GOOD AFTERNOON. I'M DWAYNE BROWN FROM NASA'S OFFICE OF COMMUNICATIONS. THE RESEARCH TEAM HAS BEGUN SHARING THE UNPRECEDENTED IMAGES AND SCIENCE FINDINGS WITH THE WORLD. AND TODAY THEY HAVE MORE.

LADIES AND GENTLEMEN, THIS MISSION HAS CLEARLY BEEN EMBRACED BY THE ENTIRE WORLD OF ALL AGES.

IN FACT THE NUMBERS THAT ARE COMING IN WITH MULTIMEDIA, SOCIAL MEDIA, THE INTERNET, RADIO, TV IS IN THE BILLIONS.

WE ALSO WANT TO GAVE NASA HEADQUARTERS SHOUT OUT TO THE JOHNS HOPKINS PLATFORM IN LOWER MARYLAND FOR THE UNFORGETTABLE MOMENTS AT THEIR FACILITY THIS WEEK.
AND NOW WE'VE TRANSFERRED HERE TO NASA WHERE THE FUTURE MEETINGS WILL BE HERE. WE'LL HAVE A BRIEF PRESENTATION AND OPEN IT UP FOR QUESTIONS STARTING HERE, ON NASA CENTERS, SOCIAL MEDIA, IN THE PHONE LINES. SOCIAL MEDIA IS ABSOLUTELY EXPLODING THE MISSION. #PLUTO FLY BY. TWITTER, FACEBOOK, YOUTUBE AND OTHER NASA ACCOUNTS. AND IF YOU HAVE QUESTIONS SEND THEM IN #ASK NASA. AND CERTAINLY ALL THE INFORMATION YOU HAVE BEEN HEARING WILL HEAR TODAY AND IN THE WEEKS AND MONTHS WILL BE ONLINE AT WWW.NASA.GOV/NEW HORIZONS. LET ME INTRODUCE YOU.
NASA HEADQUARTERS.

ALLEN STERN, NEW HORIZONS

PRINCIPLE INVESTIGATOR TO

SOUTHWEST RESEARCH INSTITUTE IN

BOULDER, COLORADO.

RANDY GLADSTONE, NEW HORIZONS

FRA N BAGINAUGH NEW HORIZONS

CURRENT INVESTIGATOR AT

UNIVERSITY OF COLORADO, BOULDER.

WITH THAT TURN IT OVER TO YOU

DR. GREEN TO KICK US OFF.

>> TODAY WE'RE GOING TO TALK

ABOUT SOME OF THE FANTASTIC

DISCOVERIES ABOUT THE HEART OF

PLUTO.

BEFORE WE START THAT WHETHER I'D

LIKE TO DO IS REALLY TALK ABOUT

A LITTLE BIT THE HEART OF THE

NEW HORIZON MISSION.
FIRST I WANT TO THANK NPL AND SWERI IN PARTICULAR FOR ALL THE WORK THEY HAVE DONE TO MAKE THIS HAPPEN.

THERE IS A WHOLE SERIES OF CONTRACTORS THAT HAVE MADE THE MISSION A SPECTACULAR SUCCESS THAT IT IS.

APL HOSTING A FABULOUS EVENT THIS WEEK THAT MANY ATTENDED PERSONALLY, BUT MILLIONS ATTENDED VIRTUALLY.

WHICH HAS BEEN REALLY CAPTIVATING.

WHAT A HISTORIC WEEK. IN PARTICULAR THE HEART OF NEW HORIZONS IS BEATING AND BEATING WELL AND BEATING STILL.

WAS PUT ON AND PRODUCED BY THE DEPARTMENT OF ENERGY, ONE OF OUR MAJOR GOVERNMENT PARTNERS AND WITH HIS RADIOISOTOPE POWER.
ENABLES US TO MOVE FURTHER OUT INTO THE SOLAR SYSTEM.

47
00:03:54,449 --> 00:03:58,259
AND IT IS ON A TRAJECTORY TO LEAVE.

48
00:03:58,259 --> 00:04:02,889
CURRENTLY IT IS IF I CAN HAVE OUR FIRST GRAPHIC.

49
00:04:02,889 --> 00:04:08,268
HERE WE SEE NEW HORIZONS PASS PLUTO.

50
00:04:08,269 --> 00:04:11,510
THIS IS THROUGH THE EYES ON SOLAR SYSTEM THAT YOU CAN GET

51
00:04:11,509 --> 00:04:15,139
ACCESS TO THROUGH THE WEB. AND AS YOU CAN SEE IT IS MORE

52
00:04:15,139 --> 00:04:19,519
_THAN 2 MILLION MILES AWAY FROM PLUTO.

53
00:04:19,519 --> 00:04:23,069
FOR TEN YEARS OR NEARLY TEN YEARS THE NEW HORIZON TEAM WERE

54
00:04:23,069 --> 00:04:26,009
ALWAYS TALKING ABOUT EACH DAY WE'RE CLOSER TO PLUTO.

55
00:04:26,009 --> 00:04:29,920
NOW EACH DAY WE'RE FURTHER AWAY. BUT HERE IS WHERE IT COMES IN

56
00:04:29,920 --> 00:04:34,050
 THAT IS IMPORTANT TO REMEMBER. AND THAT IS, IT'S DURING THIS

57
00:04:34,050 --> 00:04:38,100
_TIME THAT WE'RE GOING TO BE ABLE TO OBTAIN THE DATA FROM THE
FLYBY. RIGHT NOW WE'VE ONLY RECEIVED
1-2% OF THAT DATA ON THE GROUND. BY NEXT WEEK WE'LL HAVE PERHAPS
AS MUCH AS 5 OR 6%. SO SOME OF THE DISCOVERIES YOU
ARE GOING TO BE HEARING ABOUT TODAY HAS ONLY BEEN THE TIP OF
THE ICEBERG AND THE FEW PERCENT WE'VE GOTTEN DOWN SINCE THE
ENCOUNTER OCCURRED ON TUESDAY NIGHT.
WITHOUT FURTHER ADO HERE IS DWAYNE TO INTRODUCE THE NEXT
SPEAKER. >> AND ALLEN, GO FOR IT.
ALL YOURS. SOMEONE WHO DOESN'T NEED AN
INTRODUCTION. >> FANTASTIC.
WELL WE'RE REALLY HAPPY TO BE HERE.
AND ON BEHALF OUR OUR ENTIRE TEAM WE'VE HAD THE MOST FUN COMMUNICATING ABOUT EXPLORATION AND ABOUT JUST HOW EXCITING SOLAR SYSTEM EXPLORATION IS THIS WEEK.

But I this Pluto is becoming sort of a brand. Sort of sells itself. And you don't really have to work all that hard. I do want to recognize the team members who are here. We have quite a number of members of the New Horizons mission team, if they would stand up to be recognized. [APPLAUSE]

Thank you very much. We also have and I'd like to recognize New some Horizons mission educators who are in the audience.
IF YOU WOULD STAND UP TO BE
81 00:06:08.370 --> 00:06:17.220 RECOGNIZED.
[ APPLAUSE ]

82 00:06:17.220 --> 00:06:20.580 AND THEN FINALLY, FINALLY I'D LIKE TO RECOGNIZE ONE OF OUR

83 00:06:20.579 --> 00:06:24.069 SCIENCE TEAM COLLABORATORS WHO'S COME OVER FROM EUROPE TO HELP US

84 00:06:24.069 --> 00:06:28.219 WORK WITH THE DATA A LITTLE BIT. SOME OF YOU MAY KNOW DR. BRIAN

85 00:06:28.220 --> 00:06:39.170 MAY.
[ APPLAUSE ]

86 00:06:39.170 --> 00:06:46.720 >> I'M THE GUY†-- I'M ONE OF THOSE PEOPLE IN EUROPE WHO'S

87 00:06:46.720 --> 00:06:52.250 BEEN FOLLOWING YOUR EVERY MOVE ON OUR LAPTOPS AND TVS AND IN

88 00:06:52.250 --> 00:06:55.110 OUR OFFICES AND IN OUR BEDROOMS. IT IS A THRILL TO BE HERE WITH

89 00:06:55.110 --> 00:06:56.949 YOU AND WHETHER AN AMAZING ACHIEVEMENT.

90 00:06:56.949 --> 00:07:01.329 YOU HAVE INSPIRED THE WORLD. THANK YOU.

91 00:07:01.329 --> 00:07:04.889 >> THANK YOU.
[ APPLAUSE ]
WELL, WHILE YOU ENJOY THIS BEAUTIFUL EYE CANDY, THE PLUTO SHARING SYSTEM IS REVEALED BY NEW HORIZONS IN COLOR.

YOU REALLY SEE A BINARY PLANET. ENJOY THAT VIEW WHILE I TELL YOU NEWS ABOUT NEW HORIZONS. THE SPACECRAFT IS DOING VERY WELL.

WE'RE NOW A LITTLE OVER 2 MILLION MILES ON THE FAR SIDE OF PLUTO.

SPACECRAFT IS PERFORMING ACCORDING TO PLAN.

WE EXITED THE 9 DAY POST APPROACH AND COUNTER LOAD JUST YESTERDAY. WE ARE NOW IN THE DEPARTURE SCIENCE LOAD.

