Mars Exploration Program Virtual Meeting

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This meeting is being recorded.
Good morning and good afternoon and good evening to everyone out there. Welcome to the community. I'm very pleased to be running this meeting today. My name is Eileen and I am the chair of the Mars exploration program analysis group steering committee. I will be protecting my own slides so we will see how well I do. I can just fly the ball or do you want to transfer?
Standby
The ball should be on its way.
Thank you. Not seeing it yet. Let's try sharing screen. A little bit of faith and we are set. Just a quick congratulations to Odyssey on its 20th anniversary this year. Lovely picture on the right and we will get started. The agenda is on your right and the logistics are what they usually are for these virtual meetings. Yourself for we will do it for you. There is a chatbox on WebEx where the moderators will track questions and of course if you have feedback, questions, or concerns there is an email address that you can send to us. Presentations and recording will be online after the meeting and you are being recorded so keep that in mind as we move forward. We have a stellar steering committee. You can see the list here all of these the visuals and the people on the committee as well giving their time and effort to support the Mars communities so thank you to them. I do want to note we are rotating off and here's everybody smiling faces. If you see them as you're walking by them be sure and say hello. If we are ever actually able to be in person. And these are the folks who do the hard work. Brandy, Barbara and Sona thank you for keeping the meeting going and the program flowing.
Some quick updates since the last time we met back in June there has been a call for applications to the measurement definition team for the international Mars ice mapper and that was for July and applications were due August 23. We got some questions about that and hopefully everybody wanted to apply that apply. Baby will be hearing something about that today. There is a steering committee vacancy I noted in the previous slide and the steering committee released a call for indications and interest in the goal is to have an individual in place in that position by the next MEPAG meeting. If you're interested in serving on the steering committee please consider putting in an indication of interest and if you have any questions, take a look at the slides and you will see the people who are currently serving, you can certainly ask them about the details if you have any additional questions once you have looked at the indication of interest.
Some administrative updates and I will jump to the middle one because this is something we are pretty excited about finally we have reached into the 21st century this meeting is closed captioning available and please note the shared link. This is something that you need it is there. LPI was recently awarded a contract to provide support to all of the analysis groups for conferences and other administrative duties. The timeline for implementation of that is TBD but just so the community is aware that that is occurring, I know many of you hold do all or even try citizenship in various analysis so this is a AG wide award. The MEPAG website is being reworked and updated so thank you for the work you have been putting into that and we will keep you posted as we have updates there and in the meantime, the MEPAG website is your go to place for documents and reports and notes for meetings and recording sense I want so if you feel a little lost, please, feel free to go to the MEPAG website. Just putting this in for a general ratification. The first complete draft of the survey report for the Decadal survey is due sometimes in the next month. I everybody is working very very hard on that so hopefully we will be seeing that report before the next meeting that we have. Some upcoming Mars activities listed here. GSA is in October and that is an in person and virtual meeting. I think if you're going to GSA you do have to provide proof of a negative COVID test within certain amount of time before you arrive. Do check the GSA website if that is a conference you're planning on going to to check the latest on that. Some other events listed here also the MEPAG annual meeting we are hoping sometimes in late January or early February to be able to hold this meeting but that of course is TBD so we will keep you updated on that as well. Just a shot at the of them agenda one more time before I turn over the microphone to our next speaker. I think we are on time or maybe a little early. We will be having a status of the Mars program by Eric I Ensign and Michael Mayer and I will turn the microphone over to them and we will stop sharing so they can have their own slides. Standby.
One minute. I will be sharing next.
Do you have the ball?
I believe I just passed it to Barbara so she should be all set to go.
Thank you for the introduction. I will just wait for the slides to come up.

Excellent. As Aileen said I'm Eric I Ensign the director of the Mars exploration program a and I will be joined by Michael Mayer, our lead Mars scientist to give you an overview of what is happening with our Mars exploration program. You will hear more from the specific projects a little bit later today at I'm going to do a high-level overview.

