all the good things we can expect in the next year or two that's always a good introduction John thanks so much it's it is a pleasure for me to be here and I know this is a let me do a disclaimer before I start okay many of you know I can see right in here my Hubble family and there's some other people over there but I'm going to do this off the bat so it'll because there's some people who think I know something and I just want to let you all know as everybody who knows me knows I don't know anything so if you're here to get knowledge you're
00:00:37,640 --> 00:00:42,710
going to get it now I'll tell you

00:00:39,350 --> 00:00:45,890
second disclaimer there is probably

00:00:42,710 --> 00:00:49,009
no one under qualified to be here in

00:00:45,890 --> 00:00:51,079
this August group then the person who's

00:00:49,009 --> 00:00:55,488
here well I got a tip get on my

00:00:51,079 --> 00:00:57,679
tippy-toes they look over there and if

00:00:55,488 --> 00:01:01,218
there were three members of my first

00:00:57,679 --> 00:01:03,829
space shuttle crew sts 61c we launched

00:01:01,219 --> 00:01:06,980
on the twelfth of january nineteen

00:01:03,829 --> 00:01:11,180
eighty-six landed on the 18th of january

00:01:06,980 --> 00:01:13,400
1986 and over that period of time my my

00:01:11,180 --> 00:01:16,420
erstwhile mentor and Commander hoot

00:01:13,400 --> 00:01:18,680
gibson who taught me everything I know

00:01:16,420 --> 00:01:21,799
which will also let you know why I don't
know very much who does a Navy fighter pilot I'm not even a good fighter pilot I'm an attack pilot from the Marine Corps and there is a distinct difference I won't bore you with the difference but I was going to tell you about who'd in my exploits one day on orbit he and I were sitting in the commander and pilot seat and we were doing pilot Lee things looking at the window and all of a sudden you know we kind of we were floating and we turned around and there was just this great ape this big piece of masking tape that Dr. Stephen Holly I
think astronomer dr. George pinky Nelson

astrophysicist and dr. Franklin chang-diaz erstwhile plasma physicists

one of the foremost in the world they had taped us into the four werd part of the compartment which in and of itself was okay but when we finally managed to float across the tape we turn and we look back and they had taken a piece of a big magic marker and they had written across it intellectual

dead zone so with with that in mind that is who you have coming to speak to you today on astronomy astrophysics and other topics you know I want to wish all
of you happy new year I'm not sure how

many of you had as phenomenal a holiday

period as I did my wife and I went home

to Houston and we were blessed to have

our two kids and our three

granddaughters spend the entire time

with us and the granddaughters are three

through nine and so if there are any of

you who are not grandparents and and

you're not looking forward to it boy let

me tell you it's great having kids is

phenomenal having grandchildren is

incredible and so this group would be

proud to know my nine year old
granddaughter had one request of her grandfather before Christmas she said I know what I want for Christmas I said okay Michael what is it she said when I come to Houston I want to meet a real rocket scientist and I said Matt can probably do that and and so the morning before her death and and the rest of the family and me decided to take her to see Navy beat Missouri there are no Missouri fans in here since there were no eggs that came up but that morning we spend at the Johnson Space Center and took them and they had an
opportunity to kind of look around at

