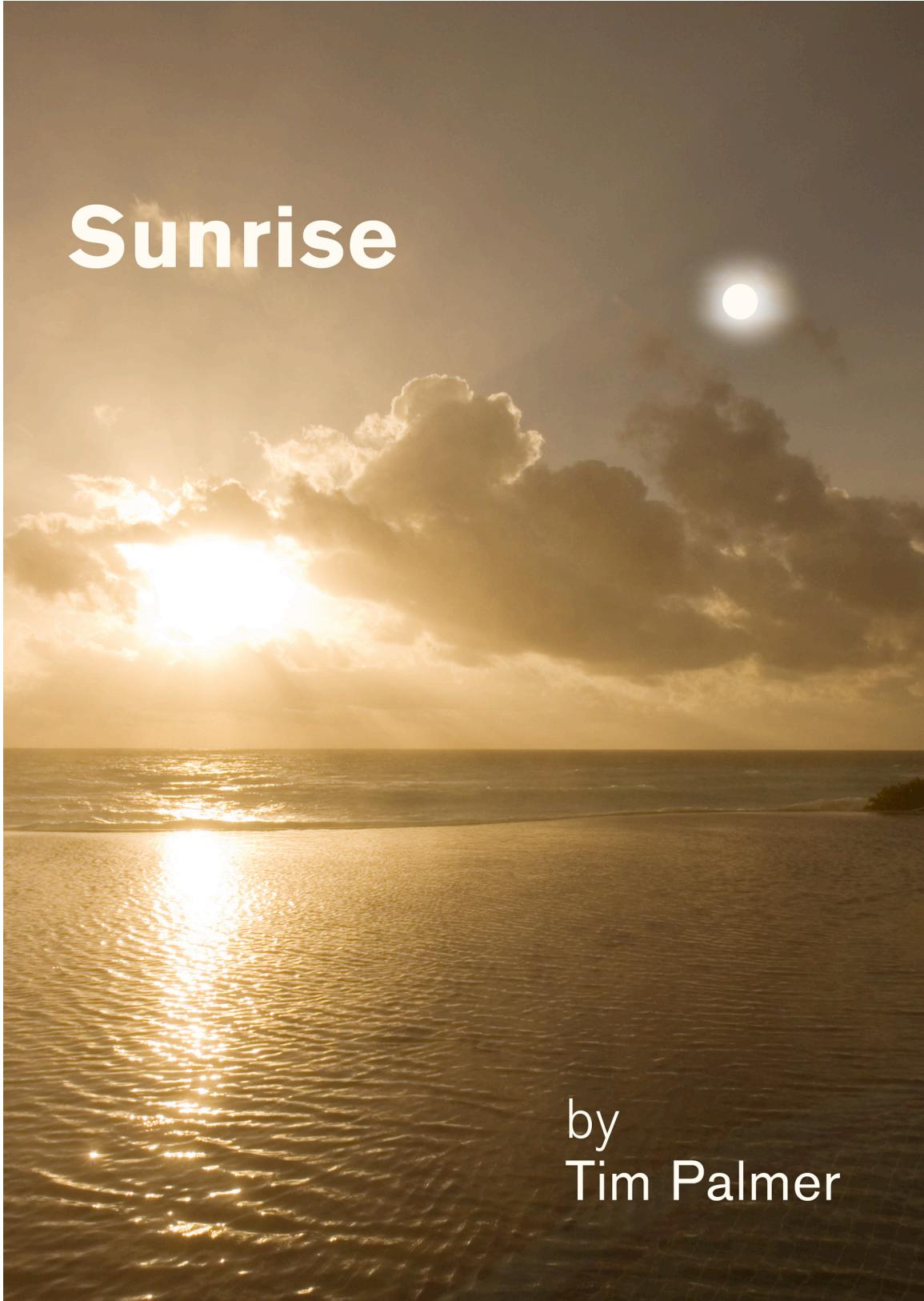


Sunrise

by
Tim Palmer



I

“Theremon, stand up! Argos has arrived!” As President Argos entered the Shao Hall, the sound of many thousands of people simultaneously rising out of their seats echoed around the walls of the great building. But Theremon took notice, neither of his colleague Kerra’s warning, nor of the mounting crescendo of noise. Instead he sat hunched, staring at the writings in his notebook, occasional flicking from one page to another and shaking his head in frustration.