LOOKING AT THE BACK OF THE PLANET AND LOOKING AT THE NIGHT SIDE AND DOING VARIOUS
EXPERIMENTS AND ALSO DOING OUR
DOWN DOWNS LINKING DATA.

104
00:07:50,180 --> 00:07:53,310
AND WE'VE BEEN DOWNLOADING A LOT
OF DATA.

105
00:07:53,310 --> 00:07:56,819
SO WE HAVE SOME BIG NEWS AND I
EXPECT WE'LL HAVE MORE BIG NEWS

106
00:07:56,819 --> 00:08:00,149
NEXT FRIDAY WHEN WE'VE
DOWNLOAD EVEN MORE.

107
00:08:00,149 --> 00:08:02,859
I'LL HAVE TO TELL YOU I'M A LITTLE
BIASED.

108
00:08:02,860 --> 00:08:05,770
BUT I THINK THE SOLAR SYSTEM
SAVED THE BEST FOR LAST.

109
00:08:05,769 --> 00:08:11,740
I'M GOING TO SHOW YOU THINGS AND
I'M GOING TO START WITH THE LITTLE

110
00:08:11,740 --> 00:08:14,310
NEWS AND PASS IT ALONG TO MY
COLLEAGUES.

111
00:08:14,310 --> 00:08:20,350
IF I COULD HAVE THE NEXT TIME
STEP, THE NEXT GRAPHIC.

112
00:08:20,350 --> 00:08:23,530
LET'S SEE IF WE CAN BRING THAT
UP.

113
00:08:23,529 --> 00:08:25,389
THERE IT IS.
OKAY THAT IS NOT VERY MANY

114
00:08:25,389 --> 00:08:27,589
PI XELS ACROSS.
BUT THAT IS PLUTO'S SATELLITE
NIX IN HIS FIRST IMAGE.
AS LITTLE AS THREE MONTHS AGO WE

DIDN'T HAVE PICTURES OF PLUTO
THIS GOOD.

AND THIS IS ACTUALLY ABOUT TWICE
AS MANY PIXELS AS THE BETH

EARTH-BASED VIEWS OF PLUTO.
WE WERE ABLE TO DETERMINE NIX'S

ABOUT 25 MILES ACROSS.

WE WERE ABLE TO MEASURE THE
BRIGHTNESS BETWEEN SHARON AND

IN THIS VIEW WE BELIEVE WE'RE

LOOKING DOWN THE POLL OF AN
ELONGATED OBJECT.

ABOUT TWICE AS NARROW IN ONE
DIRECTION AS IT IS LONG.

AND WE'RE LOOKING DOWN THE
BARREL OF IT RIGHT THERE.

WE'LL HAVE MORE TO SAY ABOUT NIX
WHEN WE GET MORE ON THE GROUND
BUT A FASCINATING SATELLITE.

MOVE TO THE NEXT TIME STEP.

THIS IS OVERLAY OF DATA FROM THE RALPH INSTRUMENT.

FOR THE FIRST TIME IDENTIFIES THE LOCATION OF A CARBON

MONOXIDE RICH REGION ON PLUTO THAT HAD BEEN OBSERVED FROM EARTH FOR QUITE A LONG TIME. NOW WE CAN ACTUALLY OVERLAY ON A MAP. NEW HORIZONS MAP PRODUCT THERE, OVERLAYED WITH CONTOURS FOR ABUNDANCE OF THIS CARBON.

AND YOU CAN SEE THE PEAK IS ON THE WEST SIDE OF TOMBO REGIO, OR THE HEART.

IT COULD BE THERE IS A SOURCE REGION THERE AND WE'LL BE LOOKING FOR IT HARD IN HIGH RESOLUTION IMAGERY.

OR THERE COULD BE ANOTHER
REVELATION.

138
00:10:11,549 --> 00:10:15,419
BUT EITHER WAY IT CATCH OURS EYE
BECAUSE ACROSS THE REST OF THIS

139
00:10:15,419 --> 00:10:20,490
DISC THERE IS NO OTHER CARBON
MONOXIDE CONCENTRATION, ANYTHING

140
00:10:20,490 --> 00:10:22,049
LIKE.
THIS WE ALREADY KNOW.

141
00:10:22,049 --> 00:10:25,698
THAT IT IS A VERY SPECIAL PLACE
ON THE PLAN.

142
00:10:25,698 --> 00:10:31,109
RANDY WILL SHOW YOU PROFOUND
RESULTS CONCERNING THE

143
00:10:31,110 --> 00:10:33,269
ATMOSPHERE.
IN FACT THE FIRST RESULTS WE'LL

144
00:10:33,269 --> 00:10:37,610
SHARE AND FRAN WILL SHARE WITH
YOU THE ESCAPING IONS FROM

145
00:10:37,610 --> 00:10:43,100
PLUTO.
AND JEFF IS GOING TO TALK ABOUT

146
00:10:43,100 --> 00:10:45,769
THE HIGH RESOLUTION.
I'M GOING TO GIVE YOU A PREVIEW.

147
00:10:45,769 --> 00:10:49,860
AT THE NEXT GRAPHIC.
HAVE A LOOK AT THE ICY FROZEN

148
00:10:49,860 --> 00:10:53,100
PLAINS OF PLUTO.
WHO WOULD HAVE EXPECTED THIS
AND BY THE WAY THIS SCENE IS ESSENTIALLY ADJACENT, NEIGHBORING THE MOUNTAIN RANGES THAT YOU SAW A COUPLE OF DAYS AGO.

WE CAN SEE THAT THERE ARE STARK CONTRASTS ON PLUTO IN TERMS OF THE GEOLOGY. JEFF WILL SHOW YOU A LOT MORE.

BUT I WANT TO SHOW YOU SOMETHING ELSE.

I'M GOING TO SHOW YOU A GRAPHIC. IT IS A FLYOVER MADE AS IF YOUR EYE WAS 25 MILES OVER PLUTO. AND WE CAN GO AHEAD AND START THAT. A FLYOVER OF FAR AWAY MOUNTAINS AND PLAINS IN THE QUAKER BELT. IF THEY CAN GO AHEAD AND CALL THAT UP. I THINK YOU WILL ENJOY SEEING
IT.
IF WE CAN LOWER†-- PROBABLY

00:11:31,509 --> 00:11:38,778
CAN'T LOWER HOUSE LIGHTS.
IS THAT AVAILABLE?

00:11:38,778 --> 00:11:41,600
WE CAN'T SEE IT BACK HERE.
THERE IT IS.

00:11:41,600 --> 00:11:46,459
WHAT YOU ARE LOOKING IS A SCENE
THAT IS ABOUT A TOTAL WIDTH

00:11:46,458 --> 00:11:50,188
ABOUT 250 MILES ACROSS, 400
KILOMETERS.

00:11:50,188 --> 00:11:55,889
AND THESE MOUNTAINS SOAR AS HIGH
ABOVE THEIR LOCAL TERRAIN AS

00:11:55,889 --> 00:12:01,429
MANY OF THE MOUNTAINS IN THE
ROCKY MOUNTAINS DO HERE IN THE
UNITED STATES.
PRETTY IMPRESSIVE.

00:12:01,429 --> 00:12:05,138
THE SECOND FLYOVER IS OF THE
PLANE WHICH I JUST SHOWED YOU

00:12:05,139 --> 00:12:14,769
WHICH WE'RE CALLING SPUTNIK
PLANEM.

00:12:14,769 --> 00:12:18,379
GIVES YOU A FEEL OF THE SCALE OF
FEATURES YOU WERE LOOKING AT.

00:12:18,379 --> 00:12:24,308
BEAUTIFUL SURFACES.
THIS IS 400 METER PER PIXEL
AND BY NEXT WEEK WE'LL HAVE MORE THAN TWICE AS MUCH AS THE THREE FRAMES WE'VE ALREADY BEEN ABLE TO SHARE BY THE END OF TODAY. AND WE'LL SHARE THAT WITH YOU AS WELL. WITH THAT I'M GOING TURN IT OVER TO THE RANDY GLADSTONE. >> THANKS ALLEN.

IF WE COULD GO TO THE FIRST TIME STEP.

AND I'LL SHOW YOU WHAT THE ATMOSPHERE IS LOOKING AT.

WE'VE HAD TO WAIT TILL WE GOT PAST PLUTO AND LOOKING BACK TOWARDS THE SUN TO GET OUR BEST DATA SET.

THIS SHOWS YOU WHAT IT LEASE LIKE WHEN PLUTO GOES IN FRONT OF THE SUN AS SEEN FROM THE SPACECRAFT.
AND THE CURVES ON THE RIGHT SHOW YOU TWO PLAUSIBLE ATMOSPHERIC MODELS FOR PLUTO. AND HERE WE SHOW YOU THE DATA WE GOT COMING DOWN. IT IS JUST COUNT RATE DATA.

EACH OF THOSE POINTS IS TEN SECONDS.

BUT WE GET A†-- FOR EVERY POINT ON THERE WE'LL GET A WHOLE SPECTRUM.

AND THEN ON THE WAY OUT IF WE FLIP IT YOU SEE THE GREEN LINE GOES BACK EXACTLY THE SAME SPOT.

SO THE ATMOSPHERE IS VERY SYMMETRIC ON OPPOSITE SIDES OF THE PLANET.

AND IT SEEMS TO BE MORE CONSISTENT WITH THE RED LINE WHICH IS MORE SLUGGISH.

