

# Tiny flying box: A study of upper sky things very close and very far away from each other.

Alexa Halford<sup>1</sup>, Jeffrey Klenzing<sup>1</sup>, Sarah Jones<sup>2</sup>, and Ryan Davidson<sup>3</sup>

<sup>1</sup>NASA Goddard Space Flight Center

<sup>2</sup>Goddard Space Flight Center

<sup>3</sup>Utah State University

November 23, 2022

## Abstract

A few friends from the big US space place, and two places where people get lots of learning, have started putting together a tiny flying box. This box will look at the tiny bits we can not see in the upper sky. We hope to learn why we see places where the tiny bits of the sky come together in large numbers and other places where the tiny bits try to get as far away from each other as possible. But before we can learn how and why parts of the sky come close together and sometimes far away from each other, we need to finish building our tiny flying box. Then our tiny box will go on a bit up goer to visit where people live in the sky. It will sit there until they have time to push it out and send it on its way around the world. We hope that our tiny flying box will stay working in the sky for at least 6 months. While this is not a long time, our short-lived tiny flying box will help us better understand the upper parts of our sky.



*Tiny flying box: A study of upper sky things very close  
and very far away from each other.*

*By Me and the tiny flying box friends*







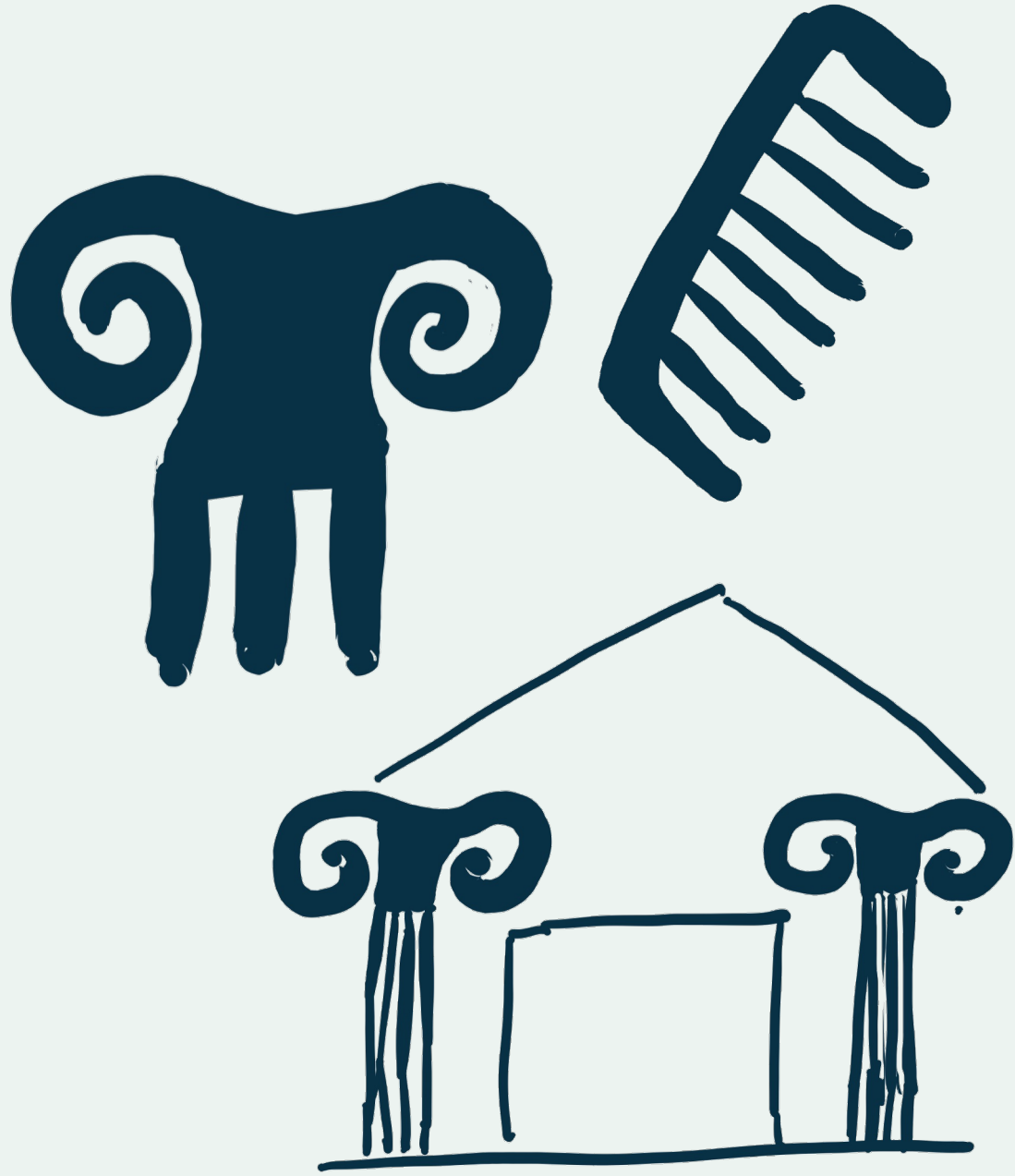
Here at the big  
meeting many of  
us come together  
who are all from  
different places.





Using simple words  
and pictures can help  
us understand each  
other.

