Photogeology In Terrain Evaluation (Part -1)
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Lecture – 17
Determination of Flightline (Lab)

Hi again.

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So, now we will learn about the second method of determining line of flight so, let us take a side these photographs and let us talk about the color photographs.

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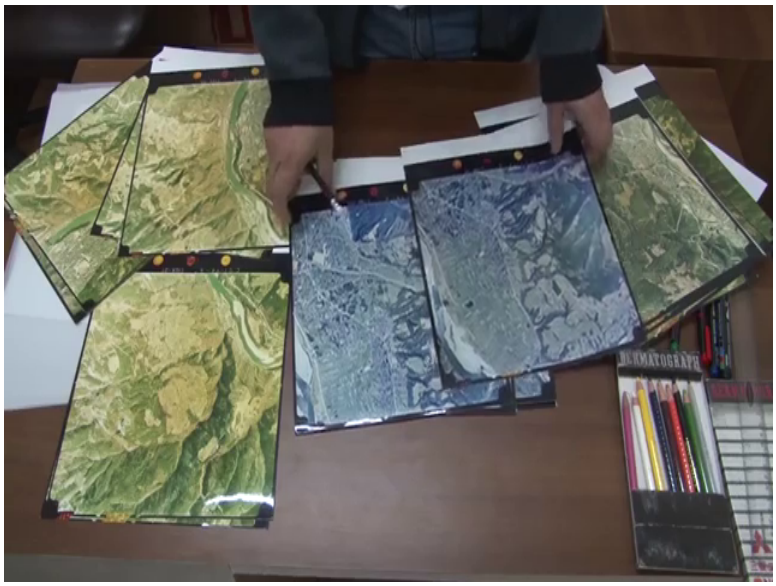

This color photographs these are also the aerial photographs taken from the Awaji island of Japan and as you can see these photographs are showing greater details of the objects located on its surface like you can see is read that a river is going like this and these are the these white patches in between the river channel these are showing the sandbars or sand island, this you will learn in the lecture of geomorphic landforms.

So, this is the river bank and on both the banks of this river you can see that there are settlements ok. When you see the zoom in image of this photograph, you can see that here are settlements on both these sides of this river. So, likewise in the in case of the black and white photograph or panchromatic data in this type of photographs we also have this much of information like photograph number as you can see here c 16 a 26 this is the photograph number and this is showing the time of photograph ok.

So, that we can know about the listen angle at the time of exposure at this location and this is showing the magnetic north and other information so, these are some other coding of the aerial photographs and this you will have on each photograph this is 26 and this is 27 the same the photograph of the same area.

So, these you can see the this is a stereo pair likewise you have c 16 a 21, then 22 this is another stereo pair then you have c 16 a 25 and then 24 then 23 and 24. So, you can see all these photographs that these are taken in the form of stereo pair. A similarly we have this much of data from the Awaji island of Japan and these photograph when you see in 3

D you will have the exact information of the object like their depth, their width, their length in each and everything you can know about the objects or the buildings or any type of geomorphic features on urbanized land.

So, in 3 D you will see that as you are looking this area from an aircraft, you are flying over this terrain and you are looking this area from an altitude ok. So, there will be a real depth perception which you will have while looking over on these photographs through has stereo scope ok.

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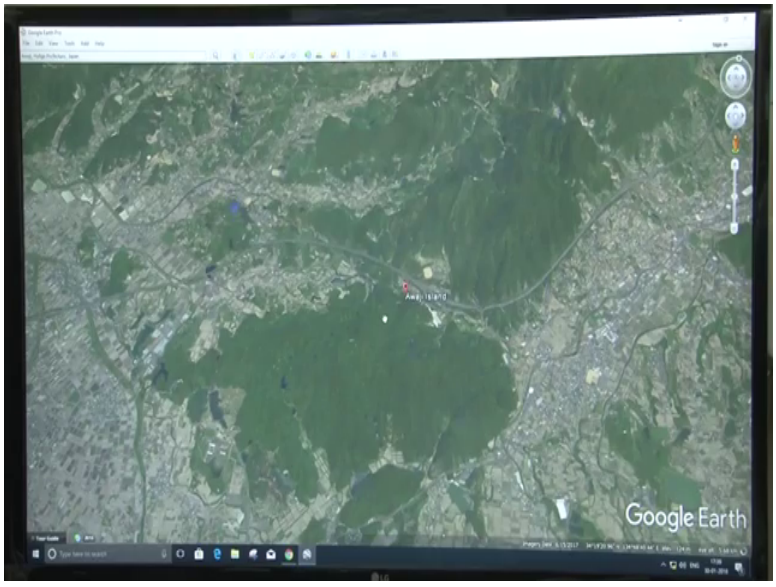

So, the photograph about which way we are talking and these photographs are taken from Awaji island of Japan as you know you can see here Awaji Island and I am showing you the Google earth ok.

