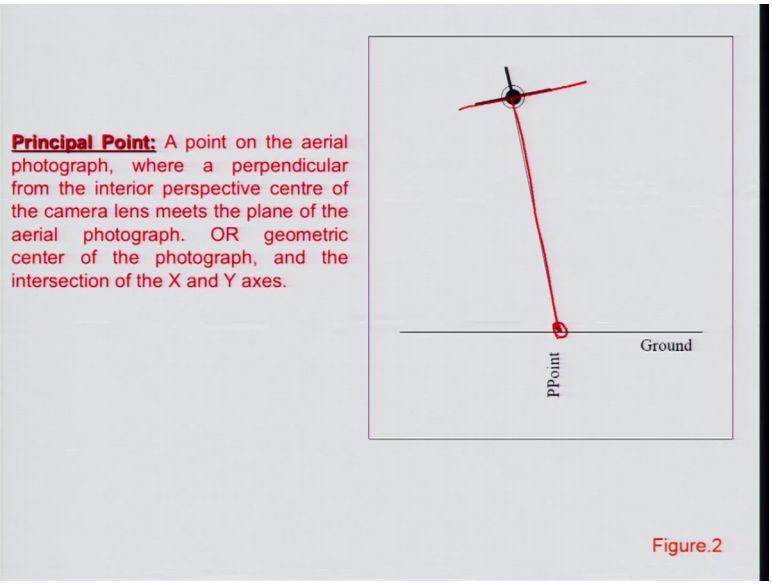

So, if you look at this here this is what you are having the principal point. So, this is the plane of your camera lens you can take, and exactly perpendicular to that will be your point onthe ground. So, this is your principal point.

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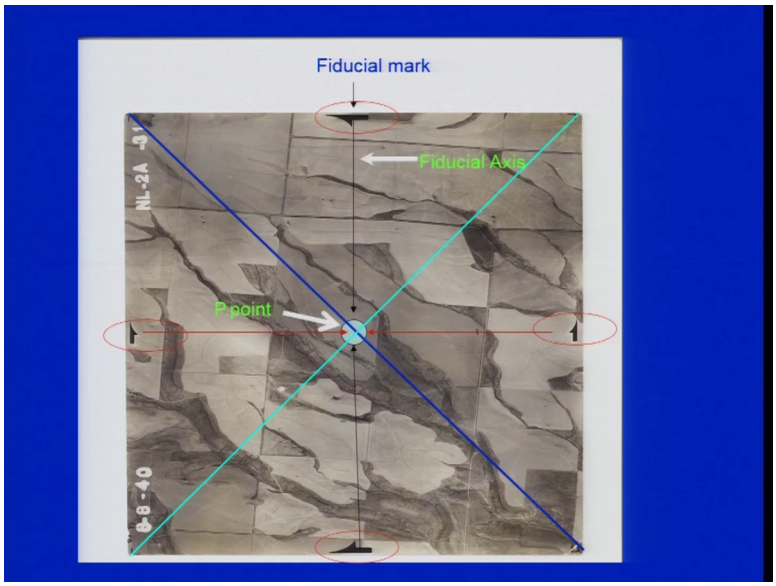

So, similarly what we were talking about that different photographs will have different fiducial mark here, we are having in half arrow at the. So, if you connect this one. So, this is our fiducial marks, connect this this will be this is your fiducial axes, this will be your principle point, you can also do this to get the principal point, the edges of the photograph where you are not having the fiducial mark available.

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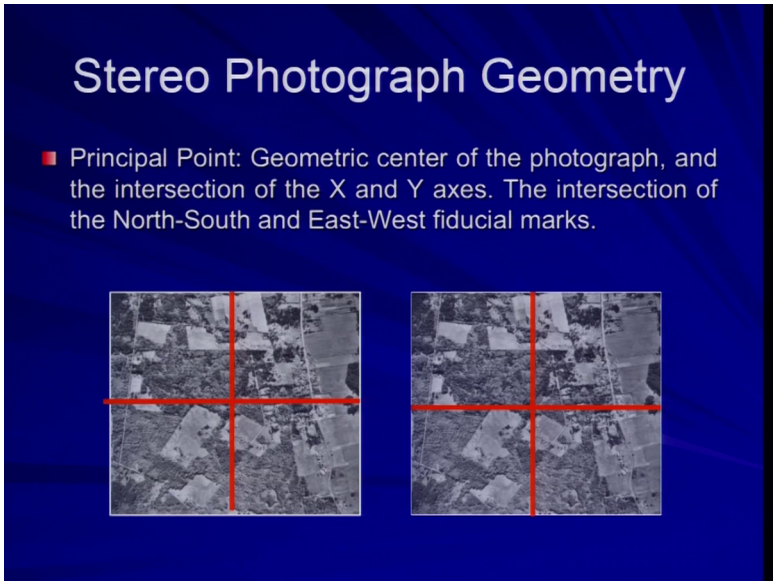