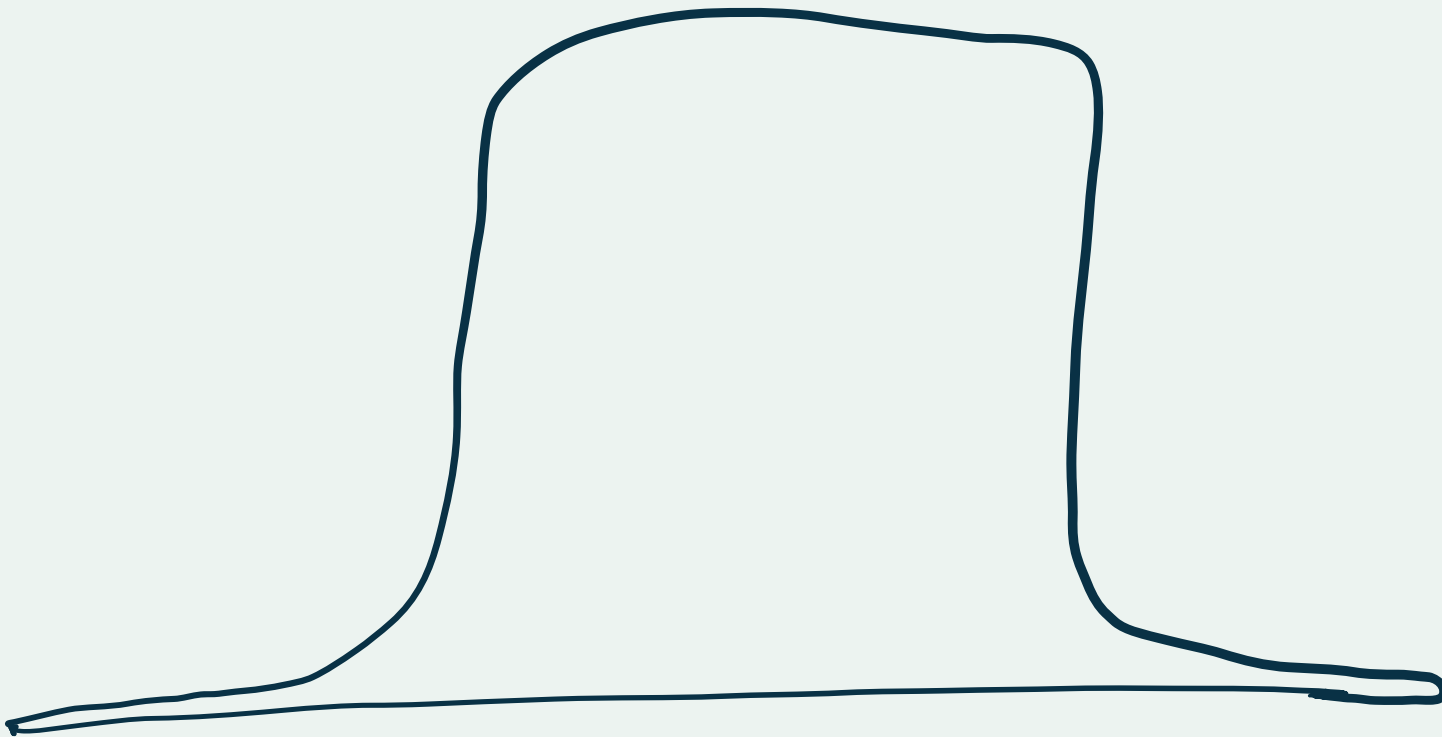


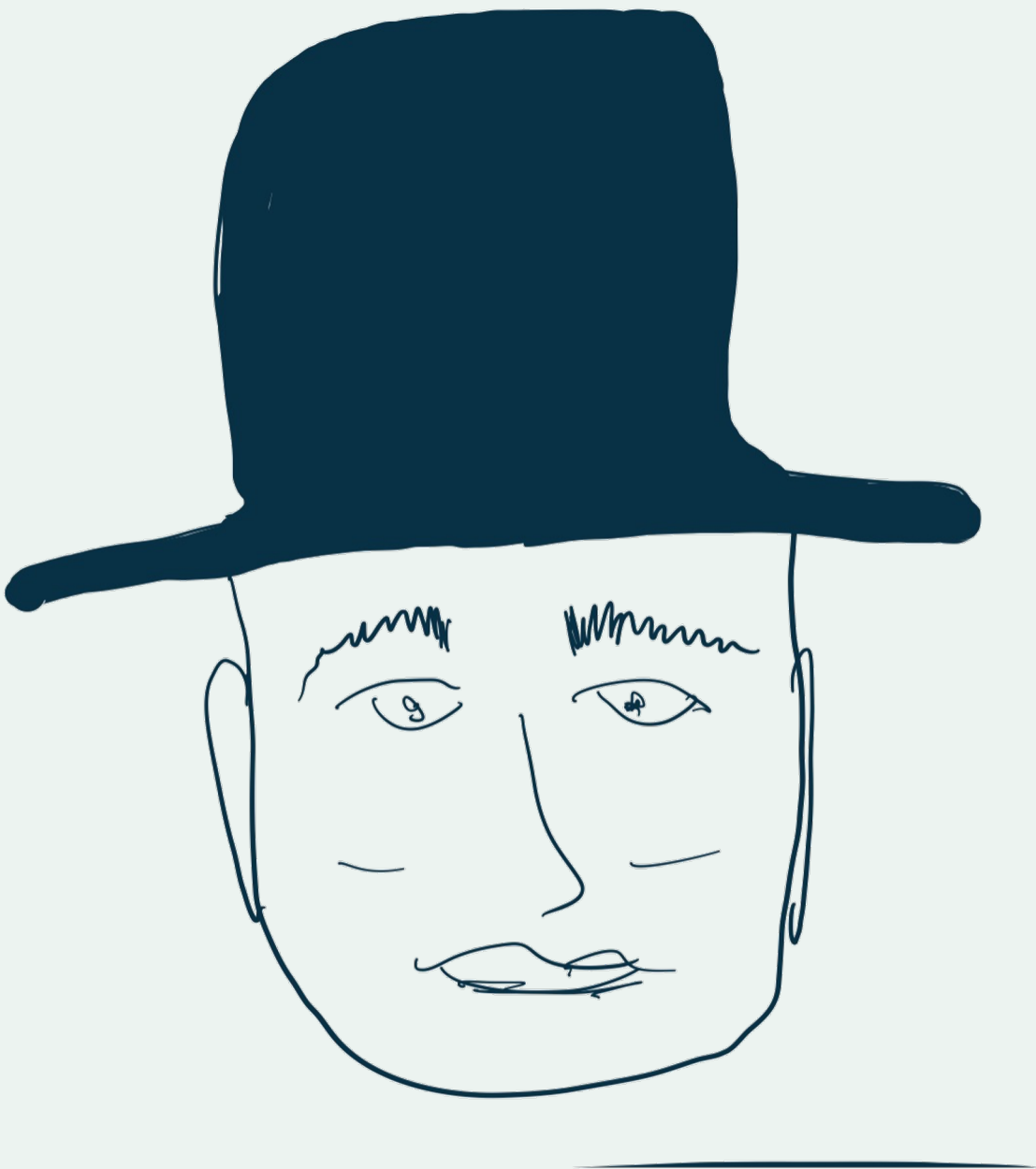


But sometimes we all see different things when we show pictures. I may see something to brush hair, but you may see a part of a building.



If I show you this  
picture, what do you  
see?