So, let us see this area the same area which are captured in the images which I have shown you on these images the color area photographs. So, the same area I am showing you on the Google earth and Google earth is accessible too very everybody, everywhere in India and world. You can see this; these images on the Google earth and you can have experience of viewing this area in 3 D ok.

Like you can see there is river coming like this and these patches which are you are looking over here this green and grayish and these rectangular patches are representing the agricultural fields and these are the settlements the urbanized land and these are the

roads which are going like this you can see here and there is a river which is coming from these the ocean which is joining the Japan which is pacific ocean and river is going like this and here you can see this area in 3 D, how you have to set the vertical exaggeration in this Google earth settings from here you can set this option from here.

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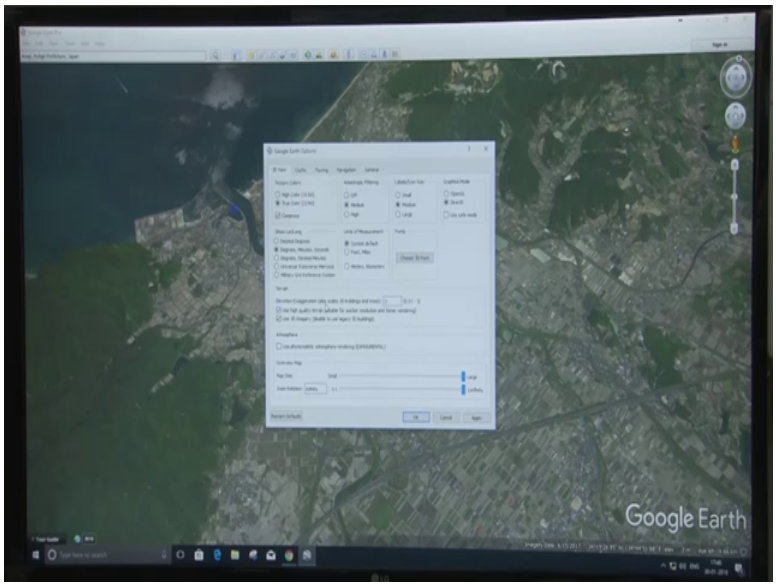

So, the here you can see use high quality terrain 3 D imagery an elevation exaggeration scale you can set for looking better 3 D of the area you can select between 0.1 to 3. I have selected 3 selected is 3 so, here you can do your settings and now you can see this area as we click here and this is by this icon you can see the street view, but here when you press the cursor of the mouse and rotate this area like this you can see the 3 D of this area. See this area is surrounded by these the (Refer Time: 06:41) on both the sides this greenish regions on the left side and the right side and there is ocean.

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So, this is an island so, you can see this area by zooming it and rotating it from place to place, you can have idea of this region and for any region you can see this type of Google earth images. So, we are having a photograph of this region and so, in this way we can also use aerial photographs for land use knowing the land use pattern or we can also plan a land use pattern for a new terrain which is a (Refer Time: 07:32) terrain or has not been utilized before ok.

So, here you can see so, when you are looking over these area photograph through these stereo scope you will be able to see the 3 D imagery of this area as you can see here there are some undulations also on the surface. So, this is the surface and a ground is going like this there is some relief also where you can see here there is the relief ok.

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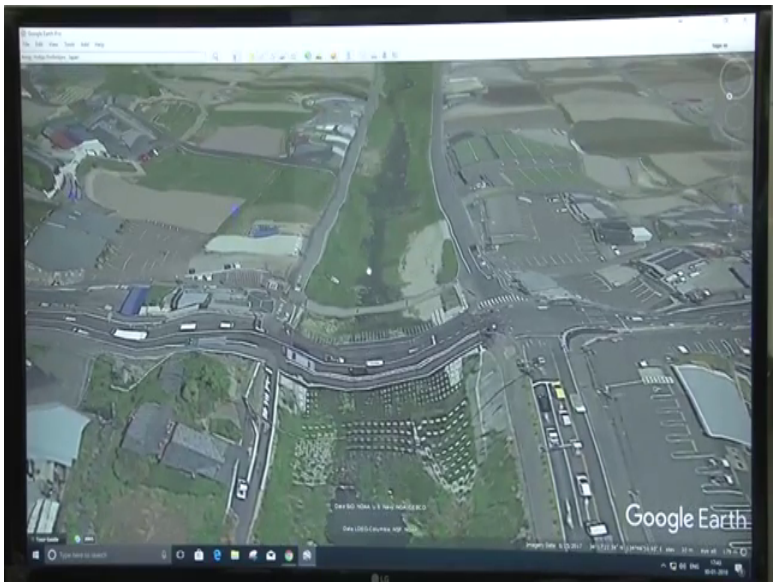

