



Small Telescope Exoplanet Observations in Taurus Hill Observatory

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Introduction of the Taurus Hill Observatory

The Taurus Hill Observatory (THO) is owned by an Amateur Astronomical Association Warkauden Kassiopeia. The observatory itself is located on the top of Hill Härkämäki, Varkaus, Finland. The main telescope of the observatory is 14" Celestron C-14 which is Schmidt-Cassegrain type of telescope. The telescope was bought for the observatory in the end of the year 2008 and it is mounted on the Paramount ME robotic mount. We use a SBIG ST8-XME CCD camera with UVBRI photometric filters for photographing and measurements. The telescope and the CCD camera are controlled via computers in the remote operating building. The main objects that THO research team observes are supernovae (discoveries and brightness measurements), solar system objects and exoplanets.

Exoplanet Observations in Taurus Hill Observatory

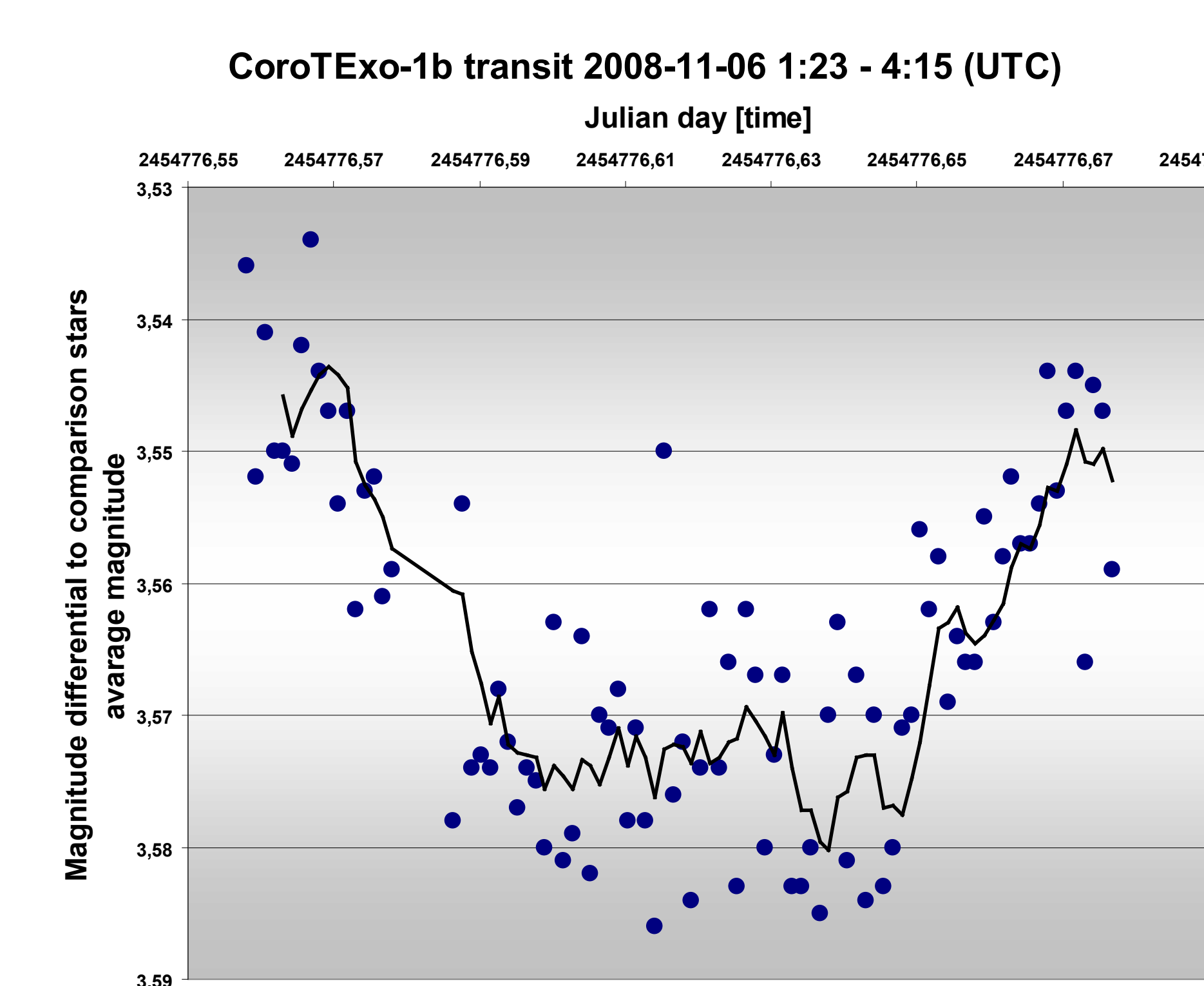
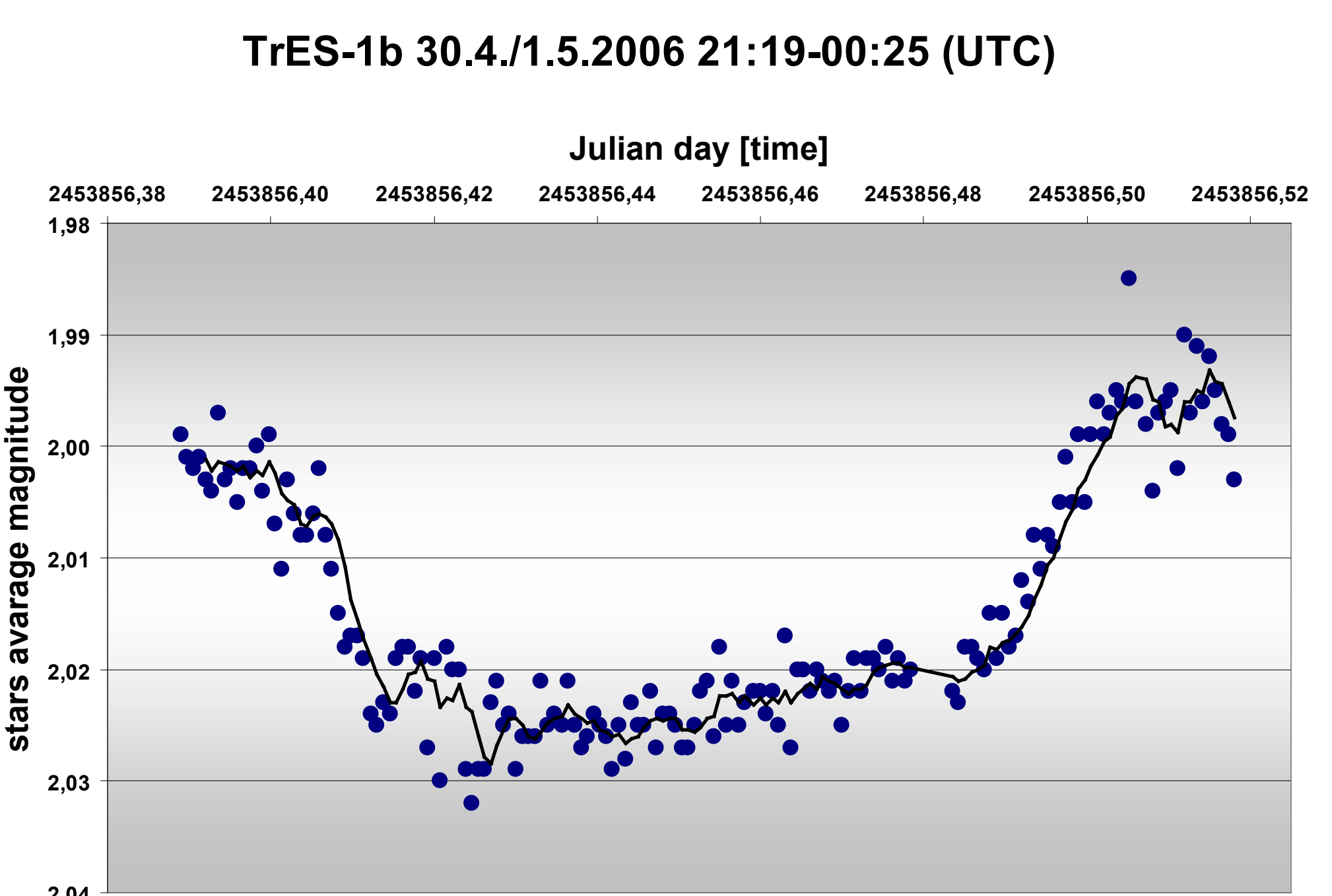
The kick-off of the exoplanet observations was in April 2006 when THO research team observed TrES-1b (detailed information below). Same year the research team started to report observations to professor Gregory Laughlin (UC Santa Cruz) who maintains the transitsearch -website. With help of professor Laughlin and the transitsearch -website, the THO research team got the accurate transit times for the observable exoplanets. In autumn 2008 THO measurements were added to the AXA -database that is maintained by Bruce L. Gary. This database contains exoplanet measurements from amateur astronomers all over the world. There are now 27 measurements from 20 different exoplanets in the AXA -database from the THO research team. There are few interesting observations, for example the THO light curve measurement from the WASP-12b that was made in January 2009 (detailed information below). All the measurements that are recorded to the AXA -database are in use of Caltech. These measurements provide a lot of new information about the