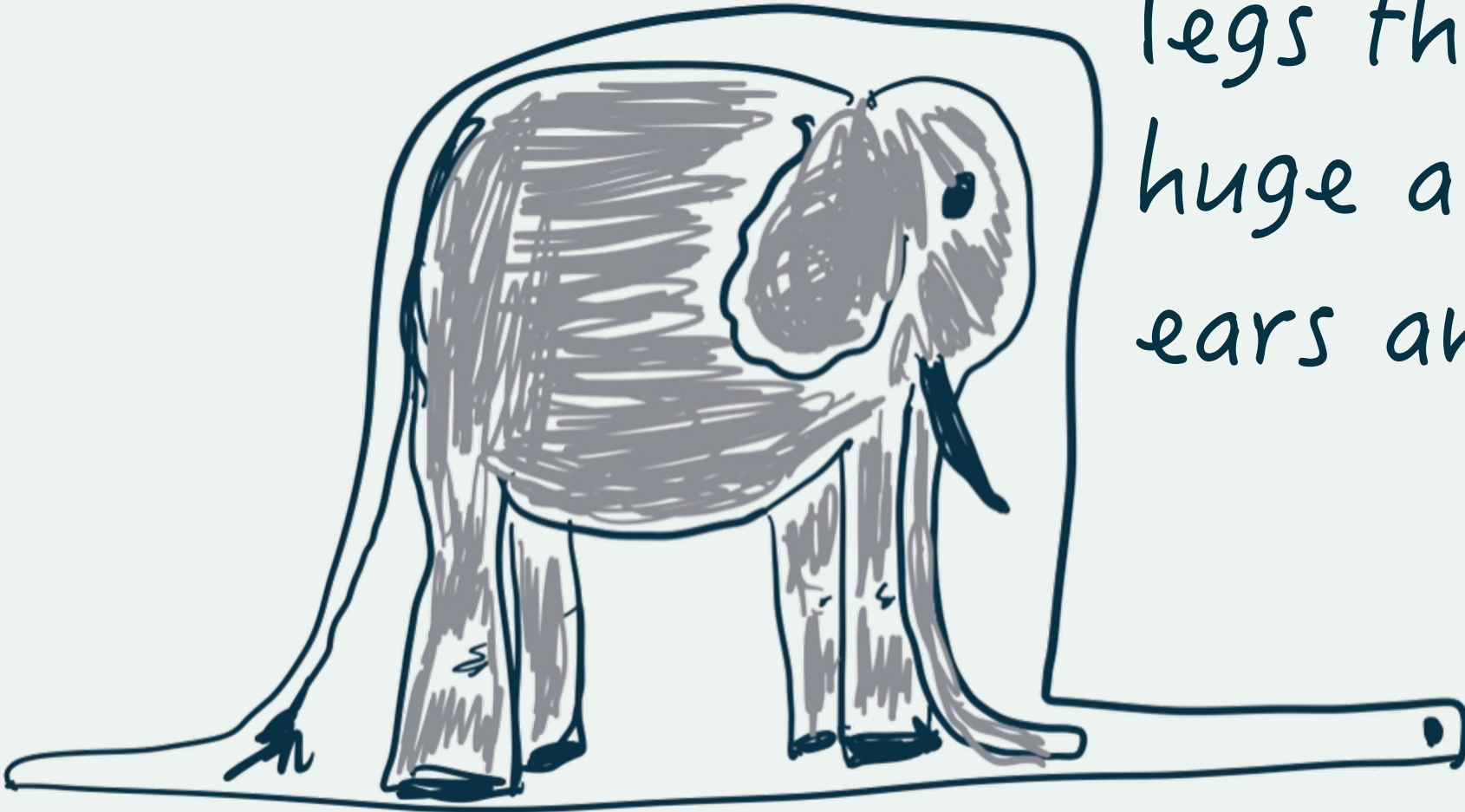




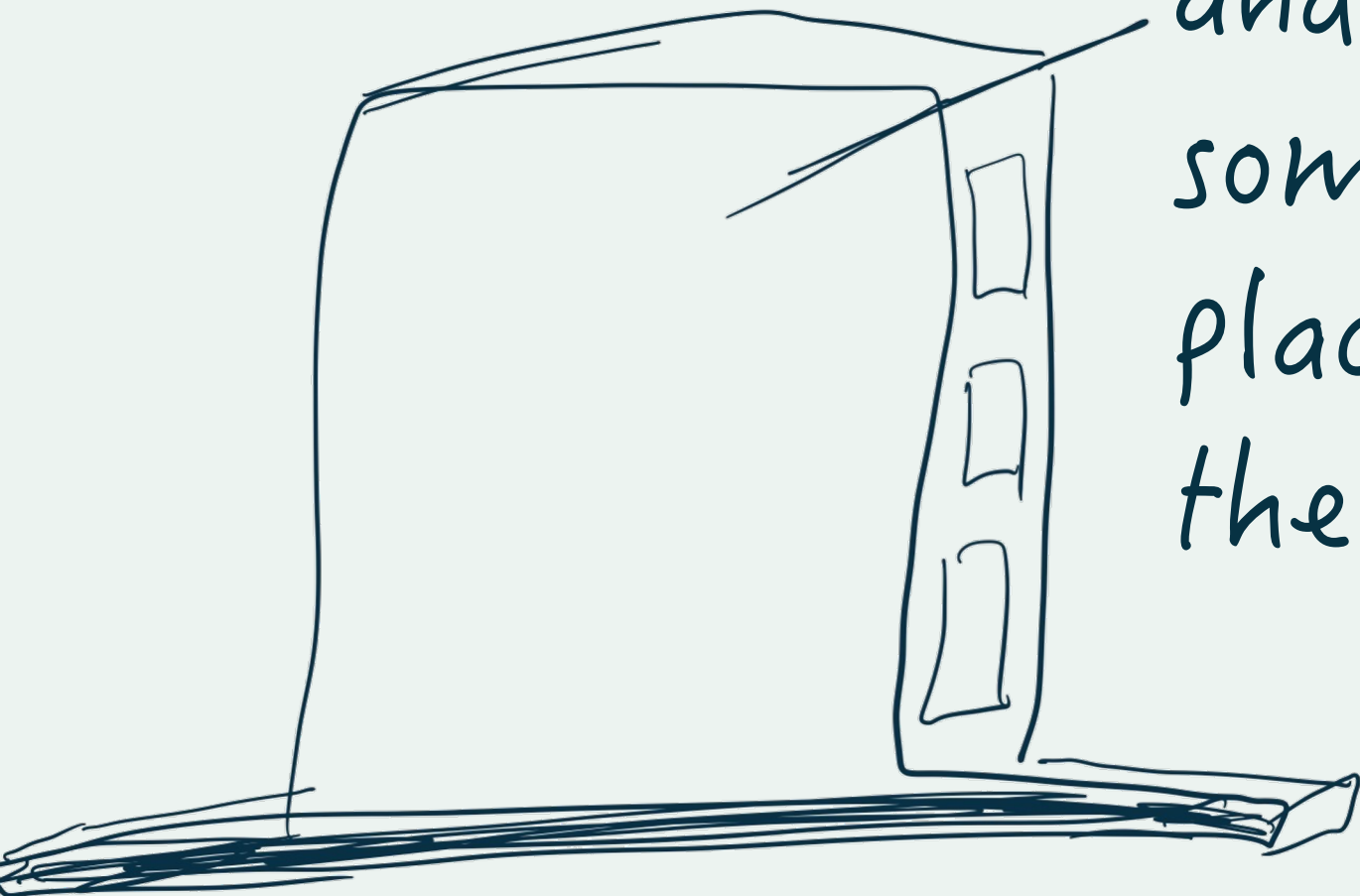
Do you see a  
thing that sits on  
your head?



Or, perhaps you see  
an animal without  
legs that ate another  
huge animal with big  
ears and a long nose.



I see a tiny box that  
will help us fly through  
and learn about a  
sometimes-forgotten  
place that sits between  
the sky and space.



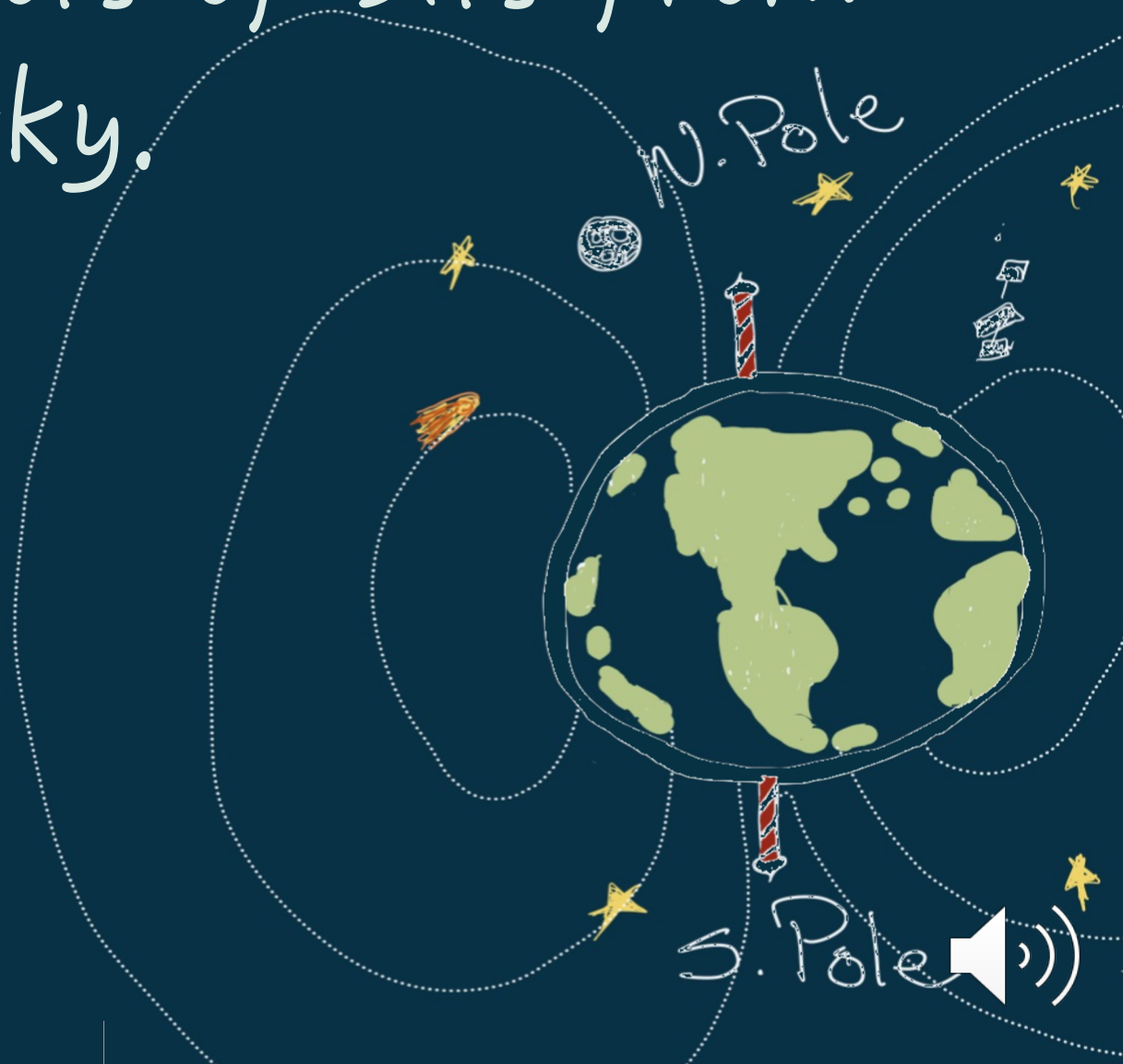
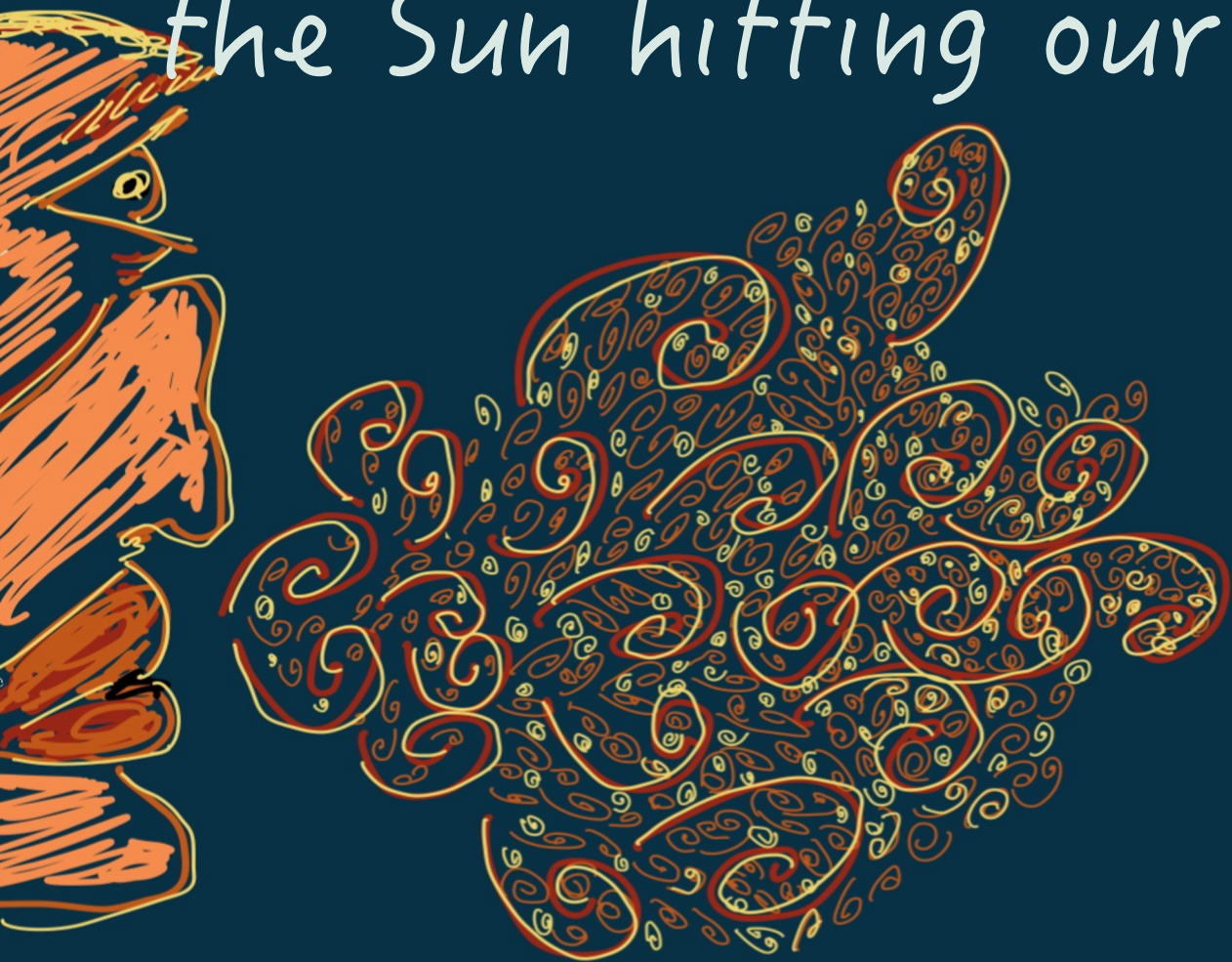


This is a story of a little flying box that is about to catch a ride and look at this place where the sky and space meet.





