

Raindrop Tales: GPM Meets Mizu-Chan

SCRIPT

Characters: Global Precipitation Measurement Core Observatory (GPM), Mizu-chan, Engineer (based on Candice Carlisle), the Tropical Rainfall Measuring Mission (TRMM); other constellation satellites – Megha-Tropiques (India/France), MetOp (Europe) and GCOM-W1 aka Shizuku (Japan)

Note inside front cover: In the story, the satellites have characters to represent them. However, the real satellites are remotely operated and do not have people aboard.

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Panel 1: [Wide shot view of GPM satellite above Earth, solar panels folded in, antenna down]

Text: In his first days in orbit, the Global Precipitation Measurement Core Observatory (aka GPM) should have felt like he had it all. Years in the making, he was a state-of-the-art satellite, the best of two space agencies*. He was on top of the world.

*NASA and JAXA, the Japan Aerospace Exploration Agency

Panel 2: [close-up of GPM character sitting on the satellite, frustrated, eyes closed – microwave imager and antenna folded down]

Text: Instead, GPM was impatient.

GPM: Can I open my eyes **now**?

Panel 3: [Engineer in control room with headset to talk to GPM]

Engineer: Be patient, GPM. We have to make sure nothing broke during launch. Remember, we can't send anyone to fix your hardware now that you're up in space.

Panel 4: [back in space with GPM, gradually stretching out solar panels]

Offscreen Engineer: Start by stretching out your [solar panels](#).

GPM: Okay, I guess. Hey, I'm curious, why is one of my solar panels at a different angle? It feels strange to not be symmetrical.

Panel 5: [show GPM's orbit on Earth]

Offscreen Engineer: That angle gets you the maximum amount of sunlight because of your orbit. You'll be able to see between the Arctic Circle and the Antarctic Circle.

Panel 6: [close up on GPM with solar panels fully extended]

GPM: Oh, I suppose that makes sense. I'm starting to feel the sunlight on my solar panels, charging up my batteries.

Offscreen Engineer: Great. You'll need that electrical energy to power your instruments.

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Panel 7: [close up on GPM and high gain antenna]

Offscreen Engineer: Let's try your high gain [antenna](#) next. That's how you send your data down to Earth.

GPM: Oooh! Do I get to open my eyes now? You'll want data to test that the antenna is working!

Panel 8: [back on the ground with Engineer in the control room]

Engineer: Still a few more checks, GPM. I'm getting a signal from the antenna through the [relay satellite network](#), and it looks like your [star trackers](#) and [GPS](#) are working, so I know where you are in orbit and in comparison with Earth's surface, which we need to direct your instruments properly.

Panel 9: [GPM grumbling, arms crossed, but eyes still closed]

GPM: The instruments you won't let me use yet. I suppose I can hear you a lot better now. But I should have some data to send along as well ...

Engineer: [laughing] Haha, okay, GPM, it's time. Start warming up your [microwave imager](#) and your [precipitation radar](#). We'll need to turn them on and let them warm up for a few hours. It's cold out there in space.

Panel 10: [sequence as GPM slowly opens his eyes and the GMI reflector unfolds and deploys]

GPM: Hooray!

Panel 11: [Once GPM's eyes are open, show a beautiful scene of Earth, with Mizu-chan streaking by below him]

GPM: Whoa! The Earth is really beautiful from up here! Hey, who's that?

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Panel 12: [close up on GPM calling out]

GPM: Hello?

Panel 13: [Mizu-chan keeps going, doesn't even turn around to look at GPM]

GPM: Wait, I just want to talk to you!

Panel 14: [spread showing multiple channels]

GPM: I know! I have thirteen different [frequencies](#) in my microwave imager. Maybe I'll be able to catch up with her using one of the others!

Panel 15: [show that GPM is using all 13 of his channels; Mizu-chan passes below him again]

GPM: [calling out to Mizu-chan] Hey! Please stop and talk to me! I just want to say hello!

Panel 16: [Mizu-chan vanishes]

Panel 17: [GPM sitting on his satellite, looking unhappy; an older satellite comes up to him in background]

TRMM: You look like you could use some help.

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Panel 18: [close up of GPM startled by TRMM beside him]

GPM: Who are you?

TRMM: I'm TRMM*, and I'm a precipitation measurement satellite too. Your predecessor, in fact.

*the Tropical Rainfall Measuring Mission

Panel 19: [GPM, next to TRMM, Earth below]

GPM: Nice to meet you. I could use some help. I just saw someone in the clouds on Earth. I wanted to say hello, but she ran off.

TRMM: Ah, you've seen Mizu-chan. I've been watching her since I launched in 1997.

GPM: Who's Mizu-chan?

Panel 20: [sequence of images of Mizu-chan, narrated by TRMM]

TRMM: She's the personification of rain, snow and all its combinations. You'll see her mood change depending on the conditions in the atmosphere.

Panel 21: [dress pale blue and the cloud trim misty and white, Mizu-chan lightly dancing, happy looking, only light rain below her]

TRMM: Sometimes there will be only light rain, barely a drizzle

Panel 22: [dress dark stormy gray, hair shooting lightning bolts, Mizu-chan wildly dancing near large thunder head]

TRMM: Other times, powerful storms and heavy rains.

Panel 23: [dress and boots coated with frost, Mizu-chan over upper part of globe, snow falling beneath her]

TRMM: My instruments aren't sophisticated enough to see, but I'm told that at higher latitudes she even makes snow.