exoplanet transit times, depth of the dimming of the mother star, variations in the orbiting periods and sudden changes seen on the measurements.

THO research team uses photometric filters for making the measurements. The exposure times that are used for measurements are typically from 10 to 120 sec. and the chosen mother star brightness from 8 to 14 magnitudes. The measurement of the each transit is commenced half an hour before the predicted start of the transit and finished half an hour after the transit is ended. The main problem with the measurements is that in Finland the weather is challenging. The humidity is very often about 80% or more and this causes difficulties when measuring objects that are located in low altitudes. Also there aren't many high pressure areas in the dark season (in winter). Despite these problems, the THO research team has managed to measure high quality light curves from several exoplanets. The minimum magnitude difference that can be measured in THO is about 5 mmag.

TrES-1b

TrES-1b exoplanet transit (see light curve on the right) observed 30th of April in 2006 was the very first one at THO. We reported this result to Gregory Laughlin (UC Santa Cruz). He reported our results on his Systemic web blog (www.oklo.org) some days after our announcement. He suspected that on our light curve of the transit can be seen a tantalizing hint of the star-spot activity that is known to characterize TrES-1. Also the results by the images of HST have shown that starspot activity on TrES-1 can produce strange-looking features in the light curve.



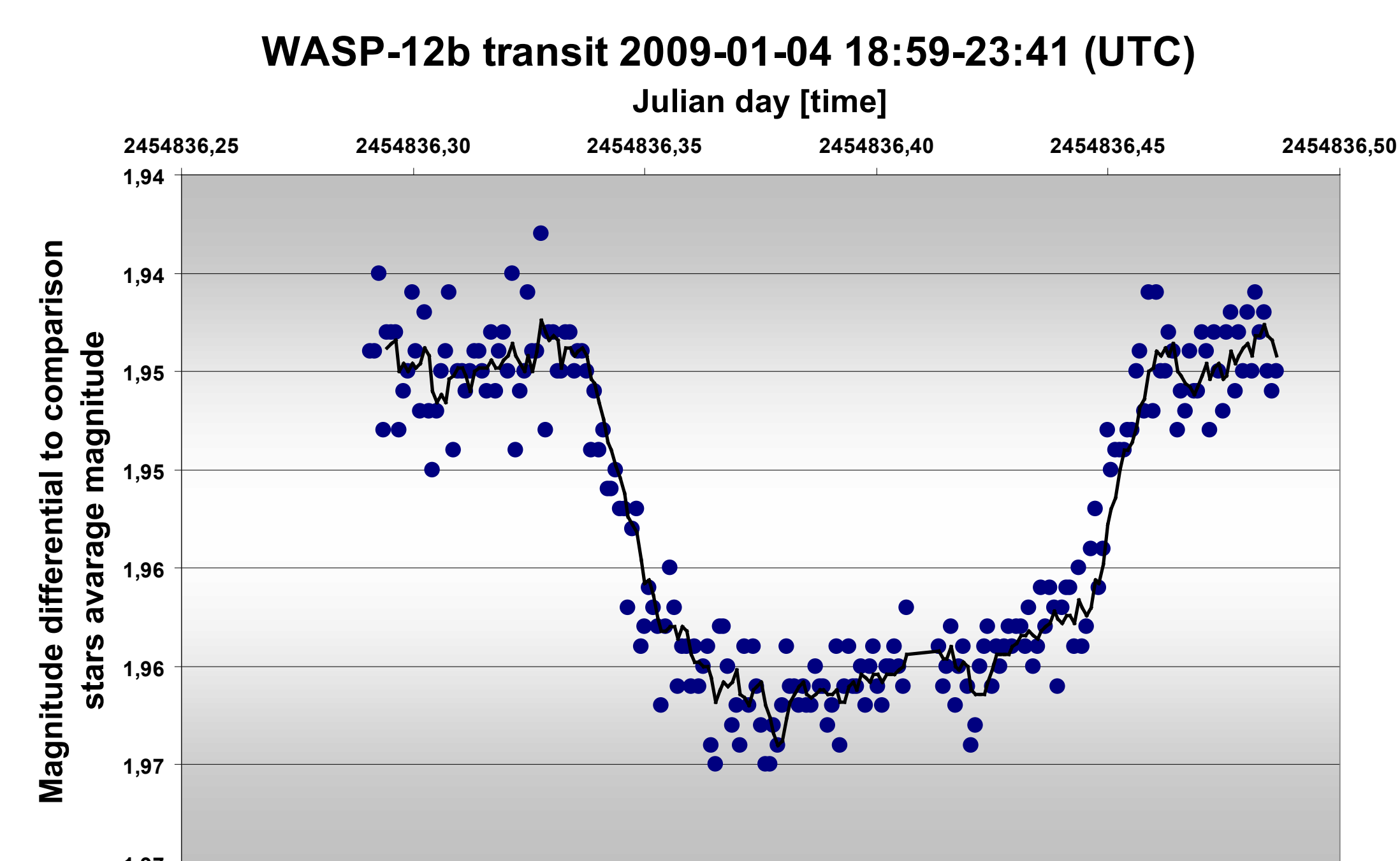
CoroTEexo-1b

French satellite Corot discovered CoroTEexo-1b 2007 and the research team of the Taurus Hill Observatory managed to measure the light curve of the transit (on the left). Veli-Pekka Hentunen and Markku Nissinen measured the light curve 6.11.2008 03.23 - 06.15 Finnish time at THO. The declination of the object is very low in the Finnish sky, only -3. This time the object was in South and therefore it was in quite good altitude for observing.

This exoplanet has a revolution time of 1.5 days and the brightness of the mother star is only 13.7 magnitudes. Veli-pekka and Markku used 90 sec. exposure times and clear -filter. The flattening of the observed object was measured by using 10 comparison stars.

