

Ancient way finding

Fun questions

- At noon in Australia, what part of the sky is the sun in?
- Is local noon the same in Portland, Seattle, and Boise?
- If you wanted to accurately measure local time using the sky, how would you do it?

Three key ideas

- How far north stars (and the sun) appear depends on *latitude*

Indonesia



New Mexico



Oregon



APOD

Measuring Latitude

- Northern hemisphere, measure the altitude of the North star



Three key ideas

- How far north stars (and the sun) appear depends on *latitude*
- Solar day varies in time (due to elliptical orbit of the earth), but stellar day is very steady.

Bologna Cathedral





Noon, day before summer solstice

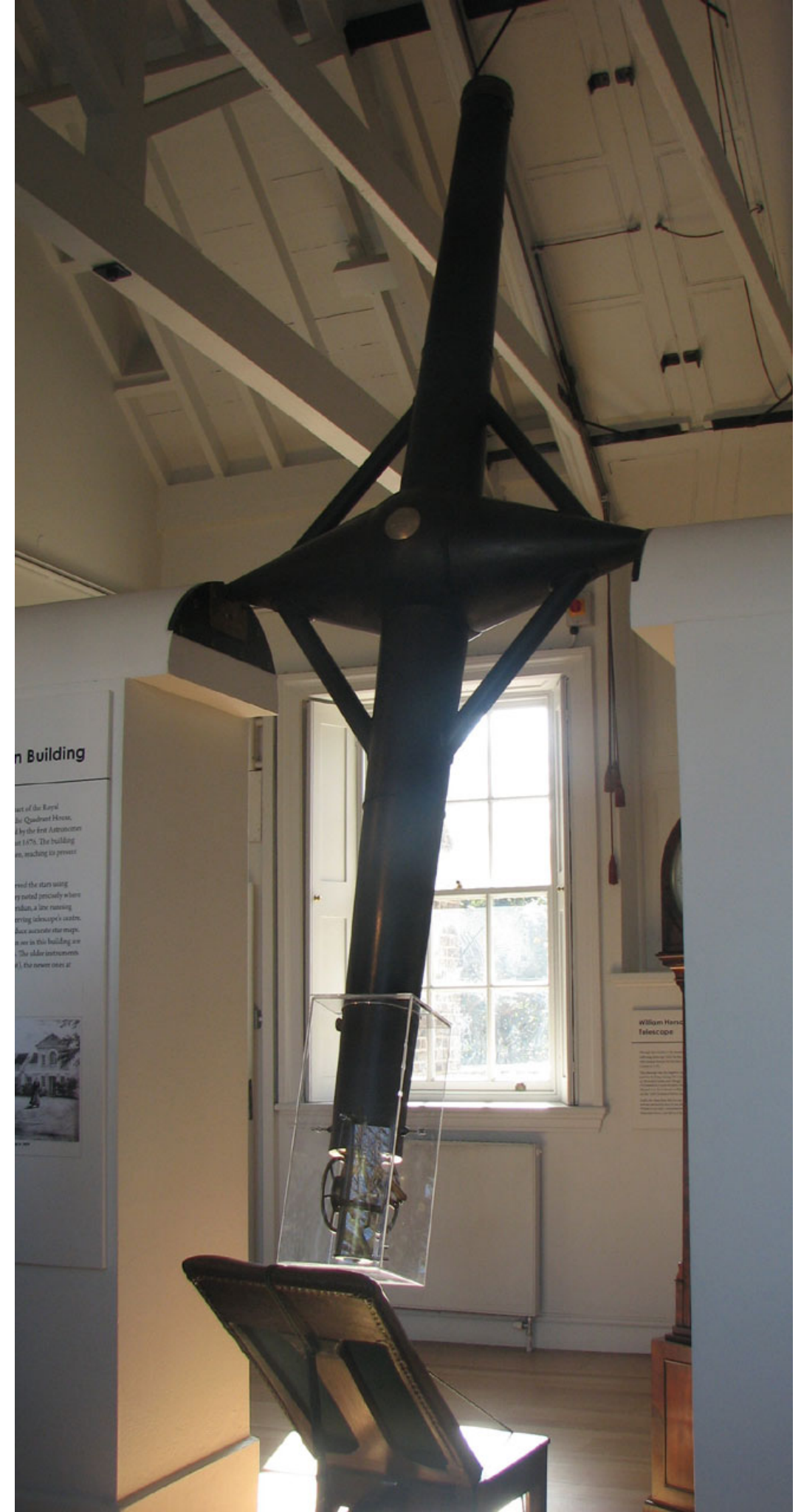


Solar day is not constant



Transit telescope

- Determine local noon (mean solar day)
- An analemma is used to convert apparent solar noon to mean solar noon



