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Someday there'll be stone-black skies

My sweetest Hai, the stars are duller than they've been in months—they don't shine like your eyes did in those late blue hours after sunset. Nowadays the rings of Saturn just make me miss you stronger. I wish I were Saturn so you could be the rings, wrapped around me. I can't believe I've been on this two-toned, two-bit rock for two years come next week, and I don't even know how I'll make it through the next three. Two years of overturning rocks, surveying ridges, and analyzing dust—chasing something in the numbers that we'll never find. Three more years of searching for traces of something that either doesn't exist or will never let us find it. Three more years of gray and white and black, and of smelly scientists trapped in this can. I'm really going crazy here, but it's with thoughts of you that I can stop myself from floating off.

Russ's breath made little clouds in front of the display as he sat up in his bunk. The research outpost of eighty people was very small. He rubbed his hands for warmth and then massaged his temples with his thumb and index finger. It was very late and preparations for the next EVA started in five hours. In four hours he had to give up his bunk for the next shift. "Forty

beds for eighty heads.” But most importantly today, the only return probe to Earth for the next six months was getting sealed in three hours, and he wanted to finish his letter before then.

Nothing feels settled here. I really mean it when I say I can feel every month and minute between us and the end of this mission. Please, please forgive me for going out this far, it was stupid and selfish. I really thought I'd find some great answers, but there's nothing here! I miss being able to talk to you in real time and I wish there was enough free bandwidth to get more videos of you and the house. I loved the one of you in your yellow sundress making grilled cheese sandwiches so much. The whole thing warmed me up and when I closed my eyes, I swear the smell of them wafted all the way up here. I'm so happy that I can finally send you a little present.

As Russ finished up his letter he was careful not to type too loudly: a hard-learned habit from living with Hai while writing up his graduate thesis late into the cool California nights. She used to turn over in bed and kick his desk chair. It was always too hot in their dusty ranch house in the Valley for Russ to work comfortably during the day, which made him figure he'd enjoy being in space. “New Methods for the Detection of Astrobiological Trace Molecules in Extraterrestrial Ices.” He had heard being that far from the Sun is like being in nighttime all the time and the habs are climate controlled. And it's cold on Iapetus, so finally no bugs.

Russ crept out of his bunk and stepped onto the aluminum floor of the hab module in his old, stained socks. Everything was so cold. For a few weeks when he had first arrived, his toes cramped up at night; by now the calluses from the long EVAs across the mountain ridges kept him insulated—the same way the outpost was perched on stilts to keep off the nitrogen-cold floor of the moon's surface.

Here, every joule of energy was precious. Solar panels on such a small and distant outpost were ineffective, so electricity came from miserly radioactive sources which needed

replenishing all the way from Earth. The cold percolated down into their souls, the low gravity threw everything into slow motion, and a hot cup of coffee was something special. The relay satellites which orbited Iapetus and its banded master relied on similar power sources, so broadcasts back to Earth were prioritized for scientific data—the only bountiful thing this far out in space (even if Russ felt his was all useless). Personal communications, letters, pictures, and videos were bundled like mail into weekly lump transmissions. Management decreed it also kept everyone focused on their work. As Russ floated down the corridors towards the return probe, his message to Hai sat in the outpost's computer systems, waiting impatiently to be sent home.

He made use of the wall and ceiling handrails to tug himself down the corridor toward the break room—in the low gravity he hardly weighed fifteen pounds and his muscles had atrophied. Thomas and Zhíqiàng were sitting at the table of the break room, awake and deathly quiet. The first looked up from reading something on his computer, and the second looked down into his warm coffee when he realized it was Russ who had come to disturb their silent hour. Spend too long cramped together and any group becomes cliquish. Russ latched onto a handrail by the door and swung gracefully towards the storage lockers.

“Hey guys, how long until the return probe lifts off?” he offered, even though he'd memorized months ago the exact time it would reascend into the darkness. He opened his locker as Thomas glanced at his watch.

“You have... an hour and ten minutes,” he said, and his eyes turned back to his readings.

