

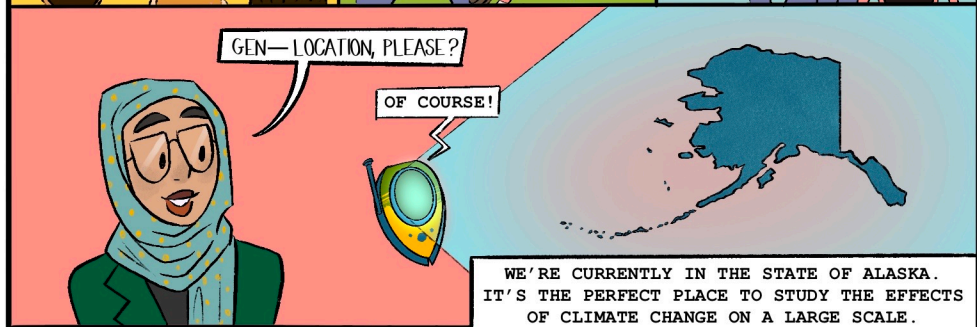
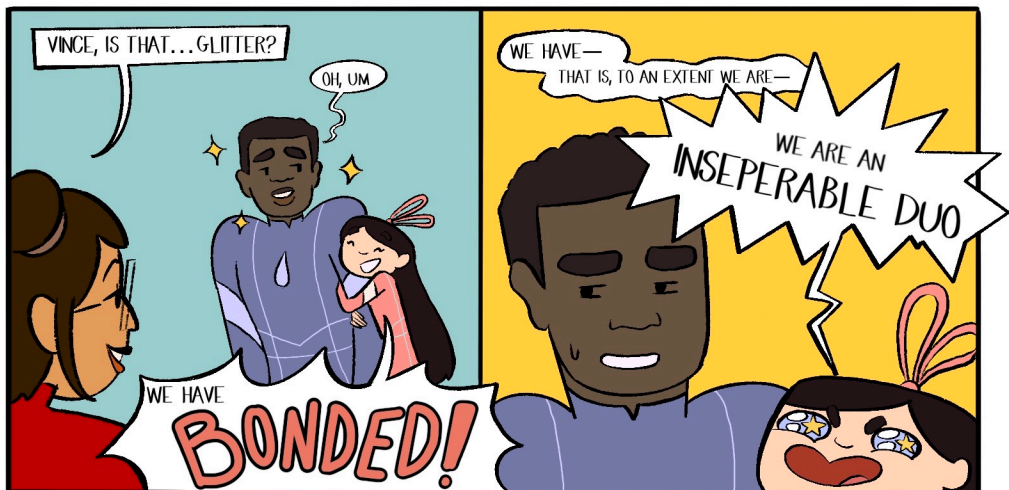
# CHAPTER 6

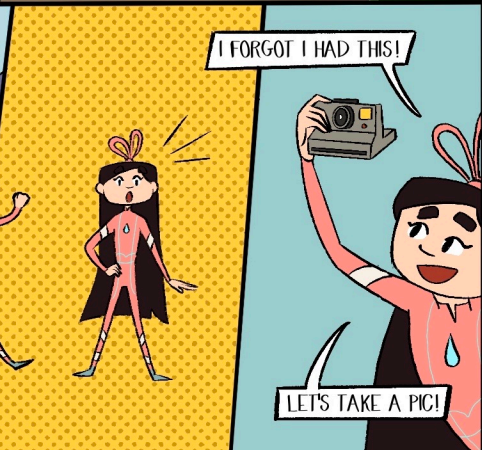
## PERMAFROST











WARNING: ACTIONS PERFORMED BY COMIC CHARACTERS. DON'T APPROACH BEARS IN REAL LIFE.





...BUT WAS INFORMED THAT THIS WOULD INCREASE BOREDOM AND LESSEN PRODUCTIVITY. I HAVE THEREFORE CHOSEN ONE OF OUR NEWEST ENVIRONMENTORS TO EXPLAIN IT WITH SOME HUMANITY AND PANACHE.



TAKE IT FAR FROM US, BEN.