the mock-ups and and look at what we do

what people who are in NASA do and i

must say they were they were impressed

and then the nine year old granddaughter

before she went back to san diego had an

opportunity to go down the street and

and spend some time with an old friend

of mine I've gentleman by the name of

Bobby Mack and many of you will know him

bow is a real rocket scientist he's been

around since the early days of the

earliest days of human space flight and

he spent about an hour with her talking
about rockets and stuff like that so you
do good stuff and I want to talk a
little bit about that
and I apologize beforehand again because
i'm going to read what i have here my
wife tells me never do this she says
because first of all you don't read very
well and somebody else said well you
know it's okay for you to read but when
you read we can tell it because you're
not passionate in your reading the way
you are when you just talk to people
well if you want to hear something
substantive on something that you
understand I got to read it okay so I'm
going to do that as I said it is a pleasure for me to be here and I hope all of you are off to an incredible new year the year ahead for us is likely to be filled with some new achievements in space at least I hope so new discoveries we can't yet imagine you heard about some yesterday when the Kepler felt talked to you there's just an incredible number of missions that we're going to launch here in the coming months beginning this month that I think will revolutionize the way we look at our world and I and I really mean it
when I say that having been a member of the initial Hubble crew_STS 31 crew we used to sit around in the crew quarters and talk often about what is this thing going to do and what's it going to mean and there were all kinds of people that most of you that I look around are too young to have any way to remember but some of you are old enough to remember when we were getting ridden launched Hubble and the discussion argument whatever you want to call it over the big bang theory and all other kinds of things were really raging in
1990 and we frequently said is this really going to mean anything and if I
were to say something that my crew universally felt we didn't know why but
we but we universally felt it was that Hubble was going to change our entire
approach to to the species and to the world in which we lived and i live and i
think we found subsequent to that that it has done exactly that and every other
instrument that we fly edge to that or complement it this year just ended was a remarkable one for our agency and if
you'll let me i just want to mention
some of the astrophysics highlights that

you know so well Kepler was launched

last March to

ducti census of earth-sized planets in

our galaxy just yesterday here the first

couple of discoveries of large planets

were announced and many more discoveries

are anticipated during the it's three

and a half year mission the wise mission

was launched in december just last month

our newest mission in the Explorer

program it will gather a treasure trove

of new data on the entire infrared sky

going much deeper than previous surveys

with much better resolution last week
the protective cover was released and
the first sky images were sent down the
first light images will be released at a
press conference here tomorrow or
tomorrow maybe not here here okay here
tomorrow so stay tuned for that i'm not
going to preempt that Ed Weiler and our
commenting coming into the hall that
there are two big hurdles that any
project like likewise has to overcome
you got to get the cover off
successfully and then you hope that it's
in focus and that doesn't mean a lot to
many of you but for those of you who
work with me it means a lot the ISA NASA

Herschel and plank missions were launched in May to study the far

infrared universe in the Cosmic

state-of-the-art instrumentation the

Chandra x-ray Observatory marked its 10th anniversary in July Sofia reached a milestone with its first opened or flight test last month and Pete you're here aren't you Pete worden back there and they're probably some I don't know whether there's anybody here from dryden but you know I I want to publicly just
think Pete the folk from dryden for the incredible work that was done in getting Sofia to where it is today some of you may know and most of you probably don't they went and resurrected the airplane from the desert where the project was really kind of struggling along and during the month of December when we flew a series of the initial tests and did the door openings until we finally had a full door opening testing everything and we're ready to start actually doing some serious work with Sofia
the months ahead but I but I want to

thank the whole team for what they did

don’t quote the Fermi gamma-ray Space

Telescope completed its first year of

science operations revealing a new class of gamma-ray pulsars and giving us a
glimpse of the nature of space-time the

James Webb Space Telescope program has

made significant progress in building

for flight hardware such as the primary

mirror segments Observatory structure

science instruments and other subsystems

Spitzer discovered the largest ring around Saturn by combining data from

Chandra and other optical and infrared
telescopes the most distant galaxy

cluster ever found was discovered and

there was and then there was the final

hubble space telescope servicing mission

bringing new life to our old friend I
call Hubble a friend because I have a

personal connection with this remarkable

instrument I share that connection I get

emotional I share that connection with a
gentleman sitting down here dr. John

Grunsfeld John was the was the master

the lead II VA for sts-125 which was a

final we know final shuttle Hubble

servicing mission hi I have learned a
long time ago since messing around with the Hubble folk you never say it's the final anything but but it was absolutely incredible and I thought just is a sense of levity I would tell you a little bit about about our deploy date on st s 31 some few of you may remember this but we had trained for a number of years for the mission everything was was pretty much in hand and we knew what was going to go on there were very strict timeline Steve Hawley operating the remote manipulator system and I as his backup it's going to take us about 10 minutes
to lift Hubble out of the payload Bay