Russ took out one of his shirts, bundled up tightly in a plastic box. He delicately unwrapped it to uncover a little stone figurine, six inches tall. It was a painstakingly carved astronaut, fashioned in the same EVA suit which kept Russ alive on his research excursions. Its proportions were a little off—it was too chubby, one arm was longer than the other, and its

helmet wasn't properly round, but it was recognizably of Russ and made by Russ—a labor of love. He swaddled it back up into the box and held it close to his chest as he continued off towards Docking 6. He murmured a “See you guys later,” to Thomas and Zhíqiàng. The first grunted a “Yup,” and the second clutched his coffee closer and let out a cloudy sigh.

Docking 6 was close by; Chloë was stationed by the umbilical tunnel which joined the return probe's storage compartment to the outpost. She was processing the last personal items when Russ floated up to her, his box in hand. His heart was beating strongly. He gave the box a soft kiss and handed it to Chloë who smiled at the warm gesture.

“Don't worry, chéri. It will get to her safely,” she reassured him, a hand on his shoulder. They stood for a second as the quiet moment passed through them both and then Chloë turned around. Russ peered behind her into the probe's cargo hold. Overall, the return probe was big like the white school bus which had picked him up from his dusty house and ferried him away to the airport in Los Angeles. The probe was mostly filled with rock and dust samples which needed to be send back for further processing and analysis. No chance to be a stowaway on a probe without life support. Chloë shrink-wrapped the box and then affixed a barcode. Russ swallowed and shuddered, then he made his way back to his frigid bunk for a short rest before another shift on the frozen moon. The transmission of his letter would occur in a few hours and the probe would launch soon after, following its final inspections.

Out on the ridge, Russ looked up through his visor and tried to see if he could spot any of the orbiting satellites, but the Sun, glaring through the black like a far-off spotlight, made it almost impossible to see anything faint. He turned back to his team members, bent over like cotton pickers, and in turn continued his work. Far off below him, a panel on the outpost slid open and a delicate communications array blossomed into the eternal, daylit night. It trained its

crosshairs on Com-2 and, silently and invisibly, Russ's words to Hai flashed through the vacuum. They imprinted themselves on the gold and silicon memory of the satellite, which then aimed itself at a second spot in the sky. With the rings of Saturn shining in the darkness, the satellite screeched in digital staccato some eighty woes, joys, and aches, some eighty recorded faces, hugs, and lullabies all toward a blue droplet almost a billion miles away. Among them, Russ's letter tumbled towards the Earth.

More and more, I feel like there's no such thing as fresh air here. The air's dry, like the cold mornings on the mountains we can see from the house. I keep getting nosebleeds. I miss the humidity of our beach trips in my lungs, and the dust of your hair and our tatty couch on my skin. Outside, there are no clothes to tear off, no windows to open, no bugs to accidentally let in, no monsters in the night that we can huddle against. The nights are frozen dead. It's like there is no outside—no space.

The transmission was caught by an array in Australia, just a little behind schedule. Its journey had attenuated the signal strength to hardly a whisper, but the electric words, lullabies, and cries arrived intact. They zipped along gold wires, copper cables, and fiber lines to computing centers in Los Angeles. The messages were processed, any sensitive material was culled, and the contents of eighty hearts were repatriated to parents, partners, and children across the globe. Two hundred miles to the north, Hai sat at her kitchen table in the pale dawn with a glass of iced tea, compulsively refreshing her inbox. The dust was getting worse and it would be another dry and windy day. She sighed, a little worried, and stood up to lean against the wall by the kitchen window. She looked up at the clouds, taking sips of her tea, though she wasn't sure where Saturn would be from her point of view at this time of day. Suddenly, her computer dinged

and her heart leapt. She opened the message and a smile reached across her tired face. Her eyes began to water before she read the first word.

I know that things have been hard on Earth, and I can't wait to come back and help you. I've made you a little doll of me out of some lovely stone I found in the Roncevaux Terra. I'm out here, working hard, but now a part of me will always be with you. It's a little crude, but you know it's just rough and tough like me. I set it on the return probe which should get to Earth in about a week, I think. I hope the rains come back soon, the droughts sound awful. I'm hoping the EVAs will be a little more interesting once we move our analyses into the darker Cassini Regio. I do envy the mini-me through—it makes me happy picturing you holding me again. He'll be brave on his journey home.