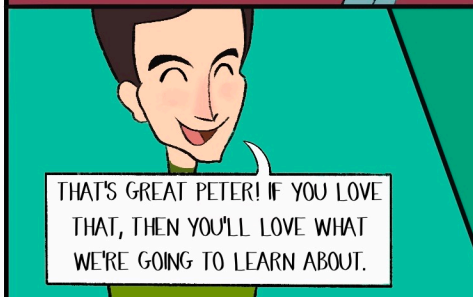
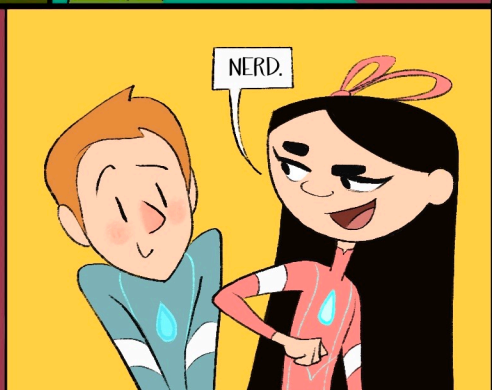
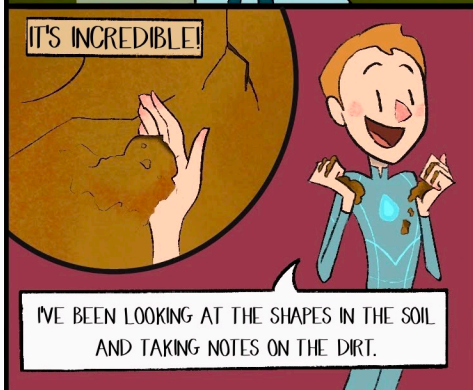
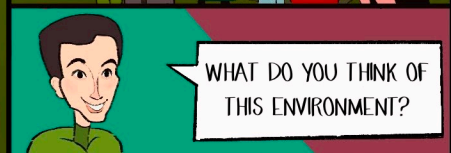
GEN MEANS 'TAKE IT AWAY!'



IT'S NOT MY FAULT YOUR IDIOMS MAKE NO SENSE.

RATHER, IT'S NOT MY FAULT IF YOUR IDIOMS— TO USE A METAPHOR— ARE TRASH.





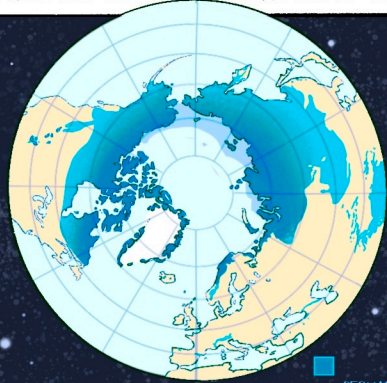


# PERMAFROST!

I THINK MY GRANDMA GOT A PERM ONCE!

THIS IS A LITTLE DIFFERENT.

YOU MAY HAVE NEVER SEEN IT, BUT IT'S UNDERNEATH A QUARTER OF THE LAND IN THE NORTHERN HEMISPHERE. THAT'S TWICE THE SIZE OF THE ENTIRE UNITED STATES!



PERMAFROST MEANS WHAT IT SAYS: PERMANENTLY FROZEN. IT'S ANY MATERIAL THAT STAYS FROZEN YEAR ROUND.

IT CAN BE ANYWHERE FROM THREE FEET THICK...

TO THOUSANDS OF FEET THICK!

AND LIVING THINGS GET CAUGHT INSIDE—MOSTLY PLANTS—BEFORE THEY CAN DECOMPOSE. SO THEY'RE TRAPPED, FROZEN IN TIME.

SO...WHAT DOES THIS HAVE TO DO WITH US?

WE DON'T LIVE HERE.

IMAGINE YOUR FREEZER AT HOME.

WHEN YOUR FREEZER TURNS OFF,  
WHAT HAPPENS TO THE FOOD?

PERMAFROST AFFECTS  
MORE THAN YOU THINK.

CHAOS. AGONY. A LACK  
OF SUSTENANCE AND  
MY COVETED DESSERTS.

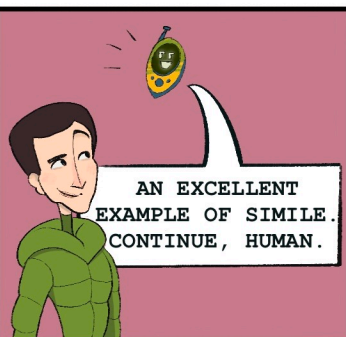
UMMM, THE FOOD ROTS, AND EVERYTHING GOES KAPUT!  
AND YOU'RE FORCED TO DRINK YOUR ICE CREAM.

