ENGINEERING GEOLOGY
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LECTURE - 14
Sediment Transport and Deposition

Hello every one and welcome back to the new lesson of engineering Geology. Today we are going to talk about sediment transport and deposition. If you recall, in the last lesson we were talking about soil formation and we talked about some soil deposits which didn't get transported away from the location from where they formed.

And today, we are going to talk about soil deposits that are developed away from the location where they form and the process in between the in situ weathering and the deposition elsewhere involved in this case is called transportation. We are going to look at the details of all different important processes involved in this. But before we do that, we are going to look at the question set of the previous lesson, the question set is here.

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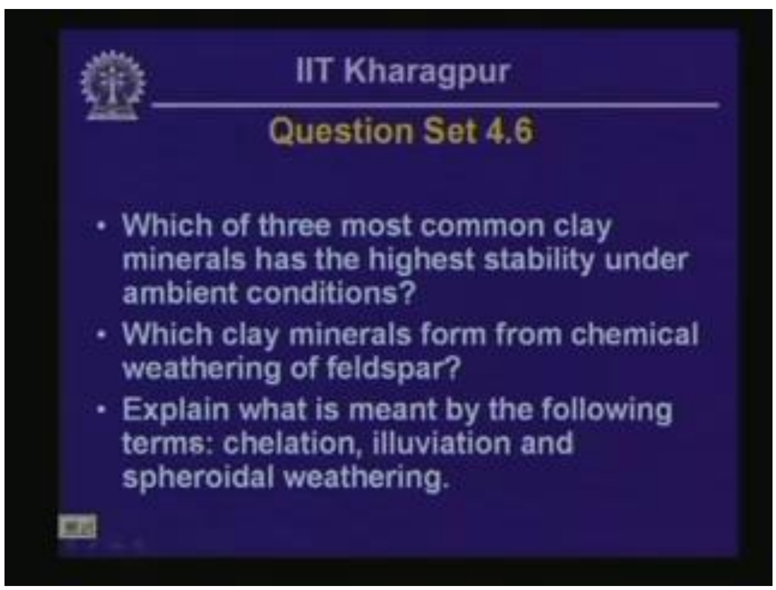

The first question was; which of the three most common clay minerals has the highest stability under ambient conditions? The discussion that we had on weathering, chemical weathering, in that discussion I indicated that in comparison with rock minerals, clay minerals are much more stable under ambient conditions and as a result, they are more abundant near surface than some of the materials, some of the minerals that occur way down in the Bowen reaction series in terms of chemical or weathering, the minerals that are more susceptible to weathering, they do not occur that abundantly near the surface of the earth.

Even then, the three most common clay minerals that we discussed in this particular lesson, in the previous lesson namely kaolinite, illite and smectite or Montmorillonite; they have got different levels of susceptibility to chemical weathering.

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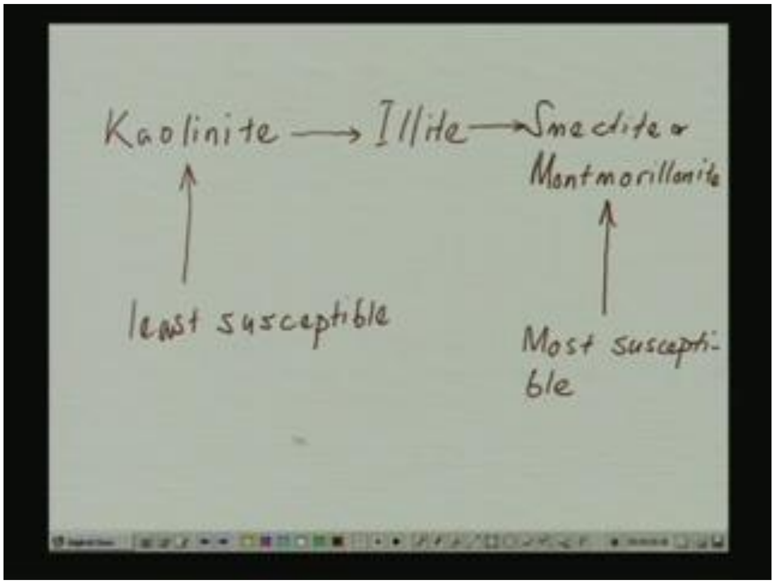

Now, if you consider this series here, actually we looked at some of the chemical processes that involve or that are involved in the tertiary weathering of these three most common clay minerals and what we found is that under certain conditions, smectite mineral actually convert into illite or kaolinite.

So from that discussion, it appears that the weathering susceptibility of smectite is much higher in comparison with kaolinite and illite. In fact, kaolinite mineral is perhaps the most stable under ambient condition and that is followed by illite and smectite is the least stable of all the three most abundant clay minerals. So, this one here is least susceptible to chemical weathering whereas, smectite or Montmorillonite has got the highest susceptibility to chemical weathering.
So, that actually takes care of the first question.

Now, the second question that I asked was which clay mineral is formed from chemical weathering of feldspar and we discussed these things in the course of last couple of presentations at length particularly for orthoclase or the potassium feldspar and what we indicated during those discussions that under acidic conditions in presence of water, orthoclase minerals get hydrolyzed and that leads to the formation of kaolinite clay mineral and that in turn, the kaolinite clay mineral in turn can get leached and lead to the formation of gibbsite or bauxite ore.

The same, a very similar chemical process is also there that leads to the weathering of sodium feldspar. So, the sodium feldspar also gets converted into kaolinite mineral and other weathering products such as release of alkali ions and generation of silicic acid. So, that actually in a nut shell, the chemical weathering process of feldspar mineral.

Then the third question that was asked was to seek an explanation of the terms, of a few terms, the first one of these terms was chelation. And, what is involved in chelation is that metal ions, they get trapped, they get trapped in the chemical structure of organic compounds and that process is called chelation and this process has got not only, has got importance not only in chemical weathering but it is also commercially exploited in removal of several metal ions from different environments.

Then the second term that I asked you to explain was illuviation and to do this, to explain this really, we have to look at a stratified deposit. Let us say, let us consider the residual soil deposit that we talked about in the previous lesson and what you had in that particular stratified deposit is an O horizon near surface. So, this one here is the surface and then you have got O horizon that is full of chemical or that is full of organic chemicals partly decomposed such as partly decomposed leaves or animal remains and so on and so forth.

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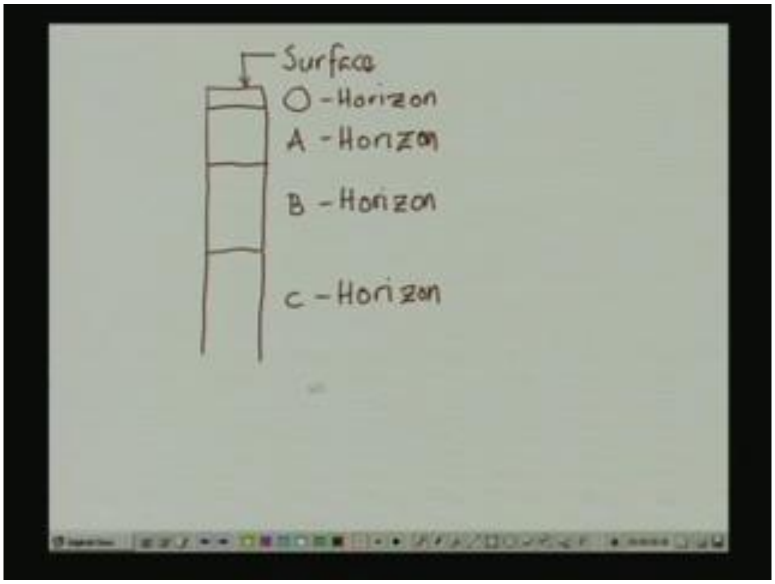

And, underneath the O horizon, typically we had A horizon and A horizon - I stated that it is rich in minerals, in organic minerals but it has got some organic compounds in it. Underneath A horizon, there is B horizon and underneath C horizon underneath B horizon, there is C horizon which includes partly decomposed bedrock or unweathered rock.