Hai wiped the dust and tears from her eyes. She caught her breath and her hands felt numb. She pushed her palms into the table, sitting up and taking a deep breath. The anxiety of waiting for a successful transmission had knotted her stomach, but reading Russ's words calmed her and her appetite crept back. She got up to the kitchen cabinet to get a cookie from her ration box, which she nibbled on with her tea while she continued to read the rest of the letter.

Back on Iapetus, Russ was asleep when the return probe was finally ready for launch. He had wanted to stay awake and see it off, but two sleepless nights in a row would have been too much for him. Despite his excursions now practiced routine, he knew that one mistake on an EVA could cost him his life, and writing his letter to Hai helped him reaffirm his personal conviction for working—and someday returning—safely. The return probe had been double- and triple-checked by the engineers on the outpost. All the diagnostic tests were finished, and the tanks were pressurized with liquid hydrogen and oxygen, hydrolyzed from water ice deep in the moon's rocks. In the final countdown, the return probe was in the hands of the computers.

It lifted off with a little rumble. Inside the hab module, Russ turned over in his bunk, dreaming deeply. Behind his tired eyes, he sat with the stone astronaut in the return probe. The probe lifted off from the surface, the exhaust of its engines scorching the ices below it. It pitched slightly to the side, trained on a calculated point towards Saturn. It crept ever upwards, drifting out from Iapetus's fingers and swinging in, towards, and then around and past the ringed giant. Safe in space above the gas planet, Russ watched the beautiful banded clouds whipping past each other. Its storms roiled like Polyphemus as the probe distanced itself from the windy shores and its main engines shut down.

When I first got here, I wished I could truly share with you the beauty of Saturn. I remember how we pored over pictures of it together, but they don't do it justice. To see the rings with my own eyes, spinning just out of reach, terrifying in their perfect geometry... I wanted to pounce, and to pin, and to frame some sample of that ghostly thing and offer it to you; to repay my debt for the years of us together lost. Now it haunts me when I sleep and I'm scared it'll follow me home.

The internal computers hummed along, its antennas blurted out status updates, and its gyroscopes and motors prepared themselves for the odyssey before them. On queue, the probe unfurled an immense golden sail and called to the laser array in polar orbit around Saturn, which had slowly begun to shrink behind it. The sensors in the orbital array squinted into the darkness and trained themselves on the probe, then, like a lighthouse, it fired on the sail. Russ awoke with a jolt—the lights of the hab module were turning on for the next shift and bunk rotation.

The probe felt the soft breeze behind it. The laser continuously pushed on the sail as the probe began to drift faster and faster. The pressure of the immense light was weak, yet cumulative. The probe moved like a glacier, then like a stream, then a torrent, a bullet, and then a

lightning bolt, its inertial guidance systems tallying up each moment of acceleration. The laser array shut off, its heat sinks glowing red like tiger stripes, and still the probe careened onwards, unhindered in the vacuum. On queue, it began a slow backflip; instead of beelining towards the Sun, it now fell backwards faster and faster out of the abyss of deep space. Tucked safely inside, the stone astronaut hurtled away from Saturn and its moons and its ice and the frozen outpost where it was born, and towards a new and dusty Earth.

I wish marking my calendar for the day I come home made that day come faster. Instead, that day is waiting far out in space for us to bump into it. Once it draws closer, I'll look into the sky at where you are and I'll imagine the Sun's warmth on my skin and how close you'll be. But today and tomorrow and the next day, when I peer up into the darkness, I see a thousand other stars and I'm scared I'll lose the Earth among them. They don't even twinkle. When we used to lie out in the mountains and gaze up, we could dream of a future because the twinkling and shivering of the stars let us know that the universe was alive, waiting for our imaginations to meet it. But here, the stars are frozen and as they stare down at me, unblinking, I'm locked in a present without a future or a past.

The probe gracefully finished its somersault and Saturn and its moons shrunk until they were just another dot against the cosmic horizon. The Earth was still far away, an even fainter speck hidden in the glare of the Sun, but the onboard computers kept their eyes focused. The Sun was getting closer, brighter, and warmer. In a few days, the probe would return home. On Earth, the control center computers fidgeted in their housings, waiting for the probe to come in range, waiting to spot a glint in the black.