SO WE'VE ALREADY ELIMINATED JUST FROM THIS LITTLE BIT OF DATA A
GLIMPSE OF THE DATA ELIMINATES A

COUPLE OF MODELS THAT WERE CONTENDERS UP TILL NOW.

SO THE NEXT SLIDE SHOWS YOU†-- THAT WAS ZOOMED IN AT JUST THE SURFACE OF PLUTO. BUT WE SEE THE ATMOSPHERE WAY FAR OUT.

SO THIS IS HOW OUR COUNT RATE WENT FROM THE BEGINNING ON THE LEFT TO THE END IN THE RIGHT IN THE RED AND WHITE CURVES AND PLUTO IN THE MIDDLE.

SO WE SEE THE ATMOSPHERE ALL THE WAY TO THE GROUND.

FROM EARTH THAT INNER CIRCLE AROUND CLOSE TO PLUTO IS THE HIGHEST STELLAR OPTICALS FROM EARTH CAN SEE.

AND THEY CAN'T SEE TO THE GROUND.

WE SEE FROM THE GROUND OUT TO 1,000 MILES ABOVE THE SURFACE.
SO YOU CAN SEE THIS ISN'T A STRAIGHT SIMPLE CURVE.

IT DROPS SLOWLY AND THEN PICKS UP AND THEN HAS ANOTHER BEND

WHERE IT PICKS UP AGAIN. AT THE HIGHEST ALTITUDES THAT IS

MOLECULAR NITROGEN. THE MAIN COMPONENT OF PLUTO'S

ATMOSPHERE AS IT STARTS TO ABSORB SUNLIGHT.

AND LOWER DOWN METHANE KICKS IN. AND EVEN LOWER IS HEAVIER HYDROCARBONS NEAR THE SURFACE ABSORBING THE SUNLIGHT.

SO EACH POINT ON THE GRAPH WILL BE A WHOLE SPECTRUM OF COLORS IN

THE ULTRAVIOLET LIGHT WE'RE GETTING THE SIGNAL FROM AND

WE'RE LOOKING FORWARD TO GETTING THAT DATA IN A MONTH OR TWO.

BUT IT IS VERY TANTALIZING RIGHT NOW AND IT ALREADY IS WE'RE ABLE

SO EACH POINT ON THE GRAPH WILL BE A WHOLE SPECTRUM OF COLORS IN
TO DO SCIENCE WITH IT.
BUT THAT NITROGEN ATMOSPHERE

00:15:19,068 --> 00:15:21,549
BECAUSE PLUTO IS SO SMALL, IT
ESCAPES DIRECTLY INTO THE SPACE.

00:15:21,549 --> 00:15:26,129
AND FRAN IS GOING TELL YOU WHAT
IT DOES.

00:15:26,129 --> 00:15:30,588
>> WE'VE HAD NINE AND A HALF
YEARS OF THIS FLIGHT OUT TO

00:15:30,589 --> 00:15:33,459
PLUTO TO THINK ABOUT WHAT ARE WE
GOING TO SEE WITH THE PLASMA

00:15:33,458 --> 00:15:39,438
INSTRUMENTS.
WE HAVEN'T GOT ALL THE DATA DOWN

00:15:39,438 --> 00:15:43,828
OZ F A YET AND WE'RE LOOKING
FORWARD TO GETTING IT DOWN.

00:15:43,828 --> 00:15:50,479
IN THE MEANTIME RANDY HAS
DISCUSSED ALREADY WE KNOW THE

00:15:50,480 --> 00:15:53,800
ATMOSPHERE IS NITROGEN AND WE
SUSPECT IT IS ESCAPING BECAUSE

00:15:53,799 --> 00:16:00,868
OF THE WEAKER GRAVITY ON PLUTO.
THE GRAVITY IS A LOT WEAKER THAN

00:16:00,869 --> 00:16:07,420
EARTH AND SO WE KNOW THAT IT'S
GOING AWAY.

00:16:07,419 --> 00:16:11,360
WHAT WE THINK IS HAPPENING IS
THAT THE SOLAR WIND THAT COMES
FROM THE SUN, THE PROTONS AND ELECTRONS RACING AT AT SPEEDS

WILL CRASH INTO AND INTERACT WITH THIS ESCAPING ATMOSPHERE

AND THIS WILL PRODUCE WE THINK A SHOCK UPSTREAM.

WE KNOW THERE IS AN UPSTREAM AMOUNT OF NITROGEN IONS.

WE'VE ALREADY OBSERVED THAT WITH NEW HORIZONS WITH THE PEPSI INSTRUMENT.

AND THAT WAS ENERGIZED BY THE SOLAR WIND AND CARRIED AWAY BY THE WIND.

THE REAL QUESTION IS WHAT HAPPENS WHEN IT INTERACTS WITH THE DENSER SOLAR WIND THAT RANDY WAS TALKING ABOUT.

AND THIS GRAPHIC YOU ARE LOOKING AT GIVES YOU A SENSE OF WHAT WE THINK HAPPENS.
AND IS THAT AS IT ESCAPES IT IS IONIZED AND PICKED UP BY THE SOLAR WIND. AND THE SCIENCE ACTUALLY FILLS OUT BEYOND THE SCALE OF THE SATELLITE. SO IT IS A LARGE VOLUME. WE HAVE ACTUALLY FLOWN THROUGH THIS WITH THE INSTRUMENTS. AND THE NEXT SLIDE WILL SHOW YOU WE THINK IS HAPPENING IS THAT SWAP NOW HAS ACTUALLY DETECTED THE IONIZED ATMOSPHERE. THESE ARE NITROGEN MOLECULES THAT ARE BEING IONIZED BY PHOTONS FROM THE SUN. AND ONCE THEY ARE IONIZE THEY GET ENTRAINED IN THE SOLAR WIND. AND CARRIED AWAY. SO WE SEE A TAIL BEHIND PLUTO OF PARTICLES THAT ARE BEING CARRIED AWAY BY THE SOLAR WIND. WHEN WE GET THE RECORDS BACK IN
AUGUST OR SO WE’LL BE ABLE TO

00:18:04,200 --> 00:18:15,390
QUANTIFY THE
AMOUNT OF THAT
ESCAPING ATMOSPHERE.

00:18:15,390 --> 00:18:19,700
WHAT WE THINK IT IS BASED ON
MODELS AND A PRETTY GOOD GUESS

00:18:19,700 --> 00:18:25,240
IS ABOUT 500 TONS PER HOUR OF
MATERIAL THAT IS BEING†-- THAT

00:18:25,240 --> 00:18:31,440
IS ESCAPING.
AND FOR COMPARISON WE KNOW THAT

00:18:31,440 --> 00:18:34,850
THE ESCAPING ATMOSPHERE FOR MARS
WHICH IS BEING STUDIED BY NASA’S

00:18:34,849 --> 00:18:44,559
MAVEN IS ABOUT 1 TON.
>> WHAT IS THE CONSEQUENCE OF

00:18:44,559 --> 00:18:48,500
THAT?
IF YOU ADD THAT UP ROUGHLY OVER

00:18:48,500 --> 00:18:55,369
THE AGE OF THE SOLAR SYSTEM,
THIS IS ON THE EQUIVALENT OF 1

00:18:55,369 --> 00:18:59,389
TO 9,000 FEET.
SO THAT IS A SUBSTANTIAL

00:18:59,390 --> 00:19:03,520
MOUNTAIN OF ICE.
NITROGEN ICE THAT IS BEING

00:19:03,519 --> 00:19:07,829
REMOVED FROM THIS EVAPORATION
AND ESCAPE INTO THE ATMOSPHERE.
AND ALLEN STERN HAS WORKED PREDICTING WHAT THIS WILL DO TO
THE GEOLOGY.
AND THEY HAVE A PREDICTION

BUT JEFF ARE GOING TO LOOK AT
THE GEOLOGY AND TELL US WHAT ACTUALLY HAPPENED.

>> INDEED WE WILL.
WELL I'M STILL HAVING TO REMIND
MYSELF TO TAKE DEEP BREATHS.
THE LANDSCAPE IS JUST
ASTOUNDINGLY AMAZING.
IN FACT LET'S GO BACK TO THIS
PICTURE THAT WE TALKED ABOUT A FEW DAYS AGO WHEN IT WAS STILL A
SURFACES ARE THE PEPPERED WITH THE IMPACT CRATERS AND ARE
MILLIONS OF YEARS OLD.
SOME OTHER REGIONS SUCH AS THE
INTERIOR OR THE HEART SHOW NO CRATERS AT ALL.

AND OBVIOUSLY YOUNGER. 
AND ALL OF THIS SHOWS THAT PLUTO

HAS A LONG AND COMPLEX GEOLOGICAL HISTORY.

SOME OF THE CRATERS APPEAR PARTIALLY DESTROYED, PERHAPS BY

EROSION.
AND THERE ARE ALSO PARTS OF

PLUTO'S CROSS THAT HAVE BEEN FRACTURED AND THERE'S

PROBABLY BEEN SOME FORCES OF THE TECTONICS.

AND ALSO HIGHER RESOLUTION IMAGES SHOW THERE ARE CRATERS

THAT MAY HAVE BEEN PARTIALLY ERODED WAY.

SO EROSION PROCESSES ALSO SEEM TO BE OPERATING ON PLUTO.