“Theremon, you’re not still worrying about these sea monsters of yours. For Ztlos’ sake, give it a rest! Argos isn’t here to discuss mythical beasts of the deep, he’s here to talk about some sort of imminent climate change. Look here at the title of the media briefing notes: Climate Change - A New Dawn for the People of Lospotia! So, pay attention Theremon - two hours from now we’ll be writing the headline story for the morning edition.”

Just as Argos reached the row of journalists, Theremon finally took notice that he was the only one still seated. As he rose, he whispered into Kerra’s ear: “Kerra, the stories are allegories, of course. In the case of the sea monsters, I just can’t figure out what the allegory is. But I’m pretty sure it’s somehow linked to what Argos is about to tell us. Something’s wrong, Kerra, something’s terribly wrong. It’s just that I can’t figure out what it is.”

The Shao Hall was built by President Argos’s predecessor. It was a magnificent structure, standing directly on the sea front, looking out over the great Southern Ocean. The jewelled walls and massive columns at the entrance spoke of great opulence. For those who ventured up onto the Highlands, the sight of the Alpha’s light reflected in the great golden roof of the Shao Hall was a sight of unimaginable beauty. The mighty Lospotian flag flying on the vast flagpole mounted on the roof of the Hall was the first sign of civilisation for sailors returning from voyages to the Southern Ocean. It was Lospotian naval tradition that the first to spot the flag on the journey home was given five extra tots of Lospotian best Brem. It grieved Argos to think that, along with the other buildings in the great city of Lospotia, the Shao Hall would have to be demolished and moved inland.

The advisers followed Argos into the hall, and took their place on the stage. To Argos’s right was the Presidential Astronomer Modom, and to her right sat Chief Climatologist Bost. To the President’s left sat High-Priest Loftoper, his jewel-encrusted robe glittering in the stage lights. As the crowd settled down, Argos spoke to each of his advisers in turn. “Are we ready to start?” The three advisers nodded in turn. “Nothing new to add before I begin?” The three shook their heads in turn. President Argos stood up to speak.

“Citizens of Lospotia!” The packed audience fell silent. “You have all heard the rumours. It’s my job today to tell you that the rumours are true.” There was a simultaneous intake of breath from the five-thousand strong audience. “However, before you get concerned, let me say that in just a few minutes, my advisers will be telling you good news and nothing but good news. We are about to start a new chapter in the history of Lospotia, and I am delighted to announce it will be a glorious new chapter. Both metaphorically and literally, we are going to witness a new dawn, a new sunrise. I’m going to ask Astronomer Modom to address you now. Modom, please...”

Modom stood up. She was well used to public speaking, but up to now her addresses had only attracted those with academic interests. She was an expert on the motion of the six suns, but, since most people thought this was an uninteresting subject, her lectures never attracted big audiences. This was understandable; until recently, the other suns had been so far away from

planet Migosh that they really didn't matter much to the daily affairs of the average person. Now what she had to say would affect everyone's lives. Modom suddenly felt nervous. "Let me start by giving you some background. As you know, our planet Migosh orbits the sun we call Alpha and has done for as far back as our records extend. Alpha is the ultimate source of energy for all life on Migosh and we are grateful for the warmth it provides, meagre though that is. But you also know from your earliest days in school, that Alpha is just one of six suns that in turn orbit around each other. Unlike Migosh's orbit around Alpha, the orbits of the six suns around each other are extremely complex and irregular."

Here Modom was being unduly modest. It was due to her penetrating mathematical theory that the irregularity of the motion of the six suns was finally understood. Modom had used the word "Kaos" to understand this phenomenon, and the scientists who worked to generalise Modom's theories were called Kaologists. Modom seemed the archetypal academic, totally uninterested in financial gain. However, it is fair to say that she may not have done her seminal work without the inducement of that stupendous cash prize put forward by Argos's predecessor Shao: the Shao prize for the essay which provided the best analysis of the motion of the six suns. Modom clearly remembered the day when President Shao presented her with the prize, in the very same hall they were in today. With the prize, Modom had built what became the finest of private houses in Lospotia. Like the Shao Hall itself, it was on the sea front. Like the Great Hall, Modom realised it would have to be dismantled in the coming months. When Shao finally stepped down, her successor, Argos, made Modom the Presidential Astronomer, another honour to add to her honours. Many considered Modom the Lospopian First Lady.