So, what happens and actually this kind of, as I indicated in the previous lesson, this kind of stratification, this kind of stratified deposit develops after chemical weathering, chemical and physical weathering of the bedrock in situ without any transportation process over a very long time. If there is less time available for weathering, then these kind of distinct horizons are not, they do not develop. But anyway, we are considering in this case is a mature stratified deposit of residual soil like the one that is shown here.

So here, what happens actually is in environments that are exposed to very high precipitation, levels of precipitation such as rainfall and snowfall and so on so forth; in those environments, chemicals from O horizon and A horizon, they get leached out, they get leached out and the products of leaching accumulate in or products of leaching accumulate underneath within deeper layers: so, accumulation of products chemical products of leaching from shallower layers.

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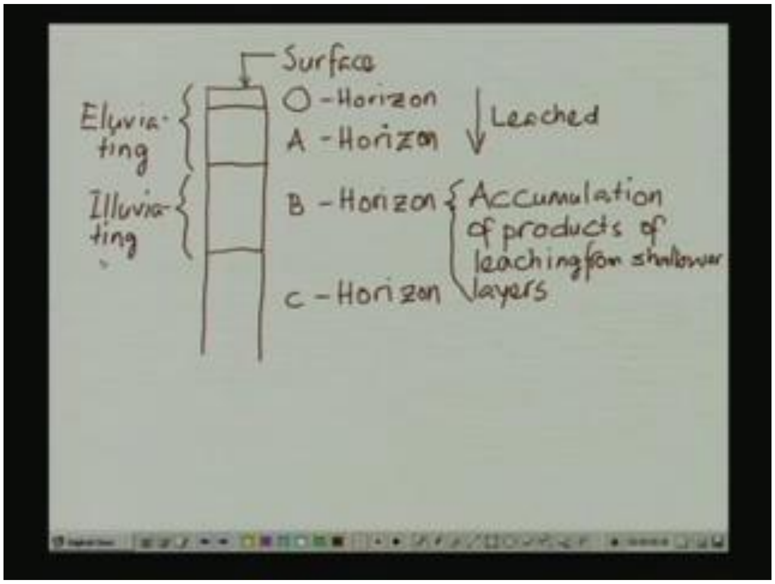

And that is typical of the B horizon and this kind of process actually gives rise to illuviating horizon and elluviating horizon. So, these two are essentially elluviating, they are essentially loosing minerals and this one here is an illuviating horizon which actually accumulates products of chemical weathering from shallower layers.

So, that explains the terms illuviation as well elluviation although the question didn’t ask for the explanation of elluviation. Now, the third question that I asked was spheroidal weathering, what is meant by spheroidal weathering; third part of the third question. Now, what I explained in the previous presentation is that physical weathering involves breaking of larger piece of rocks into smaller pieces such as these.

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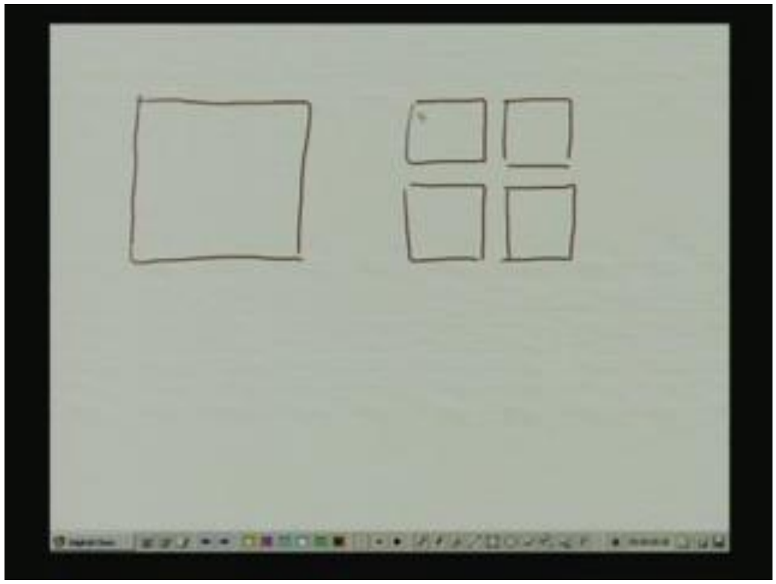

And then what happens, actually near the corners such as these, the amount of area that is available that is exposed to the weathering agents that is much larger in comparison with the volume that it represents. As a result, weathering is much faster paced near these corners in comparison with flatter areas such as these.

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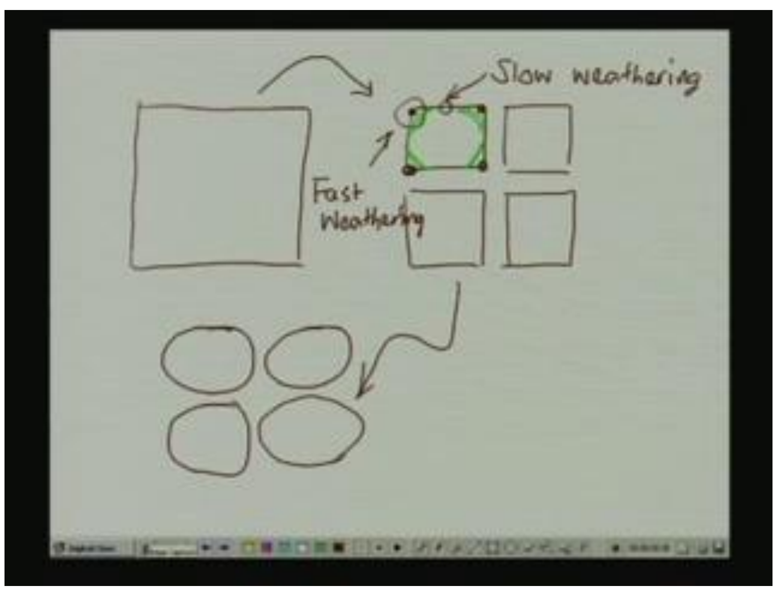

So here, you will have slow weathering typically; whereas near the corners, you are going to have fast weathering and this process actually leads to gradual rounding off of the corners of these pieces of rock and finally what you end up with, finally what you end up with is a situation like this where you have basically left out, have basically left out with a bunch of rounded pieces of rocks and this particular type of weathering is called spheroidal weathering. So, that actually takes care of the question set that was given to you in the previous presentation. Now, we hop on to the subject matter of this particular topic.

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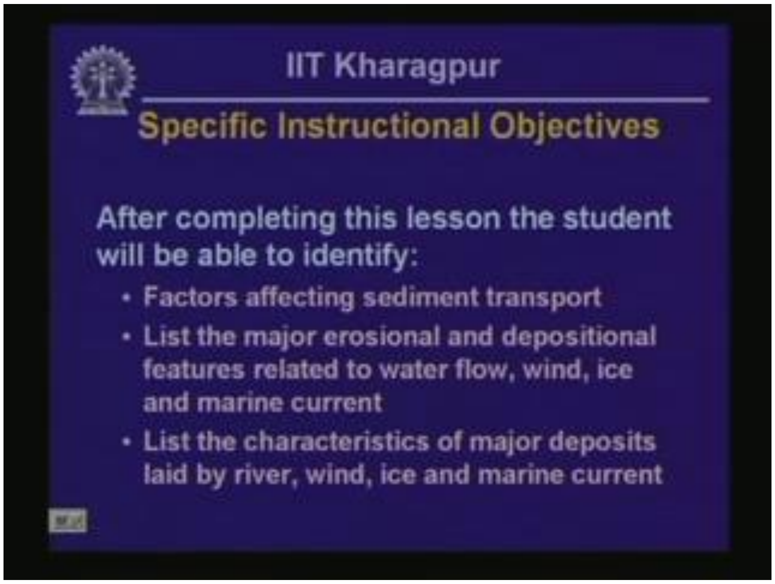

So, what we want to learn in this or in this lesson are the factors affecting sediment transport, we are going to we are going to able to list the major erosional and depositional features that arise because of flowing water, wind and ice and we would be able to see the grain sized characteristics of the deposits that form during these processes of transportation.