Panel 24: [wind and dress whipping around her, Mizu-chan spinning in the center of a hurricane]

TRMM: I've always found her the most mesmerizing and terrifying when she forms a hurricane

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Panel 25: [back with GPM and TRMM in space, showing swaths from a day on the Earth below]

GPM: [sighing] Wow, she sounds really cool. But you've been observing her for years, how am I going to do better? Even with my orbit over a larger area of Earth than yours, it still takes several days to see everywhere in my range.

TRMM: Well, I've found that tracking Mizu-chan is easier with a little help.

Panel 26: [close up on GPM]

GPM: Help? From where?

Panel 27: [large scene of TRMM and GPM gathered with some of the other constellation satellites]

TRMM: We're not the only satellites observing Earth.

Panel 28: [GCOM-W1 on her satellite]

GCOM-W1: Why should we help you? What's in it for us? We all have different missions from our own scientists and engineers, you know.

Panel 29: [GPM responding to GCOM-W1]

GPM: Rain and snow are felt locally, but the patterns come from global systems, and to monitor precipitation we need a picture of the entire Earth. Only satellites like us can give that, and only by working together can we get data about everywhere on Earth every three hours.

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Panel 30: [Megha-Tropiques asking question]

Megha-Tropiques: Even though we all have microwave imagers that can measure rain, they aren't exactly the same kind of instruments. How are we going to be able to combine the data?

Panel 31: [GPM explaining with image of Earth and orbit swaths in the background]

GPM: That's the great thing about my orbit! My [orbit swath](#) passes over all of yours at one time or another, so I can [calibrate](#) your data and work out any differences. I'm like the concertmaster of an orchestra, making sure everyone is in tune.

Panel 32: [MetOp asking question]

MetOp: If we give you all our data to combine, how do we know you'll share it with us?

[from off panel] *GPM:* My scientists and computer specialists will make sure it's available for anyone who wants to use it, other scientists or even just average citizens.

Panel 33: [GPM responding]

GPM: We're committed to making sure the data is open for everyone.

Panel 34: [constellation satellites look at each other]

Panel 35: [constellation satellites look back at reader]

Constellation Satellites: Okay, we're in.

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Panel 36: [GPM making a show of getting ready to get to work]

GPM: Great! Let's get started!

[upper left - image showing the orbits crossing each other, GPM crossing the other orbits]

[upper right - Engineers in control room]

Panel 37: [Mizu-chan finally stands still long enough to look up and see what the satellites are doing]

Panel 38: [GPM and Mizu-chan talking]

GPM: Mizu-chan! Hello! Please, can we talk?

Mizu-chan: I see you've learned my name, that's a start. What are you all doing up there?

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Panel 39: [GPM looking puzzled]

GPM: We're looking at what you've been doing. Uh, what are you doing?

Panel 40: [larger scene, Mizu-chan in foreground with water cycle diagram in the background]

Mizu-chan: I'm part of Earth's water cycle. Water evaporates from the surface up into the clouds -- depending on temperature and wind patterns, I cause rain and snow.

Panel 41: [close up on Mizu-chan]

Mizu-chan: Why do you want to know?

Panel 42: [GPM in the foreground with split image in the background - people affected by flooding/drought]

GPM: You have a big effect on the living things below you. When you linger in one place, there can be flooding or landslides, and when you leave a place alone for a while, there can be a drought.

Panel 43: [return to GPM and Mizu-chan chatting in space]

GPM: How do you choose where it's going to rain?

Panel 44: [Mizu-chan with mysterious expression]

Mizu-chan: That's a trade secret! But you seem like a hard-working satellite. I bet if you pay attention, you can figure it out. It'll be like a puzzle!

Panel 45: [back to view of GPM and Mizu-chan. Mizu-chan is poised to go, GPM looks determined]

GPM: I accept your challenge, Mizu-chan! If you won't tell me your secret, I'll just have to watch and learn about the water cycle myself.

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Panel 46: [wide image of GPM zooming above Earth in orbit with Mizu-chan in the distance below]

Mizu-chan: See you later!

Panel 47: [GPM talking]

GPM: Good observations are going to be key to figuring out Mizu-chan's puzzle. Look, I notice that some areas on Earth seem to get more precipitation than others. See this wet band around the equator?

[show Earth with band of precipitation around the equator]

Panel 48: [Megha-Tropiques with image of India below]

Megha-Tropiques: But it changes by the seasons. In India they get a lot of rain in summer, but it's dry in winter. [Monsoons](#) can cause a lot of flooding.

Panel 49: [TRMM and California below]

TRMM: In California it hasn't rained much in years. That's causing problems!

Panel 50: [GCOM-W1 and hurricane image]

GCOM-W1: The ocean has some big storms brewing!

Panel 51: [MetOp talking]

MetOp: The patterns are changing – places getting wetter or drier. Is that related to the rising global temperatures?

Panel 52: [close up on GPM]

GPM: I don't know. We'll have to ask the scientists after we send them our data.

Panel 53: [Mizu-chan comes up to GPM]

Mizu-chan: I'm impressed. You really want to learn about what I do!

GPM: We don't understand everything we're seeing yet. The water cycle is complicated! Can you give us some hints?

Mizu-chan: Where would the fun be in that? You'll just have to keep watching and learning.

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Panel 54: [end with GPM and Mizu-chan, backs facing us, looking down at an image of Earth]

GPM: I guess we'll have to find out together!

For the full comic book images and additional resources, visit: <http://gpm.nasa.gov/education/comics>