WHAT? DESPERATE TIMES.

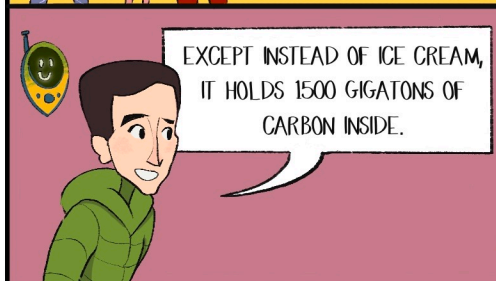




EXCELLENT WORK!  
THAT'S THE IDEA. WHEN  
YOUR FREEZER THAWS,  
YOUR FOOD ROTS.  
PERMAFROST IS LIKE A  
HUGE FREEZER.



AN EXCELLENT  
EXAMPLE OF SIMILE.  
CONTINUE, HUMAN.



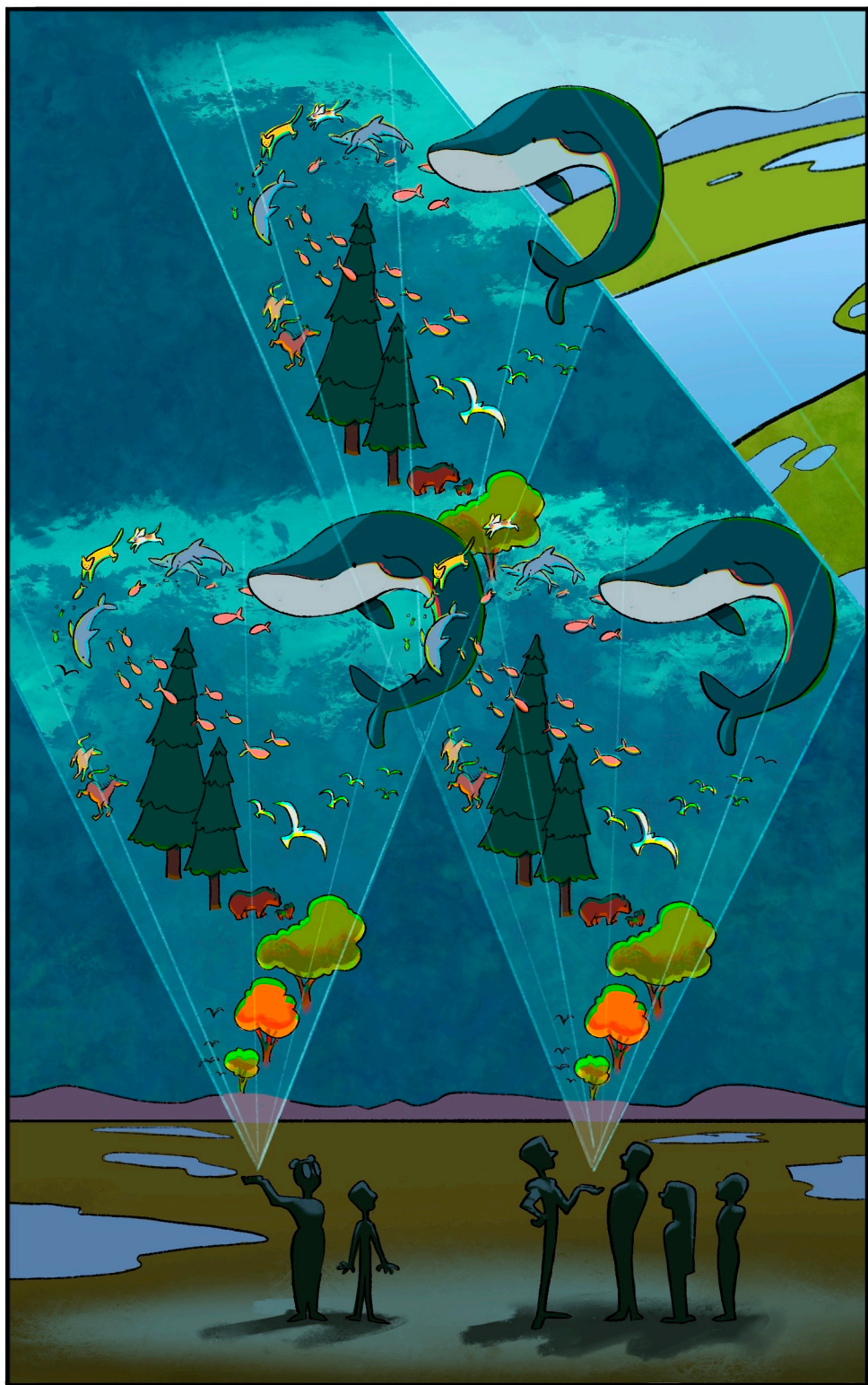
EXCEPT INSTEAD OF ICE CREAM,  
IT HOLDS 1500 GIGATONS OF  
CARBON INSIDE.