Troughton 10-foot Transit Instrument (1816)



Three key ideas

- How far north stars (and the sun) appear depends on *latitude*
- Solar day varies in time (due to elliptical orbit of the earth), but stellar day is very steady.
- Mean solar noon smoothly varies with longitude



Earth



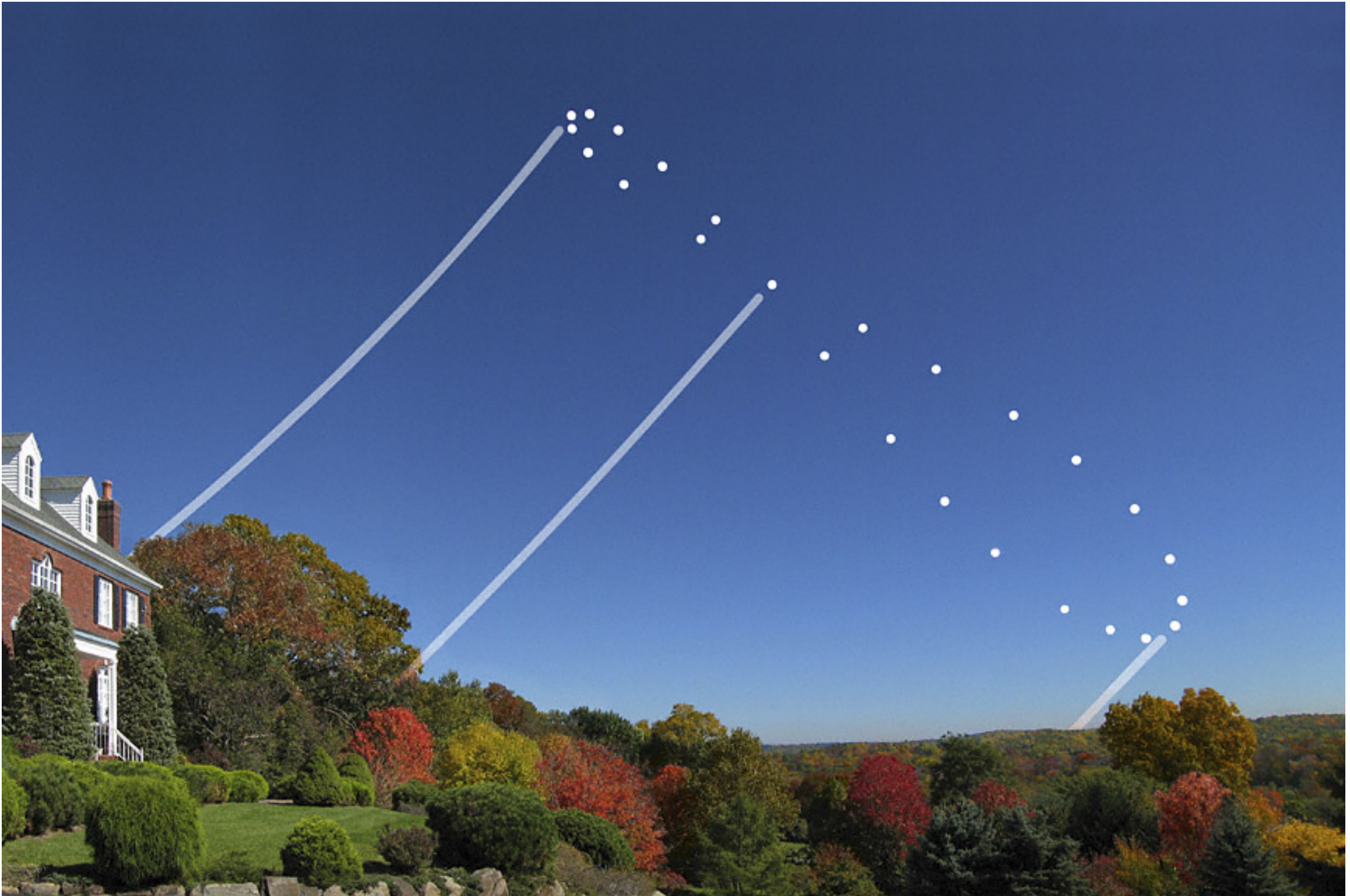
Actual movie from Messenger spacecraft

Ancient navigation

Celestial navigation (at night)



Solar navigation (during the day)



Clouds?



Viking sun stone? ~900 CE



Magnetic compass

(China 1100 CE; Europe 1200 CE)



Problem of longitude