Modom continued. "For the last thousand years, the other five suns have kept their distance from Alpha in a state of relative order, but as a number of Kaologists had speculated many years ago, this state of affairs won't last forever. And indeed, with the approach of one of the distant suns, Gamma, we are now experiencing at first hand, the inevitable irregularity of the motion of our gravitationally-bound celestial objects."

Again, a collective sharp intake of breath. One of the journalists stood up and pointed straight at Modom. "Ztlos! Gamma is going to collide with Migosh!" Pandemonium broke out. The Presidential officials tried to restore order and it took a further ten minutes before Modom could continue.

"No, Gamma will not collide with Migosh! As President Argos has told you, the news today is good news; it is not about an impending catastrophe. So please listen, and do not interrupt until you have heard the full story." The audience slowly settled down. Modom continued. "We have all noticed that Gamma has been getting brighter and brighter each week. It is getting brighter because it is approaching us. Although we cannot predict the motion of Gamma indefinitely into the future, we can predict its motion over the coming year with very high accuracy. Gamma will not collide with Migosh. At its closest approach, Gamma will come no closer than a hundred million kilometres from us. We are certain of this."

There was a sigh of relief from the audience; but they had not understood. "So, yes, Gamma will not collide with Migosh, but it will pass sufficiently close by that..." Again, Modom felt nervous. Did she really have the authority to be the bearer of such momentous news? She thought back to her childhood, lying on her back staring up at the sky, studying the suns, plotting their motion, trying to predict the movement of one relative to the others. Her fascination with this problem inspired her to study mathematics at university. However, none of this had prepared her for this moment. She looked up. Two thousand faces were staring open mouthed, waiting for her to finish her sentence. "Migosh is about five hundred million kilometres from Alpha. The gravitational

influence of Alpha is rather weak at this distance. So, when Gamma passes by, it will capture Migosh in its gravitational field. Looks of either puzzlement or incredulity on the audience's faces led Modom to restate what she had just said. "In eight months time, Migosh will have a new sun. In eight months time we will orbit Gamma. Our old sun Alpha will just fade into the distance and become a distant sun in the sky, like Gamma was for us a couple of years ago."

A thousand voices shouted "What does this mean?" "What is going to happen?" "Will we live?" Modom continued. "Please, there is no need to fear. As Climatologist Bost is about to tell, this is the best news we could imagine. However, before he addresses you, I need to tell you that in the early days there will be some dangers and you should be aware of these. The stresses on poor Migosh caused by the transition from Alpha to Gamma will be enormous. We can expect the ground to tremor. We are lucky that we experience no major earthquakes here in Lospotia; we are a long way from the fault lines in Migosh's crust. However, our proximity to the sea is a cause for concern. Large earthquakes under the Southern Ocean can lead to giant ocean waves which, if they propagate to the shores of Lospotia, can lead to enormous loss of life. We must start preparing to move out of Lospotia to the highlands just north of here."

Again, pandemonium broke out. Another journalist shouted out. "You told us we would be hearing good news. But now you say our great city of Lospotia is to be lost to the giant waves, and that we must move up to the bleak Highlands. We will all freeze to death up on the Highlands. This is awful." Argos had to intervene. "Once again, I must tell you to refrain from interrupting. There will be plenty of time for questions once we have told you the full story." I am going to ask Chief Climatologist Bost to address you now. What he has to say is extremely important, so please listen very carefully."

Bost and Modom were classmates at university, both attending the same mathematics courses. In those days they were friends - indeed much more than friends so the rumours went - but now they rarely saw one another. Modom's interest was the complex motion of the six stars. For Bost, this smelt too much of the ivory tower. Since Migosh derived little warmth from these the other five suns, they had no real impact on the daily lives of the people of Lospotia. Rather, Bost wanted to use his mathematical skills for the betterment of Lospopian society. So whilst Modom was developing mathematical models of the motion of the six stars, Bost developed mathematical models of the Lospopian weather. And miserable weather it was too. A thousand kilometres to the north lay the vast and impenetrable ice sheet; to the south was the never-ending Southern Ocean. Lospotia was located between the two. It was cold and the weak rays of Alpha did little to alleviate the constant feeling that life on Migosh was a struggle. On top of this, there was little land to grow crops; just a few miles north of Lospotia the Highlands rose abruptly upward. On the windswept highland plateau, nothing grew. It was a barren environment.