and put it in its pre deployed position

so we could unfurl the solar arrays and
do some other things and about two hours

after we started the unbirthday we had

moved Hubble a matter of feet and what

we found was that as much expertise as

we had as much knowledge as we had and

as precisely as the remote

manipulator system had been designed

and for some reason 25,000 pounds is a

lot of mass and the remote manipulator

system with its joints and everything

just at least in an unclassified flight

just at least in an unclassified flight
was not accustomed to moving that much

272
00:11:19,940 --> 00:11:24,920
mass and so it didn't behave exactly

273
00:11:22,759 --> 00:11:26,870
the way all the algorithm said and so

274
00:11:24,919 --> 00:11:29,719
Steve and I struggled with reading

275
00:11:26,870 --> 00:11:31,970
numbers to keep it precisely where it

276
00:11:29,720 --> 00:11:33,320
should be so that we didn't bump it we

277
00:11:31,970 --> 00:11:34,970
didn't want to do any damage but we

278
00:11:33,320 --> 00:11:39,530
finally got it out and got it in the pre

279
00:11:34,970 --> 00:11:41,420
deployed position the the high-gain

280
00:11:39,529 --> 00:11:45,230
antenna were deployed with no problem

281
00:11:41,419 --> 00:11:48,139
first solar away no problem second solar

282
00:11:45,230 --> 00:11:52,100
array got about 16 inches in stopped and

283
00:11:48,139 --> 00:11:53,509
I mean stop d it and i went i can

284
00:11:52,100 --> 00:11:56,269
remember telling who died said this

285
00:11:53,509 --> 00:11:58,639
can't be i said you know this is this
was our last sim this was our last joint

simulation in houston we had a failure

of one of the solar arrays to deploy it

had caused us they have to put Bruce

McCandless and Kathy Sullivan in the

suit out into the water tank you know

they transported him over to the wet F

and they had had to go out and exercise

what we had practiced in Bristol England

with the solar arrays they'd had to

manually crank the solar arrays out

which was okay but it would really just

mess things up and so we really didn't

want to do that and so for hours the
ground when it went back and forth

between the ground and us on orbit that

we had to keep the shuttle in free drift

so we wouldn't perturb ate the telescope

and we were all over the place the thing

that saved us was orbital mechanics you

know you weren't going to fall out of

the sky or anything but but attitude was

we were just all over everywhere not

wanting to perturb the telescope I mean

after a number of hours the decision was

made okay let's put Bruce and Kathy in

the suit let's put them out and while

they were very excited they were
probably the only people in the whole

hubble world excited about an e VA and i

what with what's called the

intraocular crewmember so I my task was

to get them in the suit and get him

outside safely and we went down in the

mid in the mid-deck started suiting him

up I got them in the airlock did

everything to the best of my ability

made sure I followed the checklist and

let me tell you

John can tell you this putting a human

being outside a spacecraft is not

trivial and it is although we do it all
the time and we make it easy may we make

329
00:13:29,919 --> 00:13:34,539
it look easy it is incredibly risky

330
00:13:32,320 --> 00:13:37,420
business and and my heart was beating

331
00:13:34,539 --> 00:13:39,250
probably harder than it is beat any time

332
00:13:37,419 --> 00:13:40,569
in the whole space program a young

333
00:13:39,250 --> 00:13:42,539
engineer at the Goddard Space Flight

334
00:13:40,570 --> 00:13:46,210
Center said he'll hold on there's um

335
00:13:42,539 --> 00:13:48,009
this just isn't right and he said there

336
00:13:46,210 --> 00:13:50,620
is a tension monitoring module a piece

337
00:13:48,009 --> 00:13:53,439
of software that we built into this

338
00:13:50,620 --> 00:13:55,149
thing to keep from ripping the solar

339
00:13:53,440 --> 00:13:56,740
arrays and I just think it's not

340
00:13:55,149 --> 00:13:59,409
functioning properly if you all let me

341
00:13:56,740 --> 00:14:01,120
just send a zero instead of a one I

342
00:13:59,409 --> 00:14:02,980
think we can take the tension monitoring
module out and everything will work

right well on board Bruce McCandless

earlier that morning had said I there's

nothing wrong its attention monitoring

module and for those of you who know

Bruce this was good news but it was

horrible news because once again it

meant that Bruce was right and what was

even worse Bruce had been right like

hours ago so anyway they de-energized

the tension monitoring module the solar

array went out we deployed Hubble it was

incredible to watch this this massive

instrument drift away from from the from
the shuttle and in the meantime

Bruce McCandless and Kathy Sullivan two people who had dedicated much of their astronaut lives to preparing for this mission did not get to see it they were

