

# Historical constellations in the planetarium

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**Abstract.** This contribution summarizes the reconstruction of historical constellations. It is based on studies of classics, philologies, history of science and history of art. In the given brevity, I can only sketch the strategic, scientific and educational reasons.

**Keywords.** reference systems, astronomical data bases: miscellaneous, history and philosophy of astronomy

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## 1. Introduction: Why should we care?

Indigenous constellations are a cultural heritage of people all over the world. Before the decisions in the 1920s (i) to define a set with international validity, (ii) to base this set of constellations on the 48 ancient Greek constellations and, thus, the Euro-Arabic tradition, (iii) to assign a Belgian priest with new definitions according to equatorial longitudes and latitudes, and (iv) to accept his suggestion of 88 areas by the IAU and make it canonical (Delporte, E. (1930)), each culture used its own set of constellations.

The reconstruction of the indigenous constellations is therefore a tribute to the cultural history and helps peoples and tribes all over the world to self-identify with research on the sky. If it is possible to present the constellations in the local planetarium dome, it is certainly much more immersive but also the visualisation on flat screens of desktop computers has an appeal. The latter has the advantage that the learners – children, youngsters or adults – can play around and really use it, create their own visualisations and study the sky. Either way, the local history and intellectual heritage supports the teaching and learning process.

With a global community of astronomers in mind, this is a very attractive way to introduce the IAU constellations as official frame of reference without losing the own roots by showing the indigenous constellations of many cultures. This also demonstrates that constellations are human conventions and not given by nature which is why we must not derive anything from them. It is a rather obvious way to visually demonstrate (without arguing) the absurdity of astrology.

Constellations have always been a frame of reference that kept existing although mathematical frames of reference were introduced in the 1st millennium BCE and in Ptolemy's *Almagest* from the 2nd century CE, even a coordinate system was provided but people kept using constellations additionally. Thus, roughly 2000 years of history show without doubt that the patterns of gestalt-seeing with a local cultural background are important for many people: They help memorizing the patterns and connect to the human cultures.

## 2. Making Off

Currently, Zeiss Planetarium software does not offer the possibility to display anything else but the IAU constellations – as area borders, as stickfigure and as drawing. Only

the open source software Stellarium allows to choose and change between roughly thirty different sky cultures, most of them incomplete. In the era of big data and software development, knowledge is never fixed or final and in the age of databases, sorted lists can always easily be extended.

For the Zeiss planetaria Jena and Berlin, I created and installed the almost completely preserved Babylonian constellations based on MUL.APIN (−2nd millennium), the ancient Greek (around year “0”) and the medieval set of constellations (~850 CE): Hoffmann, S.M. (2017b). In Stellarium, I contributed the original Greek sky culture in shape of the Almagest stickfigures (a work of my students) and two Babylonian sky cultures of the −1st and −2nd millennium: Hoffmann, S.M. (2020).

The mathematical reconstruction of the area of ancient constellations is based on coordinates and dates of rising, setting, culmination or whatever is available: Hoffmann, S.M. (2016); Hoffmann, S.M. (2017a). The figures are reproduced from historical depictions. This creates an image that is as realistic as possible and displays figures in a way that is known to the people (the ancestors as well as us because objects of their art are preserved). The uncertainties and ambiguities of identifications are documented in scientific papers.

### 3. Outlook

Applications of these visualisations are not only the usage in daily public presentations and narrating local history. Constellations are a frame of reference and used to identify historical transients for research in astrophysics. However, their high cultural value helps people all over the world to find access to all types of research concerning astronomy and astrophysics. It will be necessary to build a knowledgebase for native constellations.

Currently, I am setting up a structure for storing the data for my already reconstructed sky cultures. I already talked to the producers of planetaria at Zeiss about the requirements for better performance in implementing further cultures and I keep contributing to Stellarium.

My goal is mainly to provide the structure for a collection and, then, invite colleagues to contribute their work on this topic. This will enable a learning and research process that is data-driven instead of professor-driven, i. e. it is unbiased and nonauthoritarian.

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