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Week 4 Response Paper

From Atmosphere to Computer Screen – Before any type of weather forecasting can be performed, models must be built on computers to analyze data. For this to happen, raw data, or actual weather observations from weather stations around the world and onboard satellites, must be gathered. This raw data includes temperatures, atmospheric pressures, cloud gatherings, etc. All this "raw" data is collected at stations and transferred to computers. Once in a computer, this raw data must be transformed into computer data – information that computers can act on and utilize. Coded computer models have been created that reviewed previous raw data and act on ("massage") the current raw data to remove abnormalities from the raw data. These models compare the current raw data versus data from years and seasons passed to ensure fairly similar observations have been taken by the weather stations and satellites. Once the data is filtered through computer models and considered usable according to international standards, the data is considered "computer data" ("model-filtered data") and can then be passed through a number of different computer models that use this "clean" data to either predict weather in specific areas or display the current climate in those areas.

I think this model/data relationship is a very useful symbiotic one. In many places throughout history, observations and collected raw data have been used to build models and theories. Examples include raw data being used to come up with the V=IR rule used in circuits in physics and even Newton's Third Law. These models come from observing raw data instead of originating in mathematical equations. However, with time, we gain more and more raw data, analyze it, and can incorporate this new knowledge to improve our previous models. In weather forecasting and climate science, specifically, our earth and its atmosphere change with time (for instance global warming), and hence our current models cannot be used forever. However, as we update our models every so often with newly observed raw data, we can improve our models and get "cleaner" data to use for predicting weather. So while we use computer models to clean up data for efficient use by separate prediction models, that raw data is also used to clean up and improve our data-processing models. This symbiosis creates ever-improving computer models that meteorologists can use far into the future.

Lack of Data, Lack of Problem – Forrester argued that even with a "lack" of data, exceptional models could still be built and used. Forrester believed that we have so much data collected, but we do not know what to do with it. He maintained we should figure out how to use the data, i.e. create a working model, instead of worrying about collecting gratuitous data. Forrester also argued that these models could be used as policy tools even without data because they would be so comprehensive. If all possible relationships and interactions were included in the model, then it could be used to make accurate predictions and simulations. I agree with Forrester. Though scientists are continually focused on collecting and ever-growing pile of data, if they do not have correct models that contain the correct relationships and dynamics between variables, then they will not be able to utilize that data. Rather than wasting collecting enormous

amounts of data and using guess-and-check methods to create a model out of thin air, much time would be saved by coming up with a model first and then using it on smaller amounts of collected data. Even if the model was not perfect, as long as it was the focus of concentration instead of the data, it could help, as Forrester held, “reveal which data might be most important”. This would save much time and effort. As an aerospace engineer trained to integrate systems and examine the dynamics of massive systems, I must agree with Forrester. Understanding the relationships and dynamics in a system is of utmost importance when trying to design, build, and evaluate (collect data and analyze it) aerospace systems tat function to the best of their ability.