It really has been an exciting time since last time that we talked. Perseverance has successfully acquired a pair of simple course from a rock called Rochette on Mars so really exciting and this is our first step on the way to having samples returned back to earth so really exciting. The helicopter has successfully flown a total of 13 flights. This is a little bit misleading here because it says that the operational demonstration phase is completed 13 flight. It is actually a total of the tech demo that was initially done prior to us transitioning over to the operational demonstration but it's a total of 13 flights and wildly successful and I will talk more about ingenuity and a moment. As Aileen mentioned, we have received applications for the international Mars ice mapper definition team and we were actually blown away by the amount of applicants as well as the quality of applicants. Really really strong and it is going to be tough to narrow it down to the core team but it is a good problem to have. We are really excited about that and I think you will all be excited when we are able to announce of that team. MSL have their proposals for their participating science program due on September 15th and November 5th for the step one and step two parts respectively. If you're interested in that, please, be prepared for that. Step 1 has ready passed in step 2 coming up. The other big event we are preparing for right now is the conjunction solar conjunction. Our process will begin on the 27th, today a and we are preparing all of our spacecraft and landers and rovers for capsular Conjunction so were getting them all set and they will be safe throughout that entire process and come back online later in October. As I mentioned there are several projects in debriefings later today so you will hear from Insight, MSL curiosity and Perseverance so we have several briefings coming up so I will give you high-level information but you will hear a lot more detail later in the day. And just to show you what you're seeing here on the right, I mentioned the successful acquisition of core samples. This is actually the first sample that was taken at Rochelle and you can see the core inside of the two so that was really exciting. On the bottom there is an image of Ingenuity taken from its traveling partner Perseverance using the mass cam Z camera.

A little bit more about the core sampling. As I'm sure everyone is aware the very first attempt was not successful and I will talk more in a moment about that. The team ended up putting together a ground in the loop sequence, a multi-saw plan to be able to confirm that the core was in the tube before sealing it. On the second sample they acquired they were able to streamline the process and be able to conduct it in a single cell. This is really useful to give some reassurance that the sample was indeed collected before sealing everything up and preparing it for cashing in a later collection. The first sample has -- I apologize to the scientist or to the French out there if I butchered any of the names here but Montdenier is the first sample and the second one is Montagnac both taken from the same Rochelle rock and I will show you a sample on the holes that were drilled. This will be after conjunction so we will leave everything as is and make some additional attempts after conjunction. Next slide.

As exciting as things are on Mars things are also exciting here on earth because we have a couple of new additions to our team one is a new addition and one is a change in role so first I would like to introduce Tiffany Morgan. If you're online, turn on your camera just so you can wave to people in a plea will be able to see you in person and Tiffany is joining us to be the MEP Deputy Director so she will be my deputy and will be my right hand on all activities we are doing within MEP. She comes to us from the Glenn research Center where she was a project manager for the solar electric propulsion project and has spent over a decade prior to that working for the Air Force space command, space force working on rapid space acquisition missions and satellite communication control and other activities for DOD. Really excited and Tiffany has been just great as far as digging in and getting involved in things immediately upon joining the team and has been a huge help to me so far and actually was instrumental in putting this presentation here today together so I'm just excited to have her on board, and I'm looking forward to you getting to know her a little better as we go forward and she gets more deeply involved in different activities. The other person that I would like to introduce is Becky McCauley Rench . Becky, if you are on and want to put your camera on for a second. Becky is not new to planetary science and has a little bit of experience as well with the Mars program. In fact, most recently she has been serving as the deputy program scientist on MSL for the past eight months under the mentorship of Michael Mayer. We made a decision to promote Becky to be the MSL program scientist and I'm sure she will continue to consult with Michael going forward but we had every competence to for Becky to be able to measure that project. I'm really excited about that and she has been with planetary science for a few years and she also leaves the planetary protection research and habitable worlds programs. She is also the program scientist for new horizons in the planetary data system. She is in astrobiologists and she actually had some history with curiosity back during an internship at Goddard under Paul Haffey. She's a perfect fit for this role and she has done such a great job as a deputy PS and Michael felt comfortable with us

having Becky sent into the role of program scientist. Just really excited about both of these folks taking on new roles on the team.