AND THE NEXT TIME STEP, PLEASE. NEXT SLIDE PLEASE.

SO LET'S ZOOM IN TO OUR THREE
IMAGE MOSAIC OF THE 400 METER

00:20:58,890 --> 00:21:00,840
PER PIXEL IMAGING THAT WE'VE TAKEN.

00:21:00,839 --> 00:21:06,179
HERE ARE THE PROVINCES OF THE TWO MILE HIGH MOUNTAINS WHICH

00:21:06,180 --> 00:21:19,140
WE'RE NOW CALLING ENORGEMONTEZ AND THE EXTREMELY YOUNG PLAINS

00:21:19,140 --> 00:21:24,090
MAKING UP THE NORTHERN HALF OF THE IMAGE.

00:21:24,089 --> 00:21:39,159
THIS IMAGE IS ORGANIZED NORTH AND SOUTH.

00:21:39,160 --> 00:21:43,259
YOU SEE HERE ARE THE NAMES WE'VE ASSIGNED TO THEM.

00:21:43,259 --> 00:21:47,500
WE DECIDED TO NAME SPUTNIK PLANUM AFTER THE FIRST

00:21:47,500 --> 00:21:56,140
ARTIFICIAL SATELLITE LAUNCHED INTO THE SPACE AND STARTING THE

00:21:56,140 --> 00:22:00,900
SPACE AGE. AND FIRST NEPALESE TO HAVE A

00:22:00,900 --> 00:22:06,670
NAME ON ANY PLANET IN THE SOLAR SYSTEM.

00:22:06,670 --> 00:22:09,000
LET'S HAVE THE NEXT TIME STEP, PLEASE.
LET'S LOOK AT THIS LITTLE REGION HERE IN THE MIDDLE OF SPUTNIK PLANUM.
I SAW THIS IMAGE THE FIRST TIME I DECIDED I WAS GOING TO CALL IT NOT EASY TO EXPLAIN TERRAIN.

THIS IS THE FROZEN PLAINS OF PLUTO.

WHEN YOU LOOK AT THIS PLAINS, YOU CAN CLEARLY SEE VAST COLLATE CRATERLESS PLAINS.
JUDGING FROM THE ABSENCE OF CRATERS IT IS CLEAR THAT SPUTNIK PLANUM COULDN'T BE OLD POSSIBLY MORE THAN A HUNDRED YEARS OLD. AND STILL BE SHAPED BY TECTONIC PROCESSES.

THIS IS ABOUT A HALF A MILE ACROSS.

THE SURFACE IS BROKEN INTO THE Polygonally shaped segments.
THAT ARE ROUGHLY 12-20 MILES ACROSS.

THEY ARE BORDERED AS YOU CAN SEE BY APPEAR TO BE SHALLOW TROUGHS.

SOME OF THESE TROUGHS HAVE DARKER MATERIAL THAT SEEMS TO BE IN MATERIAL THAT'S COLLECTED THERE OR Erupted THERE.

I DON'T KNOW. BUT SOME OF THE TROUGHS DO HAVE WHAT APPEARS TO BE JUST DARK STUFF.

MUCH MORE ENIGMATIC ARE THESE CLUSTERS OF HILLS WHICH I THINK YOU CAN SEE IN THE UPPER RIGHT OF THE FRAME.

THEY APPEAR TO BE ELONGATED LUMPS OF MOUNDS AND TRACE OUT THE SHAPES OF THE TROUGHS THAT ENCIRCLE THE POLYGONS.

ABOUT THE ONLY THING YOU CAN SAY FOR THE HILLS EXCEPT FOR THEIR SMOOTHNESS IS THAT THE HILLS ARE
HIGHER THAN THE SURROUNDING TERRAIN.
WE DON'T HAVE A VALUE FOR THAT YET BUT THIS IS PART OF A BIGGER SEQUENCE WE TOOK.

SO WHEN WE GET THE DATA DOWN WE CAN TELL YOU EXACTLY HOW HIGH

AND EXACTLY HOW THEY ARE SHAPED WHICH WILL GO A LONG WAY TO IN FACT HELP US INTERPRET WHAT CREATED THESE HILLS.

WE HAVE†-- WE SUSPECT THE HILLS MAY HAVE EITHER BEEN PUSHED UP FROM UNDERNEATH ALONG THE CRACKS.

BUT ALTERNATIVELY ANOTHER EXPLANATION IS THEY ARE EROSION RESISTANT NOBS STANDING OUT AS THE SURFACE IS BEING LOWERED.

WE DON'T KNOW WHICH IS CORRECT BUT THEY CAN GO EITHER WAY.

THEY CAN EITHER BE POPPING UP OR EMERGING FROM EROSION LOWERING.
PROCESS THAT IS LOWERING THE ENTIRE PLAINS.

IN THE TERRAIN IN THE LOWER RIGHT I THINK YOU CAN SEE THERE ARE POLYGONS APPEAR TO BE ETCHED BY FIELDS OF SMALL PITS.

WE'LL VERY SOON RECEIVE THE SAME IMAGES WITHOUT ANY COMPRESSION.

AND I THINK THE ISSUE OF WHETHER THAT IS INDEED VAST SCENES OF PITS WILL BE VERIFIED PROBABLY PRETTY STRAIGHTFORWARD WAY.

SIMILAR FEATURES TO THESE VAST PITTED SURFACES CAN BE SEEN, FOR INSTANCE, ON THE SURFACES OF GLACIERS HERE ON THE EARTH.

AND ON RESTIAL TERRESTRIAL. >> WHAT DO THESE FEATURES TELL US?

ONE IS THAT THE POLYGONS ARE SIGNS OF CONVECTION OCCURRING WITHIN A SURFACE LAYER OF THE
CARBON MONOXIDE METHANE AND NITROGEN IONS DRIVEN FROM THE INTERIOR OF PLUTO ITSELF CREATING KIND OF THE SAME SORT OF PATTERNS YOU SEE WHEN YOU LOOK AT THE SURFACE OF A BOILING POT OF OATMEAL OR LIKE THE BLOBBS IN A LAVA LAMP.

ALTERNATIVELY THEY COULD BE ANALOGOUS TO MUD CRACKS AND CREATED BY CONTRACTION OF THE SURFACE MATERIALS.

WE HAVE WAYS TO TEST THOSE IDEAS AND WILL BE REPORTING IN UPCOMING CONFERENCES AND SCIENTIFIC PAPERS.

AND WE'LL LEARN MORE ABOUT THESE FEATURES AND TERRAIN IN MUCH HIGHER RESOLUTION AND STEREOCOVERAGE WHICH IS STILL UP ON THE SPACECRAFT IS GOING TO COME DOWN IN THE NEXT FEW MONTHS.

AND IN FACT I THINK 20 YEARS AGO PEOPLE ARE GOING TO LOOK AT THE
FOOTAGE OF THE THIS AREA IN PARTICULAR.

IT JUST WORKED OUT THAT WAY THAT, YOU KNOW, THE FACETS FAVOR US TO PUT THE MOST INTERESTING PLACES DIRECTORY IN THE SIGHTS OF YOU ARE A HIGHEST QUALITY DATA.

TO BE MORE SPECULATIVE WE ALSO SAW ONE OTHER THING.

LET'S ZOOM INTO THIS AREA THAT IS JUST NORTHWEST OF THE ONE YOU JUST LOOKED AT. THERE YOU GO.

SO THESE DARK SMUDGES APPEAR TO BE ALIGNED AND RUNNING FROM UPPER LEFT TO LOWER RIGHT. AND MAY HAVE BEEN PRODUCED BY WINDS BLOWING ACROSS PLUTO'S ICY SURFACE.

MAY I HAVE THE NEXT SLIDE PLEASE.
AND SO ON BOTH MARS AND EARTH SIMILAR FEATURES ARE WHAT

SCIENTISTS CALL WIND STREAKS AND ARE PREVAILING CAUSE EROSION OR

DEPOSITION MATERIAL BEHIND THE TOPOGRAPHIC OBSTACLES.

AND DON'T ASK WHAT THE TOPOGRAPHIC OBSTACLES ARE

BECAUSE WE CAN'T TELL YOU YET. AND ALTERNATIVELY THIS IS EVEN

MORE SPECULATIVE THEY MAY BE PLUME DEPOSITS.

THE PLUMES THEMSELVES F THEY EXIST ON PLUTO HAVE NOT BEEN

SPOTTED YET. SO THIS IS NOT AN ANNOUNCEMENT

THAT WE'VE SPOTTED PLUMES OR GEYSERS OR ANYTHING LIKE ON

PLUTO BUT OF COURSE WE'LL BE LOOKING FOR THEM.

LET ME CONCLUDE BY SAYING THESE ARE EARLY DAYS OF THE POST

ENCOUNTER ANALYSIS AND AS
EXTRAORDINARY AND PROVOCATIVE AS

00:28:49,329 --> 00:28:53,480
THESE IMAGES ARE, WE ARE IN THE
MOST PRELIMINARY STAGES OF

00:28:53,480 --> 00:28:58,190
INVESTIGATIONS AND WE'RE STILL
ENTERTAINING THE WIDEST RANGE OF

00:28:58,190 --> 00:29:00,890
HYPOTHESES.
WE ARE ACUTELY AWARE THAT

00:29:00,890 --> 00:29:03,730
JUMPING TO CONCLUSIONS COMES AT
GREAT PERIL.