So, first of all, the question that comes to mind is what is meant by transportation?

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Now, the products of weathering, products of physical and chemical weathering, they actually get transported away from the location where they were originally formed and they get deposited at distances at great distances from the location where they originated and this particular process is called transportation.

Now, transportation can be, transportation can be triggered, transportation of sediments can be triggered by several different agents and what we or the main ones are flowing water, water flow and water flow could be because of flowing river or it could be because of ocean waves or submarine currents or it could be because of melt water - streams originating from glaciers or it could be because of wind or it could be because of ice itself. So, these are the main agents that actually trigger the transportation process and we are going to consider each one of them in some detail in this particular lesson.

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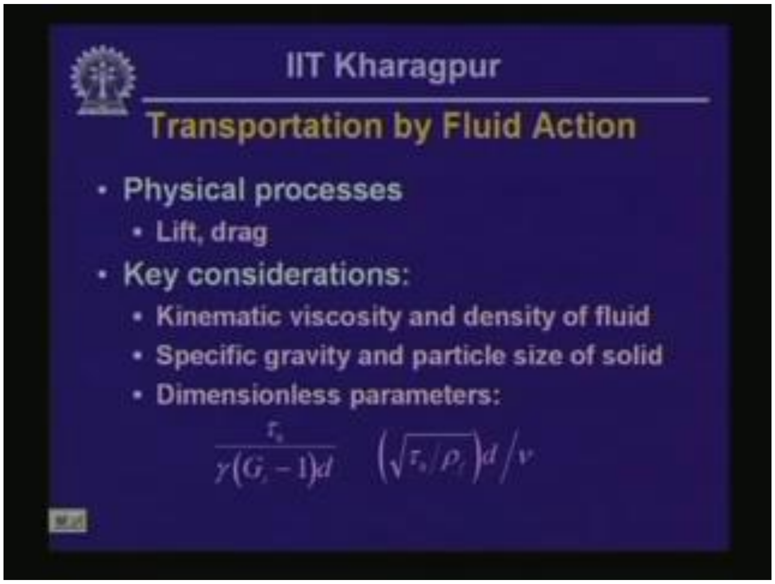

Now, inorder to understand the transportation process, we need to understand the action of fluids which actually triggers the sediment transport. Now, the physical processes that actually are involved in fluid action in this particular case include development of lift and drag. So, what is meant these two terms is explained very crudely with these sketches.

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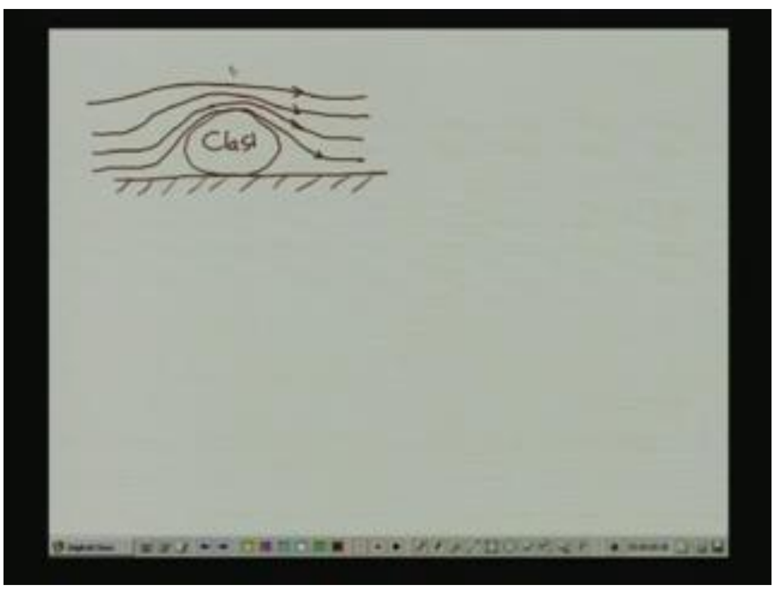

Actually consider that you have got near the surface of the earth, you have got some pieces of rocks or clasts and then water or wind is flowing around these pieces and the streamlines that develops in this process are of this type and what is going to happen in this case typically is that the streamlines are going to be squeezed close together immediately near the top of the clast that it is actually passing by.

So, this one is our clast in question and because of that what is going to happen there is, a pressure drop is going to develop near the top of this particular clast and consequently the clast is going to feel an upward force and this type of force is called lift.

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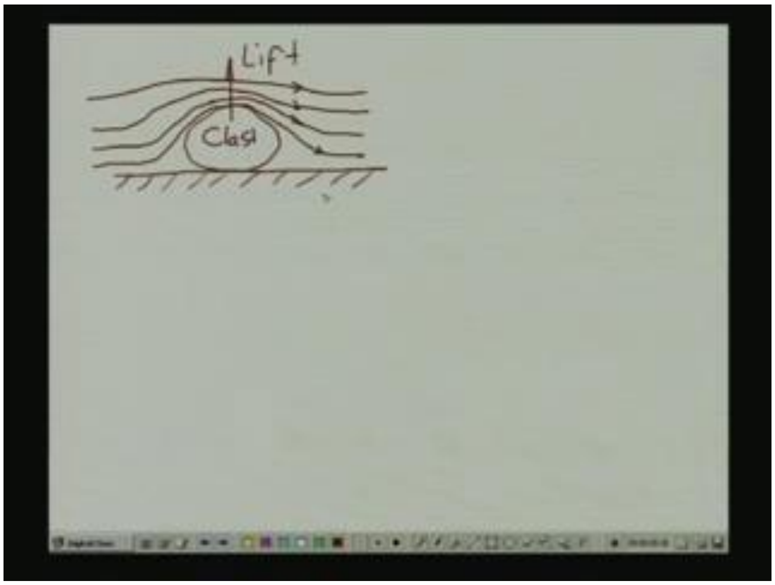

So, this is actually exactly the same kind of process which gives rise to the lift above air foils or the wings of an aircraft is exactly the same kind of process and also there is a pressure drop near the front of this particular or this type of configuration of this kind of flow regime and as a result, the clast also feels a force in the forward direction and that type of force is called drag.

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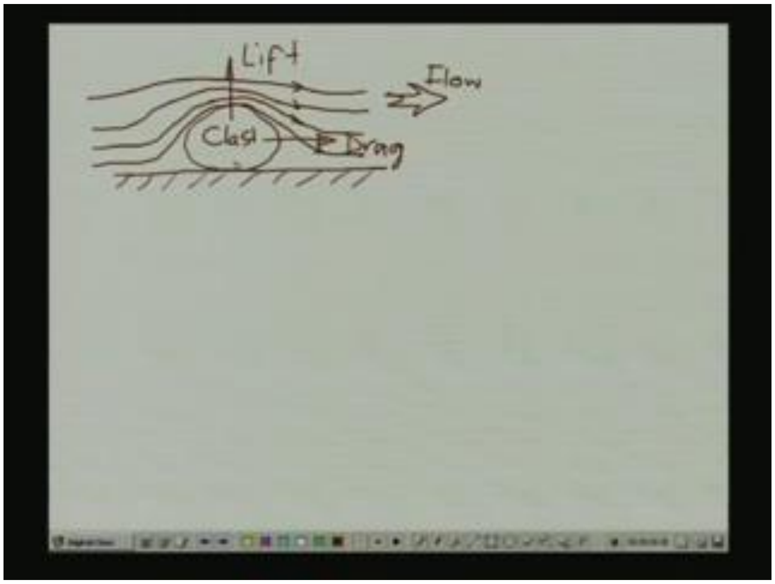

So, the clast gets dragged in the direction of flow; so in this case, the direction of flow is oriented like this, so this is our flow direction. So, the clast is going to feel a drag along the direction of the flow and also it is going to feel a lift above, perpendicular or lift in the vertical direction because of the close packing of the streamlines near the top of the clast.

