

Anne Lawrence-Mathers, *Medieval Meteorology: Forecasting the Weather from Aristotle to the Almanac* (Cambridge: Cambridge University Press, 2020), 296 pp., £21.99 (paperback), ISBN 978 1 108 40600 0.

Despite Stuart Jenks's *Isis* article from 1983 and Charles Burnett's numerous excellent studies, medieval astrometeorology has largely escaped scholars' scrutiny. Most recent studies of the history of astrology have emphasized genitures and elections, medical knowledge, religious ramifications, and its role in politics and historical writings. Anne Lawrence-Mathers redirects attention on weather forecasting in astrology, successfully demonstrating the vibrancy of medieval attempts to develop mathematical methods for predicting the weather.

Lawrence-Mathers concentrates almost exclusively on technical writings over the *longue durée*, covering the period from the first century AD to the beginning of the nineteenth century. In many ways the narrative arc will be familiar to those who have studied traditional accounts of the history of natural philosophy, medicine, astronomy, or alchemy in medieval Latin Christendom.

This narrative goes as follows. While Aristotle wrote about meteorology, the most important ancient writers on weather prediction were Virgil, Aratus, and Pliny, who codified weather signs that were based on animal behaviors and the appearances of the sky, in particular the sun and the moon. In the early Middle Ages, efforts to establish the calendar spurred Bede, relying on Isidore of Seville and Pliny, to posit that celestial bodies are signs of future weather. Bede gave special importance to the moon's path, providing a basis for mathematical forecasting. In the Carolingian and Ottonian periods, a number of scholars

continued this mathematical approach that was tied to the *computus*. Geometrical explanations of the seasons and climates suggested the promise of this method. Linking the weather to the regular celestial motions seemed to confirm God's order and rationality as manifested in the created world.

The eleventh and twelfth centuries mark a turning point, when Gerbert of Aurillac, Hermannus Contractus, Adelard of Bath, and others sought out texts on astronomy and astrology written in the Islamic world. As a consequence, the Alchandrean corpus, planetary tables, knowledge of the astrolabe, Ptolemy's *Tetrabiblos*, and Albumasar's astrological works became available in Latin Christendom. In the thirteenth century, more writings on astrometeorology were translated into Latin, notably Al-Kindi's *De mutatione temporum*. The number of Latin texts on astrometeorology grew as twelfth-century scholars, including Hermann of Carinthia and Hugo of Santalla, translated and compiled writings from the Islamic world that used the luminaries' and planets' changing positions on the zodiac and their conjunctions to predict the weather. Scholars writing in Latin offered slightly changed versions, simplified techniques, and updated tables, as Ptolemy, Albumasar, and Al-Kindi continued to influence astrometeorological works, such as the work of Firminus de Bellavalle. In the fourteenth century, the earliest extant examples of weather-related recordkeeping suggest that at least a few scholars aimed to test astrometeorological predictions. In the fifteenth century, there are indications of astrometeorology's growing prominence in universities, as manifested in lecture notes and the annual predictions required by university statutes. In the sixteenth century, publishing houses printed almanacs that featured annual weather predictions based on similar astrological principles. Reformers like Tycho Brahe and Johannes Kepler tried to improve the

field, while accepting the underlying premise that future weather is related to celestial bodies, an assumption that can be found in almanacs in the seventeenth and eighteenth centuries. The publications of Robert Fitzroy's *The Weather Book: A Treatise of Practical Meteorology* in 1862 signals the end of the astrological tradition. Fitzroy promoted predictions based on measurements made with thermometers and barometers. Lawrence-Mathers has uncovered a wealth of sources and her numerous paraphrases will be of great service to future investigators of the topic.

The book puts forward two main theses. One is a continuity thesis, namely, that the astrological methods and materials appropriated by Latin scholars from the Islamic world formed the basis for weather prediction until the nineteenth century. The second is that these methods and practices were scientific. Both arguments are less than satisfying. What Lawrence-Mathers means by "scientific" is never clearly defined, but it seems to be positivistic in nature. Perhaps the closest we get to an explanation is that the treatises were written by experts using geometry and astronomy. Frequently she refers to "advances" made in astrometeorology and maintains that the science was "moving forward" (pp. 1, 40, 44, 54, 69, 70, 71, 72, 153, 171). She characterizes a dictum similar to what is found in the *Tabula Smaragdina* and the first book of Aristotle's *Meteorology*, "what is above affects and influences what is below," as a "scientific principle" (pp. 143, 160). The repetitions of the words "science" and "scientific" give the sense that she is arguing against unnamed, hypothetical opponents who reject that there was "scientific" weather prediction in the Middle Ages, even though I doubt there are many scholars that deny that medieval thinkers developed sophisticated theories for understanding nature. Still, it is not clear why there is a such great concern about labelling it "science" or what

standard should be used to measure an advance in astrometeorology. Were the new methods based on Albumasar and Alkindi more accurate or just more complex? And does increased complexity necessarily constitute progress in a practical field?