Bost devoted himself to using his mathematical models to predict Migosh's weather patterns. If he could predict the weather for the coming months, he could help the farmers determine the best crops to grow. Dry weather for the coming six months and they should plant the drought-resistant Silpash plant. Wet weather and the Tisiup would produce much the highest yield. Also, he had begun to realise that the size of Lospopian fishermen's catches seemed to depend on the direction of the Southern Ocean currents, and these in turn depended on the strength and direction of the winds that blew across the ocean surface.

Predicting the behaviour of Migosh's weather would be so much more important than predicting the behaviour of the six suns, Bost had thought. However, he had to approximate the equations for Migosh's weather because they were so complicated, much more complicated than Modom's simple model for the six suns, he would constantly tell himself. On top of this, Bost realised he

would need Lospotia's sailors to take observations of the weather in the Southern Ocean to create the initial conditions from which his model would generate the forecast. However, the sailors couldn't observe the weather everywhere so there would always be errors and uncertainties in the initial state. Bost tried to estimate the impact of these errors on his forecasts. To his horror, he found that even the tiniest error, no matter where in Migosh's atmosphere it occurred, would grow and grow and cause the forecast to completely change - a forecast of dry weather became a forecast of wet weather, a prediction of stormy weather became a prediction of calm weather. Bost was so depressed; he threw the results into the bottom drawer of his desk, locked it, and started working on a completely different project. As he brooded over this apparent failure, he read in the paper that his old classmate Modom had won President Shao's prize for her essay on the motion of the six suns. That made him even more unhappy.

When Modom was appointed Presidential Adviser, she invited her friends and colleagues, new and old, to a big celebratory party. Bost wasn't sure whether to accept her invitation; Modom's career had been so much more stellar than Bost's, both literally and metaphorically, and he felt envious. However, he thought back to their times at college and realised that the flame of desire had not burnt out at all; he was still very attracted to Modom. So, he did accept, and Bost and Modom met for the first time since college. That initial encounter was so awkward. Bost really wanted to ask Modom if she still felt the same way about him as she had at college....but he didn't have the courage. So instead he thought of an anodyne technical question as an unsatisfactory substitute: what were the implications of her work for predicting the motion of the suns? Modom replied that the implications of her equations were that the tiniest error in measuring the position of just one of the suns would inevitably amplify and make long-term prediction of any of the suns impossible. Bost froze on the spot; in an instant he had made the connection. He remembered his calculations of the weather, now languishing in the bottom drawer of his desk. By Ztlos, the motions of the suns are kaotic just like the weather is kaotic! He realised he had found exactly the same phenomenon that Modom had found. Not only that, he had probably performed his calculations before Modom had done hers. If only he hadn't thrown those results in the bottom drawer, then maybe he might be bathing in the glory that was now Modom's!

When Bost was tasked by Argos to estimate how the climate of Migosh would change when it came under the influence of Gamma, his first reaction was that this problem would also be kaotic and impossible to predict. However, Bost soon realised that this was not so. This wasn't an initial value prediction, it was a prediction of how the statistics of Migosh's weather would respond to a predictable set of new external forcings – it was a forecast “of the second kind”, as he liked to call it, to contrast with his less successful predictions from an earlier time. So, armed with scientific confidence, he applied all the mathematical tools he had used in his previous studies of Migosh's weather, to this one career-defining moment of his life.

That moment was now. Bost, Chief Climatologist, was addressing the people of Lospotia on the most important day of his life. What he had to say was as important, more so perhaps, than what Modom had to say. Never in his wildest dreams did he imagine that his work would have such an impact on the lives of Lospotians. Despite the earlier frustrations, he was beginning to feel his life's work in developing a mathematical model of Migosh's climate had been worthwhile. Bost stood up. “Our new orbit will be much closer to Gamma than our old orbit was to Alpha. As a result we will receive much more energy from our new sun than we ever got from our old sun. My dear friends,” said Bost, always considering him one of the people, “we are about to experience a rather dramatic climate change, and it will be for the better! I have solved the equations of my mathematical weather model with new upper boundary conditions corresponding to Gamma's solar output and Migosh's new orbital parameters, and I can tell you that we should

expect much warmer conditions. About 10 degrees warmer on average! Now this won't happen immediately. Lospotia will warm slowly; it'll take many years, as the giant waters of the Southern Ocean absorb the new energy from Gamma. But, year on year, it will get warmer and warmer. Life will be bountiful and beautiful!"

All around the hall, people's faces lit up. Ten degrees warmer! Oh such bliss! Give praise to Ztlos!