In addition to that, the clast is also going to have its own weight. So, weight of the clast is going to be counteracted by lift and if lift becomes larger than the weight, the particle is going to become entrapped or entrained within the fluid flow.

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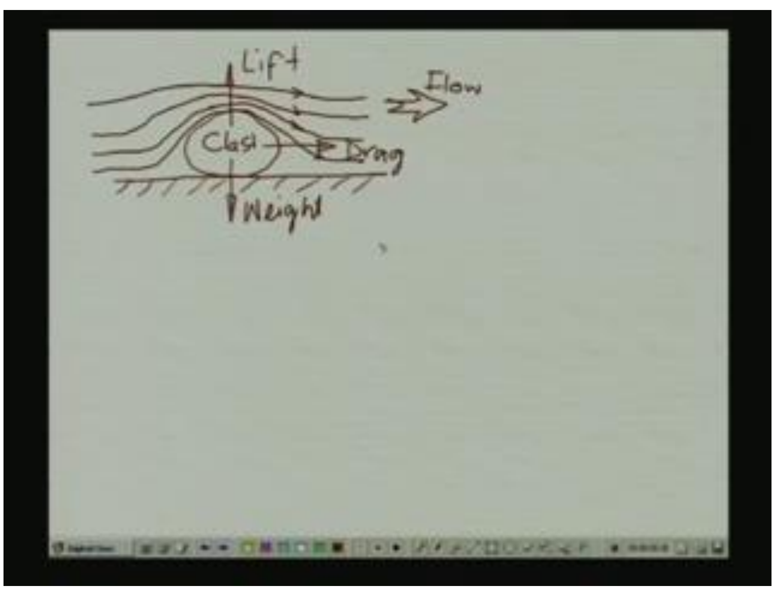

So, these are the forces that you need to content and here the factors that affect these forces that include the kinematic viscosity and density of fluid. It also includes the weight of the particle or in other words, specific gravity of the particle and what is of interest here are a couple of dimensionless parameters shown near the bottom of this slide.

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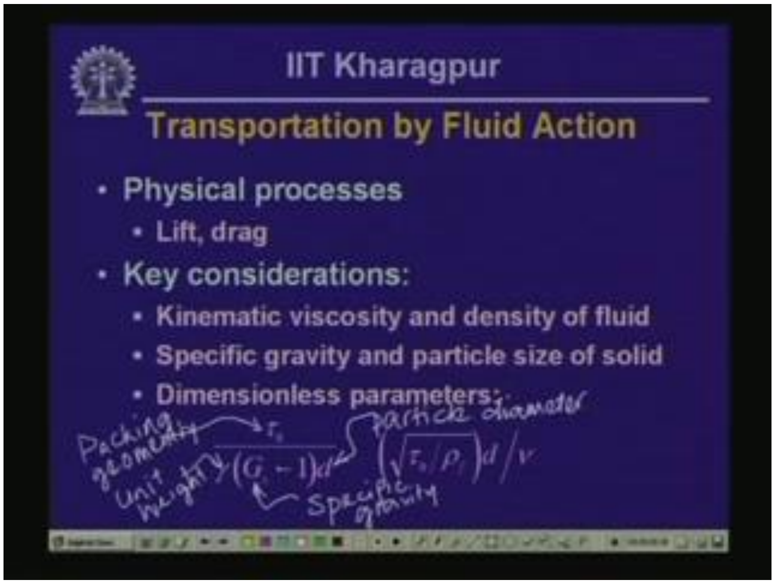

The first one, the one of the left is called the shields parameter in which you have got a quantity called tow not in the numerator and this particular quantity depends on the characteristics of how, characteristics of packing or in other words, how closely packed are individually grains, individual grains near the location where the transportation process is being triggered. It also depends; the quantity tow not also depends on the geometry of individual grains such as particle size diameter.

In the denominator, what you see is the thing called gamma and gamma is really is the unit rate of the particles that are being transported that the fluid action is trying to transport. Subscripted, s subscripted g - g subscript s is the specific gravity. So this one, the gamma is the unit rate. This one is the specific gravity of the solids, solid particles and again d, we have got particle size diameter appearing here again, particle diameter is in the denominator as well. You remember particle size was there in the quantity tow not which is there in the numerator as well. So, this particular combination, this particular combination is called shields parameter because it was originally introduced by a person called Shield in 1935.

And, on the right here is another combination which is really a surrogate of Reynolds number which says which actually indicates whether a flow regime is going to be turbulent or it is going to be laminar and this involves again tow not in the numerator and it also has got another quantity called row subscript f and this is the unit mass or mass density of fluid.

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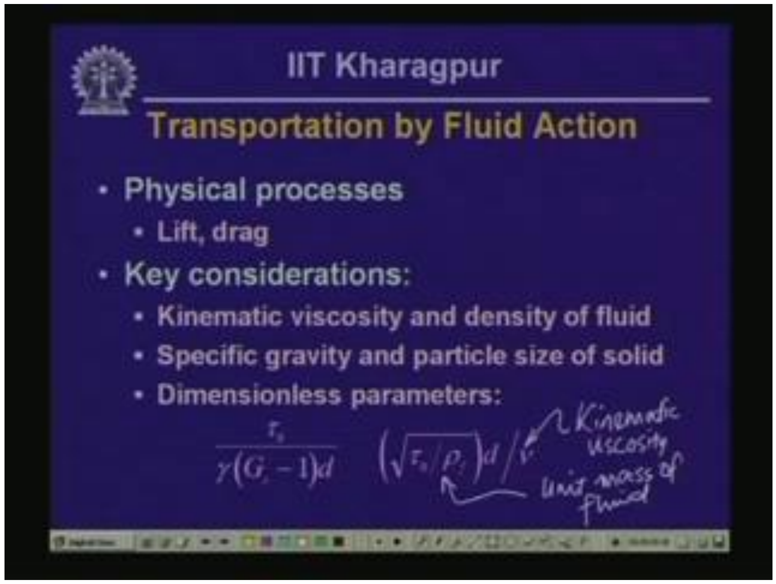

Then you have got particle sized diameter also in the numerator and in the denominator, what you have got is a quantity called mew, Greek symbol mew and this is the kinematic viscosity of fluid. So, that basically explains the symbols.

And, what Shield did was he plotted shields parameter against the Reynolds number and what he published was a chart which is shown here.

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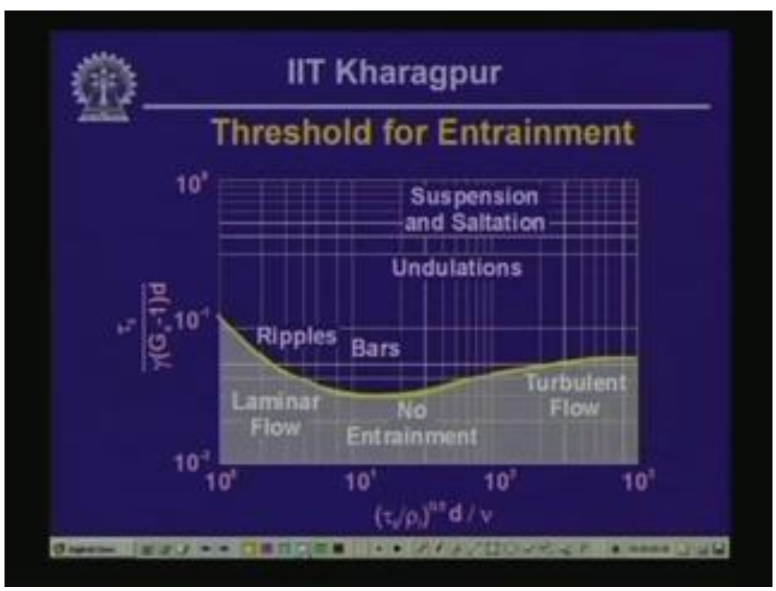

So, what you see here is a zone near the bottom of the chart which is shaded and that particular zone indicates situations in which no sediment transport is going to take place. So, if you are above the zone on this particular plot, then sediment transport is going to be triggered. So, what we were looking in this chart is a zone bounded by a curved line like this and if you are underneath this particular line, then there are going to be no sediment transport and if you are above this particular line, then there will be sediment transport.