Our world has fields that go out into space and help stop lots of bits from the Sun hitting our sky.



Closer to the ground we have  
the sky that has lots of wind.



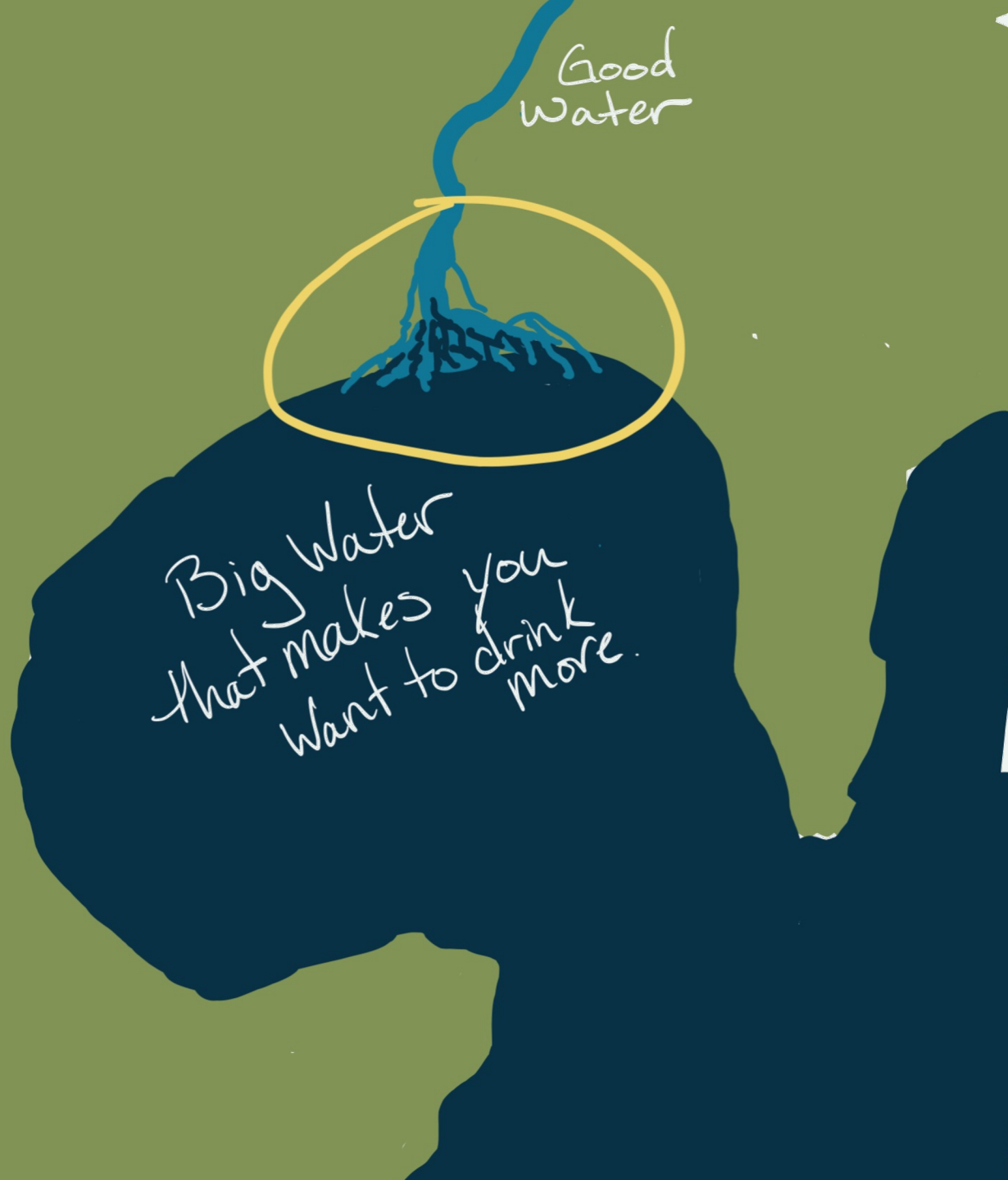




Where the sky and space meet is called the I-on-no-ball (?).

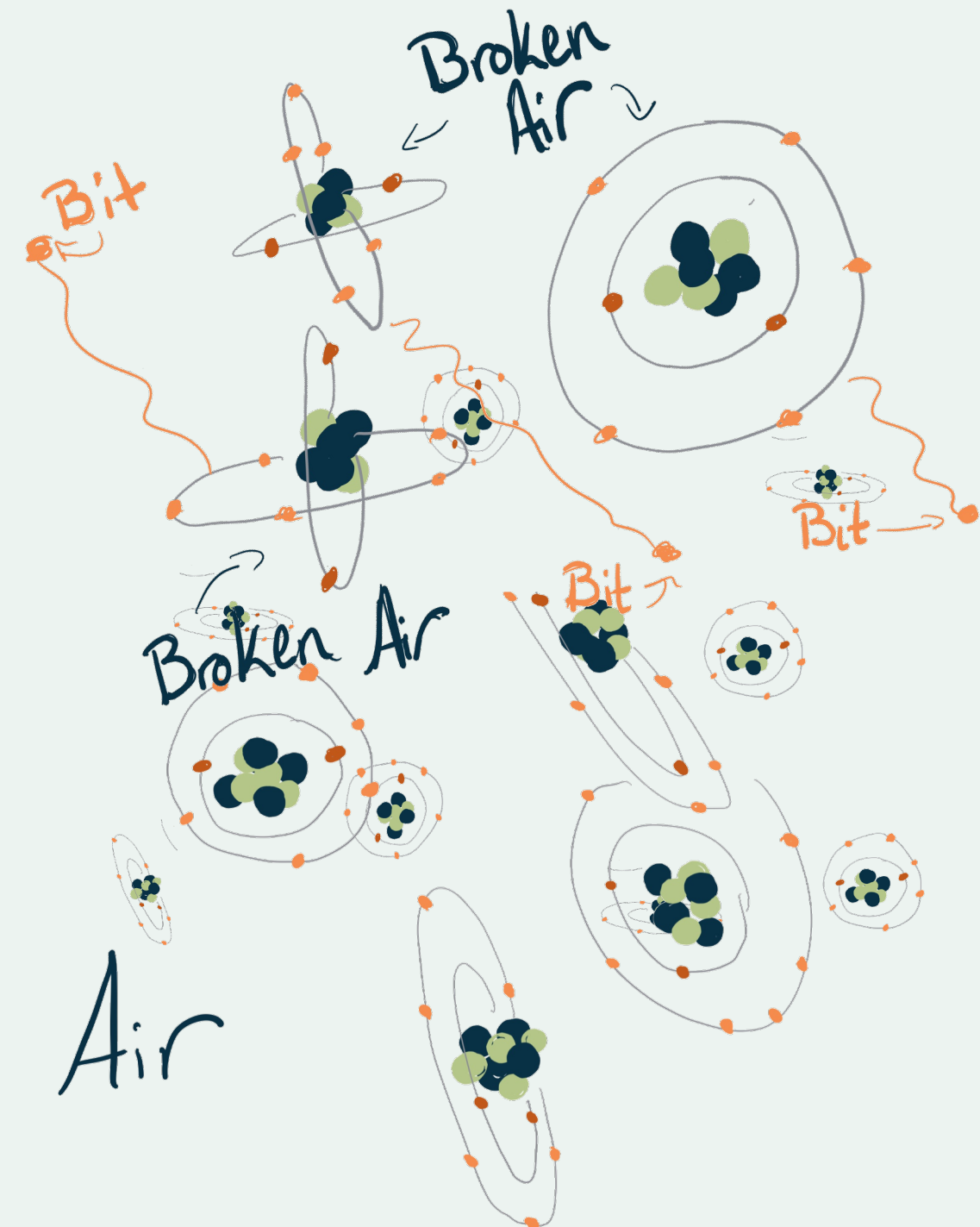
This place between sky and space ...