"Indeed we will give praise to Ztlos in a few minutes" Bost continued. "High-Priest Loftoper will lead us in prayers of thanks". However, before I hand over to the good Loftoper, I need to tell you that we must start the planning procedures to adapt to the coming climate change. You will remember that Modom said that we will need to move onto the Highland Plateau to avoid the giant waves that may come from the earthquakes under the Southern Ocean during the period of adjustment to Gamma. Well, there is another reason that we need to move onto the Highlands. As Migosh warms, the giant icesheets to the north of us will begin to melt. The meltwater will flow out to sea and the sea level will rise. In the course of time, sea level will rise some 20 or more migyards. I'm sorry to say that Lospotia will be under the ocean in just a few generations time. As part of our climate adaptation strategy, we need to rebuild Lospotia on the new seashore... on the Highland Plateau! We will call the new city, New Lospotia! But friends, our new houses do not have to have the thick walls that our houses currently have; thick walls that are needed for insulation, to keep the cold out. In the new climate, thin walls will be fine. We won't have need for insulation. Gamma will give us the perfect climate."

A small figure slowly stood up. It was Torpella the farmer, now old and infirm. Migosh's unremitting coldness seeped through her bones. What she would give to witness this new dawn! Everyone respected Torpella, not least Bost, and the room fell silent and waited for her intervention. "But have you thought of everything Bost? What about rain? We need rain to make the crops grow. Will it rain in the new climate? Perhaps it will become too dry here on the Highland Plateau. Perhaps we should move further north up towards the ice sheets. It may not be as warm up there, but perhaps that is where we will find the water we need to make the crops grow." If anyone knew anything about water, it was Torpella.

Bost was ready for this question. "Torpella, my dear friend, that is a very good question. However, my mathematical model of the Migosh climate shows that, under climate change, weak low-pressure weather systems will come in from the Southern Ocean perhaps one every month. These weather systems will bring small amounts of rain, enough to water our crops and make the Highlands a green and pleasant place to live. There is no need to move further north. Indeed, if we move north, we will lose contact with the bountiful Southern Ocean. Lospotia is a maritime city. We survive on the fish brought in by our sailors. We cannot move away from the sea. So let us enjoy the new warmth here on the Highland plateau and continue to look out over the great Southern Ocean. This is where we should build New Lospotia - and we should start building right now!"

The audience broke out into applause. Bost's hard work on the mathematical model of Migosh's weather had finally been vindicated. He forgot about the years of frustration and that work shoved in the bottom drawer. It had all been worthwhile. He felt so happy. Modom looked at Bost and mouthed a single word: "Bravo!"

President Argos took advantage of this change in mood to introduce the High Priest. "As Bost has indicated" Argos began "we need to give thanks to Ztlos. High Priest, please lead the prayers"

Loftoper stood up, the great Onfa-Jewel on his right hand twinkling with a brightness reminiscent of the approaching Gamma. "Oh Lord Ztlos" Loftoper began "we have suffered for years under Alpha's miserly grip. We give thanks for your intervention which will bring us the life-giving energy of Gamma. We look forward to our new dawn. We look forward to the new Sunrise." Modom was not very enthusiastic about the notion that Gamma's sudden approach to Migosh arose purely from Ztlos's interventions; not least it undermined her own mathematical theories. However, given the circumstances, she was not going to object.

The prayers continued for another half an hour. At the end, the audience was delirious with joy. Argos felt this was a good time to move to the last part of the meeting. "As you know, not all the citizens of Lospotia are here today. So now it is your job to relay the good news to your friends and neighbours, to your family, to everyone. Rejoice! We are about to start a new chapter in the history of the great city of Lospotia. Rejoice! Rejoice! Rejoice!" And the crowd shouted back "Rejoice! Rejoice! Rejoice!"

"And we must also remember the good words of Bost: We must start to adapt!" And the crowd shouted back, "We must start to adapt!"

Modom leaned over to Bost and touched him on his knee. "Bost, I feel bad that up to now I have been the one bathing in the glory, whilst you toiled away on your models but never had the recognition. In truth, you discovered Kaos before I did. But now it is different. Look! The people are in wonder at your scientific skills. And so am I" And now she got closer and whispered in his ear. "Bost, do you remember, in college, we were...so close. Do you think we might become close again? I have a marvellous house, the best in Lospotia, but I am lonely. When I rebuild my house up on the Highland Plateau, it will have the most magnificent of views out to sea, even better than the ones I have now. I was thinking, perhaps you and I," Bost's heart leapt. However, looking into Modom's eyes, he realised that, for the first time in his life, he had the upper hand. Bost suppressed his instincts; he would savour the moment...and make her wait! He smiled a rather professional and condescending smile; "Modom, indeed, I can't imagine what you are talking about - and in any case, please concentrate on the issues of today's meeting!"