And, depending on where you are above the line, different types of bed forms can be observed and some of which are, some of which are indicated on this chart itself like ripples or bars or undulations and if the flow regime is increased, I mean the flow velocity increases even further, then suspension and saltation is going to take place as is indicated by the top middle portion of this plot. This chart was published by Shield in 1935.

Actually, nearly at the same time, another person by the name Hjulstorm, he conducted a series of systematic investigation regarding sediment transport and he published a bunch of charts that are known as Hjulstorm charts and these charts are shown on this slide here.

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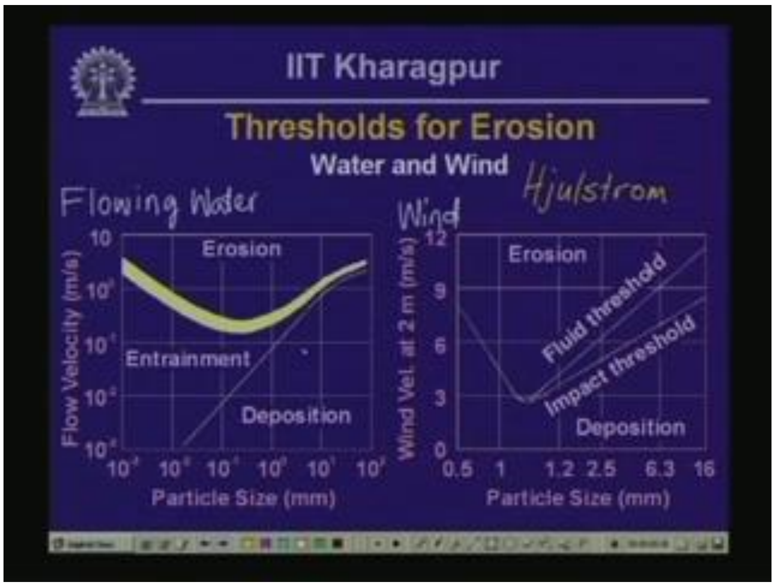

So, these are empirical charts published by Hjulstorm in 1936 and what is here essentially is a plot; this is a plot of particle size on the horizontal scale, particle size is plotted in logarithmic scale and what you see on the left chart is flow velocity in the vertical scale, that is also in logarithmic scale and the one in the left that involves sediment transport by the action of water flow and the one on the right here represents the situations that arise when sediment transport is triggered by wind action.

So, on the left, the chart represents the situations that arise because of flowing water concerning sediment transport. In this case you can see three zones; if the flow velocity is quite large and you are near the top of this particular plot, then erosion is going to take place and that is quite intrutive. In between erosion and entrainment or in between erosion and deposition, there is a zone in which sediments are going to be entrained within the flowing mass of water and if the flow velocity becomes even smaller, then particles are going to deposit, are going to be deposited near the bottom of the flow and what you end up with is a zone of deposition.

So, if you have got the largest flow velocities, then you are going to trigger erosion; in between intermediate flow velocities, you are going to get entrainment of particles dislodged within the flowing mass and if the flow velocity becomes very very small, then deposition of entrained sediments is going to take place as is indicated by the three zones on the chart on your left.

Now, let us consider the chart on the right. In this case, you have got two zones essentially; if you have got larger flow velocity, again you are going to have erosion and as the flow velocity becomes smaller, then you are going to have deposition.

Now here, you should notice that the vertical scale in this case is not in logarithmic scale but it is actually in arithmetic scale but the flow velocities in this case, flow velocities in this case are comparatively larger. You can see if you compare the particle sizes on the chart that represents erosion and deposition because of flowing water and the chart that represents wind action; if you compare those two charts, then you will see that erosion and transportation by wind requires relatively larger velocities compared to those required in case of water flow and that is quite intrutive because of the differences in the densities and kinematic viscosities that are there between wind and water.

Infact, the density of wind is approximately 1000 of the density of water and the kinematic viscosity of wind under ambient condition of say 20 degree Celsius at the sea level it is approximately, one tenth of the viscosity of water and these these things reflect in the capacity, in the smaller capacity of wind in sediment transportation.

So first of all, we consider water action, the sediment transport triggered by water flow and one of the agents, one of the physical processes involved in this case is river flow.

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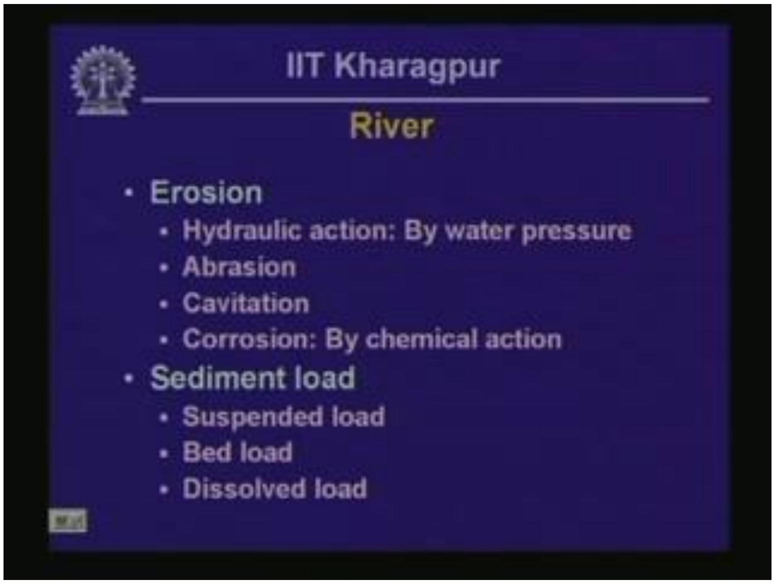

Erosion in, erosional activity because of river flow is triggered as indicated in the preceding by hydraulic action and this is essentially lift and drag once again. It could also be due to abrasion - the particles that are entrained in the water flow, they can abrate, they can actually rub against the, rub against the bed forms that actually is going to dislodge even more, even more number of particles.

And the third one that is involved here is cavitation and the cavitation process essentially arises when the water flow becomes very turbulent and because of the turbulence, the flow, I mean because of the turbulence bubbles formed within the flowing mass and these bubbles sometimes implode and the implosion of the bubble actually leads to the development of jets of air and these jets impinch onto the rock surface and they are sometimes powerful enough in case of very high velocity environments and they can also trigger more erosion and this type of activity is seen near the bottom of a of a high water fall.

And the fourth one, fourth of the causes of erosion because of river is corrosion and this is essentially chemical weathering. So, if there is or if there are some chemicals in solution within the solution and these chemicals sometimes corrode and they lead to the chemical weathering of underlying bedrock and that actually accentuates the dislodgement of particles from near the surface of the bedrock.

Now, sediment load that is carried by river, they could be suspended load, they could be bed load or they could be dissolved load. Suspended load are those particles that are entrained within the flowing water itself, then it could be bed load - the particles that are being dragged along the bedforms along the river bed or it could be dissolved load - the chemicals that are being carried by water flow in solution. Now, dissolved solution by far is the largest proportion of all these three and it constitutes typically about 70% of the mineral load that is carried by river flow.

Now, we look at the erosional activity of wind. Now, wind takes solid particles, entrained solid particles by three processes essentially. The first one is deflation; this is because of localized drop of pressure and because of that a portion of the surface is simply blown away by the wind that is blowing over.