In the Valley, Hai delivered coffee and took phone calls at the town hall, but she was distracted. More than ever, she wanted to pick up the phone at her desk and be surprised by

Russ's warm voice, crystal clear and in real time. She wanted to pick up the phone and feel Russ's hand reach from behind her and set it back down on the receiver. She wanted to pick up the phone by her bed and call in sick and roll over and feel Russ lying there next to her.

The computers in Los Angeles tuned in to satellite dishes around the world, which scanned upwards until Madrid finally spotted the probe, its golden sail gleaming in the void, right on course. Another orbital array, even bigger than the one leashed to Saturn, fired up its lasers and bore down. The stone astronaut shifted in its box as this first deceleration process began. The Earth bloomed from a dot into a disk, and then swelled into a marble—first quickly and then more gradually, until several hours later the probe had been slowed enough to let its own engines take over and it was too close for the orbital array to target it.

Still, sometimes I look up and I can just barely spot one of the satellites drifting overhead and I remember that we can set our own pace for the cosmos. Just because the universe looks frozen in place doesn't mean we're frozen in it. Our satellites keep their orbits, our schedules tick on, and my heart keeps beating, kept warm by your love.

Had the stone astronaut had a window, it would have seen hurricanes and oceans, vast mountains, floods, and dust below it. It'd have seen the probe stow away its golden sail in preparation for the engine burn. The onboard computers whirred up the gyroscopes, and the probe aimed its heat shield down towards the Rockies. Given the upcoming deceleration by the engines and the rotation of the Earth, the landing spot would be a cool splashdown in the Pacific ocean. At home, Hai took the curlers out of her hair and picked the pills off her dress. Heavy, teasing clouds loomed over the mountains and it looked to be another windy day.

I know three more years seems like an eternity, and a billion miles is worlds away, but I'll be there soon, by your side.

The engines activated with a thump as a worn-out fuel line suddenly ruptured and the probe began to spin head over tail. The engines cut out as emergency procedures whizzed through the computers. Gyroscopes throttled up and control thrusters fired to fight the violent rotation but it was too late—the fuel line had been connected to the liquid hydrogen tank, which now gushed out a magnificent shower of ice particles into the vacuum of space. The computers in Los Angeles blared alarms and threw up warning lights, calculating outcomes and simulating contingencies. The probe's computers wrestled back heroically and the control thrusters regained control. The probe was stabilized, but its main engines were uselessly out of fuel.

The engine burn hadn't lasted nearly long enough and the probe screamed towards the Earth. The computers huddled behind the heat shield, bracing for the end. The stone astronaut settled into its box. A few hours later, with the Rockies to the east and the Pacific to the west, the probe slammed into the upper atmosphere. Huge waves of burning plasma welled up around it. The cargo shook and jolted, paint charred and debris tore away. The heat shield was devoured by the inferno, blasted away like an icicle pressed into hot steel. As the deceleration mounted, the frame of the probe was pressed into itself and in an instant the tanks were crushed.

Driving on the dusty highway towards the center of town, Hai caught sight of a breathtaking meteor from over the mountains disintegrating overhead. She checked her watch and pulled over, stepping out of her car to witness the probe's spectacular return. A large section of the cargo hold sheared off and what little remained of the probe started to tumble again, splintering into smithereens. Several tons of rock and dust samples were plunged into the re-entry blaze, pulverized into particles which cascaded down into the lower atmosphere, along with the remains of the stone astronaut.

Look up at the sky, and know that I'm smiling. The dust will be over someday, and you'll have blue skies soon. All my love and more — Russ.

Hai gasped, her hands over her mouth in shock, unsure what she should do. Her yellow dress billowed in the wind against deep and murky skies. The wind had picked up and the clouds over the mountains were drifting down into the Valley, towards the haze of smoke and debris left by the probe. She looked upwards and suddenly a smile reached across her tired face.

Right above her, something in the pulverized rock strewn into the air seeded the formation of a few crucial droplets, and so it was that for just that morning, the clouds swelled overhead. She felt a kiss of water on her cheek and she opened her mouth and tears filled her eyes. For the first time in months, rain fell in the Valley and the dust settled to the ground. The cracked earth turned a rich, dark brown, thunder echoed through the mountains, and lightning flashed across their peaks. Hai leaned onto her car beside the highway, drenched in the otherworldly downpour. She looked up at Russ and for a day she just laughed and laughed.

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