... is like where land water, water that is safe (sometimes) to drink, meets the big water that is not good to drink, and their waters come together.

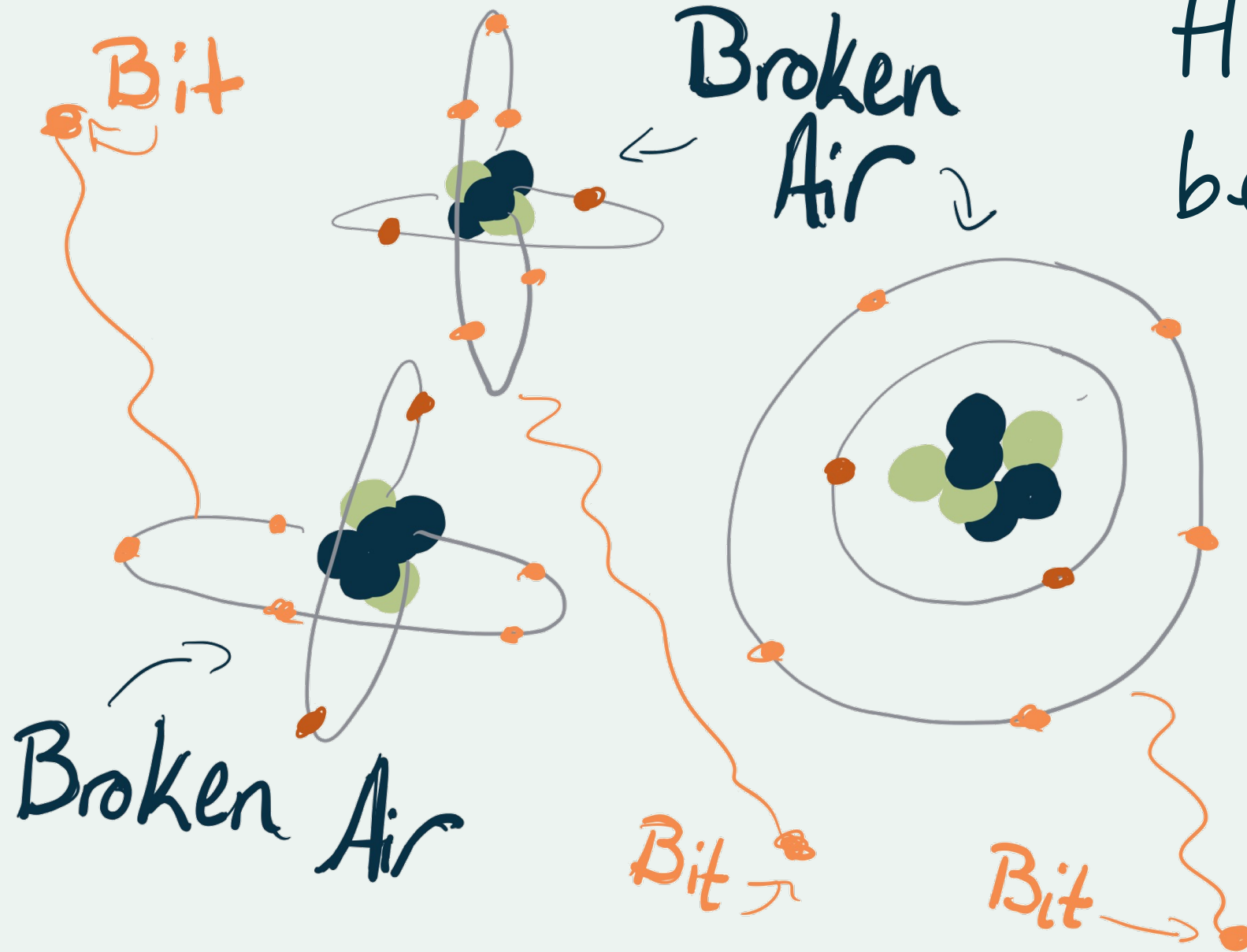


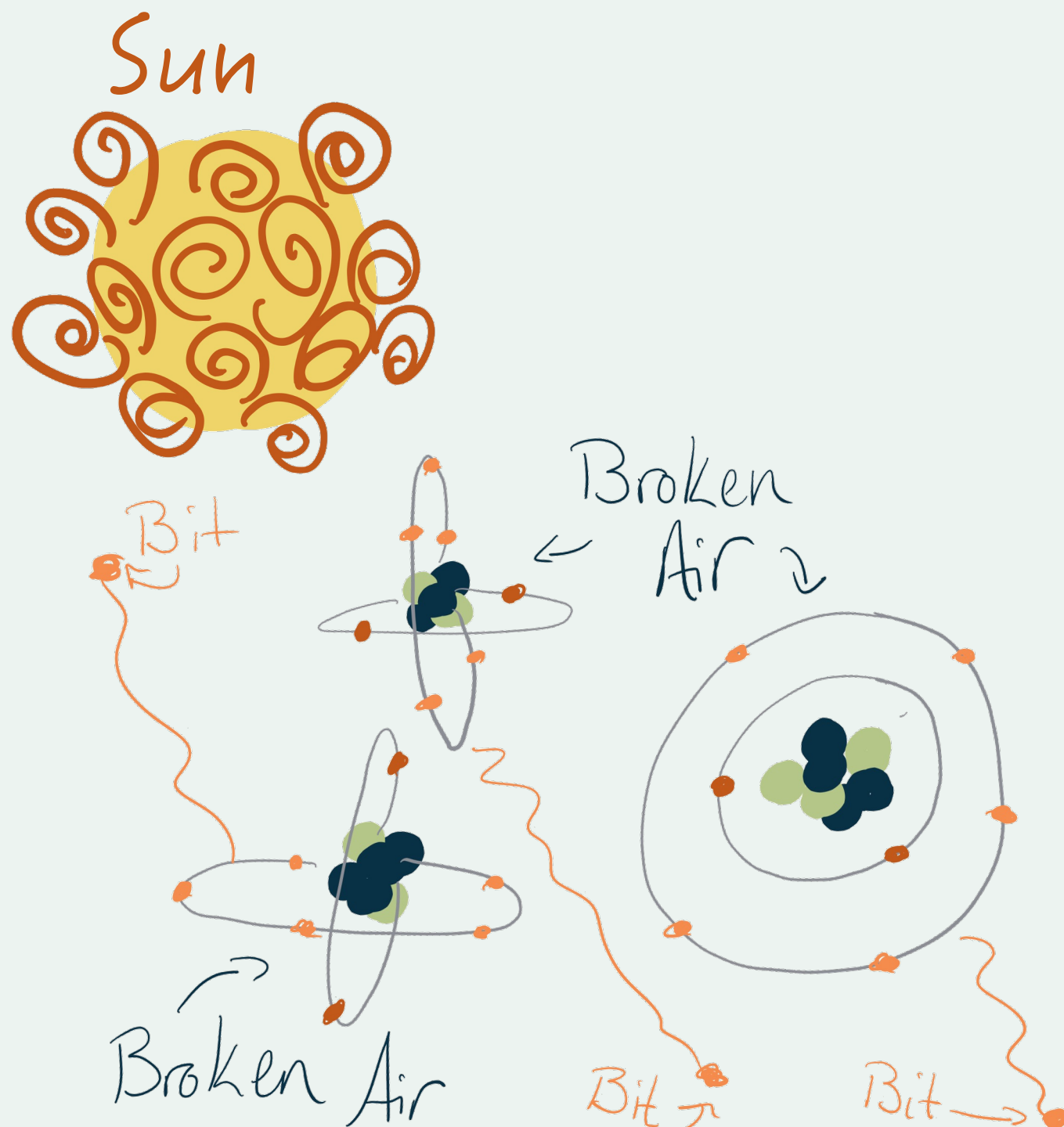


Where the sky and space meet you have air, broken air, and little bits from the air and from space.



How does the air become broken?