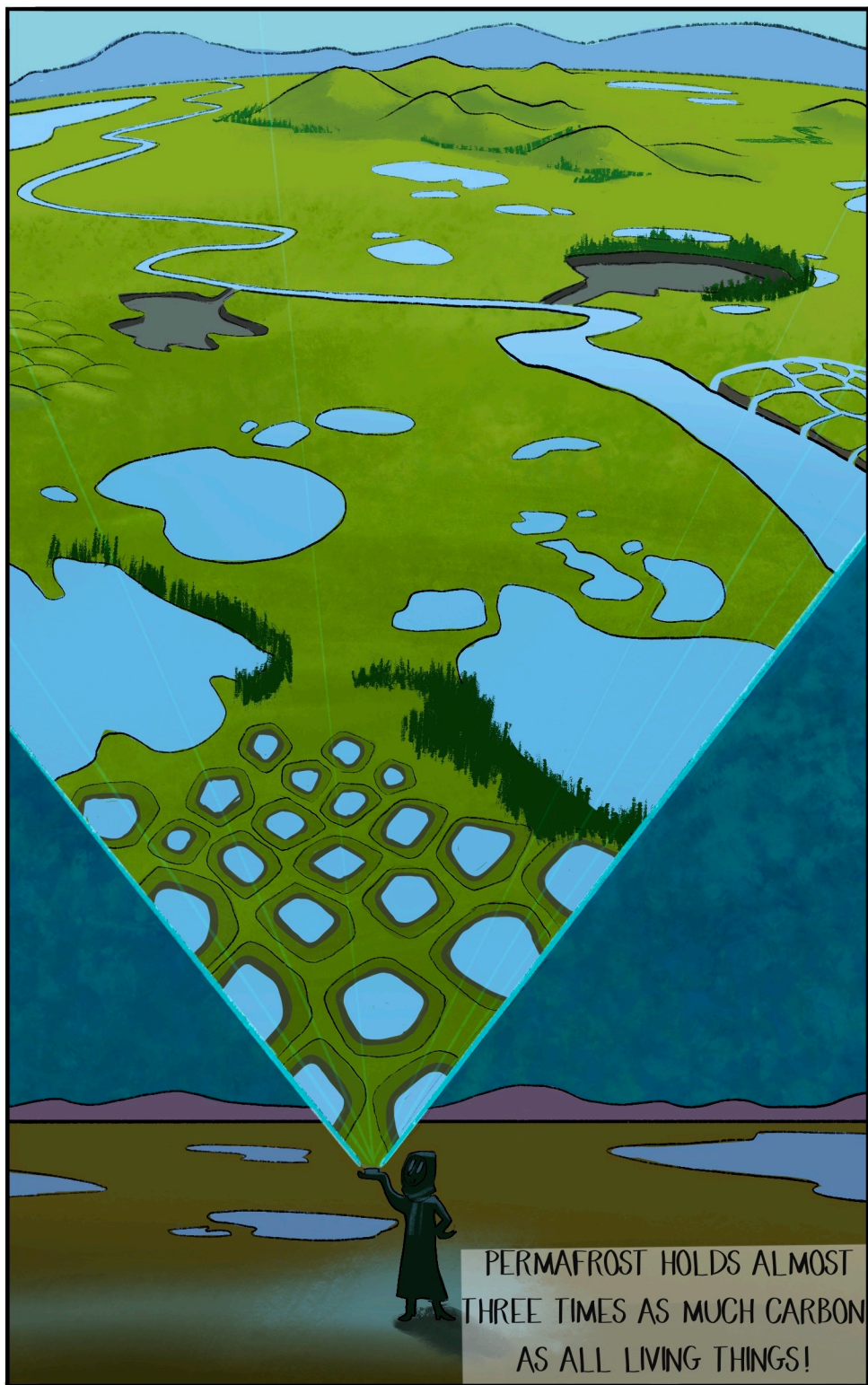
HERE, THIS MIGHT HELP  
YOU PICTURE IT BETTER!



