

Joseph of the Colorful Coat as Climatologist

by Bill Menke, October 9, 2014

I would like to use the story of Joseph to illustrate the problems that we scientists experience in talking about Global Warming. The Joseph that I am referring to is the Biblical character who you might have encountered, either from having read the Book of Genesis, or by having seen the musical, *Joseph and the Amazing Technicolor Dreamcoat*. Joseph's story is long and complicated – a fine story to tell around a bonfire in a Middle Eastern desert – but here I am focused on only a small part of it, the part that concerns Joseph's prediction of an Egyptian famine. The short of it is that circumstances allowed Joseph to guide Pharaoh's response to that famine better than any of us scientists have been able to influence our own society's response to Global Warming. I want to tell you why.

Here's an abridged version of Joseph's story ...

Pharaoh had a dream ... He was standing by the Nile, when out of the river there came up seven cows, sleek and fat ... After them, seven other cows, ugly and gaunt, came up out of the Nile ... And the cows that were ugly and gaunt ate up the seven sleek, fat cows. Then Pharaoh woke up. He fell asleep again and had a second dream: Seven heads of grain, healthy and good, were growing on a single stalk. After them, seven other heads of grain sprouted--thin and scorched by the east wind. The thin heads of grain swallowed up the seven healthy, full heads. Then Pharaoh woke up; it had been a dream. In the morning his mind was troubled, so he sent for all the ... wise men of Egypt. Pharaoh told them his dreams, but no one could interpret them for him. Then the chief cupbearer said to Pharaoh, "Today I am reminded of my shortcomings. Pharaoh was once angry ... and he imprisoned me and the chief baker in the house of the captain of the guard. Each of us had a dream the same night, and each dream had a meaning of its own. Now a young Hebrew

was there with us ... We told him our dreams, and he interpreted them for us, giving each man the interpretation of his dream. And things turned out exactly as he interpreted them to us ..." So Pharaoh sent for Joseph ... Pharaoh said to Joseph, "I had a dream, and no one can interpret it. ... I cannot do it," Joseph replied to Pharaoh, "but God will give Pharaoh the answer he desires." Then Pharaoh said to Joseph, "In my dream ... Then Joseph said to Pharaoh, "The dreams of Pharaoh are one and the same. God has revealed to Pharaoh what he is about to do. The seven good cows are seven years, and the seven good heads of grain are seven years; it is one and the same dream. The seven lean, ugly cows that came up afterward are seven years, and so are the seven worthless heads of grain scorched by the east wind: They are seven years of famine. ... Seven years of great abundance are coming throughout the land of Egypt, but seven years of famine will follow them. Then all the abundance in Egypt will be forgotten, and the famine will ravage the land. The abundance in the land will not be remembered, because the famine that follows it will be so severe. ... And now let Pharaoh look for a discerning and wise man and put him in charge of the land of Egypt. Let Pharaoh appoint commissioners over the land to take a fifth of the harvest of Egypt during the seven years of abundance. ... This food should be held in reserve for the country, to be used during the seven years of famine that will come upon Egypt, so that the country may not be ruined by the famine." The plan seemed good to Pharaoh ... So Pharaoh said to Joseph, "I hereby put you in charge of the whole land of Egypt."

Book of Genesis, New International Version¹

A really key part of this story is that Pharaoh, the political leader of Egypt, realized that something was wrong. Now, I don't want you to get distracted by this realization coming in the form of dreams. Today, we don't take the content of dreams seriously. I'd rather you think of Pharaoh as an astute leader with an intuitive feel for the rhythms of his society. He begins to suspect that something is amiss and that suspicion manifests as dreams, either as a literal expression of the Pharaoh's subconscious mind, or a metaphorical device of the Biblical storyteller.

The point is that the initiative to investigate comes from Pharaoh, himself.

Folks, issues involving climate are just not on the radar screen of the great majority of our leaders. This is not to say that the more committed among them don't sense problems and take the initiative to understand them and to solve them, but they are focused on different problems – economic problems, foreign relations problems, and so forth. I think this points both the subtlety of the climate problem - we can't smell rising CO₂, after all - and to the degree to which we of the Industrial Era are sundered from Nature.

I'm not sure who in today's White House might play the role of Pharaoh's chief cupbearer. He seems to have had more influence than the White House's chief chef but to have been well outside of the inner circle of advisors and Cabinet Secretaries. But in any case, not only did he bring Joseph to Pharaoh's attention, but he gave him a strong recommendation based on his own eyewitness account of Joseph's abilities.