Some additional mission updates. Some of these you're going to hear more about later but I will touch on a few things. On InSight I believe InSight is on the agenda later and you will hear more about InSight but the solar array power generation trends indicate that the spacecraft has passed its lowest energy point so they are doing well with managing their power. And their preparing for a solar conjunction. One of the cool things that you may have seen reported recently is that InSight is identified as some of the largest earthquakes are Mars quakes that it has seen since it's been taking measurements so really cool and in fact, I don't know if anyone has seen, there is a TV commercial I think it is hmmm they what you call it earthquake on Marston before he answered it Mars quake I know all about that from what InSight has been doing so in any case , InSight has been continuing to do some great stuff and we will hear about them later. On MOMA the instrument is fully integrated with the Rosalind Franklin Rover. We are now also providing we NASA are providing some assistance to ESA with the power should testing so there is a drop test planned in Oregon later this fall so we are providing some assistance to our friends from ESA on that activity. Some of our ongoing missions. All of them are healthy and productive and fully funded through the end of FY 21 and we have plans for them to continue through FY 22. Odyssey now 20 years since its launch incredible and still going strong. It is operating on all stellar mode in order to be able to preserve the initial measurement unit lifetime so that is a great. MRO they had what we believe is a single event upset that put the spacecraft into safe mode. This was within the last month and it is back and operating nominally. MRO as well as also operating in all stellar mode to preserve its IMU. MAVEN they set a new system of record for throughput during a single communication session and the perseverance Rover they sent a total of 2.34 gigabytes and that will exceeded the previous record of 1.74 gigabytes and they used something called a low-density parity check encoder and that helped to contribute to this capability of being able to transfer. The ExoMars/TGO mission again our friends at ESA helping us out they continue to return over 55% of the total relay science from the Mars assets so just really grateful for the great work that they do their own helping to relay data back to earth.

Let's talk a little bit more about perseverance and the activities that have been happening there. This shows the journey of perseverance across the Jezero Crater since landing and February. The Octavia E Butler landing dating site and the rover drove south from there and attempted the collection at Rubion and that little curve there. After that unsuccessful attempt, the perseverance drove Northwest along Artebi Ridge in an area known as Citadel. If you look in that green insect there, you can see the outcropping of rock at the Citadel and these were images taken from perseverance, and you can see that circled rock that is a Rochette named after the town La Rochette in France. It is a relatively small rock and if you look over in the upper right you can see the drilled holes that were taken so there were two attempts taken or the two samples that were taken in September so you can see the two drill holes. Just very exciting so we are looking forward to making more collections after the solar conjunction.

Now let's head to the error. Air and talk about ingenuity. On the left you can see the ground track yellow line there on the 13 flights to date. You can see the initial deployment site and what was called the Wright brothers field a and it has continued to basically track the same general path of perseverance but what we have seen is that it has really been an effective reconnaissance platform for us because it has been able to image areas that were or are not accessible by Perseverance so it has been really exciting so after demonstrating that we Ackley actually could fly on Mars, transitioning over to our operational demonstration in which we are actually showing how we can use this type of platform in order to take aerial images and look at places were either Perseverance cannot go or perhaps looking ahead so we can get a better view of what is ahead of Perseverance. If you look in that middle image there you can see this is actually a Mosaic of the South region and these images would have been impossible to acquire from a Rover without diverting it from its path. This was a pretty cool thing that we were able to get that something that we would not ordinarily get with our rover itself and the quote you see there that ingenuity has become a valued and low-impact science partner, low-impact to perseverance. That quote is from the science lead and Ricky was really excited after seeing some of the images that have come back. It is becoming a reconnaissance asset, a science asset so just really cool that we are able to do this and for the future of what can happen someday with the aerial observations of Mars. If you take a look on the upper left you can see some more stats there of our flights and that's the total flight time so we have gotten significantly more than what was originally planned and the distance and the altitude just really great stuff so happy how this has worked out for us.

Let me touch on the international Mars I snapper eyes mapper. The concept study team is continuing to work on the framework of the January 2021 statement of intent among the partners so everyone is working together to help develop where we go from here. The partner agencies have completed a point design 2.0 and are developing a preliminary coordinated mission schedule. The concept study benchmarks leading towards

potential for further international agreement and facilitating a start to phasing. The space office has been an additional potential partner in this and they have been active participants in the study and potentially could contribute flexible solar arrays. So far that work is going well. As I mentioned earlier we have the reconnaissance and science measurement definition team. The intent is to target high-priority science measurements for human exploration, human led in sity site investigation and water ice resources for sustainable human exploration for example propellant. The call has been successful and we have had an international multidisciplinary group of applicants very high quality and a lot of them to choose from. The concept team is in the process of reviewing and selecting members and we are expecting an announcement hopefully in early October. But just very exciting and really thank you to anyone who applied to become a member of the MPT. I think it's going to be a great team. I think I'm handing it over to Michael at this point.