WHEN YOU ADD UP THE CARBON OF ALL LIVING THINGS — ALL THE BLUE  
WHALES, REDWOOD TREES, AND MICROORGANISMS — THEY CONTAIN 550  
BILLION TONS OF CARBON COMBINED, WHICH MEANS...

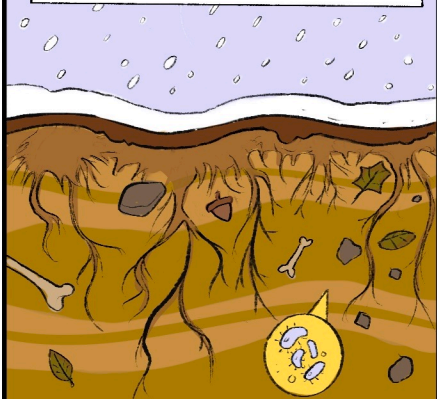






PERMAFROST HOLDS ALMOST  
THREE TIMES AS MUCH CARBON  
AS ALL LIVING THINGS!

RIGHT NOW, THE CARBON IS STORED AS BACTERIA, PLANTS, AND FOSSILS INSIDE OUR HUGE FREEZER.



ONCE YOU THAW THE PERMAFROST, THE CARBON ROTS JUST LIKE FOOD DOES.



WHEN SOMETHING ROTS, THAT MEANS MICROORGANISMS ARE EATING IT.

THE MICROORGANISMS IN PERMAFROST WAKE UP WHEN IT THAWS.



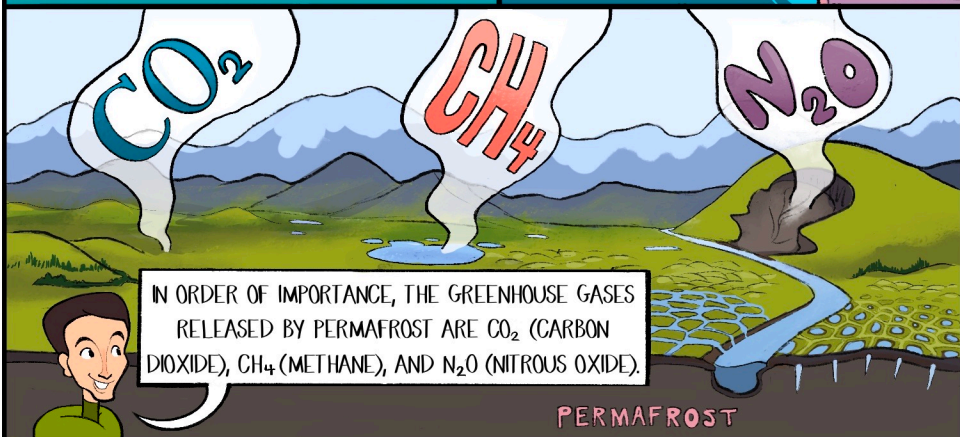
MOST PERMAFROST HAS BEEN FROZEN FOR THOUSANDS OR EVEN MILLIONS OF YEARS, SO PERMAFROST MICROBES HAVE BEEN PATIENTLY WAITING!



WHEN THEY WAKE UP AND START CHOMPING ON ORGANIC MATTER, THEY BREATHE OUT GREENHOUSE GASES.



THAT'S THE SAME AS WHEN THE ROTTING FOOD IN YOUR FREEZER RELEASES NASTY SMELLS.



IN ORDER OF IMPORTANCE, THE GREENHOUSE GASES RELEASED BY PERMAFROST ARE  $\text{CO}_2$  (CARBON DIOXIDE),  $\text{CH}_4$  (METHANE), AND  $\text{N}_2\text{O}$  (NITROUS OXIDE).

