[MUSIC PLAYING]

KAREN FOLEY: Hello and welcome to the Student Hub Live. I'm Karen Foley and this is our ExoMars special. In real time, it is the 21st of October at 12:00 noon. And for the next two hours, I have a fantastic array of guests who are going to be talking about various aspects of the ExoMars mission and about space in general and planetary sciences.

So for those of you who are new, welcome to the Student Hub Live. You should see some widgets appearing on your screen. This is if you're in the Watch and Engage option. So there are two ways you can engage with us today, Watch and Engage, which is infinitely better because you can chat. You can fill in your responses to the interactive widgets and tell us where you are, how you're feeling right now, what subjects you're studying, what level, et cetera. All of that gives us some really good information to be able to pitch this just at you.

And of course, you can ask questions too in the Chat or you can email us at studenthub@open.ac.uk. And our Twitter handle is @studenthublive or the hashtag is #StudentHubLive2016. So there are loads and loads of ways to have your questions answered during this session, to tell us what you think, and generally to engage within this academic community, which really is what these Student Hub Live events are all about.

So there are lots and lots of different things to do and to feed in all your chats, I'm joined by Sophie and HJ from our Hot Desk. Welcome you, both. The screen looks brilliant behind you. I see you've got a focus on the weather. Sophie, why is that?

SOPHIE: Well, I've always wanted to be a weather girl. So we thought we'd take the opportunity today. We're talking about the climate on Mars and things like that. So please tell us what the weather's like where you are and we'll pop it up on our board. Any selfies, anything like that-- we have actually had some in already--

HJ: Yes--

SOPHIE: Some eager beavers. This is from Eric. So he's actually in Portsmouth. That's his study desk there. This is last week, by the way. This is Friday, the 14th and he's joining us in Portsmouth by the Spinnaker Tower. So any selfies, send them through to us-- studenthub@open.ac.uk. So yeah, we're all ready and excited.

HJ: But we're just here so any thoughts you have, anything you want to ask our guests, that's what we're here for. And as Sophie said, we love it when you send us stuff, too, and we love to see where you are, what the view looks like from where you were, maybe your study materials that have arrived-- but yes, we're very excited and ready to go.

KAREN FOLEY: Lovely. And someone has a pizza in the oven already. We're just on the jelly beans here today because we've got a lot to get through but yeah, do have your lunch. Drop in and out as you want to over the next couple of hours or so. You can always watch this on the catch-up. Immediately after the show's over, there's a live stream link and so you can catch up on any bits you may have missed. And of course, if you can't be here in real time, that's a great option, also.

OK. So we thought it would be a good idea to generally introduce some of the things that are important to this whole area of study. So I'm joined by my panel of guests. Welcome, everybody, to the studio. So we have Jon Mason, Rhian Chapman, Matt Balme, Jan Raack, and Liam Steele. And you're all planetary scientists here at the Open University-- so a very, very exciting time.

But I wanted to just briefly start by looking at some of the things that are really important. And Jan, I wanted to ask first, how important is Mars? In terms of a planet, obviously, right now it's very hot. But how important is it in terms of planetary science and generally an area of scientific investigation?

JAN RAACK: I think it's one of the most important planetary bodies in the solar system because Mars was once-- so three billion years ago-- habitable so that life forms could have existed on Mars. And humanity is always searching for life, extraterrestrial life, and this is what we are looking for, not directly but step by step. This makes Mars very, very important for us.

And also, Mars is normally easy to reach. It's nearby, compared to the Jupiter moons or Saturn moons. And with cameras, we can look onto the surface of Mars directly. So it's a very good choice to make science on Mars.

KAREN FOLEY: Yes. And at least we don't have to measure it in light years. So that is always good, as well. Yes. OK. So very close to us, easy to get to, and like recently with all of the ESA and ExoMars live streaming events that have happened after, of course, the Trace Gas Orbiter has landed in orbit, we've been seeing some of the delays have been very, very short in terms of how

quickly we can get data back to Earth. So that must be an advantage, also.

JAN RAACK: Yes, of course. I think it's 15 minutes or so. And this is a lot better than communicating with satellites in the outer solar system. So this makes also the work easier for us.