Now, stereo photograph geometry if you take principal point, what we have already discussed is geometric center of the photograph and the intersection of x and y axes, the

intersection of north south or we can say east west of any area. So, if your for example, you are having this photograph here. So, you are having you say east, west, north, south you have connected. So, you have the another photograph saying you can do here.

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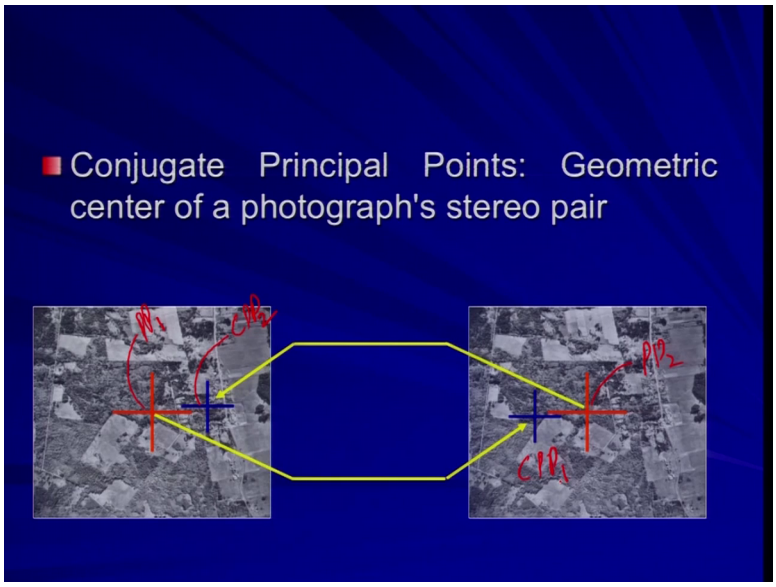

So, different photograph even though taken for the same area, will have respective principal points, and that will vary from one photograph to another one, but they will have their respective principal points.

Now, conjugate principal points are the geometric center of photograph stereo pair, and this is important because this will help us in identifying the line of flight and this information will also be useful, when we are talking about or calculating the some geometric parameters in terms of height and all that. So, for example, again let us take this 2 photographs we are having the after getting after connecting the north south and east west, we have an central point here and same we are having here.

So, this what we are having is the principal point of the 2 photographs, but the principal point of this photograph, is not exactly the same of this one, because if you look at 2 areas here for example, this one if you take this object here it is pointing here, but at this point it is slightly different, maybe that may be one of the one criteria which we can take and then you are having the conjugate principal point.

So, this is the principal point this one, is the principal point of this one, which we have transferred here and this we will termed as the conjugate principal point and this will be the principal point of this photograph. So, say p p 1 and this is the p p 2 principle point 2, and this will be transferred here. So, this is an conjugate principle point for that photograph similarly you can do here, and you can have either you can say that this is new 2 and this is a p p 1 here.