locked depressurized in the airlock and

and I couldn't bring him out until after we had deployed the telescope so they

that's where they spent their deploy

time and Hubble the rest now you know

the rest of the story but Hubble

continues to make discoveries that just overwhelm all of us and it continues and

it will continue where you know it
things like the first ever image taken of an extrasolar planet orbiting another star altogether NASA's science Mission Directorate supports over 60 operating space missions this year begins with 15 NASA or NASA partnered space assets available to the astronomical community compare this with five in 1990 and nine operating missions in 2000 these missions are of great value to the nation and help us to meet the national needs in science education and technological innovation for both human and robotic missions of the future one
fact will be common to all or one facet

will be common to all we must develop a stronger partnership with the international community the cost and complexity of space programs require that both the achievements and the cost be shared among many nations for no one nation can carry this burden alone whether it be future human voyages beyond low-earth orbit are complex sample return missions from Mars or deep space objects or building future large space telescopes NASA must pursue a new era of international cooperation a relationship where our partners are
treated as equals astronomy astronomy
and science touches our communities in
many other ways as well last fall I
joined President Obama and the first
family on the White House lawn to
celebrate the international year of
astronomy and for some of you who were
here for breakfast this morning you may
have heard I understand dr. John Holdren
mentioned this night it I wasn't here
but I can tell you what he told you is
very very true to watch the president
mrs. Obama and the girls but even more
importantly to watch these young kids
from all over Washington DC I mean to watch their eyes light up some of them had never seen a telescope some of them didn't have a clue what a telescope was and they had an opportunity to meet Galileo I mean you know we had two astronomers who had dressed up as Galileo and somebody else and and they carried around ancient telescopes and the like and they talked to the kids John was there Sally Ride was there Buzz Aldrin mae Jemison and they had an opportunity to interface with real live astronauts as they as they got ready to
view through the telescopes and it was incredible the whole lawn of the white house was covered with telescopes

inflatable planetariums and and these astronaut heroes did I mention present

with us were 150 students from DC Maryland Virginia schools

who learned of crater formation on the moon viewed Jupiter in its four Galilean moons as well as a distance as well as distant stars and nebula in our galaxy

the President and First Lady joined the fun peering through some of the telescopes and mingling with the
students and I'll tell you it was not a

00:18:00,648 --> 00:18:05,329
normal night it was cold that night and

00:18:03,380 --> 00:18:07,100
the president first lady were out there

00:18:05,329 --> 00:18:08,898
for a good 45 minutes to an hour just

00:18:07,099 --> 00:18:10,519
going from telescope to telescope

00:18:08,898 --> 00:18:12,918
planetarium displayed a planetarium

00:18:10,519 --> 00:18:14,960
display with us that night was a West

00:18:12,919 --> 00:18:17,740
Virginia high school student who had

00:18:14,960 --> 00:18:20,210
discovered a new astronomical object a

00:18:17,740 --> 00:18:22,250
strange type of neutron star never

00:18:20,210 --> 00:18:25,700
discovered before what's remarkable

00:18:22,250 --> 00:18:27,138
about Lucas Boyd's discovery is that he

00:18:25,700 --> 00:18:29,538
made it after he had studied two

00:18:27,138 --> 00:18:32,168
thousand data points collected from the

00:18:29,538 --> 00:18:35,480
Robert Byrd Green Bank telescope and
originally found nothing but like young

would-be astronomers he was determined

to scrutinize his data looking for more

his discovery was almost overlooked in

the radio interference streaming in from

space but he was persistent he was

dedicated and as a result he made

history also with us that night was

Carolyn Moore a 14-year old and in love

with science she discovered a supernova

it wasn't your average supernova either

this exploding star was so dim it was

1,000 times dimmer than a typical

supernova more a ninth-grader won the
distinction of being the youngest person ever to discover a supernova, what I witnessed that night on the White House lawn served as a reminder that astronomy and science can inspire the next generation to study the science technology engineering and math, or STEM subjects so critical to America's future workforce of critical importance before we can inspire the rising generation however, is to expose them to your craft and the tools you use, you must become engaged with students as early as elementary school and help them to learn
that who you are and what you do why

you're passionate about astronomy and astrophysics and the magic they brought to your lives you have to share that with them

the years ahead promised a steady stream of new missions and new discoveries this spring the James Webb Space Telescope our next astrophysics flagship mission to study the distant universe in the infrared will go through its critical design review aiming for a 2014 launch Sofia I mentioned earlier the largest airborne observatory in the world that
will study objects in the far infrared