00:29:03,730 --> 00:29:08,740
WITH THAT CAVEAT BACK TO DWAYNE.
>> THANK YOU ALL.

00:29:08,740 --> 00:29:16,339
LET'S GIVE THIS TEAM A ROUND OF
APPLAUSE.

00:29:16,339 --> 00:29:24,269
[ APPLAUSE ]
>> MUCH MUCH MORE TO COME.

00:29:24,269 --> 00:29:27,319
NOW WE TRANSITION INTO THE Q AND
A.

00:29:27,319 --> 00:29:30,490
WE'RE GOING TO START HERE WITH
NASA HEADQUARTERS AND THE

00:29:30,490 --> 00:29:36,890
MEETING AND AUDIENCE AND THEN
ANY QUESTIONS FROM PHONE BRIDGE

00:29:36,890 --> 00:29:40,560
AND OF COURSE SOCIAL MEDIA.
WAIT FOR THE MIC.
RAISE YOUR HAND.
AND GIVE YOUR NAME AND

AFFILIATION, PLEASE.

>> STEVEN YOUNG WITH ASTRONOMY NOW MAGAZINES.
WE HEARD HOW THIS IS JUST THE

TIP OF THE ICEBERG AND ALSO IN
THE IMAGES, YOU CAN SEE THEY ARE

COMPRESSED.
CAN YOU QUALIFY HOW MUCH YOU

HAVE ON THE GROUND RIGHT NOW
VERSUS HOW MUCH SON THE

SPACECRAFT WAITING TO COME DOWN
AND WHAT IS THE DIFFERENCE GOING

TO BE WHEN WE SEE THE
UNCOMPRESSED VERSION.

>> IN VERY ROUND NUMBERS WE HAVE
ABOUT 50 GIGA BITS OF DATA THAT

WAS MADE IN THE BEGINNING ABOUT
TEN DAYS BEFORE CLOSEST

AND THAT 50 GIGA BITS IS THE
FULL AMOUNT WE'LL STORE THROUGH THE END OF THIS MONTH.

INCLUDING THAT WHICH WE HAVEN'T YET TAKEN.

ALL THAT WILL COME TO THE GROUND WITH LESS COMPRESSION.

ABOUT 2 TO 1 COMPRESSION, IT DOESN'T INTRODUCE ANY SORT OF NOISE.

BUT THE OTHER COMPRESSION CAN GET IMAGES TO THE GROUND WITH EXPENSE OF SOME NOISE.

VERY EFFICIENT AT THE BEGINNING TO SEND HOME THE BROWSE DATA SET, AS WE CALL IT. CONCERTED EFFORT TO GET EVERYTHING TO THE GROUND THAT CAN BE COMPRESSED WILL BEGIN IN SEPTEMBER. AND THAT WILL TAKE ABOUT 10 WEEKS, MAYBE 12. DEPENDING UPON DSN SCHEDULES AND OTHER FACTORS. WE CURRENTLY HAVE ON THE GROUND
LESS THAN 1 OF THOSE 50 GIGA BITS.

PROBABLY AROUND 1 GIGA BIT. WE CAN GET YOU A MORE ACCURATE NUMBER IF IT'S HELPFUL.

>> ERIC HAND WITH SCIENCE MAGAZINE.

MY QUESTION IS FOR RANDY.

YOU MENTIONED THAT YOU THINK YOU HAVE RULED OUT THIS TURBULENT MODEL FOR THE ATMOSPHERE AND YOU THINK IT'S MAYBE MORE SLAGGISH OR STAGNANT.

WHAT ARE THE IMPLICATIONS OF THAT FOR TRANSPORT OF MATERIALS AROUND THE PLANET VIA FROST?

AND DOES IT, YOU KNOW, HAVE ANY EFFECTS ON MAYBE WHAT YOU ARE STARTING TO SEE ON THE SURFACE WITH THESE WIND STREAKS?

IS THIS AN ATMOSPHERE THAT BLOWS AROUND ALL THE TIME OR MAYBE NOT?
SO MUCH.

>> YEAH.

GOOD QUESTION.

WE STILL DON'T HAVE A GOOD MEASURE OF THE LOWEST ATMOSPHERE WHERE IT'S VERY COMPLICATED.

WE THINK OF ALL THE ATMOSPHERE ON PLUTO AS SORT OF COMPRESSED INTO A VERY THIN LAYER ON THE SURFACE WHERE THE WINDS CAN BE UP TO A FEW METERS PER SECOND, EASILY.

AND THOSE NUMBERS ARE GOOD ENOUGH TO LAUNCH OR LOFT PARTICLES OFF THE SURFACE, YOU KNOW, MICRON SIZES.

SO IT IS NOT INCONSISTENT AT ALL EVEN WITH A SLUGGISH ATMOSPHERE.

TO BE ABLE TO MOVE STUFF AROUND STILL.

WE THINK IT IS FINE, OR CONSISTENT, SO FAR.
434
00:32:41.630 --> 00:32:45.850
AT THIS POINT HAVE YOU LEARNED
ANYTHING THAT WILL HELP YOU
UNDERSTAND WHAT HAPPENS ON THE
SURFACE OF PLUTO HAS IT GOES
THROUGH ITS LONG ORBIT?
>> WE'VE UNDERSTOOD THE PHYSICS
OF MULTIPLE TRANSPORT COUPLED
WITH THE ATMOSPHERIC ESCAPE VERY
WELL FOR A LONG TIME.
BUT HAVEN'T HAD THE BOUNDARY
CONDITIONS TO BE ABLE TO RUN
THOSE MODELS IN A WAY WE'D LIKE
WE DON'T KNOW, WE HAVEN'T KNOWN
UNTIL NOW THE DETAILS OF WHERE
THE BRIGHT AREAS ARE AND THE
DARKER ONES ARE.
AND THAT CAN RELATE TO WHERE
AREAS HEAT UP.
PARTICULARLY PLACES DEVOID OF
MOLECULES MIGHT HAVE HIGHER
SWINGS.
IN THE COMING MONTHS WE'RE GOING TO SEE MANY MORE MAPS COME TO THE GROUND ALL OF WHICH WILL MAKE TREMENDOUS INPUT TO BE ABLE TO INFORM US TO RUN THE MODELS TO THE REAL PLUTO.

AND NEW HORIZONS PAY LODE WAS SELECTED TO MAKE THOSE KIND OF ANSWERS AND QUESTIONS. BECAUSE THE SURFACE IS ELLIPTICAL AND THE PLANET’S POLE VECTOR IS TILTED OVER. IT'S OBLIQUITY IS VERY HIGH. IT IS A PRETTY COMPLEX SITUATION. WE KNOW HOW TO MODEL IT AND ONCE WE GET THIS DATA ON THE GROUND I THINK WE'RE GOING TO GET SOME SPECTACULAR RESULTS. IT WILL SHOW US NOT WHAT HAPPENS AROUND A 248 YEAR ORBIT WHICH ITSELF IS INTERESTING BUT OVER
Much longer time scales. I'm interested in how the

457
00:34:28,099 --> 00:34:31,730
VOLATILES TRANSPORT OVER LONG
TIMES AROUND THE PLANET AND

458
00:34:31,730 --> 00:34:34,980
WHETHER SUFFICIENT MATERIAL
MOVES AROUND THE PLANET TO

459
00:34:34,980 --> 00:34:41,690
ACTUALLY OR TO POTENTIALLY BURY
STRUCTURES OR BE REMOVED FROM

460
00:34:41,690 --> 00:34:47,740
STRUCTURES SO THAT WE SEE THEM
AT DIFFERENT TIMES IN PLUTO'S

461
00:34:47,739 --> 00:34:52,018
SEASONAL CYCLES.
THE CLIMATE CYCLES HAVE VERY

462
00:34:52,018 --> 00:34:55,108
LONG PERIODS IN SOME CASES.
EVERYBODY IS AWARE OF THE 248

463
00:34:55,108 --> 00:34:58,400
YEAR ORBITAL CYCLE.
BUT THE POLE VECTOR ACTUALLY

464
00:34:58,400 --> 00:35:02,230
CIRCULATES OVER A 4 MILLION YEAR
CYCLE WHICH AVERAGES OVER MANY

465
00:35:02,230 --> 00:35:04,740
MANY ORBITS.
RUNNING THE MODELS IS GOING TO

466
00:35:04,739 --> 00:35:07,278
BE FASCINATING AND WE'RE GOING
TO HAVE THE DATA ON THE GROUND

467
00:35:07,278 --> 00:35:12,730
TO DO IT.
REALLY HAM TER NAIL ON THE HEAD.
I'm going to go to the phone lines and for the media like we've had at all of our briefs. Lots of media from around the world are going to ask questions.

I want to get to as many as possible.

So please limit your questions to one.

On the phone line first NBC News, Allen Boyle.

Thank you. This might be for Jeff or Allen.

Just looking at that hilly terrain and potential for plumes, can you say anything further about whether there is Triton-like terrain? What sorts of similarities do you see to what folks have seen on Triton and how do you hope to
RESOLVE THE ISSUE ABOUT THOSE PLUMES OR WIND STREAKS?