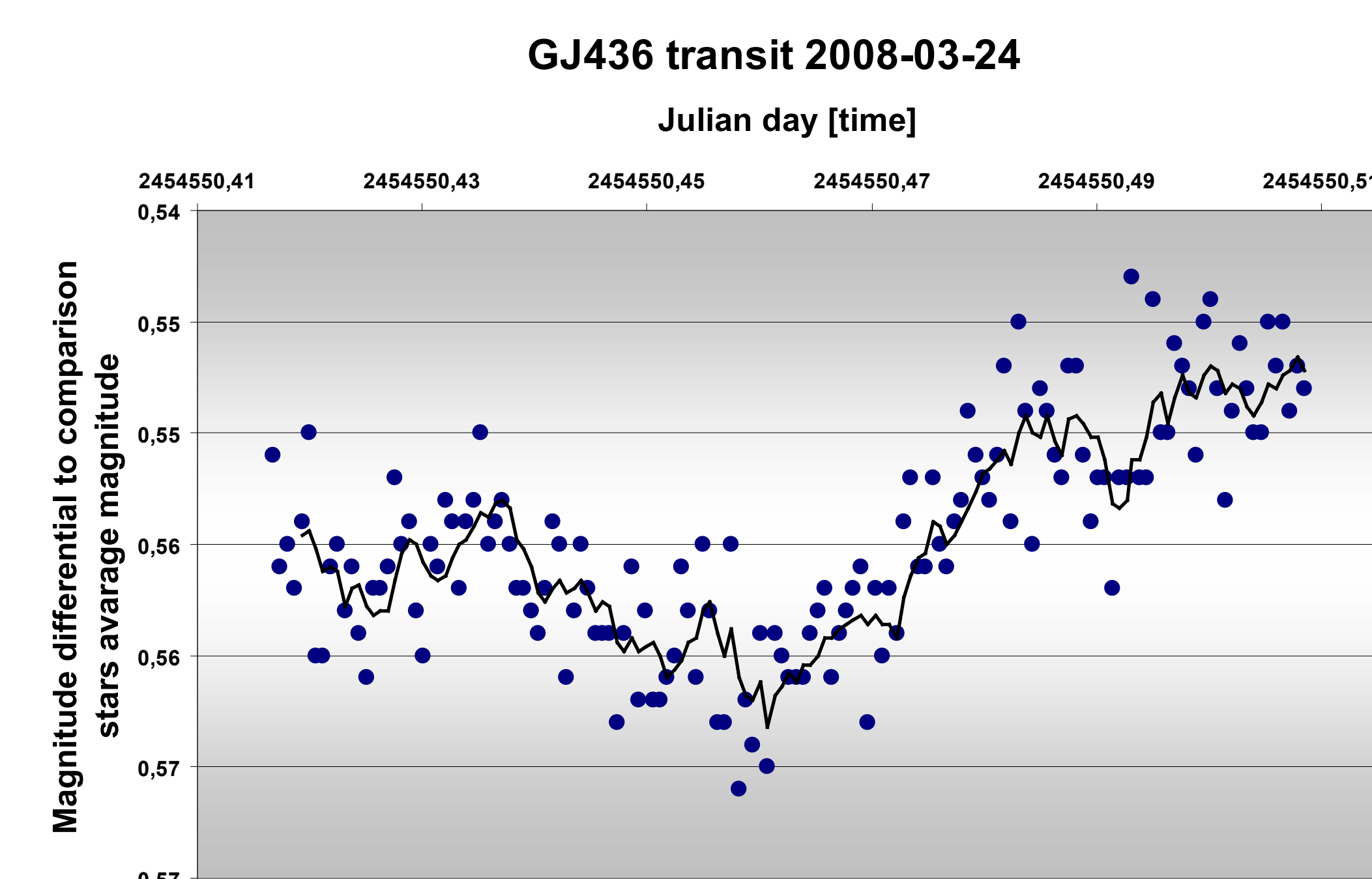
WASP-12b

Exoplanet WASP-12b is one of the latest exoplanets that is discovered. It is very exceptional exoplanet. It



is largest known exoplanet at the moment and it circulates its mother star (GSC 1891-1178) ones in just over one day. It has a surface temperature of 2500 Celsius degrees.

The THO research team managed to measure the light curve of the WASP-12b transit 4.1.2009 (see light curve on the right). The team used 10 stars as comparison stars. The exposure time was 60 sec. for each measurement (=picture). The used filter was clear.



GJ436b

GJ436b is the exoplanet that has been observed more than any other exoplanet in THO by the research team. This exoplanet is very interesting due to the fact that there are more anomalies in its behaviour than in any other exoplanet behaviour. This has been estimated to be a sing of other planets in the same solar system. The light curve on the left is one of the measurements made in THO. The measurement was made by Veli-Pekka Hentunen 24.3.2008.

More information about the Taurus Hill Observatory research

If You would like to get more information about the research work that is made in THO, please visit in our websites in address <http://english.taurushill.net>. We recommend that You will also visit in the Transitsearch (<http://www.transitsearch.org/>) and AXA (<http://brucegary.net/AXA/x.htm>) websites.

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Poster design: Harri Haukka