Argos continued. "Before I end the meeting, I invite some more questions from the audience. Please stand up if you have a question."

From the front of the hall came the first: "How do you intend to honour Modom and Bost for their outstanding scientific investigations?" Argos laughed. "Yes indeed, a good question. I have decided that Modom and Bost will receive the Presidential Peace Prize. As you all know this is the highest prize it is in my power to give, but I am sure you will all agree they deserve it." The audience broke out into applause.

The next question came from the back: "Will the President tour Lospotia, so that all the people can give thanks to our great leader?" Argos laughed again; this really was his day. Indeed, he realised that perhaps a couple of months after Gamma has captured Migosh, he would hold the somewhat overdue Presidential election. The climate would have started to warm and everyone would be happy. Everything was working out so well. "Yes, in the coming weeks, I will travel extensively around Lospotia and I will meet with all the people".

"So, no more questions? Then we should perhaps draw the proceedings to a close."

One more person stood up, a person recognised by everyone, especially Argos. "Yes Theremon", said Argo. "You just have time to ask a last question." Argos was slightly apprehensive; of all the

journalists, Theremon always wrote the most penetrating articles, always asked the cleverest questions. But everything had gone so well today. Argos was certain that even someone as smart as Theremon could not do any harm.

Theremon looked up from his notebook which he had been studying avidly for the last hour.
“First I have a question for Presidential Astronomer Modom. Modom, do you think Migosh could have orbited around Gamma before, sometime in the past?” Modom hardly needed to think.
“Well mathematically it is possible, certainly. But if it did happen, it would have to have happened a very long time ago, because we certainly have no observational records of this.”

Theremon continued, turning a leaf of his note book over. “Thank you. President Argos, I now have a question for the High Priest.” Argos was now getting a little more concerned, but he relented. “OK, but don’t take too long Theremon”.

“High Priest, you are of course a believer in the Cultist’s Book of Revelations?”

“Of course!” replied Loftoper.

“Then, when the Ninth Chapter writes about a time when the climate was warm, and when people grew lazy basking in the heat of the sun, and plants grew of the type that could not possibly grow today, do you believe that it happened?”

“If it is in the Book, then of course I do!” replied the High Priest.

“So Modom if I could return to you, do you think that the Book of Revelations is referring to some very distant time when Migosh orbited Gamma?”

Modom had to think hard about this. She was not too familiar with the Book of Revelations. However, to deny the truth of the Book would be professional suicide. After a few moments, she responded. “Well the writings in the Book of Revelations are certainly consistent with your hypothesis that Migosh once orbited Gamma. It is possible what we are observing is part of a quasi-periodic sequence of events. Of course these writings refer to an ancient time, well before the era when scientific observations were made. But nevertheless, you make an interesting point Theremon. I will certainly give the matter some further thought.”

At this point Bost stood up. He was much less equivocal. “The sort of warm conditions referred to in the Book of Revelations could never have occurred when Migosh was orbiting Alpha. I have simulated Migosh’s climate using my mathematical model, and with Alpha’s insolation, the model would be incapable of simulating the sort of warm climate referred to in the Book. So yes, I would say it is quite plausible that the Book refers to an ancient epoch when Migosh orbited another of our suns such as Gamma.”

“Well thank you, Theremon.” interrupted Argos. “This is quite interesting, but, if you don’t mind my saying, a tad academic. So let’s wrap up now....”

“Mr President, with all respect, I haven’t quite got to my main point. I don’t know if any of you have read the Ninth Chapter all the way through. It’s difficult reading, since the language used was much different than the language we use today. Nevertheless, if we agree it describes a period when Migosh orbited Gamma, then perhaps we might learn about the future, by reading about the past.”

Now Theremon paused for a few seconds and said in a rather more sombre tone: "Perhaps we might learn some things that are not properly described in Bost's mathematical model."

"What nonsense!" Bost immediately interjected.

"But with respect, you yourself, Bost, have admitted in your published papers that your mathematical equations of Migoshian climate are approximate. Are you sure your model is still reliable after these approximations have been made?"

