Video: Podzol on Glacial Till and Outwash Sediments, UBC Malcolm Knapp Research Forest, July 2020
(provided in the Google Earth Tour at Site 2, Coastal needleleaf soil and EX 3, Question 9)

We are in UBC's Malcolm Knapp Research Forest. This is a typical coastal needleleaf forest with the three species, Western red cedar, Douglas fir, and Western hemlock, which would have been cut over through much of this forest, but allowed to regrow. This stand is probably about 60-70 years old. We also have a couple of broadleaf species, including this Bigleaf maple right above me; and an understory of Sword fern, Red huckleberry, Salal, and other native understory herbs and shrubs. So, you'd expect then that this would be a Podzol, given the sort of temperate-rainy west coast marine climate, and the coniferous vegetation that will create a rather acidic A horizon with very slow to decompose leaf litter. But what's interesting about this site is the parent materials. Now, they're glacial like much of BC, and as that big ice sheet receded 10 000 years ago, that glacial till was laid down across much of our province. But here you can see that it occurs in what can be a typical sequence. The first is this layer of what we call Basal or Lodgement till. And that extends from about here [points to top of layer with spade, about 1.5 m depth], and I'm going to try to dig it, it's very difficult to dig, and this is crushed material that would have been compacted under the weight of the ice, so lodgement till then, is deposited from englacial or subglacial, under the glacier material that is really compacted under ice, again it has a variety of materials: This is a piece of granodiorite, a rock, but also, all of this fine material that really is crushed silt and clay, and it's almost cemented. It's very difficult for plants to root in that. And that's probably sitting on top of the bedrock here [points to layer below lodgement till, about 2.5 m depth], which is granodiorite – igneous rocks. Above it, from about here [points to top of lodgement till], we hit what is ablation till, and that is very typical [for surface layers of recently deglaciated regions]: It's material that is laid down by the ice as it melts. Its carried on or in, so it's supraglacial material, and it's fairly loosely packed, again a mix of coarse material – there's another block of granodiorite in there [that is] sub-rounded – but also you'll have fines as well. And that is what the plants are rooting in. Now, the other thing that's unique to this site, is that there was a large glacier dammed lake just to the east of here, and when it burst, when the ice dam failed, all of that water rushed across the landscape, and it re-sorted this ablation till. And what it did was it removed many of the clays and silts – the fine material – and left behind perhaps some of the sands that it was carrying as it slowed down under … and spread out over here. So we have in this reworked ablation till. We have a fairly sandy parent material with some coarse material that's been left behind in there as well. Not as fine as you'd expect for a glacier till. Much more sandy and well-drained. So, let's just have a look at the soil, the Organic [O] horizon is probably around where I've pinned my tape [points to top of metre tape], and its maybe a few inches thick. It's an LFH: it is probably a mix of: litter (that is relatively undecomposed), fibric, and humic material (which is quite decomposed), but below it, we enter the mineral horizon – the top most mineral horizon, which is an A horizon. And I'd suspect it's right around here. It's much, much darker or blacker in colour [than layers below it]. And it's a mix of mineral material [should say: and organic], and fairly granular or crumb in [structure]. Lots and lots of fine roots in here that you can't see but I can. Yeah, and I'm going to tell you that's a medium granular or crumb [structure]. If we move down we start to see – and I can see, a much lighter layer at the bottom of the A. And it's a little bit grayish, but it's the colour of some of the bare mineral grains, the quartz sands, which is a sign of leaching and illuviation. And then if we go further still, you might notice the orangey colour of the soil right here exposed, and

that’s probably our B horizon, and it’s an illuvial horizon, it has received materials from above, including some organic matter, but also some fine iron oxides, which as iron does its reddish and its coating the mineral grains and staining them a little bit orangey red. So that’s a slightly oranger colour there and not as black as the A horizon above it, and then we hit our impermeable lodgement till. Just to take a look at the effect of having our lodgement till here, our impermeable lodgement till, probably at the end of the rainy season in the spring, there is quite a bit of water that’s percolated down through the A and B horizons here that get stuck on the top of the C, so you might even have a perched water table. And some of that stuff will find cracks through the lodgement till and eventually seep out below it, but again, we might actually find some evidence of water logging at the bottom of this soil at the end of the growing season. And that’s our soil!