KAREN FOLEY: Brilliant. Brilliant. Thank you. And you'll of course be talking to us a little bit more about various aspects to do with the surface. So we'll talk about that a bit later.

But Rhian, I wanted to ask you about general research on Mars. What's happening and just broadly? The OU are clearly involved with a lot of the ESA and ExoMars missions. But broadly, what's happening?

RHIAN CHAPMAN: Well, at the moment, there are five orbiters around Mars. There are three belong to NASA, two belong to ISA, and one that's the Indian Space Organisation and there are two rovers on the surface. The orbiters are looking at the surface. They're taking images. They're taking measurements of the atmosphere. And the rovers are looking particularly at the chemistry and the mineralogy of the rocks on the surface.

KAREN FOLEY: So lots going on-- lots of different types of data we can access. And comparatively, how much is Mars being researched compared to some of the other planets?

RHIAN CHAPMAN: So much more on Mars, partly because it is a bit easier to reach. It's a bit easier to get there and put things in orbit, although it is quite hard. Only about half of the missions that we've ever sent to Mars have succeeded. So it's still a hard planet to explore, even though it's really close to us.

KAREN FOLEY: Yeah. Yeah. Excellent. Liam, I wanted to ask you, we've got our lovely model of the Trace Gas Orbiter and Schiaparelli Lander here. But in terms of ExoMars, this specific project, how important is that in terms of the overall research on Mars?

LIAM STEELE: Yeah, one of the main things we go to Mars for is well, the search for life. And to search for life, really you need evidence of water and methane. And there's been a few missions in the past that have searched for things like that but you really need them by observations in really, really high resolution because they exist in such small quantities.

And the Trace Gas Orbiter that's currently in orbit around Mars now, that can detect methane. It's got the best detection of methane that's possible, that we've ever done so far. So it should give us the best signals if we're trying to detect life, which is incredibly useful.

But as well as that, there's also the rover that's going to be going at some point, as well. So it's not just all about the atmosphere. Some people are interested in the surface, as well.

KAREN FOLEY: There's no fighting allowed, you guys.

[LAUGHTER]

LIAM STEELE: That's fine. That's fine. If they want to look at the surface, that's all right. So it's incredibly important for Europe to be involved in this. As well as all the American missions that are there, it's important that Europe would be involved in it, as well.

KAREN FOLEY: Yeah. No, absolutely. So Jon, could you tell us then, having transported this wonderful model here, how is the technology changing in terms of what we're doing? There are clearly advances in terms of what we're able to look at.

JON MASON: Yes, the technology is certainly becoming more bolder and more complex. So we can now take HD images of Mars and 3-D images of Mars, compared to the past. But more importantly, the instruments themselves are becoming more high-tech and more complex as we try and shrink down more and more of our technologies we have in our lab on Earth into fridge-size experiments which we can send to the planet.

KAREN FOLEY: Brilliant. Excellent. No, that's really interesting and I think it's so useful to be able to have a model here that we can demonstrate. This has had quite a lot of press coverage over the last few weeks, hasn't it? How important is that to be able to show people something-- because it's quite a conceptually difficult idea to talk about, isn't it?

JON MASON: Yes. It is very important to try and get the public on the side of these things because the science is very interesting for us but not part-- it's very interesting science and we have to get that point across to the public so that they can realise why we're doing this and why is it significant for them.

KAREN FOLEY: Yeah. No, absolutely. Absolutely. And we're going to take a very short video break just after this session to fill you in on some of the aspects in terms of how everything's happened, what the launch looked like-- how all of this translates into the wider spectrum there.

So the whole idea then, Matt, about finding life on Mars, if we do find any existence of life, what are we going to do then?

MATT BALME: It depends on whether we find life on Mars that is the same as on Earth or find life on Mars that we can prove has evolved independently because if it's evolved independently to life on Earth, well, that basically means that there's two separate occurrences of the emergence of life next to each other in the solar system. And the chance of that happening purely coincidentally are essentially zero.