"With respect to you", Bost immediately responded, "my model is based on the laws of physics, and I have validated my model using real observations of Migosh's weather patterns."

"And these validations show no errors?"

"No model is perfect, of course, but the validations are satisfactory in my opinion."

"You haven't validated them on the weather patterns that will occur once Migosh orbits Gamma."

"Well obviously I haven't. These new weather patterns haven't occurred yet!"

"Bost, I admire your exceptional work, we all do. All I am asking is whether there is something to learn from the Book of Revelations ..."

"For goodness sake," Bost exploded, "I am a scientist. I work with hard scientific facts. The Book of Revelations is nothing but...." He froze realising the hole he had dug himself.

"The word of Ztlos?" Theremon added unhelpfully.

"Well, yes, but...."

The truth is that neither Modom nor Bost had read the Book; they both considered it superstitious nonsense. Moreover, as Theremon had said, it was written in a language that was extremely obscure to modern-day Lospotians. Even Loftoper had only a passing knowledge of the Ninth Chapter. This Chapter was especially obscure and seemingly irrelevant to the lives of modern Lospotians.

"I will read, as best I can, a small part from the very last part of the Ninth Chapter." Theremon skipped to a new part of his notebook. "'And the Lord Ztlos became angry with the people. They languished in the warmth and had become lazy. Indeed they no longer gave thanks to the Lord Ztlos and had begun to sin. Ztlos showed His wrath for their transgressions. The sky grew dark, and up from the Southern Ocean, Ztlos sent an army of the Hurri-Cane. And all was violence and destruction. And the people knelt in the open fields and pleaded to Ztlos for forgiveness. But Ztlos was vengeful indeed, and sent a further army of the Hurri-Cane, and a further and a further, until the people despaired and they dashed themselves against the rocks.' " Theremon put down the book and looked up at the stage. "President Argos, do any of your experts know what this means? What is the army of the Hurri-Cane?"

Loftoper was the first to answer. "In those days, society was primitive; they had no laws. People went stealing from each other and doing bad things. The Lord Ztlos, in his infinite wisdom, had decided to punish these people. We don't know who the Hurri-Cane was, perhaps some minor Sea God. The army of the the Hurri-Cane probably describes some pack of terrible monsters

which came up out of the ocean onto the land and destroyed everything they set their eyes on. We can only speculate at the power of these awful beasts of the sea. However, nowadays, we have an industrious and law-abiding civilisation lead by the great Argos. Under his guidance and rule, we live peaceful lives. We honour and love Ztlos and in turn He loves us and protects us. If we continue to give thanks to Ztlos for his blessings, we need not fear the army of the Hurri-Cane.”

“But the Book says that the sky grew dark” Theremon answered. “Is it not possible that the Hurri-Cane is some sort of exceptional tempest?”

Bost interjected: “Well I can assure you that we have nothing to fear from exceptional tempests. As I mentioned to you before, my mathematical model does predict some weather systems coming in from the Southern Ocean, but these will be benign, they will bring life-giving rain. That is all - there will be no tempests. Indeed, let me reassure you. I have varied the uncertain parameters in my model and studied how the solutions change as the values of these parameters are altered. I call the set of all possible solutions, a “perturbed-parameter ensemble”. Yes, the rainfall is a little stronger in some members of this ensemble than in other members, but for goodness sake, in these modern times we have technology to help us. Compared to the primitive people all these thousands of years ago, the sort of dwellings we can build today will certainly withstand any of the weather predicted in the solutions of any of my ensemble members. We don’t have straw roofs any more you know!” The audience burst out laughing - the mere thought of it!

“Above, all,” Bost concluded, “the chance of some disastrous tempest...is zero!”

Again, Modom leaned over to Bost and whispered in his ear. “Your perturbed-parameter ensemble - that’s a brilliant idea. Not only do you predict what’s going to happen, you predict the reliability of your prediction!” Bost’s eyes shone as he smiled back at Modom. “Modom, do you have any plans after this meeting’s over? Perhaps I could show you the probabilistic analysis I performed to obtain this multi-model ensemble of solutions. It’ll take a few hours, so why not bring a bottle of Lospotian best Brem - just to stave off the cold, you understand!”