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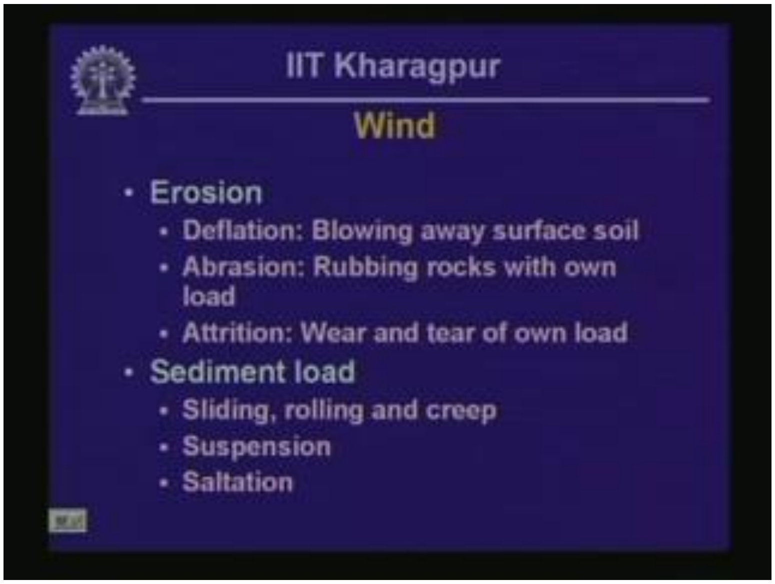

Then the second one that we are going to consider is abrasion is essentially the same as the rubbing action that we talked about when we looked at erosional activity of water near the bed, near the river bed.

Then the third one in this case is attrition. So, what happens here is that the particles that are in or that are entrained in wind, that are entrained in wind of high velocity that goes and impinch against exposed rock surfaces and that leads to dislodgement of clasts of rock from the surface, wear and tear of the surface and this process is called attrition.

Now, the second, the second aspect here really is the sediment load. So, here again as it is quite similar conceptually as that involving river flow; there will a bunch of particles that are going to slide, roll or creep near the bottom, near the interface of the bedrock and the wind that is flowing over the bedrock or it could be taken into suspension within the volume of wind, within the volume of the flowing wind or there could be saltation which is somewhat intermediate between the particles that are carried as bed load and those are in permanent suspension.

So, these particles really taken into suspension temporarily and then the flow velocity is not enough or the wind velocity is not enough to sustain their, sustain them within suspension and as a result, they get deposited a little bit within a little bit of distance down wind and this process is called saltation.

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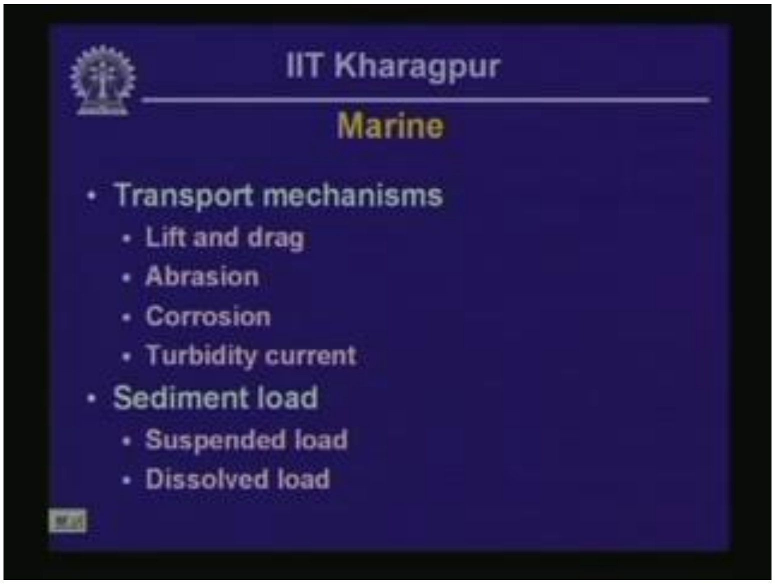

Now, the transport mechanisms because of ocean currents, essentially very similar in the transport mechanisms that we considered concerning river flow but in this case, there is an essential difference that the flow velocities typically are much smaller in comparison with sub aerial water flow like river flow; underwater, under ocean currents are typically much smaller velocities but the physical details of the processes are very similar.

So, here again you have got lift and drag, abrasion and corrosion but here you see an new term called turbidity current and this particular transport, this particular transport mechanism arises when there is a submarine mass wasting process such as submarine landslide that is occurring near the continental shelf margin. In those situations, very large volume of soil can be taken into suspension because of large velocities involved in the process and that leads to the transportation of much larger particle because of the large velocities of movement.

In other cases, in other cases because of the smaller flow velocities in case of marine sediments, in case of marine transportations, transportation processes; the sediment size that is typically transported in the marine environment are much smaller, the size of the sediments are much smaller in comparison with those transported by the action of river flow. Sediment load here is once again that includes suspended load and dissolved load.

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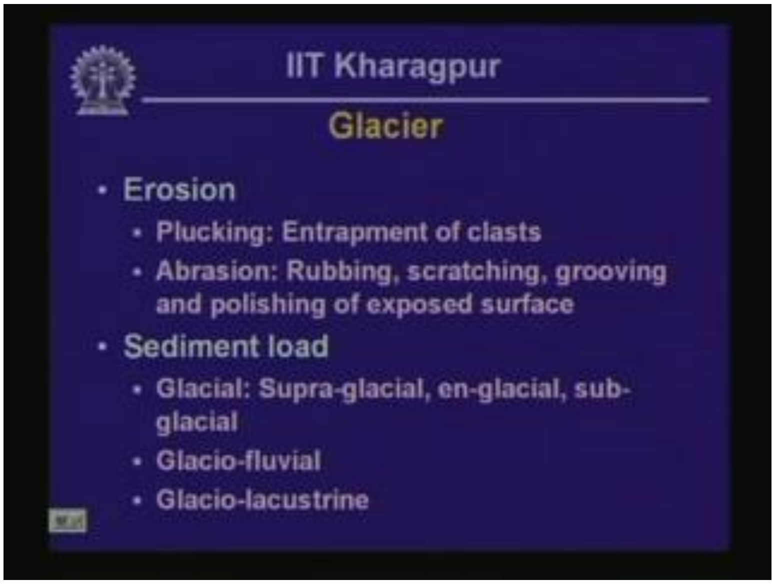

Erosion and sedimentation process associated with moving ice, movement or glaciers; first we consider the physical processes involved in erosion, glacier related erosion. The process that is involved include plucking and what happens in this case is pieces of rock that get entrapped in the ice flow, ice that is flowing on top of the bedrock and there could be abrasion as well and abrasion like earlier, it is essentially rubbing of ice and the load that the ice is carrying near the interface of bedrock and this process is called abrasion and as a result, actually this particular process leads to the grooving and polishing of exposed bedrock surfaces, bedrock surfaces exposed to glacier movement and we are going to see the landforms that arise because of that.

Now, the sediment loads that are carried by glacier are of three types, the sediment load that is carried within ice that are of three types; supra-glacial, en-glacial or sub-glacial. Supra-glacial sediments involve those sediments that are carried on top of the moving ice. En-glacial debris include those clasts that are entrapped within the flow of ice by the flow lines, streamlines or it could be sub-glacial, sub-glacial sediments are carried, they are essentially conceptually very similar to the bedloads that are carried by river flow and wind which we already have discussed.

Now, sediment load because of glacier movement can also be glacio-fluvial sediments and these are those sediments that have worked by water, melt water that originate from melting of the glacier. So, they are reworked by water, so they have got very similar, they have got many characteristics similar to those observed in sediments deposited by water flow or sediments could be glacio-lacustrine, the sediments that are dropped underneath glacial lakes, they also have got similarity with the sediments that develop underneath non-glacial lakes and underneath low velocity regimes of lakes that are not related to glaciations.