The road is going like this see the road is coming like this and here there is a slope in the road, why because there is a river valley and narrow type of channel we can say it has a [FL] in Indian language. So, that is why with the road is going like this.

So, in the same manner, we can see the aerial photographs when we look through the stereoscope we have the same experience ok. So, what we can do is we can show you this type of land use pattern or the changes of the landscape the slope and the elevation changes on the Google earth images, but we have the camera so, it is not possible to show that imaginary image which is formed into our brain when we look a stereo pair through the stereoscope.

So, let us start again with the determination of the line of light with these two color aerial photograph from the Awaji island Japan so, now, for method of doing this exercise is by joining the principle point and conjugate principle point over these photographs. So, let us take this stereo pair of photograph number c i c c 16 a 23 16 a 24. So, similarly take these two photographs and fix it with the table ok.

So, now take a four sheet so, that you can watch the principle point so, for this I have already mark the principle points of this photograph you can fix it you can see it here that the line joining these two prediction marks on the corners these dots placed on the corners are acting like a prediction marks for this photograph. So, line joining this the intersection point gives you the principle point so, this is principle point 1 and let us

write down the photograph number over here to memorize on which photograph we have done this exercise.

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So, PP 1 for photograph number 23 so, first and other thing you should mark here where this principle point is line on this photograph. So, you should always take a feature clear cut feature, geomorphic feature or any type of land form you can take and mark on your photograph to take the reference like I am marking this bridge which is connecting these two parts of the lands located on each side of the river. So, I am taking it as a reference so, that I will not forget on forget it forget this location on the other photograph.

So, now you can mark this principle point on your photograph here so, this is representing this notch. So, we can mark it with glass pencil like you can take this glass pencil and you can mark this principle point over here on this photograph. So, this is your principle point 1 so, now, take another photograph the stereo pair of this one and we can now remove it at least to be our measurements you can place this like this; this photograph like this ok.

So, now, you will take you will notice the principle point of these photographs putting a tracing sheet over here and fixing it and then take excite this tracing sheet and you can now mark you can you have take the largest scale from marking these too prediction mark located at a distance.

Again, the line joining these opposite prediction marks will give you the access of the photograph and the intersection point will give you the principal point for this photograph this will be your PP 2 and likewise on the previous photograph we noticed feature this bridge ok.

So, try to locate it again on this photograph also so, that you will have a reference to join the principle point with the conjugate principle point because there is this will act as a reference and will give you directions for completing this task. So, this is the bridge now so, where is this point located on the second photograph so, the point which is located in the principle point of the first photograph will be the conjugate principle point on the other photograph. So, the conjugate principle point for which one for the first photo.

So, the principle point this is marked by some the road is coming like this and then turning like this so, this location this position is marked by the principle point. So, where this position lies on this photograph this you have to mark so, as you can see here the position the location of the bridge was on the left side of the principle point here this bridge is located here so; obviously, this principle point will be located farther away from this bridge over here somewhere over here like this road is coming like this and now this is turning on this photograph run.

So, similarly on this photograph this load is coming like this and turning like this so, the point in front of this notch of the road is the principle point on the other side other side of the river. So, the point on the other side of the river in front of this notch is your principle point 1 you can mark it by glass pencil. So, this will be your CPP we know that this is this point represents the principle point of the first photograph, but this will be termed has conjugate principle point for this photograph.

So, now what we will do we again put this tracing sheet over the first photograph and now in the same manner we mark the principle point of the second photograph on the first photograph ok, on the tracing sheet we will mark the principle point of the second photograph with reference to its own principle point. So, let us take this tracing sheet as it was earlier by joining by putting these x is on the (Refer Time: 17:45) mark so, in this way again fix it and you can see here the principle point of this photograph is located on the left hand of this bridge.