FIRST OF ALL, AS I SAID BEFORE WE ARE NOT MAKING AN ANNOUNCEMENT THAT WE'VE SEEN PLUMES IN ANY WAY.

AS FAR AS COMPARING TO TRITON, WELL THE SAD STORY FOR TRITON IS IT DIDN'T HAVE A NEW HORIZONS ENCOUNTER.

THE DATA SET WE HAVE FOR TRITON IS ABOUT TWICE AS WELL LET ME PUT IT THIS WAY. THE VERY BEST IMAGES WE EVER TOOK OF TRITON UNDER THE BEST OF CIRCUMSTANCES ARE ONLY JUST AS GOOD AS THE PICTURES WE'VE SHOWN YOU SO FAR.

AND ALMOST ALL OF TRITON'S IMAGE ARE MUCH WORSE RESOLUTION OF THE IMAGES THAT WE'VE SHOWN YOU. AND OUR IMAGES IN CONTRAST. THESE ARE JUST KIND OF THE
MIDDLE RESOLUTIONS FOR US

00:36:44,159 --> 00:36:47,440
COMPARED TO THE REALLY GOOD
STUFF WE HAVEN'T EVEN SEEN YET.

00:36:47,440 --> 00:36:51,960
IT IS HARD TO COMPARE PLUTO AND
TRITON IN SUBSTANCE BECAUSE WE

00:36:51,960 --> 00:36:55,568
NEED TO SEE TRITON BETTER.
HAVING SAID THAT.

00:36:55,568 --> 00:37:00,518
NOT ONLY DID THE SCIENTISTS IN
1989 SEE ACTIVE PLUMES ON

00:37:00,518 --> 00:37:05,278
TRITON, TRITON APPEARED TO BE
COVERED WITH A NUMBER OF DARK

00:37:05,278 --> 00:37:09,548
ALIGNED MARKS WHICH ARE
INTERPRETED AS WIND STREAKS.

00:37:09,548 --> 00:37:13,278
SO TO THE EXTENT THAT WE CAN
COMPARE OUR GOOD DATA WITH

00:37:13,278 --> 00:37:16,650
TRITON DATA AND THE BEST TRITON
DATA WAS ACTUALLY OVER THEIR

00:37:16,650 --> 00:37:23,449
WIND TERRAIN.
WEATHER COMPARABLE.

00:37:23,449 --> 00:37:26,680
>> JEFF IT'S PROBABLY WORTHWHILE
TO SPEAK TO THE COMPARATIVE

00:37:26,679 --> 00:37:30,149
DIFFERENCES TO DO WITH OUR
DETECTION OF MOUNTAIN RANGES
RIGHT OFF THE BAD AND THE POLYGONAL TERRAIN.

>> FOR ONE THING, PEOPLE HAVE FOR MANY YEARS, WONDERED WHETHER
TERRAINS YOU SEE ON THE GIANT

ICY MOONS OF THE GAS AN GIANTS WERE MADE THAT WAY BECAUSE OF A

PROCESS CALLED TIDAL HEATING WHERE THE MOONS INTERACT WITH

THEMSELVES AND THE BODY THEY ARE ORBITING AROUND TO BASICALLY

HEAT UP THE INTERIORS THROUGH FRICTION.

AND PEOPLE SEE VOLCANOS ERUPTING THEY ATTRIBU TE IT TO THIS

PROCESS TIDAL TORQUE HEATING. BUT THE QUESTION, COULD ICY

WORLDS ALSO BE GEOLOGICALLY ACTIVE?

AND THE ANSWER IS OBVIOUSLY YES. PLUTO IS EVERY BIT AS
GEOLOGICALLY ACTIVE AS ANY PLACE WE'VE SEEN IN THE SOLAR SYSTEM.

AND THIS ANSWERS A FUNDAMENTAL QUESTION ABOUT ARE ICE WORLDS ABLE TO DO THEIR THING ON THEIR OWN RIGHT OR THE HELP OF THE BIG PLANETS THEY ORBIT AROUND.

>> NEXT UP PETE STOTTS, CHRISTIAN SCIENTIST MONITOR.

DR. MOOR I THINK, ONE OF THE DETAILED QUESTIONS WHEN YOU WERE TALKING ABOUT THE HEIGHTS OF THESE HILLS AS BEING ABOVE THE SURROUNDING TERRAIN.

IS THAT THE TERRAIN TRENCHES OR THE ACTUAL INTERIORS OF THE POLYGONS. AND DO YOU HAVE ANY DEPTH ESTIMATES FOR THE TROUGHS AND ANY BALLPARK ESTIMATES FOR THE HEIGHT OF THE HILLS.

>> THE HEIGHT OF THE HILLS.
APPEAR†-- AND WE DON'T HAVE ANY QUANTITATIVE DATA TO SAY MUCH

MORE THAN THIS. APPEAR TO BE A LITTLE HIGHER

THAN THE SURFACE REPRESENTED BY THE POLYGONS.

WE DON'T HAVE ANY DIRECT MEASUREMENT OS SHADOWS AND SO

ON. AS I SAID BEFORE WE'LL BE RECEIVING DATA SIX OR SEVEN TIMES HIGHER RESOLUTION AND IN

STEREO. SO WE CAN GIVE YOU THE ANSWER

EXPLICITLY VERY SOON IN THE NEXT FEW MONTHS.

>>KEN KRAMER, UNIVERSITY TODAY. >> GREAT RESULTS.

MY QUESTION ALSO ON THE POLYGONS.

PHOENIX LANDED ON POLYGONS A FEW YEARS BACK.
IS THAT A REASONABLE COMPARISON AT ALL?

IS THERE ANY RELATIONSHIP TO THEM AT ALL?

OR ARE THEY TOTALLY DIFFERENT?

>> YOU ARE RIGHT THAT WHEN YOU LOOK AT LARGE POLYGONS ELSEWHERE IN THE SOLAR SYSTEM, THE SURFACE THAT IS MOST REMINISCENT OF THE SURFACE WE ARE LOOKING AT IS THE HIGH ALTITUDES†— SORRY, THE HIGH LATITUDES OF THE NORTHERN HEMISPHERE OF MARS. AND INDEED THE PHOENIX LANDER DID LAND ON SUCH POLYGONAL TERRAIN NEAR THE ARCTIC OF MARS.

HAVING SAID THAT WE'RE ENTERTAINING TWO ALTERNATE EXPLANATIONS AND I THINK RIGHT THIS SECOND THE GEOLOGY TEAM MAY WEAKLY FAVOR THE IDEA THAT SOME FORM OF INTERNAL CONVECTION MAY BE RESPONSIBLE.
BUT AS I SAID WE ARE STILL VERY

00:41:02.539 --> 00:41:06.539
VERY OPEN TO THE IDEA THAT THESE
COULD BE DUE TO CONTRACTION AND

00:41:06.539 --> 00:41:12.460
THERMAL CONTRACTION FORMING THE
POLYGONS, ESSENTIALLY

00:41:12.460 --> 00:41:15.329
RESPONSIBLE FOR THE POLYGONS ON
MARS.

00:41:15.329 --> 00:41:20.059
THAT IN COMBINATION WITH
SO COULD BE MORE ANALOGOUS.

00:41:20.059 --> 00:41:26.278
IT IT IS JUST REALLY TOO EARLY
TO SAY.

00:41:26.278 --> 00:41:28.809
>> WE'RE STILL ON THE PHONE
LINE.

00:41:28.809 --> 00:41:31.630
WE'RE GOING TO DO THREE MORE
CALLS FROM THE PHONE.

00:41:31.630 --> 00:41:33,930
SOCIAL MEDIA AND THEN WE'RE
GOING TO COME BACK HERE FOR THE

00:41:33,929 --> 00:41:39,149
MEDIA IN THE AUDIENCE.
DAVE MOSIER.

00:41:39,150 --> 00:41:42,430
FROM BUSINESS INSIDER.
>> THANK YOU.

00:41:42,429 --> 00:41:45,710
CONGRATULATIONS ON THE MISSION.
THIS IS FOR JIM.

CONGRATULATIONS ON THE MISSION. THIS IS FOR JIM.
MAYBE FOR ALLEN.
YOU MENTIONED THE BEATING HEART OF NEW HORIZONS.
THERE IS ONLY SO MUCH PLUTONIUM LEFT.
HOW IS THE CURRENT SUPPLY CRUNCH LIMITING FUTURE MISSIONS NASA IS DREAMING UP?

CURRENTLY WE HAVE OUR PLUTONIUM IS BEING OF COURSE MANAGED BY THE DEPARTMENT OF ENERGY.

WE DO HAVE A FAIR AMOUNT OF IT. IT IS APPROXIMATELY 17 OR SO KILOGRAMS OF PLUTONIUM THAT IS AVAILABLE TO US THAT COULD BE USED RIGHT AWAY.

WE HAVE ADDITIONAL PLUTONIUM.

IT DOESN'T HAVE QUITE THE ENERGY DENSITY WE NEED TO ACTUALLY USE IN THESE MISSIONS.

BUT WE'VE ALSO BEEN GIVEN
APPROVAL BY CONGRESS AND SUPPORT
BY THE ADMINISTRATION TO BE ABLE

00:42:32,940 --> 00:42:35,599
TO START GENERATING PLUTONIUM 238.