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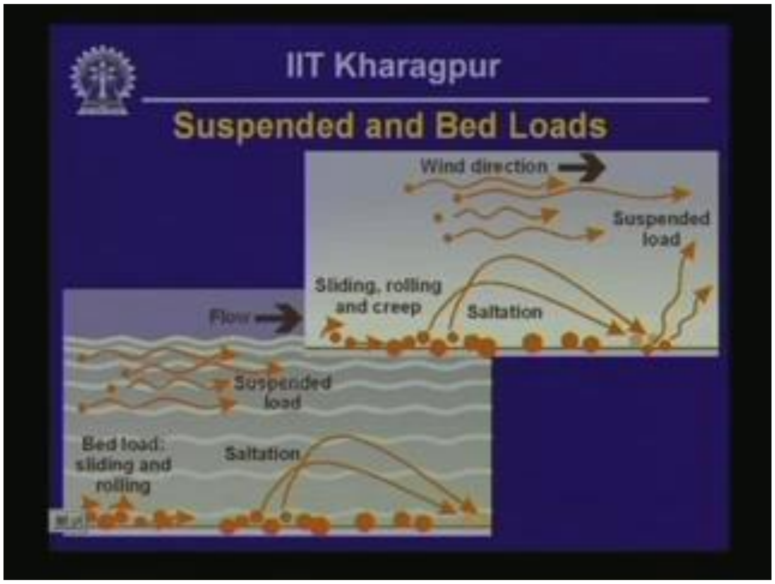

Now, inorder to recapitulate the processes involved in transportation, we look at a couple of, couple of sketches; the one on the bottom left actually shows the transportation processes involved with the flow of water and as I indicated before, the sediment loads could be either suspended load, suspended load or bed load or the sediments that are being transported because of saltation.

The one on top right, the cartoon on top right of this particular slide shows the transportation or the transportation processes that are involved because of wind and in this case, you again have got suspended load, then bed loads that are transported from one location to other because by sliding, rolling or creep or you have got saltation as well just like what you had in case of flowing water.

But here, you see, you try to notice an essential difference in this case that involve the secondary movement of particles triggered by bouncing of when particles that are taken into, that are taken into suspension temporarily because of saltation within the wind, within the volume of wind; when those particles land at some distance downwind, they actually can collide with particles that are not initially mobile and these particles can be airborne because of the, because of the because of the collision process and this kind of secondary movement is not normally observed in case of transportation processes involved in water flow because in case of flowing water, the impact of the landing particles are cushioned because of the buoyancy effects as a result of the presence of water.

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Now, we try to look at the number of features that arise because of fluvial erosion. Some of these features have already been discussed when we were looking at land forms in one of the earlier lessons. Now, the first type of landform that is important here are gorges and canyons and this type of land form arises because of sudden increase in the flow velocity or sudden uplift of the river bed because of some tectonic activity or other reasons, other geologic processes and this can lead to the under cutting of the rally bottom and as a result gorges and canyons develop.

Then there are other types of landforms which we have already discussed involving escarpments and waterfalls and in this case, actually river undercuts soft rock stratum referentially in comparison with the straighter that are more resistant to erosional activities and as a result steep bluffs actually form and if such kind of bluff forms along the river flow, then that leads to the development of a waterfall and we discussed these issues in the previous lesson in greater detail or in one of the previous lessons in greater detail.

Now, another type of feature that is associated with fluvial erosion is lag sediment. These are essentially coarse grained sediments that cannot be transported by the flowing water and they are left behind really and this process leads to the development of coarse grained deposits called lag deposits. They could sometimes even include sands in the final side, typically they include gravel sized particles or coarser grain particles, the particles that are even coarser grains.

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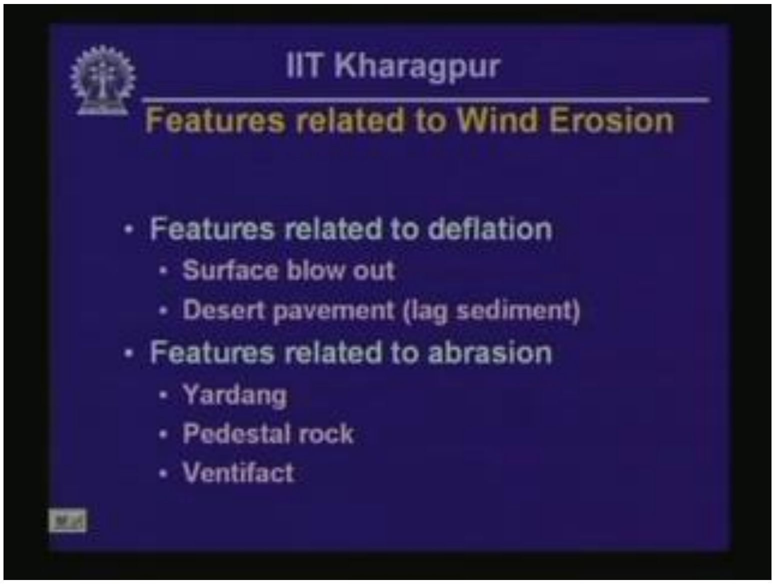

Then we look at some of the features, important features related to wind erosion. We have discussed atleast one of them a few minutes back called surface blow out and this is essentially a a large, a reasonably large area, a few meter across may be; these areas are simply sucked out of from the surface because of the low pressure that locally sometimes develop during wind blowing or during blowing of wind and that process leads to the development of surface blow out.

The second important feature is desert pavement. It is essentially, it is very similar to the feature that we discussed just a few minutes back regarding lag sediment and these include the soil particles that cannot be transported by wind action. From, within these soil particles, final grain particles are blown away by wind leaving the coarser grain, gravel size or sand size particles and these lead to the development or feature called dessert pavement.

Then features that relate to abrasion or rubbing action include yardang. They are basically narrow ridges, narrow and long ridges of bedrock that actually align in the direction of wind movement. Then there could be pedestal rock; they are columnar rock which is eroded away near the base and sometimes the top portions of these rocks, they have got a larger foot print than the areas near the bottom portion of the columnar form.

And the third one that arises, third important one that we are discussing here that arises because of abrasion activity of wind is ventifact and this particular type of landform is essentially a polished surface that arises when wind carrying lot of debris such as sand sized particles, they keep on impinging on exposed rock surface leading to development of a polish on that surface. So, that is called ventifact.

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Now, features that relate to wave action: so here, what we have typically is sea cliffs, they are steep bluffs that face the ocean. Then there could be headlands or bays; they basically involve eroding away of soft rocks leaving behind some of the projections of harder layers and they are called headlands or there could be wave terraces, these are essentially shallow flat shelfs cut by waves.

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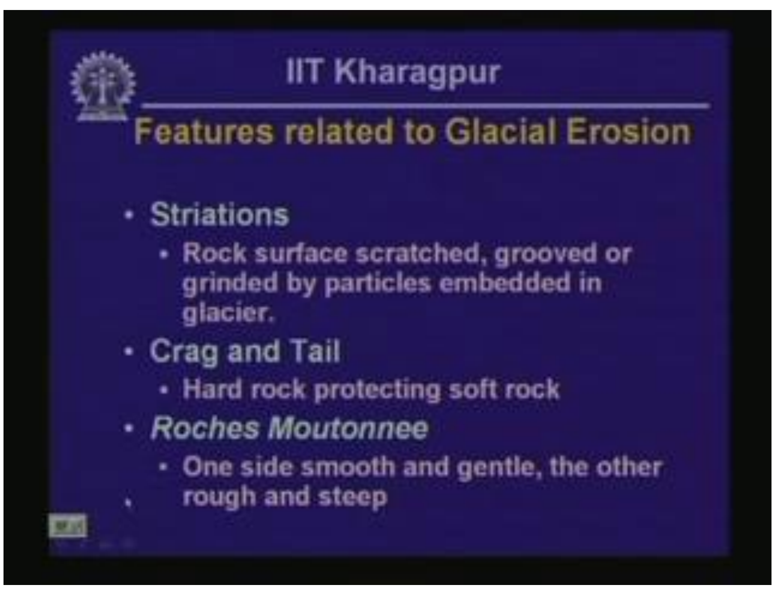

Then some of the features related to glacial erosion; striations - scratching and grooving of rock which we have already discussed. Then there could be crag and tail; these are essentially hard rocks that protrude, that protect soft rock. And, roches mountonnee; these are basically asymmetric hills, asymmetric hums of bed rock with one side steeper, the down wind or down glaciers slope much steeper compared to the up glacial slope and the down glacial slope is quite rough because of the plucking activity of the ice movement; whereas the upglacial slope, upglacial gentle slope is quite smooth because of the polish, grinding effected by ice flow.