So that basically means the galaxy is teeming with life. So if we can find life in the solar system, whether it's on Mars, Europa, Enceladus, if we can find life in the solar system, that's a massive, culture-shaking discovery. It's not just science.

KAREN FOLEY: And when we're talking about life on Mars, we're talking about the organisms, aren't we?

MATT BALME: Yeah. We're not talking about hyena or antelope galloping across the plains.

KAREN FOLEY: Martians.

[LAUGHTER]

MATT BALME: For Mars, we're looking at very ancient life because it's pretty unlikely there's life on Mars right now because we think that would probably be quite easy to see, although if we detect lots of methane, that could show there's life on Mars. We're looking back 3, 3.7 billion years ago to when Mars was probably a more habitable planet. So we're looking for what we call "biomarkers," little bits of geochemical or geological evidence that say there was once life.

But that is the same period of time on Earth life was getting started, 3.74 billion years ago. So that's why we go looking at those ancient rocks on Mars, as well. We're looking for that same origin of life.

KAREN FOLEY: There have been some questions, as well, in the chat about the idea of fossils and you're talking about ancient life and finding various things. Is it likely that we would find anything like that?

MATT BALME: Well, like I said, we're not going to find a jawbone of a dinosaur or anything but the chances are that there could possibly be microfossils or other what we call "morphological indicators"--so indicators of the shape of something that we look at that could tell us that this is part of the evidence for life. We're never going to find anything that just says, boom, life. We're going to have to add up lots of different types of evidence and weigh them all together and say, we found it.

KAREN FOLEY: Which is what I think makes this particular panel so interesting because you're all looking at these various different aspects and also in various different remits, as well. So we've got obviously the equipment. Then you're both looking at surface modelling, the environment, the parachute-- there's so many different aspects here that all translate that you're looking at at very different levels.

Well, thank you. That's been a really interesting introduction and we're going to break down some of these areas beforehand. But we've been getting some of the results from the widget. So we were asking what level you're studying at, which faculty you're with, and it's great to see so many new science students with us. Welcome to the Student Hub if you haven't come before. I hope you're figuring it all out. There are a couple of things that you might like to know about if you haven't been before.

So the Chat, you can ask any questions in the Chat. You can put your thoughts, your observations, and comments. You can also change the layout of the interface. So those of you who are just joining us and haven't seen that interface video that we played before the show, you can change the options so that you can increase the size of the Chat or the widgets, et cetera. And if you haven't voted on the widgets, you can do so just by clicking on them, put your data in there, and then close them down. And then your data will populate and you'll be able to see what other people have added, also.

With the word clouds where we have three things-- so we might say, what three words describe something. If you can't think of three, just put a couple and put an x. But they won't send or populate until you've completed the actual graphs. So that's all really, really good. If you have any questions, do let Sophie and HJ. Are there any immediate things, HJ and Sophie, that we need to bring to people's attention?

SOPHIE: Not really, I don't think. We started the lunch conversations early.

KAREN FOLEY: Good.

HJ: Mmm. That always comes into play, doesn't it?

KAREN FOLEY: And what's the weather like 'round-- outside, because we're obviously in a studio here in Milton Keynes where I think it was partly cloudy beforehand. But how's the weather doing with everybody? Looks this similar for most people, actually-- partly cloudy. A little bit of sun somewhere-- I don't know where that is. I'm very jealous wherever this one is.

HJ: A very few lucky people there.

SOPHIE: But 76% of people at the moment are partly cloudy, I'm afraid.

HJ: I think David did ask a question. We may come on to it later. But he says, "Has the EDM been in contact since chute deployment?" And yes, that's his question. So he's very interested and eager, I think, David, but we shall find out either now or as we go.

KAREN FOLEY: Yes, I'm going to tackle that one a little bit later. Wonderful. Well, thank you very much. We'll find out what the weather's like on Mars just a little bit later. But first, we're going to play you a very short video from the European Space Agency, which just shows you exactly how it all happened. And we'll see you in about three minutes, where I'll be joined by Jon and we're going to take a look at the Trace Gas Orbiter in a lot more detail. We'll see you very soon.

[MUSIC PLAYING]