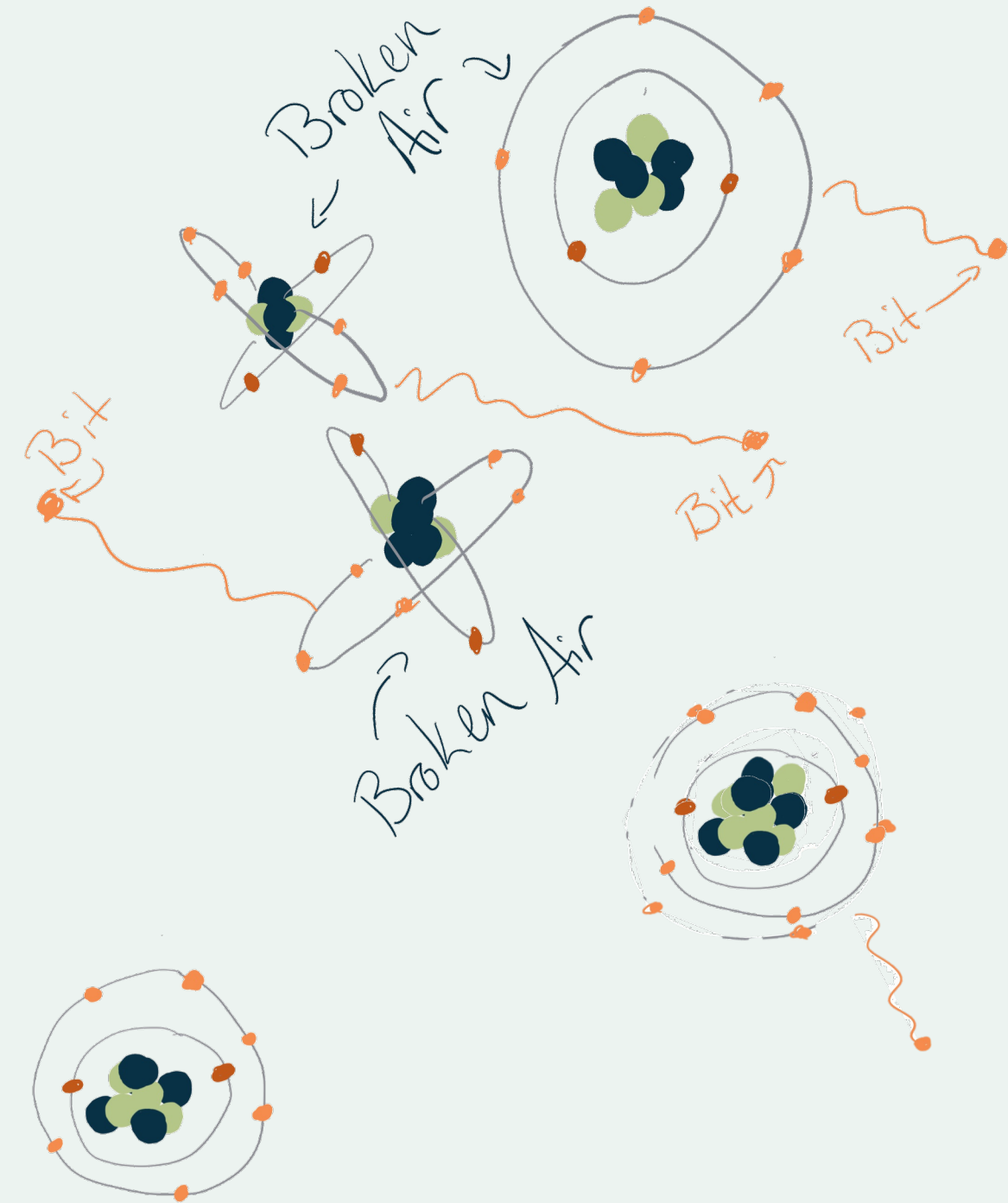




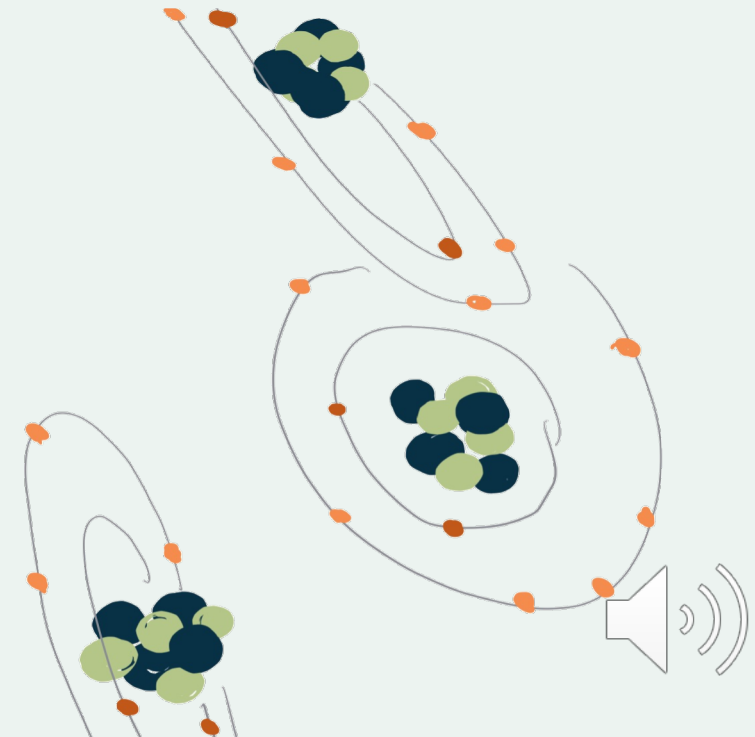
Little bits can come off kind of easily. Sometimes all it takes is for the air to see the Sun.



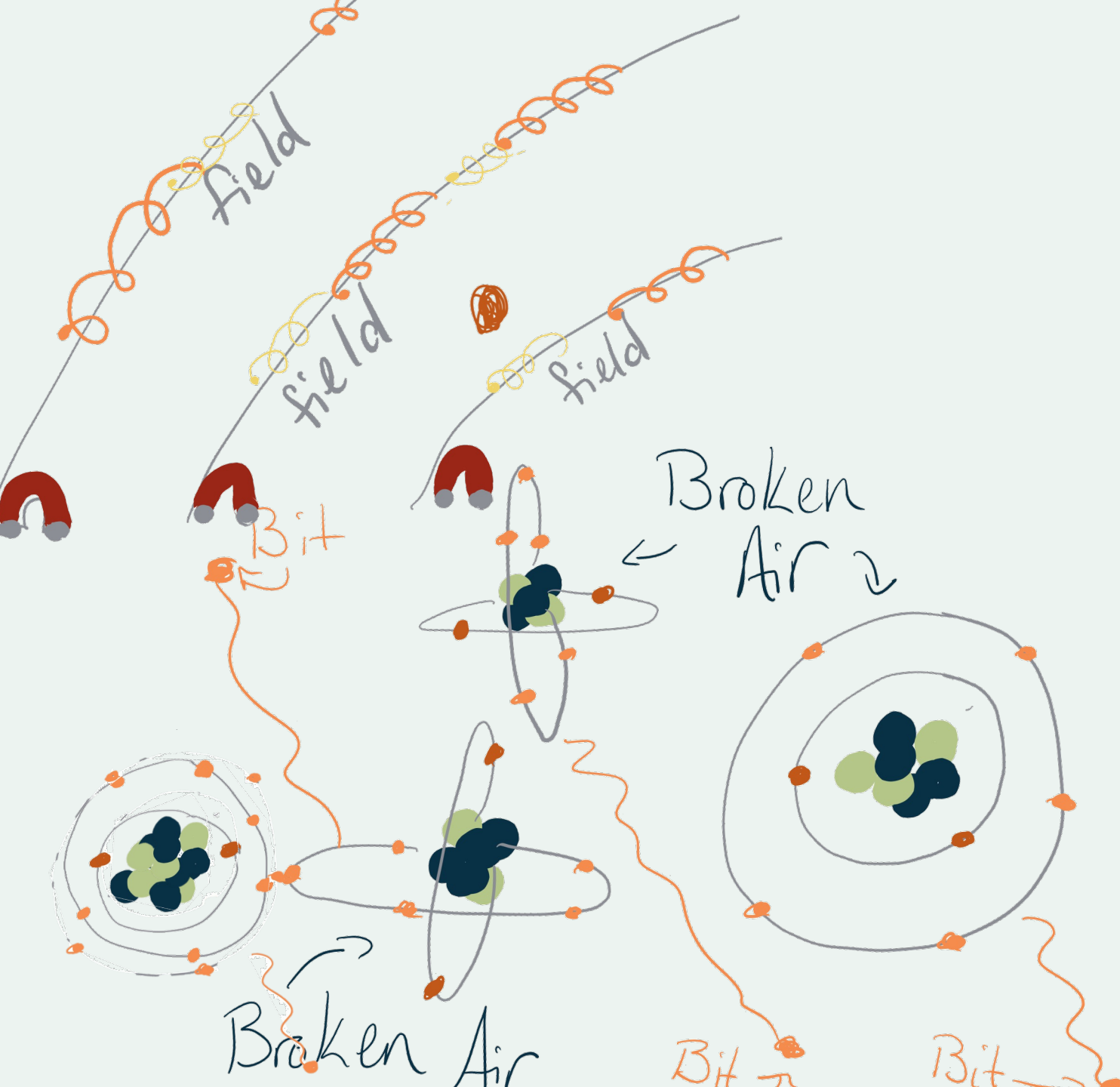
The air, bits, and broken air are close enough to hit and break each other.



Air







Other times you  
need falling bits  
from space to  
break the air.