00:42:35,599 --> 00:42:40,420
 THAT IS REALLY GOOD NEWS.
 THE DEPARTMENT OF ENERGY HAS

00:42:40,420 --> 00:42:46,499
 CREATED A PROCESS, AND THEY HAVE
 VERIFIED IT, TO TAKE NEPTUNEIUM

00:42:46,498 --> 00:42:51,980
 IRRADIATE IT IN SOME OF THE
 REACTORS AND THE REACTION ENDS

00:42:51,980 --> 00:42:56,619
 UP PROVIDING ONE OF THE BOILING
 POINTS OF THE PLUTONIUM 238 AND

00:42:56,619 --> 00:43:00,349
 THEN THAT CAN BE EXTRACTED AND
 STORED.

00:43:00,349 --> 00:43:04,670
 SO RIGHT NOW WE FEEL REALLY GOOD
 THAT WE'RE IN THE POSITION TO BE

00:43:04,670 --> 00:43:08,499
 GOOD STEWARDS OF THE PLANETARY
 PROGRAM FOR MANY DECADES TO

00:43:08,498 --> 00:43:11,969
 COME.
 WE HAVE ADEQUATE RESERVES OF

00:43:11,969 --> 00:43:14,649
 PLUTONIUM ON THE GROUND AND
 INDEED WILL BE MAKING IT

00:43:14,650 --> 00:43:18,999
 STARTING LATE THIS DECADE, EARLY
 NEXT ON A REGULAR BASIS.
>> KELLY, BEATTIE, SKON TELESCOPE.

>> THANK YOU VERY MUCH. I'M GOING TO JUMP AHEAD A LITTLE

IN THE PLAYBOOK FOR ALLEN OR RANDY.

DO YOU SEE ANYTHING IN THE DATA TO SUGGEST SHARON HAS AN

WE DON'T HAVE ANY DATA YET.

THEY WILL BE COMING IN THE NEXT THREE TO FIVE DAYS†-- YEAH.

SO WE'LL GET BACK THE YOU ON THAT.

>> LAST QUESTION BEFORE WE GET TO SOCIAL MEDIA.

MIKE WALSH, SPACE.COM.

>> THIS IS HOW HOLD THE TERRAINS ARE.

DO WE KNOW ABOUT IMPACT RATES, CRATERING RATES TO MAKE GUESSES
EVEN ON THE TERRAIN WHERE THERE ARE CRATERS?

OR ARE CRATERING RATES LOWER THAN THEY ARE CLOSER TO THE SUN?

AND THAT'S A TOTALLY DIFFERENT BALL GAME OUT THERE?

>> THE WAY WE ESTIMATE THAT IS SEVERAL WAYS.

FIRST OF ALL WE HAVE SEEN CRATER SURFACES ON THE MOONS OF THE

URANUS AND NEPTUNE.

WE STUDY THE LARGER COMPONENTS OF THE KIPER BELT DOWN TO A FEW MILLIMETERS ACROSS WITH HUBBLE TELESCOPES.

BY LOOKING AT THE CRATERING ON URANUS, NEPTUNE AND SATURN AND THE NUMBERS AND DISTRIBUTION OF OBJECTS IN THE KIPER BELT, THERE HAVE BEEN SEVERAL STUDIES WHICH HAVE DERIVED A APPROXIMATION OF THE CRATER FLUX RATE.

SO IT IS FAR FROM PRECISE
AND WE CAN OFTEN TELL YOU IF THE SURFACE IS EXTREMELY OLD OR EXTREMELY YOUNG. IT'S OFTEN HARDER TO TELL IF IT'S INTERMEDIATE AGES. YOU HAVE FACTOR OF FOUR UNCERTAINTIES IN THESE. WE CERTAINLY UNDERSTAND THE CRATERING RATES WELL ENOUGH TO SEE A SURFACE THAT HAS NO CRATERS IT IS DIFFICULT TO SEE HOW IT COULD BE MUCH OLDER THAN 100 MILLION YEARS. AS I SAID EARLIER, THE WORLD HAS EMBRACED THIS WITH BILLIONS AND SOCIAL MEDIA IS CERTAINLY A BIG PART OF THAT AND NASA ALWAYS LOOKING TO REACH OUT TO NEW AUDIENCES. SO WHAT IS OUT THERE IN THE WORLD. FIRST QUESTION FROM TWITTER
USING WHO ASKS HOW DO WE KNOW PLUTO’S ATMOSPHERE IS ESCAPING?

HOW IS THAT MEASUREMENT MADE. WE HAVE NOT YET ACTUALLY MEASURED THE ESCAPE. WE HOPE TO.

CURRENTLY IT IS BASED ON EXPECTATIONS, UNDERSTANDING THE GRAVITY OF PLUTO, THAT IT IS RELATIVELY WEAK AND THAT WE EXPECT IT TO BE ESCAPING. FURTHERMORE WE KNOW THAT THERE IS A LITTLE BIT OF METHANE AND MAYBE RANDY CAN TELL YOU MORE ABOUT THAT. BUT WE KNOW THIS METHANE IN THE ATMOSPHERE AND WE KNOW FROM EARTH THAT METHANE IS A GREENHOUSE GAS THAT ABSORBS THE SUNLIGHT. AND THE ENERGY OF SUNLIGHT IN THE ATMOSPHERE GIVES IT THAT
ENERGY TO ESCAPE THE GRAVITY.
WE'RE PRETTY SURE THAT IS

628
00:46:33,608 --> 00:46:37,619
HAPPENING AND HAVEN'T GOT A
DIRECT MEASUREMENT BUT WE WILL

629
00:46:37,619 --> 00:46:44,960
HAVE MEASUREMENTS TO COMPARE
WITH THE ATMOSPHERIC

630
00:46:44,960 --> 00:46:51,199
OBSERVATIONS COMING FROM THE
ALEX AND REX TEAMS.

631
00:46:51,199 --> 00:46:54,659
>> NEXT QUESTION FROM JASON, WHO
SORT OF MATERIAL COULD BE

632
00:46:54,659 --> 00:46:57,170
RESPONSIBLE FOR PLUTO'S DARK
SCENES?

633
00:46:57,170 --> 00:47:00,249
ORGANICS?
>> JEFF, DO YOU WANT TO

634
00:47:00,248 --> 00:47:01,068
SPECULATE?
>> SURE.

635
00:47:01,068 --> 00:47:03,469
WHY NOT?
>> I DON'T.

636
00:47:03,469 --> 00:47:12,028
>> THE LEAST CRAZY IDEA, WHICH I
THINK WE'RE STILL WORKING ON.

637
00:47:12,028 --> 00:47:15,059
I KNOW THIS WILL HOPEFULLY BEEN
DETERMINED WITH THE

638
00:47:15,059 --> 00:47:19,859
SPECTROMETER.
THE DARK STAINS, WELL THE
COMPOSITION ARE PROBABLY JUST HIGHER HYDROCARBONS MADE BY THE IRRADIATION OF METHANE. IT CAN BE EITHER RADIATED ON A SURFACE ICE OR IRRADIATED MORE LIKELY AND COMMONLY AS PARTICLES. HIGHER UP IN THE ATMOSPHERE THAT VERY SLOWLY RAIN DOWN TO THE SURFACE. AND, FOR INSTANCE, THE STREAKS IF THEY IN FACT TURN OUT TO BE WIND STREAKS ARE PROBABLY JUST VERY FINE PARTICLES THAT SLOWLY FALL OUT OF THE ATMOSPHERE AND WIND SWEEPS THEM AND THEY GET WIND TRAPPED BEHIND OBSTACLES. LET'S TAKE ONE MORE AND THEN WE'LL COME BACK HERE JASON. LOTS OF QUESTIONS ABOUT ELEVATION. THIS IS FROM GEORGE. WILL THE DATA COLLECTED FROM NEW
HORIZONS BE SUFFICIENT TO CREATE PLUTO AND SHARON ELEVATION MAPS?

>> ABSOLUTELY.
THE SURFACE YOU CAN SEE PRETTY

MUCH IN THE PICTURE ON THE SCREEN IF IT'S STILL UP ON THE

SCREEN NOW, WE WILL HAVE ALTHOUGH THEY WON'T ALWAYS BE AT

THE SAME RESOLUTION TOPOGRAPHIC MAPS FOR NEAR ENCOUNTER

HEMISPHERES OF BOTH WORLDS.

I WANT TO THANK OUR SOCIAL MEDIA AUDIENCE.

AND WE'RE GOING TOO ANSWER THOSE QUESTIONS.

GET THEM IN #ASK NASA.
WE HAVE SCIENTISTS AND WE'LL GET

TO THOSE ANSWERS AS QUICKLY AS POSSIBLE.

BUT YOU CAN FOLLOW THE CONVERSATION AND THOSE ANSWERS

WILL PROBABLY BE ON THAT
CONVERSATION.

662 00:48:47,679 --> 00:48:51,210
THERE IS A LOT OF CONVERSATION AT THE PLUTO FLYBY.

663 00:48:51,210 --> 00:48:57,409
LET'S SEE THE HANDS.
WE'LL GO HERE AND THEN WORK OUR WAY THIS WAY.
NAME AND AFFILIATION SIR.

664 00:48:57,409 --> 00:49:00,460
WAY THIS WAY.
NAME AND AFFILIATION SIR.

665 00:49:00,460 --> 00:49:01,929
>> STEVEN CLARK WITH SPACE FLIGHT EXPLORATION.