As such, the book presents a lost opportunity to explore the epistemology of these predictions in light of medieval conceptions of *scientia* and semiology. Alexander Fidora has written about Albertus Magnus's development of the idea of *scientia coniecturalis* as applied to medical prognostics and other forms of prediction, including that of the weather. Albertus considered this category of knowledge distinct from syllogistically demonstrated *scientia*. In order to evaluate astrometeorology as a form of knowledge, we might ask whether this category or others were broadly used to characterize these forecasts or, more generally, how was the epistemological status of this practical knowledge considered in relation to mixed mathematics, natural philosophy, medicine, and other fields of natural knowledge as their standings changed over the centuries.

A number of anachronistic terms – “temperature,” “atmosphere,” “observation,” “data” – appear with frequency in the sections on medieval astrometeorology. Employing the word “meteorology,” not just in the title but throughout the books, presupposes that the goal of past meteorology was always weather forecasting. Yet, natural philosophical *meteorologia* pertained to causal explanations for sublunary change, including infrequent or irregular phenomena such as shooting stars, rainbows, parhelia, and comets, that are not part of the weather strictly speaking. It would have been more precise to use the term “astrometeorology” in the title and consistently throughout the book. My objection is not a question of mere semantics, since these terms give the appearance of correspondences to modern science where

there are none, and terms like “observation” are used without consideration of the development of the concept itself, which Katharine Park and Gianna Pomata have explained with precision for these periods.

The continuity thesis is also not entirely convincing. The weak claim that some Europeans attempted to predict the weather using the motions of celestial bodies from the early Middle Ages to the nineteenth century is no doubt true. But the question is whether this weak claim is significant. Commentaries on Aristotle, Galen, Avicenna, and Hippocrates have retained the same form and principles for centuries, if not millennia, even though close examination shows they were not static. Moreover, in arguing for continuity, Lawrence-Mathers overlooks a swelling of critique of astrometeorology. Giovanni Pico della Mirandola contended that according to his records astrometeorological predictions were almost entirely inaccurate. Francis Bacon largely excluded astrometeorology from the kinds of prediction considered in his *History of Winds*; Pierre Gassendi expressed skepticism over it. Even Girolamo Cardano, a practicing astrologer, wrote that the field was defective because the natural philosophical foundations were unstable. Vladimir Janković contends that many endorsed Aratean weather signs in the early eighteenth century in order to avoid astrometeorology. In sum, a complete examination reveals a far more complex and divided set of opinions than simple continuity.

The scarcity of sources makes writing about the Middle Ages a difficult task. And while Lawrence-Mathers has found a trove of technical writings, some of the attempts to contextualize them fall flat because of too much speculation. At times these speculations are used to support her thesis about the scientificity of medieval astrometeorology. After summarizing the multiple methods found in the twelfth-century *Book of Nines*, she envisions

that those who used it “would presumably keep records of their findings, and come to decisions as to which methods worked best,” even though the few medieval examples of this kind of recordkeeping date to much later than the twelfth century (p. 103).

Such speculation is particularly evident in discussions about who used medieval weather predictions. She assumes that these techniques must have been considered useful by farmers and sailors, even though she admits the techniques are not described in agricultural or sailing manuals. We know that many sailors and sea captains resisted mathematical methods for navigation even as late as the sixteenth century. Might they have also resisted mathematical weather prediction? The book hypothesizes that in the twelfth century, learned physicians, given their training in astrology, made weather forecasts as part of their attempts to preserve patients’ health. The only evidence presented, however, is of a physician who engaged in divination through dreams, seemingly an entirely different mode of prognosticating (pp. 113-114). Medieval physicians routinely used astrology for timing crises, bloodletting, and surgery; and after 1350 astrology was used to make predictions about plagues. But the argument would have been far more effective if there were citations of *consilia* or other medical writings that describe attending physicians employing astrometeorology.

Some of this speculation could have been tempered by greater attention to sources, both primary and secondary. Many quotations and assertions have no corresponding footnote, or the page or folio is not indicated. Surprisingly, a number of scholars are not cited, including Fidora, Janković, H Darrel Rutkin, Monica Azzolini, Andreas Lerch, and Joëlle Ducos, consideration of whose works might have placed astrometeorology’s relation to natural philosophy and to other aspects of astrology on firmer ground.

Scholars will be thankful for the large number of sources that are tracked down and summarized in *Medieval Meteorology*. But the volume will likely be the starting point for future analyses of medieval astrometeorology rather than the definitive word.

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