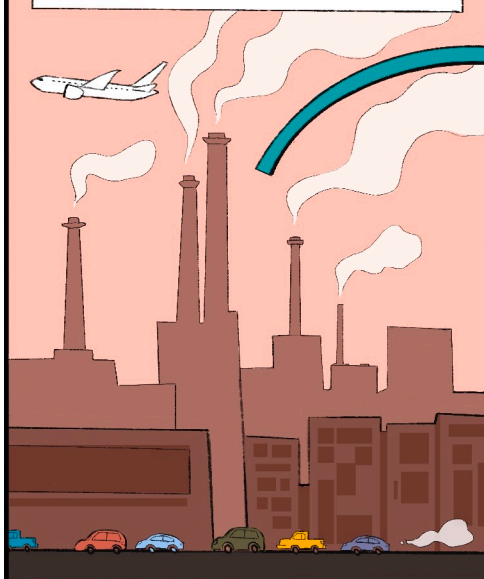
PERMAFROST



WHAT EXACTLY IS A GREENHOUSE GAS?

GREENHOUSE GASES TRAP HEAT IN EARTH'S ATMOSPHERE.

SO, THAT'S THE PROBLEM WITH PERMAFROST THAWING—EVERY YEAR, HUMANS RELEASE CARBON INTO THE ATMOSPHERE.



AS THE EARTH HEATS UP, THE PERMAFROST THAWS AND RELEASES MORE GREENHOUSE GASES.



IT'S LIKE LAUNDRY BUILDING UP—SOMETIMES YOU DON'T NOTICE THE PILE UNTIL IT CRASHES DOWN ON YOU.

EXACTLY! THAT'S WHY IT'S SO IMPORTANT TO REDUCE OUR GREENHOUSE GAS EMISSIONS. THE FASTER WE SHIFT TO RENEWABLE ENERGY AND CONSERVATION, THE MORE CARBON AND NITROGEN WILL STAY SAFELY LOCKED AWAY IN THE GLOBAL PERMAFROST FREEZER.

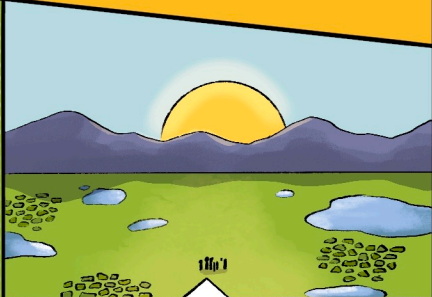
OH MY! I HAVE TO RUN—THERE ARE OTHER STUDENTS THAT NEED ME.



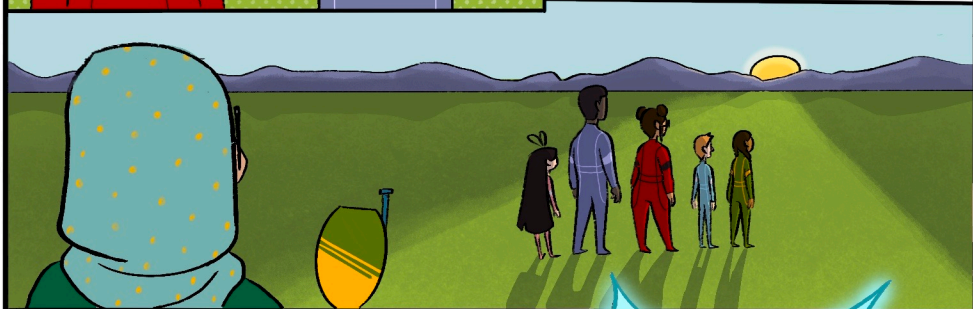
TAKE CARE, OPERATIVES.



HUH. I HAD NO IDEA WHAT PERMAFROST WAS.



IT'S STARTLING TO KNOW WHAT WE DO AT HOME CAN AFFECT THINGS ALL THE WAY OVER HERE.



GEN, WHAT DO YOU THINK—ARE THE OPERATIVES READY FOR ANOTHER ADVENTURE?



TECHNICALLY, I DO NOT THINK. BUT MY PROGRAMMING'S DECISION ALIGNS WITH YOURS.

ZAP!

ON WE GO!