I don't know what kind of testimonial would make a compelling case for us scientists. Both the public and the political leadership confer us a fair degree of respect, in a distant sort of way, but the same time portray our opinions as esoteric and politically naïve. But more importantly, although we are recognized as having achieved some practical successes - building the Bomb, curing polio, inventing the Smart Phone and so forth – our ability to forecast the future is seldom acclaimed. And, in fact, climate change is a new arena in which no long history of scientific predictions is available.

We scientists portray ourselves as being guided by the transcendent laws of physics and chemistry with much the same spirit that Joseph portrays himself as merely the conduit through which God's words are spoken. We do not invent Global Warming; we simply report an inevitable consequence of rising CO₂ levels that change the heat balance of the

atmosphere. Pharaoh accepts Joseph's ability to speak for God to a far greater degree than, say, the Congress of the United States accepts the ability of climate physicists to speak for the First Law of Thermodynamics. In the modern world every authority is suspect.

Joseph was in the very enviable position of speaking to the leader of what was, for all intents and purposes, the only political power in the affected region. Pharaoh could unilaterally decide to adopt Joseph's program and know that its success would not depend upon the actions or inactions of his neighbors. As a subsequent part of the story reveals, Pharaoh did have to deal with an influx of starving refugees (among who were Joseph's brothers). But no invading armies arrived, intent upon carrying away Egypt's stockpiles of grain.

The region that is both responsible for, and affected by, Global Warming is the whole world. The United States is only one of several major emitters of CO₂ and only one of the many nations to be affected by its consequences. No CO₂ reduction unilaterally made by any nation is likely to have anything but symbolic value, for other nations can easily take up the slack. Any lasting solution will require an international agreement whose negotiation will be a slow and tedious process.

The scenario that Joseph presents, of seven years of plenty followed by seven of hardship, is one which resonates with Pharaoh. It connects with his experience in the same way that yet-another water shortage resonates with the mayor of Los Angeles. The Pharaoh had experienced famines before, had witnessed their horrors and the land's slow recovery from them. Unfortunately, none of us alive today have prior experience with Global Warming.

We scientists have not done well articulating what Global Warming is all about. Nor have we done well explaining why it is a concern and especially why its effects are to be feared. Few of my fellow scientists would ascribe to the apocalyptic scenarios put forward by the more extreme environmental activists – a group composed mostly of non-

scientists. Nevertheless, most of us agree that the world will change and many of the changes will cause great human hardship. But here I think that our knowledge of history – I mean geological history – jades us. Anyone who has studied the earth knows that our planet has experienced great changes and that every change has engendered both winners and losers. Scientists, committed to the power of the mind, are inherent optimists. Perhaps we can adapt in such a way to be among the winners. Global Warming is not nearly as simple as famine. And complexity leaves rooms for ambiguity.

Joseph's solution to the problem of the forthcoming famine is simple: spend the next seven years of plenty stockpiling enough food to get through those seven lean years. And the fraction – a fifth – of each year's harvest that must be put aside is manageable. Pharaoh agrees that it can be done and orders the program to start.

Scientists have not put forward a plan for stopping Global Warming that is anywhere near as workable as Joseph's. We know at the very least that we must stabilize atmospheric CO₂ at its current level and preferably reduce its level back to what it was in 1980. To stabilize it, we must either stop burning all fossil fuels or, alternatively, capture and store all the CO₂ that their combustion produces. To go further and actually lower CO₂ levels would require the capture and storage of three decades-worth of burning. Both scenarios are possible. Alternative sources like wind and solar can replace fossil fuels and sequestration technology can scrub CO₂ from the atmosphere. But both are massive undertakings of daunting scale. Saying that the United States needs to install one million wind turbines, for that is the number it will take, is not the same as building them. Congress is not going to fast-track my proposal to expedite construction.

I envy the clarity of Joseph's message to Pharaoh. But as a scientist trained in the rigorous estimation of error, I shudder at the certainty with which it is presented, for it goes against scientific culture in which everything is subject to probability. Hour before its landfall, the chances

are ninety percent, not a hundred, that the hurricane will hit New York. We scientists cannot calculate precisely how severe the effects of current CO₂ levels will be and so rightly state large bounds on our predictions. Sea level will rise somewhere between one foot and three by the year 2100². Our perspective is laudable, yet we are focusing on the wrong question. There is no reason to think that CO₂ will stay at its current level and every reason to think that their rise will be steady, or even that it will *accelerate*. The two-thirds of the world's peoples who are at the bottom of the economic ladder are rushing climb up – a process fueled by fossil fuels. The probability of hugely painful climatic impacts is one hundred percent in a burning as usual world. Somehow, we scientists need to get that across.

¹Genesis 41:1 – 41:41, www.biblestudytools.com/genesis/41.html

²http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf