Questions of Evidence

Three Interrelated Principles:

    Mars-Sun distances via diametral distance rule

    Timing along trajectory via area rule

    Trajectory is an ellipse (three parameters)

Evidence extracted from observed geocentric longitudes confirms that all three principles hold to within bounds of uncertainty

Issue: Do these principles hold (or should be taken to hold)

    Exactly

    "Essentially exactly" – i.e. would hold exactly in absence of "external" perturbing factors

    Merely approximately – i.e. without precluding alternative principles different from them

Issue: Generic vs. specific principles for Mars

    When should a discrepancy between calculated and observed geocentric longitudes count against the generic principle rather than against the specific values of the orbital elements?

Sources for Material in the Handout

For the discussion of the true versus the mean Sun: Bruce Stephenson, *Kepler's Physical Astronomy* (New York: Springer-Verlag, 1987).

For the discrepancies between calculated and "true" longitudes between 1580 and 1600: James R. Voelkel and Owen Gingerich, "Giovanni Antonio Magini's 'Keplerian' Tables of 1614 and their Implications for the Reception of Keplerian Astronomy in the Seventeenth Century," *Journal for the History of Astronomy*, xxxii (2001), pp. 237-262.

For the discussion of the sequence of models leading to the final ellipse, Owen Gingerich. "Johannes Kepler," in René Taton and Curtis Wilson (ed.), *Planetary Astronomy from the Renaissance to the Rise of Astrophysics, Part A: Tycho Brahe to Newton*, (Cambridge: Cambridge University Press, 1989). on reserve

Other material from the *Johannes Kepler Gesammelte Werke* edition of *Astronomia Nova* or the English translation by William Donahue (Cambridge: Cambridge University press, 1992).

The engraving of Prague in 1606 from Patrick Moore, *The Great Astronomical Revolution: 1543-1687 and the Space Age Epilogue* (Concord, MA: Paul & Company, 1994).