



Fig. 1

## 1. Make TOPOCENTER useful

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- What's reposition for, anyway?
- Using a vocabulary
- Derive TOPOCENTER
- Related: machine readable errors

(cf. Fig. 1)

## 2. Reposition

TIMESYS (and future COOSYS) let you declare a reference position: What position in the Universe are times and coordinates given for?

You need that when combining times and places from different sources; corrections like:

- Light travel time correction ( $\lesssim 100$  ms up to geostationary orbit,  $\lesssim 5$  s to L1,  $\lesssim 10^{12}$  s for galactic center relative to EMBARYCENTER). Of course, how much it really is depends on the geometry between the two repositions and the object observed.
- Parallax: up to 0.5 arcsec between EMBARYCENTER and BARYCENTER for an object 1 pc away.

## 3. A Vocabulary

We've inherited one from STC1. It's now at [rdf/reposition](http://www.ivoa.net/rdf/reposition)<sup>1</sup>:

- TOPOCENTER – The location of the instrument that made the observation
- GEOCENTER – The center of the earth
- BARYCENTER – The barycenter of the solar system
- HELIOCENTER – The center of the sun
- EMBARYCENTER – The barycenter of the Earth-Moon system
- UNKNOWN – The times cannot be transformed to a different reference position reliably.

<sup>1</sup> <http://www.ivoa.net/rdf/reposition>

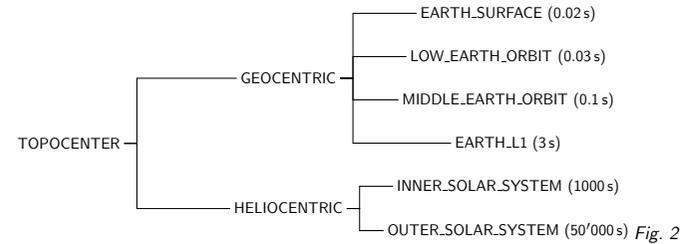


Fig. 2

## 4. TOPOCENTER

Trouble with TOPOCENTER: To compute the light travel time, we need the location of the instrument (e.g., lat, long, height of observatory, spacecraft ephemerides).

We have no way to specify this (e.g., in VOTable) right now.

Perhaps we'll have a DM for that one day.

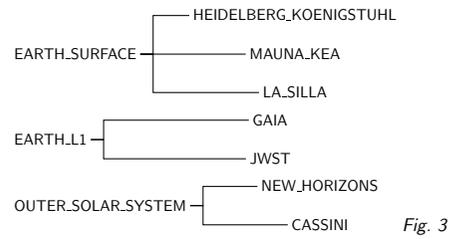
Until then: Use it to adjust errors?

## 5. A TOPOCENTER Hierarchy?

What about:

(cf. Fig. 2)

The numbers in parenthesis give the adjustment to the systematic errors in time.



## 6. And Perhaps Further?

We could make that “optionally precise”:

(cf. Fig. 3)

Bonus: Clients that don't know about JWST's orbit could still work out a systematic error adjustment using semantics.

## 7. But

We still cannot annotate statistical and systematic errors in VOTables, so right now clients couldn't do automatic adjustments. Meas DM and VODML annotation would help here.

## 8. Any takers?

I think that's a reasonably useful thing to have.

But I won't push this along.

Also, there's no need to do this now – vocabularies can be amended later.

So: Would *you* like to have it?