Examining the Ice

Kevin Hand – (orange winter jacket)
So I've collected a couple of samples, hopefully they won't melt; crack them open. You gotta remember that when liquid water crystallizes into ice, it is legitimatelya mineral and therefore also a definition of a rock. So this is geologist field dream here and this is what most of the rocks in the outer solar system look like, just chunks of ice. But what I was looking at here, this of course is sea ice and I don't know how deep down the water goes here but you see how far out we are. See those little specs and you can see the big crystals of water also, pretty remarkable. But those little specs, part of that's dirt but part of that is also microbes that are sort of hanging out for the winter. Many of them are probably Sino bacteria and when this place thaws comes spring time these guys will start reactivating essentially and doing their thing; and we'll get big blooms of Sino bacteria and other microbial communities coming out of this ice. So right now they're just kind of just hanging out and during this harsh winter but there's a life in this here icy rock. This is part of what we find really intriguing when we look at these extreme environments on earth and try and think about whether or not there could be little microbes in the ice on the polar caps of Mars or what that ocean ice interface might be like on Europa. Could there be microbes trapped in that ice and once that ice comes to the surface we might be able to spectrascopically detect with an orbiting spacecraft and what this would look like from orbit if these were in fact microbes on the surface of Europa? So there's a lot of interesting questions that we could ask here on Earth that help guide our search for life beyond Earth. And there are many questions. Just fundamental biological questions about how life here on Earth actually, really works and try and understand some of these extreme characters here on Earth help us get at some of those questions. Alright, the sun is there off in the horizon. The big question picture there is what happens to life when you don't have as much sun? Either as the case may be here in Barrow or down in Antarctica, or if you go back in time, one of the key interesting questions about the early history of the life on Earth and the connection of that life to the sun goes back to this paradox tof the early sun being quite faint, about 70% of it's modern day luminosity. So a sun shining about 70% of it's modern power leads to a pretty cold earth. Many scientist including the late Carl Sagan worked on this extensively trying to figure out what mechanism might have allowed the surface of the Earth to be warmer and more clement to the conditions that we typically associate with life. And one of the ways in which you could get a warmer planet as we now know in our modern day – and we appreciate it very well - the Alaskan natives here certainly appreciate it cause they see this change is through global warming; greenhouse gases. And so potentially on early earth increased levels of methane or ammonia might have outed to the greenhouse effect and kept the Earth warm during those early days of faint sun. Now in the modern, looking at life here in the ice, at the poles on Earth, what I find fascinating is essentially as you decrease the amount of energy from the sun, life tends to slow down. Now some life forms go into spores. But other life forms, they just slow down their metabolism to a rate where they can just process enough and repair their genes, they do very little other than making sure that they're DNA is still good. So that's part of what was probably going on with some of the microbes that were trapped under

ice here; some have gone into spore form and some have just gone into essentially slow motion. And so as you decrease that amount of energy from the sun, life takes on new adaptive strategies. That's one of the things we have learned about these life forms here trapped in the ice. Looking for polar bears, do you see any?