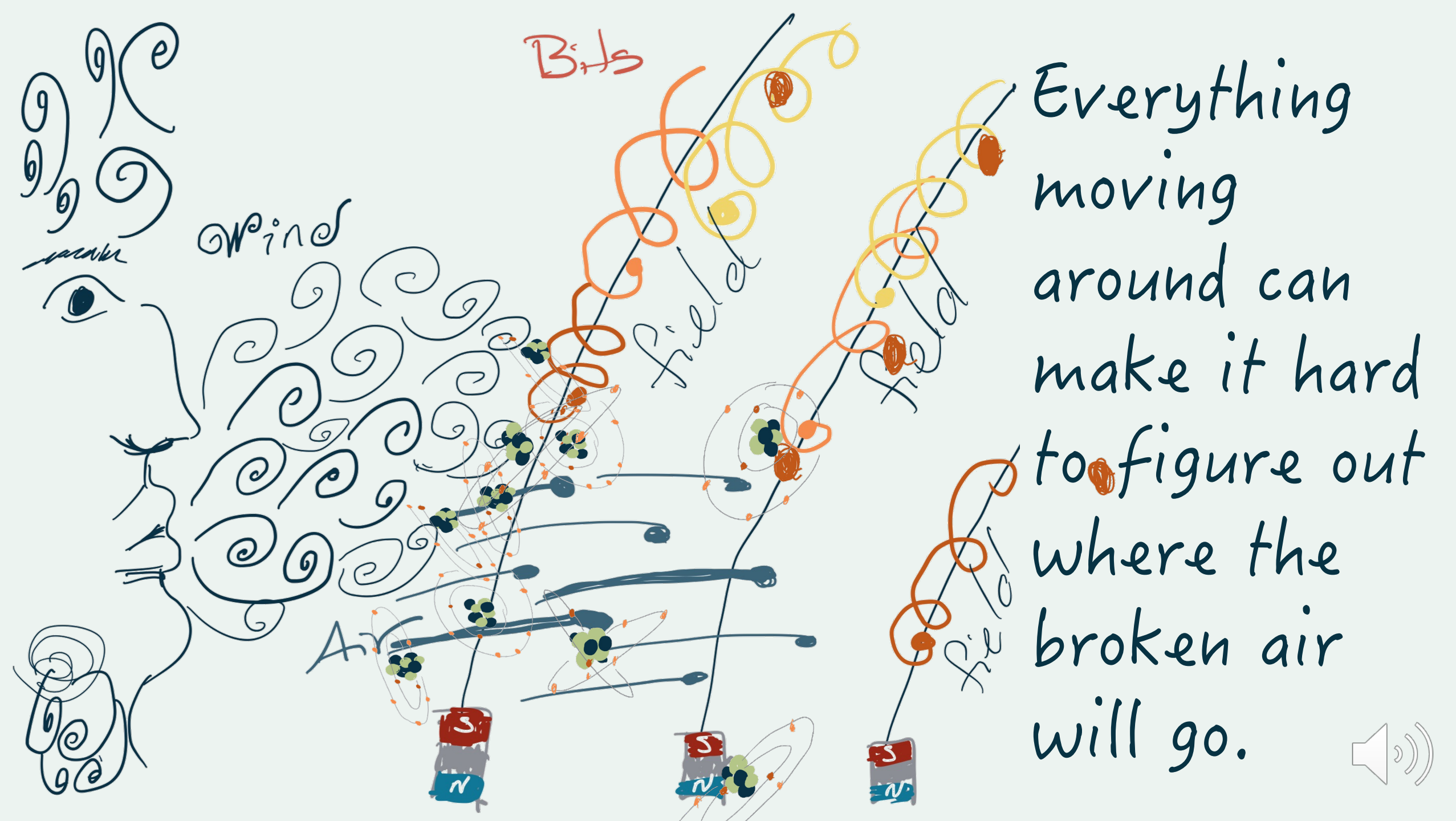


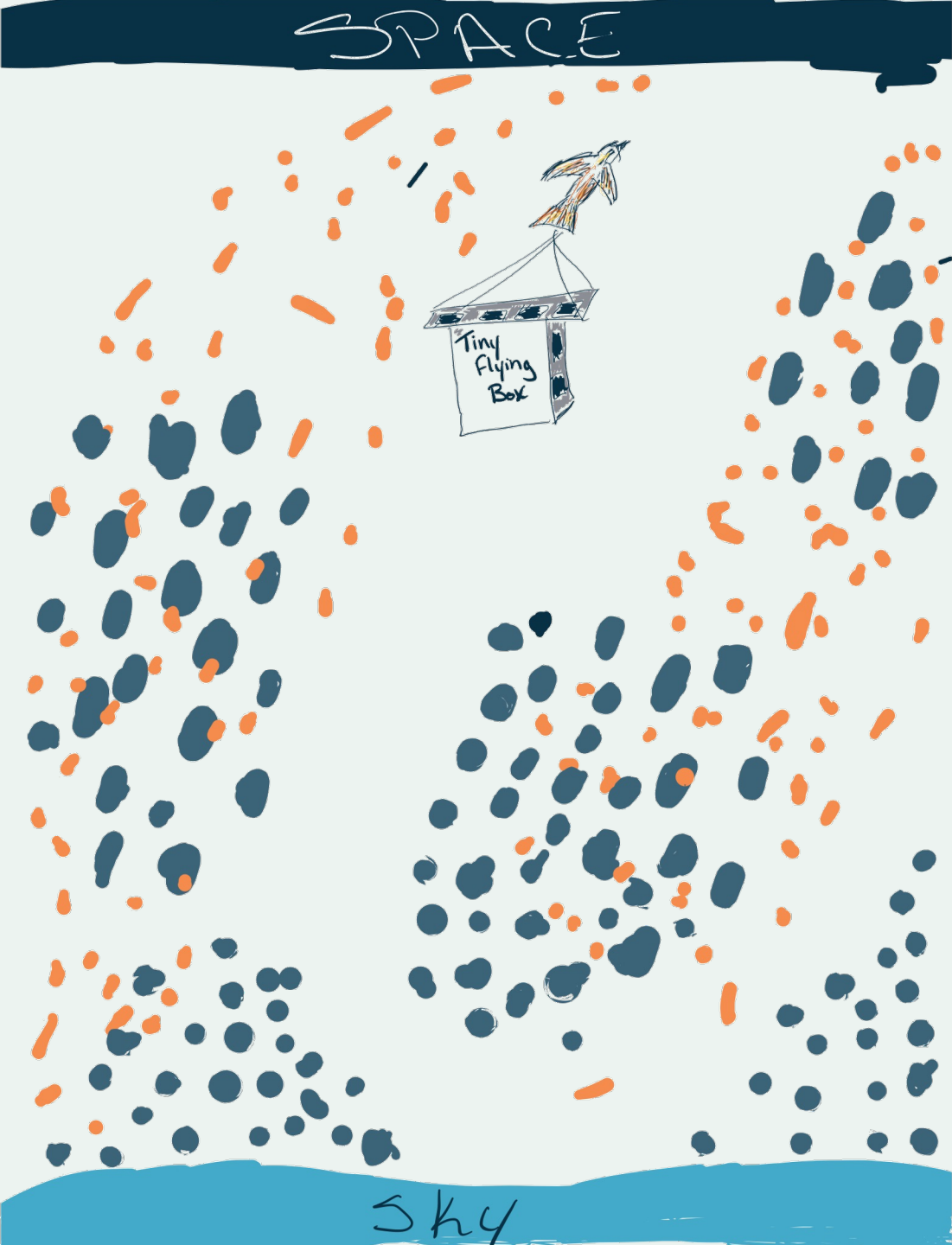
The bits from space and from the sky want to follow the fields, and the broken air also feels the pull along these lines.



The air that is not  
missing bits like to follow  
the sky winds.







This is what our tiny flying box (The TFB) will look at. The TFB will see what happens to make the broken air go in different directions.







With only one TFB it can be hard to know why the broken air moves the way it does.





The TFB may only see a part of the area where all the broken air comes together or goes a part.



