what we think of snow depends a lot on where it falls if you live in the
eastern US
maybe it's fun or maybe it's just a pain
but if you live in parts of the world where they depend on the water that's in
the snow for a large fraction of their total water that they use for drinking
for agriculture for industry or for hydropower the snow is a very important natural resource for example in the western part of the United States 80 to 90 percent of their renewable water comes from snow
snow is one part of the crowds fear that
many of us have actually encountered
before but it also plays a critical role
in regulating the Earth's climate
through decades of remote sensing nASA
has kept a close eye on the ebb and flow
of snow cover we now have a 52 year
record of snow cover in the northern
hemisphere and we can see changes in the
extent of snow cover over the time

period particularly in the last few decades where we can see that the snow cover has been retreating it's been melting a lot earlier in the springtime

the extent is relatively easy to doing it has been done over the years what's tricky is though how thick is that snow and it's even trickier how much water is in that snow that tricky part is known as the snow water equivalent or how much water would actually be in a layer of snow if it melted NASA and its partners have taken to the air to help solve this
elusive mystery

00:01:55,519 --> 00:02:01,170
first there's the airborne snow

00:01:57,659 --> 00:02:02,670
Observatory or ASO a small plane

00:02:01,170 --> 00:02:04,890
outfitted with a couple of instruments

00:02:02,670 --> 00:02:07,319
one of which measures snow depth using

00:02:04,890 --> 00:02:10,139
lidar lidar measures distance using

00:02:07,319 --> 00:02:12,870
light from lasers since 2014

00:02:10,139 --> 00:02:15,329
ESO has flown over basins in California

00:02:12,870 --> 00:02:18,090
and Colorado taking before-and-after

00:02:15,330 --> 00:02:20,489
looks at snow depth scientists subtract

00:02:18,090 --> 00:02:22,770
the snow free summer data from the snow

00:02:20,489 --> 00:02:25,080
on winter data to get an idea of the

00:02:22,770 --> 00:02:27,150
snow depth there's no single way to

00:02:25,080 --> 00:02:29,370
measure all types of snow across the

00:02:27,150 --> 00:02:31,980
globe and so NASA's other airborne
campaign snow X is testing different combinations of sensors this winter snow
x will test a new instrument the snow water equivalent synthetic aperture radar and radiometer or suisse our sweet-sour consists of two main components one of them being the radar and the second one being the radiometer so with the radar providing the depth of the snow and the radiometer providing the density of the snow we could put those two things together and get the snow water equivalent here in the chamber we're going to measure different
radiation patterns that are different

frequencies and do some for system

testing in this chamber this chamber

kind of enables us to isolate various

types of radiation and interference and

in about a month we're gonna take the

instrument mounted on a twin otter and

the grand Mason in Colorado we're going

various different measurements this is

what we call like engineering flight

making sure the sensors are calibrated

is key in order to face the challenges

nature will throw at them half of the
area that gets covered by snow every
winter contains trees and forests and
the trees make it difficult for the
sensors to see the snow that's
underneath the trees so it makes it
difficult for us to to measure how much
snow there is
after the snows had a chance to sit on
the ground for a while it gets denser
and denser and denser over time and it
changes which is another reason why snow
is very challenging to remotely sense it
doesn't stay the same it's constantly
changing one of the things that we often
do in the field is go dig what we call

snow pit you literally dig a pit in the

snow so we can see all the different

layers the layering is very important

all this digging is part of ground

truthing snow acts a way of matching up

with the airborne instrument see and

what is actually sitting on the surface

the ultimate goal of snow X is to figure

out what the best combination of

instruments would be for a future

satellite mission in order to get a

global picture of snow we need to know

how much snow is in a snowpack because

if we had too much snow and the snow
melts too fast then you can get flooding

and if you don't have enough snow or if

the snow melts too early that can lead

to a longer wildfire season a more

intense drought and we need to know

these things for water resource planning

after we had a record that was about 15

20 years long we started noticing that

the extent of the ice in the Artic was

getting smaller over time