Thank you very much, Eric. I put this slide and we will put from Curiosity later and I want to point out that they are moving forward and their entering the region and is proven to be very interesting in that it is not a clear demarcation. But they have been doing fantastically well, taken 33 rock samples already and if you want some eye candy certainly go to the webpage and look at the 360 view of Rafael and the mountain and you will be truly missed from the mission. Also want to take this opportunity to say I'm really grateful for Becky McCauley Rench for stepping up. She is been a deputy for the last eight months and she has done a fantastic job and I'm really happy to take advantage of her capabilities and hand the reins of the mission over to her. I think MSL will do great and probably even better and I appreciate being able to rest assured that the mission will be well taken care of with Becky being the program scientist.

On the Mars sample return fund essentially I'm channeling the project itself and the program is in phase a so this is where a lot of the trade studies are going on and this is where as you dig deeper you find out what the technical issues are and how to sort them out and that is ongoing and we are on our way to KDP-B. The team is not really jelling together and the work that needs to be done is getting done. There are multiple technologies and engineering developments that are challenge. One of them is sealing the container that is going to contain the samples and looking at how to control the vector for the Mars ascent vehicle and also some of the there has been tests in the last two weeks looking at their earth entry system and how the structure survives impact. That is all going well. Just sort of where we are in the calendar is ESA earth return orbiter and phase B2/C/D is going well. The sample retrieval Lander and error shell landing engines have been put out for that. DC CRS been eject mechanism the request for proposals has gone out and earth entry system for that that contract is going to be released this coming month and for the Mars ascent vehicle the system integration request for proposals has been put out. All of that is moving along and we are very much in sort of a bare minimum of pieces that were due the trade study on so I think probably at the next MEPAG meeting will be a good time to have a more in-depth briefing on where Mars sample return is.

A few science updates. Concerning the Mars exploration program the Mars sample return science planning group 2 this is an activity that's been going on for a little bit more than a year. An international body of 31 people they finished a report. It is completed and has been presented to headquarters a and B papers for publication have been submitted to astrobiology and that's well on its way to hopefully come out this fall in time before AGU. There is a joint -- this is a U.S. ESA definition team and this is ongoing and they're looking at the actual steps of when you get a sample, what is the first step, what is the next step and handling the samples and in a receiving facility and also looking at how you would manage those samples and kind of a materials lab. We have on the books and in fact, a request for information has a ready been put out this last week on a receiving facility trade study plan for FY 22. This is the idea that we are collecting information and from that a call for a study to do the trade studies of different modalities for a receiving facility anywhere from what you consider in your typical bricks and mortar building that has everything you need in a diverse is something that is much more modular or even perhaps renting or releasing a BSL 4 type facility that we are able to get to the level of class that is needed for materials back from Mars. Inside we will hear more about Insight later and they put in a fantastic issue of science they came out in July, that nice picture on the cover and three major papers on the interior Mars. I think that is really a milestone in terms of our understanding of the planet particularly its interior. Also insight has been still very active and measured actually three new Mars quakes that we will hear more about so that is really exciting. Moon to Mars ice and prospecting challenge that went on this past weekend looking at how you can drill into Mars and it's a very fun and exciting activity for undergraduate and graduate students down in the Hamptons. The survey recommendation the planetary science conference is coming out in March and in terms of the RNA program and status analysis program we have gone through that and 31 of the 96 step 2 proposals have been selected and also for FINESST proposals four have been added for the Mars program. Eric, if you want to take a few specific questions now and leave time for discussion later in this first section of the MEPAG.

I think we are doing well on time.

Yes. We have time so I don't know how you want to do it. Aileen, if you want to just take the questions or --

Thank you for giving us enough time for discussion. Why don't we start with folks submitting