00:20:21,630 --> 00:20:26,730
will produce initial science this year

00:20:24,210 --> 00:20:30,450
as it moves toward its full operational

00:20:26,730 --> 00:20:33,720
capability in 2014 new star the first

00:20:30,450 --> 00:20:36,210
focusing hard x-ray telescope mission to

00:20:33,720 --> 00:20:38,850
study black holes supernova remnants and

00:20:36,210 --> 00:20:42,029
the most extreme active galaxies will

00:20:38,849 --> 00:20:44,759
launch by early 2012 the gravity and

00:20:42,029 --> 00:20:47,548
extreme magnetism one of our small

00:20:44,759 --> 00:20:49,890
explorer explorer programs or gems

00:20:47,548 --> 00:20:52,048
mission there's a new small explorer

00:20:49,890 --> 00:20:57,450
x-ray mission being prepared for launch

00:20:52,048 --> 00:20:59,668
in 2014 and Astro H Japan six x rays

00:20:57,450 --> 00:21:02,429
astronomy mission in collaboration with

00:20:59,669 --> 00:21:05,520
NASA is also being readied for launch in
2014 and there will be more sounding rockets and more long-duration balloon missions but what of the discoveries we cannot predict as this new year begins thus far more than 400 extrasolar planets have been discovered orbiting other stars last month a super-earth was discovered that might be an all water world when when will someone in this audience discover a Pandora a real Pandora like the one in James Cameron's fabulous new movie and will such a discovery open a positive Pandora's box changing the way citizens
of Earth view ourselves and our places

in the cosmos only time and the best

science will tell these are exciting

times to be astrophysicist astronomers

grad students and researchers it's a

pretty exciting time to be the NASA

Administrator also the scientific community and NASA have a relationship

that dates back to the agency's earliest days yielding scientific discoveries in

the bed is the bedrock of NASA's existence

I just notice I'm giving you a light

show back here as I play around with the
computer as administrator I look upon it as a partnership this partnership takes many forms setting priorities developing new technologies building spacecraft and operating missions one of our biggest challenges is balancing resources between older facilities and enabling new missions and technologies we must also continuously work to optimize the agency's fiscal management and I appreciate how your community has worked with us to improve our efficiency many here are participating in the next decade old survey identifying more
promising areas of discovery and

astronomy and astrophysics for the
decade ahead and designing a program to
achieve it this decade Oh process first
introduced in astronomy has become a
model to be followed in other
disciplines some of you serve on nasa
advisory committees others participate
in peer reviews to assure that the best
scientific return that we get the best
scientific return from these missions i
want to thank all of you for your
service because of it nasa addresses the
most compelling science of our time a
benchmark of excellence that as a model
for the world space science requires a
healthy space program and new ideas and innovative approaches this can only be achieved from a trained and skilled workforce to attract the best workers NASA must continue to develop missions that inspire as well as educate us so another big challenge is finding ways to share your discoveries with the public it's critical that we do so effectively and I know that this community has been very active in communicating with the public partnering with museums and planetariums
holding teacher workshops and developing classroom materials for young students

I'm sure all of you would like to know what direction President Obama will choose for the future of the space program all I can say for now is that NASA is working closely with the executive office of the president in helping him determine the best path forward what I know however is that science is important to our president important to NASA and crucial to whatever way forward we are to follow I can make this commitment to you as the
NASA Administrator the future of human space flight will not be paid for out of the height of the science budget let me let me close with a little story and I learned this when I was on the White House lawn last summer in honor of the 400th anniversary of Galileo's astronomical discoveries and in commemoration of the international year of astronomy one of Galileo's telescopes came to America for public for the public to see for five months the Franklin Institute in Philadelphia not only displayed the telescope on loan
from Italy but also created an entire exhibit about Galileo and his age of discovery by our standards today the telescope looked quite crude only one of two original telescopes used by Galileo that survived there are only two that survived today but it helps spark a revolution in science whose consequences still echo across the centuries if we continue to develop our partnerships the day will come when Hubble and the Webb Space Telescope’s will look just as primitive to our grandchildren and great grandchildren and future generations as the Galilean telescopes look to us today
so let's embrace our future together along with new science will come the excitement and turbulence that always follows new discoveries you and I together along with our international partners must forge ahead mindful that our task remains to develop missions and programs that give value back to the taxpayer we must identify new ways to inspire the next generation of explorers the nation and the international science community expect no less of us with your partnership and cooperation NASA stands ready to deliver thanks very much for
letting me be with you this afternoon