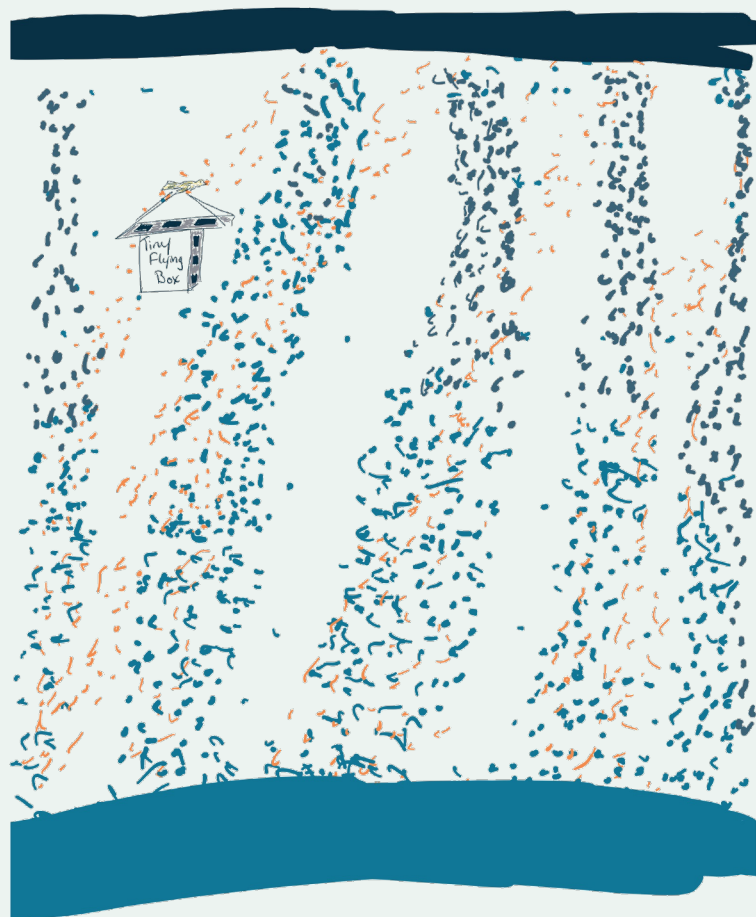
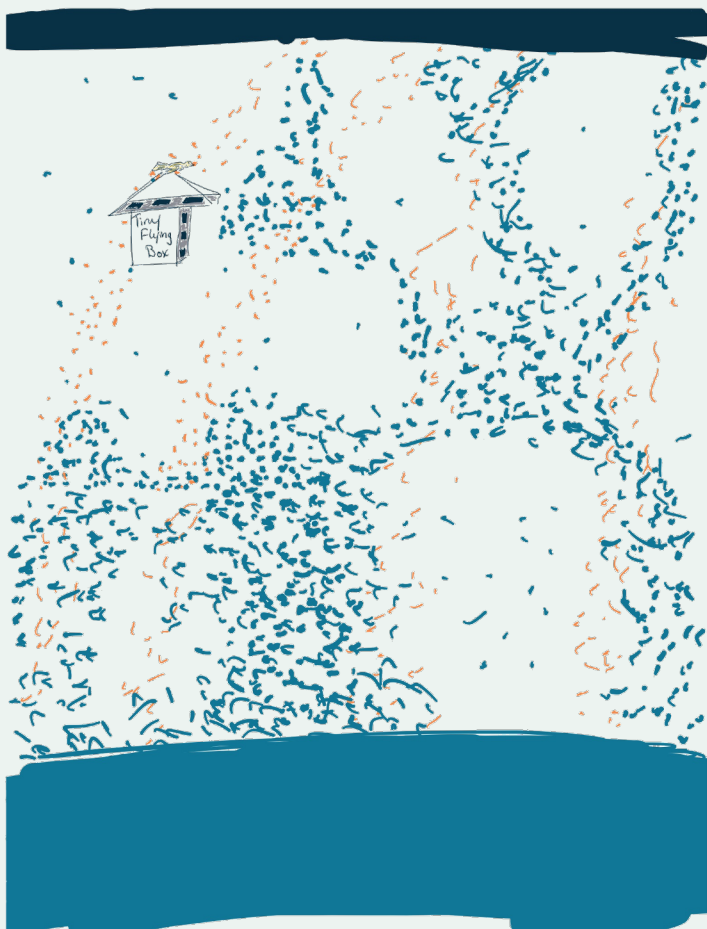


-- Big  
area of  
broken  
Air?

Like the pictures at  
the start of the talk,  
it can be hard to  
know what it shows.







Some may see  
a strange area  
of broken air.  
Others may  
see waves in  
the broken air.





So we work with people who imagine the sky and space on computers.





What the TFB sees  
will help them  
imagine the world  
better.





Before we can learn why parts of the sky come close together and sometimes far away from each other, we need to finish building the TFB.





The TFB will then  
go on a big up goer  
to visit where people  
live in the sky.





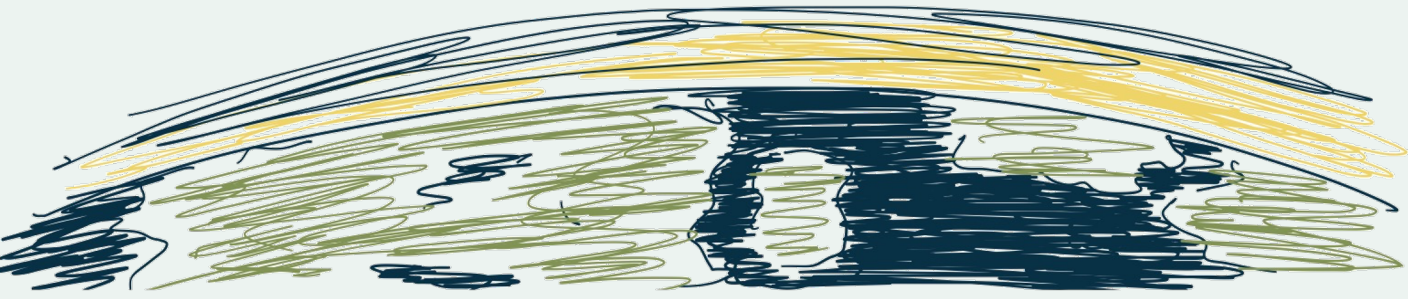
It will sit there until they have time to push it out and send it on its way around the world.

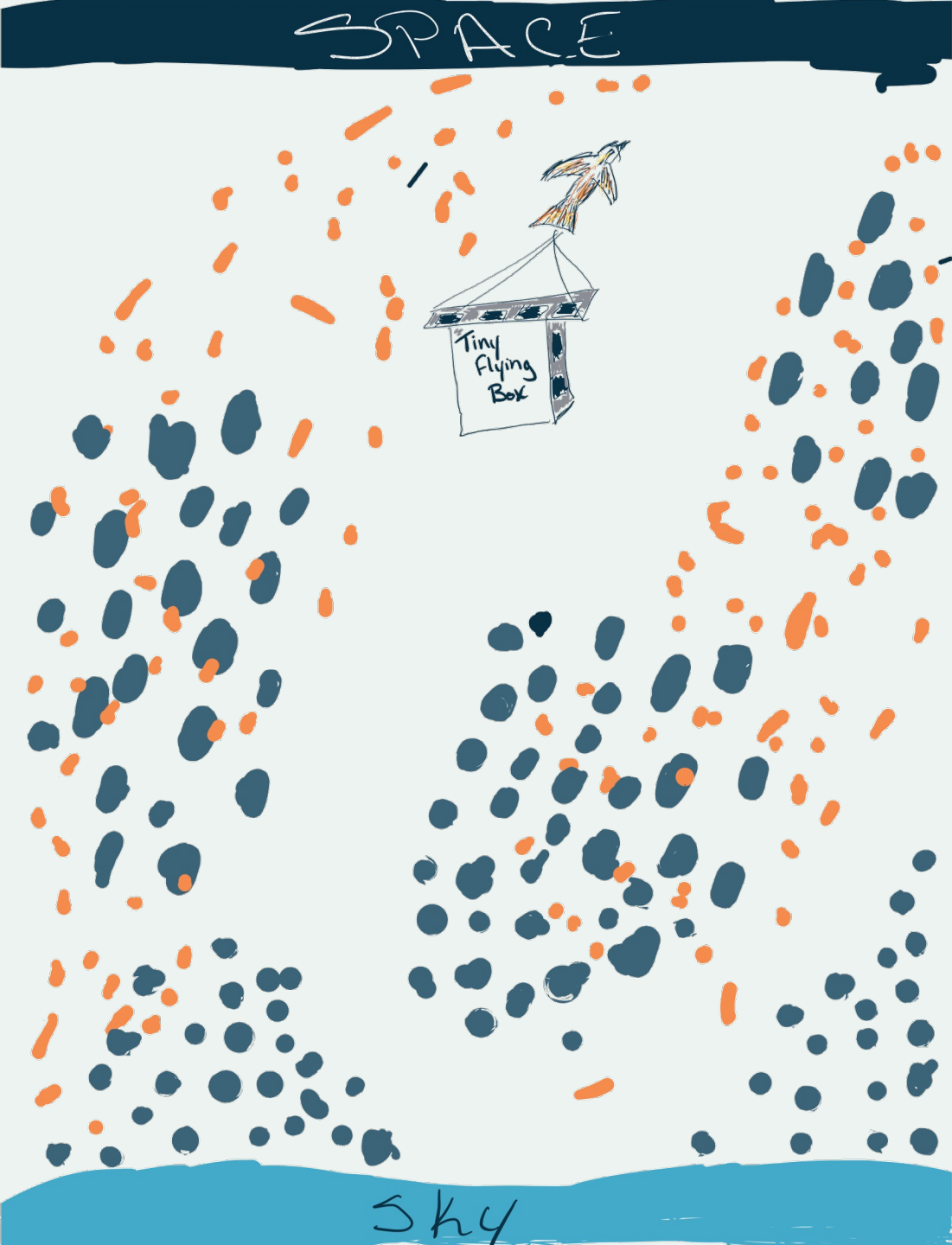






We hope that the TFB will stay working in the sky for at least 6 months.





While this is not a long time, our short-lived TFB will help us better understand the upper parts of our sky.





Thank  
you



Thank you for  
learning about our  
tiny flying box, and  
make sure to wave  
when we hope to fly  
over your head at  
next - next year's  
big meeting.



Thank you to all the tiny  
flying box friends:



Jeff Klenzing  
Sarah Jones  
Ryan Davidson