666 00:49:01,929 --> 00:49:06,498
I KNOW YOU ARE NOT PREPARED TO MAKE A REMARK ABOUT GEYSERS OR

667 00:49:06,498 --> 00:49:08,699
I'M NOT PREPARED TO MAKE A REMARK ABOUT GEYSERS OR PLUMES.
DO YOU NEED DIRECT EVIDENCE OF

668 00:49:08,699 --> 00:49:18,108
THAT OR.
>> THERE MIGHT BE SOME INDIRECT MEANS BUT I'M AN OLD FASHIONED GEOLOGIST.

669 00:49:18,108 --> 00:49:21,098
MEANS BUT I'M AN OLD FASHIONED GEOLOGIST.

670 00:49:21,099 --> 00:49:26,150
I WASN'T QUITE BORN IN MISSOURI,
I WAS BORN IN A STATE NEAR IT.

671 00:49:26,150 --> 00:49:28,778
I WANT TO SEE UNAMBIGUOUS EVIDENCE THAT SOMETHING IS ERUPTING UP INTO THE ATMOSPHERE.
AND IF WE SEE IT, DON'T WORRY,
WE’LL COME AND TELL YOU ABOUT IT.

PLANETARY SOCIETY.

ELLEN, FOR A LONG TIME YOU HAVE BEEN A PROPONENT OF AND BEEN SUPPORTED BY THE AMATEUR IMAGE PROCESSING COMMUNITY AND STARTED RELEASING THE RAW IMAGES.

THAT WAS HALTED THIS MORNING. I’M WONDERING IF THAT IS A PLAN TO CONTINUE OR IF YOU ARE GOING TO KEEP THE DATA IN ORDER FOR THE SCIENTISTS TO INTERPRET IT BEFORE YOU SHOW IT TO THE PUBLIC.

WE INTEND TO CONTINUE TO RELEASE ALL THE LAURIE IMAGES. HOWEVER AS WE’RE WINDING DOWN FROM THE PEAK OF ACTIVITY AFTER THE INTENSITY FLYBY ACTIVITIES, WE’RE GOING TO MOVE TO WEEKLY RELEASES ALL IN ONE SET.
THAT IS A MANPOWER THING AND
ALSO HELPING US VET THE IMAGES

00:50:18,568 --> 00:50:22,099
WHEN WE DON'T HAVE THE ENTIRE
SCIENCE TEAM ASSEMBLED.

00:50:22,099 --> 00:50:24,609
THE DATA IS REALLY GOING TO
START TO FLOW IN THE FALL.

00:50:24,608 --> 00:50:29,420
BEFORE THAT†-- YOU KNOW, AFTER
THE NEXT WEEK OR SO, ONE OF THE

00:50:29,420 --> 00:50:33,269
THINGS WE WANT TO MAKE SURE THE
AMATEUR COMMUNITY KNOWS IS THAT

00:50:33,268 --> 00:50:36,899
WE'RE GOING TO TURN TO GETTING
THE PLASMA DATA AND OTHER LOW

00:50:36,900 --> 00:50:40,200
SPEED DATA SETS TO THE GROUND.
THERE WILL BE A LONG GAP.

00:50:40,199 --> 00:50:43,348
IT IS NOT BECAUSE WE'RE STOPPING
THE SHARING IT WILL BE BECAUSE

00:50:43,349 --> 00:50:47,338
YEAR NOT SENDING IMAGES TO THE
GROUND IN AUGUST AND EARLY

00:50:47,338 --> 00:50:50,578
SEPTEMBER.
THEN WE'LL START AGAIN AND WILL

00:50:50,579 --> 00:50:55,229
BE ON A WEEKLY BASIS AND YOU
WILL BE ABLE TO COUNT ON IT LIKE

00:50:55,228 --> 00:50:58,998
A CLOCK.
>> A FEW MORE QUESTIONS.
LEO ENRIGHT OF IRISH TELEVISION.

WE JOURNALISTS ABSOLUTELY LOVE FLYBYS.

MAINLY BECAUSE IT IS SCIENCE AT THE SPEED OF JOURNALISM.

AND WHO COULD POSSIBLY NOT LIKE THAT.

BUT IF YOU WILL FORGIVE ME, I DIDN'T WANT THIS WEEK TO FLY BY WITHOUT REMARKING THAT THAT IS THE FIRST PLANETARY FLYBY IN AMERICAN MISSION YURIY WOODY HAS NOT BEEN INVOLVED IN THE IMAGING.

YURIY WAS THE FIFTH PERSON AT THE FRONT TABLE AT EVERY FLYBY. WE COMPLETELY RELIED UPON HIM TO SUPPLY US WITH IMAGERY DURING THOSE DAYS.

NASA CHOSE AN AIR FORCE FIGHTER PILOT FROM THE DUTCH AIR FORCE
TO DEAL WITH US.
BUT HE WAS OUR LINK WITH THE

IMAGING TEAMS FOR MY ENTIRE PROFESSIONAL CAREER.

AND I DIDN'T WANT THIS WEEK TO PASS WITHOUT MENTIONING YURIY.

HE WAS A GREAT PUBLIC SERVANT, A TERRIFIC GUY.

AND I SUPPOSE AS WE IN IRELAND

MIGHT SAY HE'S A MENSCH.

>> A TERRIFIC GUY.

EVEN AS A YOUNG STUDENT YOU COULD CALL HIM PICK UP THE PHONE

AND YOU COULD SAY I'M SO AND SO FROM HE WOULD MAIL YOU PICTURES

OF THE LATEST ENCOUNTERS. IT WAS FANTASTIC.

>> FOR OUR TELEVISION ADDS,†-- AUDIENCE.

YURIY, I KNEW HIM. THE NASA FAMILY, WE WORK VERY

HARD.
BUT WE CARE FOR EACH VERY HARD.

AND WE'VE LOST SOME PEOPLE,
YURIY AND OTHERS TO THE JET

AND WE'VE LOST SOME PEOPLE,
PROPULSION LABS.
SO OUR THOUGHTS AND PRAYERS GO

OUT.
BUT THE NASA FAMILY CARES VERY

HARD WHEN WE LOSE FOLKS.
ERIC AND THEN ONE MORE AND CLOSE

OUT.
>> ERIC HAND WITH SCIENCE AGAIN.

I'M WONDERING IF YOU CAN TELL US
HOW THICK IT IS?

THIS MORE THAN JUST THE VENEER
YOU SUSPECT EVERYWHERE ELSE?

IS IT PURE?
THERE OTHER ICE MIXED IN?

AND HOW DID IT GET THERE?
IS THIS DEPOSITS FROM ABOVE OR

SOMETHING WELLING UP FROM
WITHIN?

AND IF YOU CAN'T SAY RIGHT NOW
HOW WOULD YOU DISTINGUISH
BETWEEN THOSE TWO?

>> I'M GOING TO SAY A COUPLE OF

AND WE SPECIFICALLY BROUGHT

ALONG OUR COMPOSITION TEAM LEAD
WILL GRUNDY WHO IS DOWN IN THE

WE KNOW IT'S AT LEAST THICK

ENOUGH TO MAKE THAT ABSORPTION
BUT IT COULD BE QUITE A DEEP

LAYER.

>> YOU SAID IT EXACTLY RIGHT.

YOU ONLY NEED A CENTIMETER OR
SOMETHING TO PRODUCE AN

SO WE KNOW THAT THERE IS A LID

THAT INCLUDES A LOT OF CARBON
MONOXIDE.

BUT HOW THAT INTERACTS IS
POTENTIALLY QUITE SUBTLE.

IT IS SOLUBLE IN NITROGEN ICE,
WHICH IS ALSO WIDE SPREAD AROUND
THE SURFACE AND METHANE IS ALSO PARTIALLY SOLUBLE IN THE MIXTURE.

SO HOW THEY COMBINE, REALLY DON'T KNOW YET AND WE'RE GOING TO HAVE TO DO DETAILED MODELLING.

I LIKE THE SCENARIO OF UP LETTING FROM BELOW BUT WE'RE NOT close to proving that's what's happening.

>> I'M WONDERING IF TELL US IF

YOU SEE ANY SIGNS OF THE ATMOSPHERIC STRUCTURE IN OKAYAL TAKES.

>> THE THEY TELL US WHERE ONE

ATMOSPHERIC SPECIES TAKES OUT AND THE OTHER ABSORBS UP.

SO THAT IS NOT REALLY STRUCTURE. BUT FROM THE SHAPE WE KNOW ACTUALLY HOW† ACTUALLY MIGHT BE A LITTLE COOLER THAN WE thought. BUT WE'LL GET THAT LATER.
WELL, LADIES AND GENTLEMEN,

FOLKS WATCHING FROM ALL OVER THE WORLD, THE PLUTO STORY IS JUST BEGINNING.
YOU CAN FOLLOW THE CONVERSATION ON ALL THE NASA SOCIAL MEDIA ACCOUNTS.

AND OF COURSE GO TO WWW.NASA.GOV/NEWHORIZONS.

I WANT TO THANK FOCUS FOR JOINING US AND WITNESSING HISTORY. WE ANOTHER COMING UP FRIDAY.

THANKS FOR JOINING US. SCIENCE NEVER SLEEPS.

[ APPLAUSE ]