In truth, Theremon’s question did bother Bost a little. It was true that he did make approximations to the underlying mathematics. But the fact of the matter was that he didn’t have the resources to solve the equations more accurately. Here, again, he was envious of Modom. She had only to snap her fingers and Argos’s advisors would provide her with new funds to help her in her astronomical research. Perhaps I should have been more assertive, Bost thought to himself. But in any case, there was no evidence that his model was deficient in any serious way – it simulated the Migosh’s current weather patterns just fine. For goodness sake, what is there to worry about, Bost reassured himself? “Yes indeed, the chance is absolutely zero!” Bost repeated, his initial doubts having completely vanished.

Argos, worried that Theremon’s questions were undermining all the good work of himself and his advisers, took advantage of the light-hearted mood of the people. “As Loftoper has said, Ztlos loves us now. He will not send these beasts. We have nothing to fear! In fact, not only nothing to fear, we have everything to give thanks for. And now this is a good place to end our meeting.” The crowds cheered one last time. Argos put on his thick coat, and with the wind blowing down from the ice-sheets to the north, walked back to his Presidential Palace, followed a hoard of admiring Lospotians. Modom and Bost quietly slipped out of a side door...together. Neither Alpha nor Gamma was visible in the chill overcast sky.

II

As predicted, Gamma captured Migosh into its gravitational field and almost immediately the temperature of Lospotia began to rise. But the diligent people had prepared for the climate change and had built a new city on the Highland Plateau - New Lospotia. And the Shao Hall, where President Argos had made his historic Presidential Address years before, had been dismantled and reassembled on the edge of the Highland Cliff, in anticipation of looking out over the new seashore. And with each passing year, as the temperature of the great Southern Ocean began to rise, New Lospotia got warmer and warmer. And the people grew content, even lazy, some would say. But with each year, the fair-weather clouds rolling in from the Southern Ocean became darker than they had ever done when Migosh orbited Alpha. At first these clouds brought benign rain, just as Bost had predicted, and crop yields from the fields surrounding New Lospotia grew bigger and bigger. New Lospotia flourished. But the clouds became darker still until, one year, they joined together to create a tempest of unimaginable fury, ripping the flagpole from the reconstructed Shao Hall, and damaging many of the thin-walled houses of New Lospotia. The High Priest asked forgiveness of Ztlos, and told the people to repair their houses and to lead purer and more industrious lives. However, no sooner had the buildings been repaired, a new set of tempests of even greater fury came ashore, and now many houses were destroyed, including the finest house in New Lospotia, the house of Frimto, great-grandson of Modom and Bost, giants of Lospotian science and joint founders of Kaos Theory. And now these tempests were relentless, each wreaking havoc and destruction worse than the last. Even the reconstructed Shao Hall was utterly destroyed. And the people fell to their knees one last time and begged forgiveness. And when none was forthcoming, the people finally sensed the enormity of their situation: Ztlos had forsaken them and left them to the ravages of this new army of the Hurri-Cane – at last they understood what Theremon never could. No point moving north, the people argued, the army will simply hunt us down. Engulfed by such an overwhelming sense of hopelessness, they jumped from the Highland cliffs into the giant waves of the boiling seas below.

But a small group of people did move north shortly after the transition to Gamma. These were followers of Torpella the farmer. Torpella herself did not live to see the building of New Lospotia; she was already dying when Shao had called that fateful meeting in which she had asked Bost about the rain-bearing weather systems. But in her autobiographical memoirs she wrote that if the people saw the Moltalla birds fly north in the years following Migosh's capture by Gamma, then the people must follow them. The scientists, not least Bost and Modom, thought this was complete mumbo-jumbo; what do Moltalla birds know about the complex equations of climate, after all? And in any case, why move north, away from the bountiful sea, and towards the domain of the cold ice sheets where nothing grows? But the birds were seen flying north, and a small sect, for whom Torpella had much more natural wisdom than Bost and his mathematical models, set out long before the tempests set in. And they flourished. Inland the storms had lost their bite and the benign rain and warm temperatures meant the harvests were plentiful, no thanks to Bost's model. Though, unknown to Bost, only a modest increase in modelling resources would have revealed the true nature of the army of the Hurri-Cane.

From time to time, the distant sun Alpha could be seen in the night sky, its milky light twinkling in Migosh's turbulent chaotic atmosphere. It seemed to be sending a coded message for those who cared to look up: "For some, my departure brings the promise of a new prosperous life, but for most of you it has proven a disaster. It seems your destiny, life or death, was determined by chance. But if you really had wanted, truly wanted, it needn't have been like that. You could have done better. Goodbye Migosh. For now..."

With due acknowledgement of the influence Isaac Asimov's Nightfall had in writing this story.