So, this you can take measurement on similarly on the other on the first photograph so, a road is coming like this and crossing this principle point on the left hand side of the bridge. So, similarly this is the bridge on the left hand side, a road is coming like this and somewhere here, you can also take the measurements here for the exact marking you can take measurement from the principle point to your reference point. This is something 3.5 centimeter so, you can again mark it here as 3.5 centimeter.

So, this will be your conjugate principle point so, let us mark it as CPP 2 and CPP 1 because this is this conjugate principle point is with reference to principle point 1 and this conjugate principle point is with reference to principle point 2.

So, now join these two or the best way of doing this is you have to actually transfer your principle point such like that these 4 point should be in the same line should be in the same line. So, let us transfer this principle point on this tracing sheet so, it had it will be visible to you so, this is your principle point 2 and this is your principle point 1.

So, the line joining all these 4 points will give you the line of flight because this is your photograph number 23, 24; you can mark the direction of your flight from the lower number to higher number ok. So, this will be you line of flight for this exercise.

So, this is another way of doing this now I will I will tell you how to determine line of flight while we are looking these two photographs through a stereoscope. So, now, will start with our stereoscope so, how stereoscope look like you can see here. So, there are 3, 4 types of stereoscope with us.

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So, as you can see right this is a pockets stereoscope, this is a portable kind of thing which you can carry with you in the field also if you are taking some out going to carry some topographic survey with you with taking aerial photographs. So, this is a portable set of stereoscope so, this is called the pocket or lens stereoscope.

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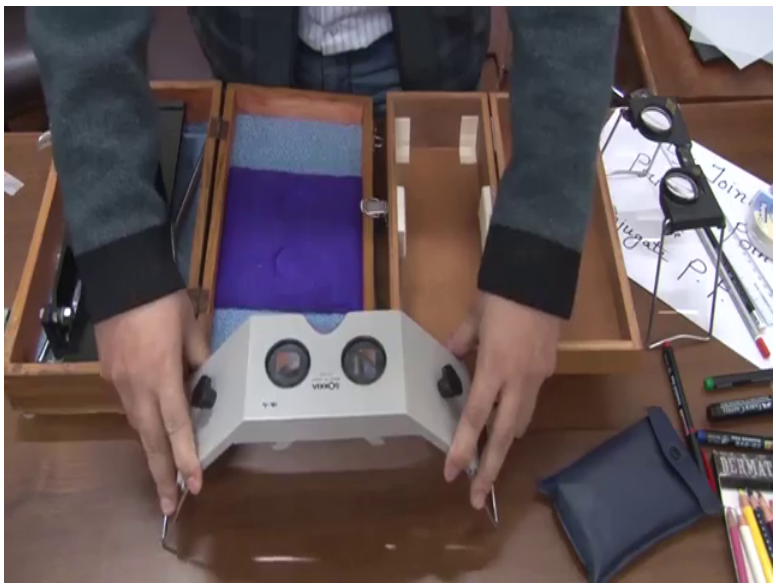

Here another kind of stereoscope you can see this is this stereoscope means from Sokkia company made in Japan, this is a simple kind of stereoscope.

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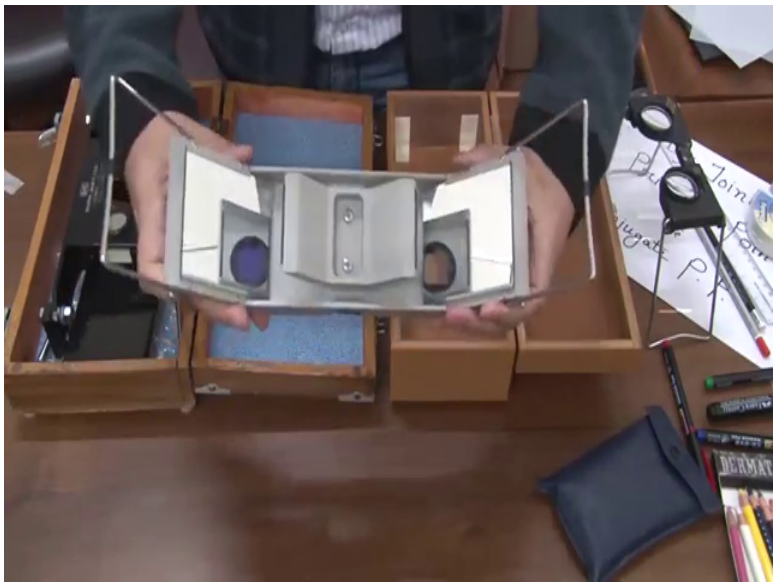

This is having mirror on both its legs right and left so, this will give the reflection of the photographs and these reflections will move to this mirror ok. So, this mirror are located on the is (Refer Time: 22:07) angular plates so, now, the this will finally, reflect your image on these two lenses, through which you can generate your 3 D vision by putting your photographs below this like this ok.