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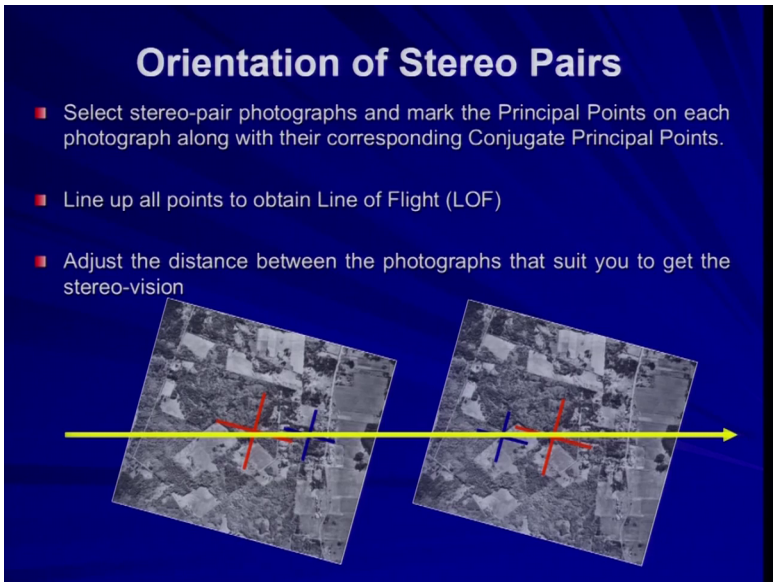

And connecting both that is the stereo pairs photographs and marks of the principle point on each photograph, along with their corresponding conjugate points, line up all points to obtain a line of flight. So, if you connect all this this will be the exactly the line of flight in which you have taken the photographs again.

Adjust the distance between the photographs that shoots you to get the stereo vision. So now, when we orient this photographs because earlier in the previous 1, we were having this photograph just we kept on very, very straight we did not even moved or inclined, but after getting the line of flight because the line of flight is something like this here, if you connect both the conjugate and principal point, hence you have oriented this in this direction to get the line of flight.

Now, when you will adjust both the photographs, and try to view under the stereoscope or by the naked eye you will be able to see the 3-dimensional view otherwise not. So, if you would have been keeping your photograph almost like straight as we have seen the

previous 1, you will not be able to see, but after getting the principal and conjugate point connecting those two, we got that there is some rotation based on the identification of line of flight. So, this will help us and also orienting your photographs properly before you start viewing it.

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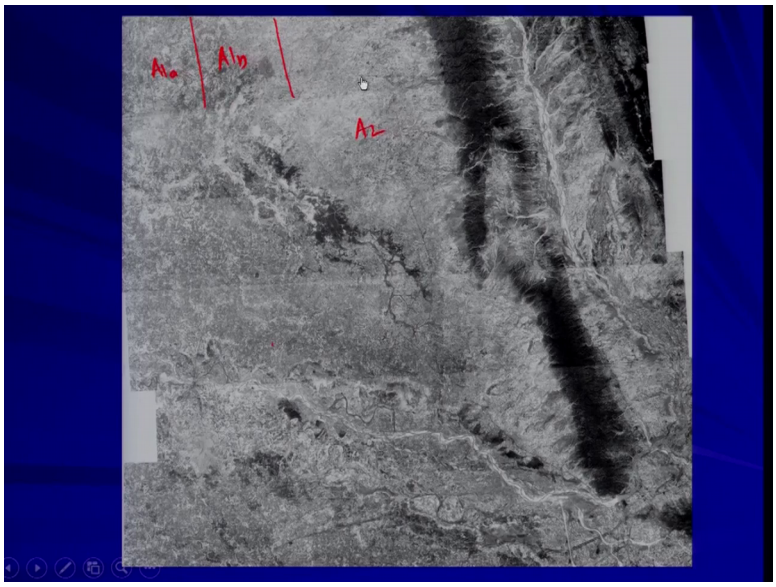

Now, sometime it is extremely important, to also look at the huge amount of data which has been connected and try to mosaic. So, this is this this satellite data is again fromcorona satellite in and they are termed as corona photographs corona satellite photographs, very high resolution. So, what we did was we mosaicked all these photographs, and we gave numbers to these photographs depending on the easiest way which was comfortable to us actually, but you can view the overall terrain of the area.

Which and based on for example, we named this as an a 1 a 2, these are the strips if you carefully see this these are the connecting points here, or the overlapping then you can easily makeout that fine this portion which is printed here like this in the blocks, this will be a 1 a 1 b and so on. So, you can easily a catalog it properly and then you can take out the photograph of the area, which is required of the area of the interest maybe we can say.

So, I will stop here maybe we will continue in the next one and discuss more about the geometric aspects of the fir of the photograph.

Thank you.