And, some of the windblown are Aeolian deposits, dunes that we already know, dunes could be of different geometry, different types of footprints and they can be crescentic or they can be straight. Then there is loess deposits, these are essentially silt and clay grade particles that are dumped by wind.

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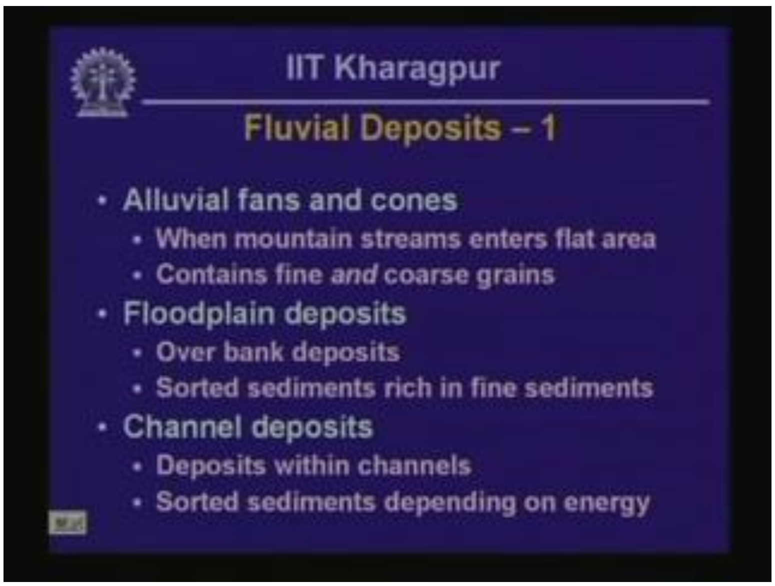

Some of the fluvial deposits; alluvial fans and cones, these are when mountain streams enter a flat area and there is a sudden change in velocity involved and that leads to the dumping of coarse as well as fine grain deposits.

Floodplain deposits; these are essentially, these are essentially over bank deposits, low velocity regime deposits. So, they are rich in fine grain sediments, sorted because the sediments that are near, that are deposited near the river bank are much larger in size; whereas those deposited farther away, they are typically of final grains.

And channel deposits, these are deposits that form within the channel. They are again sorted but they are relatively coarser grain in comparison with floodplain deposits because of the larger velocity regime in which they get deposited.

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Then there are deltas, they are again deposits near river mouths, low velocity regime. So, they are, the sediments are typically rich in finer grain, finer grain sizes and then there are natural levees and point bars, they are narrow regious of sand along the river bank and typically inside of a curve and they contain lots of coarser grain deposits because of the higher velocity of the flow involved.

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Marine deposits could be shallow water deposits such as beaches, spits and bars and tombola as explained in the list there or there could be deep water deposits, they could include turbidites and turbidites are the deposits laid by turbidity currents because of the high energy involved in this case, they could be of mixed grain size and there could be pelagic mud, these are deposited in very low energy environment, so they are very fine grained or they include very fine grained particles.

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Glacial deposits; they could be deposited directly from the ice. In this case, the grain size could be quiet rich and they could vary over a very wide margin and they could be, they are typically unsorted because of the capability of ice to carry a lot of different sizes of grains. They are not reworked by water; examples include moraine and drumlin or they could be stratified which are reworked with water and in this case, there is a lot of similarity in these deposits compared to deposits laid by riverflow and examples of these stratified drifts are kame deposits, eskers and outwash deposits

Outwash deposits are they sometimes generate because of very large flow of, very large volume of water suddenly released because of melting of a large volume of glacier and in such cases flow velocities could be quite high and much larger particles can be deposited in this process; whereas kame and eskers typically are composed of sand and gravel size particles whereas outwash could be quite rich in times in gravel size particles.

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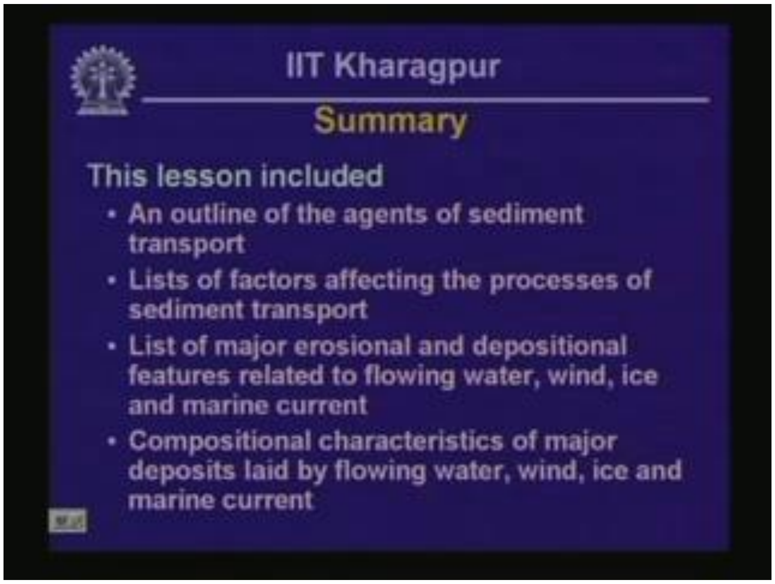

To summarize this lesson; we looked at an outline of the agents of sediments, sediment transport processes, list of all the factors that affect these processes and some major erosional and depositional landforms including the compositional characteristics of the sediments that are deposited in these processes. Finally, we wrap this particular lesson with a question set which is as follows.

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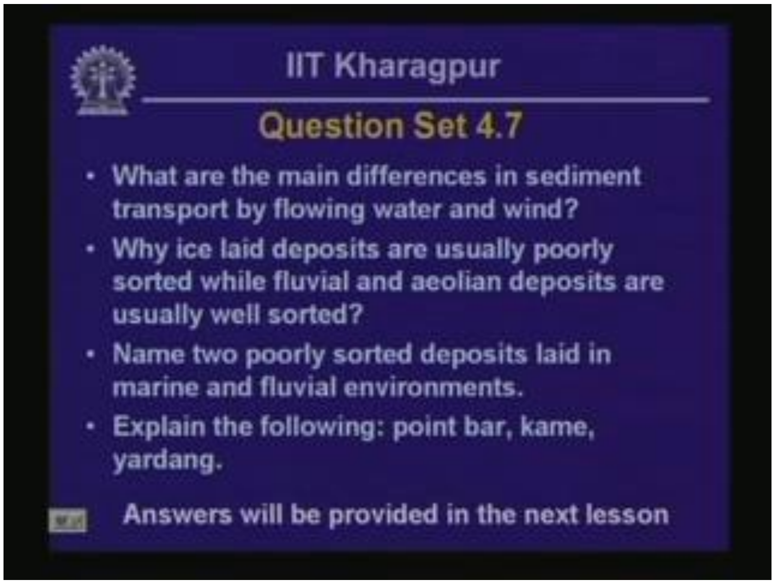

What are the main differences in sediment transport by flowing water and wind? Why ice laid deposits are usually poorly sorted while fluvial deposits and aeolian deposits are usually well sorted? Then the third question is name two poorly sorted deposits laid in marine and fluvial environments and the fourth one; explain the following terms - point bar, kame and yardang.

Try to, try to answer these questions. When we meet with the next lesson, I am going to talk about the answers to these questions. So, until we meet in the next lesson, bye for now.

Thank you very much.