To: The Executive Net -- C778 Community Conference
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PROVOCATIONS -- #3
Aristotle and Weather Forecasting

Perhaps more than any ancient people, the Greeks left us records of their meteorological speculations. The were ardent watchers of the drama of weather as it unfolds in the atmosphere, literally "atmos + sphaera," or the sphere of air surrounding the earth, incidentally signalling their belief in the spherical earth.

The Greeks gave the name "meteors" to clouds, wind, rain and all other natural phenomena believed to occur in the region between the earth's surface and the moon. Made of mixtures of the four elements (air, fire, earth and water), meteors were ostensibly drawn into the atmosphere by the sun's heat.

Because these phenomena fell under the "corruptible" influence of the moon, they were considered mutable and unstable, and were thought to be controlled by what Aristotle called "the eternal cycle of creation and destruction." All were characterized by properties of temperature and moisture: winds were hot and dry, while clouds were cold and moist. Meteors were thought to reside within one of three vertical layers in the atmosphere--the spheres of water, air, and fire. In the Greek view, even earthquakes, comets and other phenomena we now consider extraneous were included in the meteorological system. Earthquakes, for example, were thought to occur when dry vapors (wind) escaped from beneath the earth's surface.

These views were presented systematically in Aristotle's "Meteorologica", written about 340 B.C. Earlier Greek philosophers had speculated about the causes of particular phenomena, like hail or lightning, but Aristotle was the first to unite these ideas into a comprehensive system. His logical deductions were sometimes brilliant--his discussion of the process of evaporation and condensation reads like a modern textbook--yet his conclusions were sometimes very naive. For example, he rejected the view held by many earlier philosophers that wind is air in motion, and, in his own words, "proved" that winds are driven by the motions of the celestial sphere.

The tenets of the "Meteorologica" remained largely undisputed until the 17th Century, when accurate new meteorological instruments afforded scientists with a means of refuting some of Aristotle's claims. Yet, even today vestiges of Aristotle's ideas remain. We still refer poetically to the weather as "the elements." And a glance at the dictionary reveals that the primary definition of "meteor" embraces all atmospheric phenomena, and is not confined to extraterrestrial stone or metal fragments flaming into the earth's atmosphere as brilliant "shooting stars." Similarly, a meteorologist is one who who studies all events occurring within the atmosphere--excluding only phenomena we now know are extrinsic, like earthquakes.

And, unfortunately, the weather and climate forecasts made today--even using the most potent of computers, space vehicles, environmental sensors and quantitative theories of the behavior of compressible fluids--verify little better than those of Aristotle's era, when they are pushed beyond a month or two. At the short term, say to five days or a week, modern forecasts are vastly better than even twenty years ago. I'll talk about some of this in future "Provocations."

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