So, this will actually gives you a small area to cover with and if you want to cover a large area then you will have to move with other kind of stereoscope the larger sets.

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So, this is other medium size of stereo scope is also called mirror stereoscope because it is having set of mirror on both the sides. As you can see here these are the plates on both its legs and here also this will give you direct vision not through a second mirror.

So, this will these that the images which formed in these two mirrors will be magnified here at this place on both the sides and then you can see magnified images through these two lenses ok.

So, this is another type of medium size mirror stereoscope which we use for accepting information of the topography from the aerial photographs. So, let us take it aside so, these kind of stereo scope for the purpose of wearing you with this. So, for our is study we use a large mirror is stereoscope this is also from Sokkia made in Japan, but it is a large type of mirror stereoscope.

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This is the binocular used to set for magnifying view of the photographs and here this is the mirror stereoscope. So, I am showing you with the front side of it so, that you can see it easily.

So, let us take this binocular aside so, removing cover so, here you can also see that on these two legs there are two mirrors and this keep the reflection of your image to the secondary mirrors ok, the secondary mirrors. Likewise, in the other a stereoscope and then this is the lens top lens through which you will look into this these two images.

So, this is the right orientation suppose where I am a standing so, this will be the correct orientation of the mirror is stereoscope for looking onto the aerial photographs and this binocular is magnifying glasses you can set it here like this in this socket. So, now, you can rotate it like this and you can also magnify your image into 3 x as shown it here, 3 times you can magnify your image to the level where it is clearly visible to you. Here you can easily mark the features which are shown on the set of aerial photographs.

So, again let us look over these two photographs 23 and 24 this is stereo pair. So, let me have a cap so, that my hairs will not interfere with the vision. So, first we do not need it when we do not need it we can we can put it like this so, first we have to look on these two photographs on these stereo pair. So, first you need to learn the orientation, how to orient your stereo pair this is the most important thing.

So, take two take a common feature which is located on both the photographs like this bridge and put your finger on this bridge and another finger on the same feature on the other photograph and then see through these lenses and move your images closer and away ok, you will see your two fingers when you will move your two fingers towards each other.

There will be your two fingers will be when standing with each other and then you will be able to create a 3 D vision because the two fingers are also a part of your plane ok. So, these two fingers when you will be able to merge your fingers with each other so, at this point. Suppose, at this point I am able to see only one finger ok, likewise you learn in the sausage exercise in your lecture of the stereoscope.

So, at this place I am able to look a 3 D stereo vision of this area and this will give you great deal of information about the surface which is covered in the photograph, the overlapping area, like you can easily notice the valleys, the rivers, the depressions and the hills and the settlements and all kind of features which are present on the land you will be able to see. So, this now my photographs are oriented so, this is called the orientation ok.

So, at the location where I am able to see a 3 D I will fixed both the photographs because this orientation is giving me 3 D vision or a stereo vision. So, I am going to fix this position so, now, I can do my work like measurements. So, at this stage whatever I am looking over here the same thing, I was showing on the Google earth and this same

manner you will be able to see all the relief of the ground like elevations, depressions, the valleys, the regions, the hills each and everything you will see in its true dimension and its true orientation. So, this is the magic of stereo vision or 3 D vision of these stereo pairs.

So, in this way when you are able to locate your photographs, able to you are able to orient your photographs in a correct way so, then it means this is the line of light for your photograph because whatever you are looking you are looking like the camera was capturing the images of this ground afterward and forward.

So, in the same manner you are also looking the ground in the same orientation you are looking in which the camera captured the images ok. So, that is why this orientation will give you the line of light so, if you put your put the paper on which you have drawn the line of flight so, that will give you the correct orientation.

So, as you can see here if you a see it in a zoom image so, you will be able to see that the orientation of this line is same is parallel to the orientation of the photographs. See my tracing sheet the edge of my tracing sheet is going like this which is not parallel to the edge of these photographs, but the line the red line this line is parallel to the orientation of the photograph ok. So, if you are able to create 3 D or with the help of your stereo pair under a stereoscope you will be able to know you line of flights. So, these are the three methods of determining line of flight, now will move to another exercise ok.

Thanks.