THE KERN ASTRONOMICAL SOCIETY

The Syzygy

THE NEWSLETTER OF THE KERN ASTRONOMICAL SOCIETY NO. 485 APRIL 2014

NEXT KAS OPEN MEETING

Friday April 4th, 2014 @ Round Table Pizza
4200 Gosford Rd Bakersfield 93313
Dinner & Fellowship: **6:30 pm**
Meeting & Program: **7:30 pm**

Program

DARREN C. BLY
"2014 Mars Opposition"

OLD TOOL, NEW USE

GPS AND THE TERRESTRIAL REFERENCE FRAME

Alex H. Kasprak

NASA SPACE PLACE

Flying over 1300 kilometers above Earth, the Jason 2 satellite knows its distance from the ocean down to a matter of centimeters, allowing for the creation of detailed maps of the ocean's surface. This information is invaluable to oceanographers and climate scientists. By understanding the ocean's complex topography—its barely perceptible hills and troughs—these scientists can monitor the pace of sea level rise, unravel the intricacies of ocean currents, and project the effects of future climate change.

Artist's interpretation of the Jason 2 satellite. To do its job properly, satellites like Jason 2 require as accurate a terrestrial reference frame as possible. Image courtesy: NASA/JPL-Caltech.

But these measurements would be useless if there were not some frame of reference to put them in context. A terrestrial reference frame, ratified by an international group of scientists, serves that purpose. "It's a lot like air," says JPL scientist Jan Weiss. "It's all around us and is vitally important, but people don't really think about it." Creating such a frame of reference is more of a challenge than you might think, though. No point on the surface of Earth is truly fixed.

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The Kern Astronomical Society InfoShare

Who We Are

Since 1956, The Kern Astronomical Society has promoted community awareness of current events in astronomy, and provides a forum for sharing of knowledge and experiences among amateur astronomers.
Annual membership is $20.00 which also provides "Sky and Telescope" and / or Astronomy magazines at reduced rates. More information on our web site.The KAS will e-mail The Syzygy free of charge to any educator; just contact the editor.

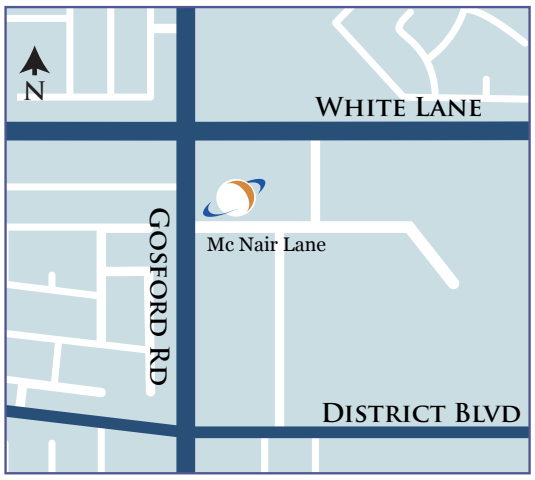
Club Star Parties

The Kern Astronomical Society usually has 2 Club-Star Parties per month depending on the weather. We also host public Star parties upon request.
Our Star Parties are held on Saturdays.
The primary date is the weekend of new moon with the secondary date being before or after new moon. You may get current Star Party information from
our coordinator, Darren Bly.

Next Meeting

The KAS holds their Monthly meeting the 1st Friday of every month.

Round Table Pizza in the **"Meeting Room"**
Diner & Fellowship: **6:30 pm;** Meeting: **7:30 pm**
4200 Gosford Rd. #101, Bakersfield 93313, (661) 397-1111



KAS Club Telescopes

The Kern Astronomical Society has telescopes and accessories (listed below) available for loan to Club members in good standing. Members are encouraged to borrow the different types of scopes in stock (especially if you are considering purchasing one-checking out and trying different types will help you make an informed purchase decision). If you have a Club scope in your possession, the KAS expects you to use it by participating in at least one Star party.

- 6" f/6, 8"f/6, 10" f/5.6, 13" f/4.5 Dobsonian scopes
- Parks Jovian 90, 3-1/2" F-13 Maksukov-Cassegrain
- 4" f/15 Unitron Refractor
- 8" solar filter
- Eyepieces up to 2" wide

KAS Contacts

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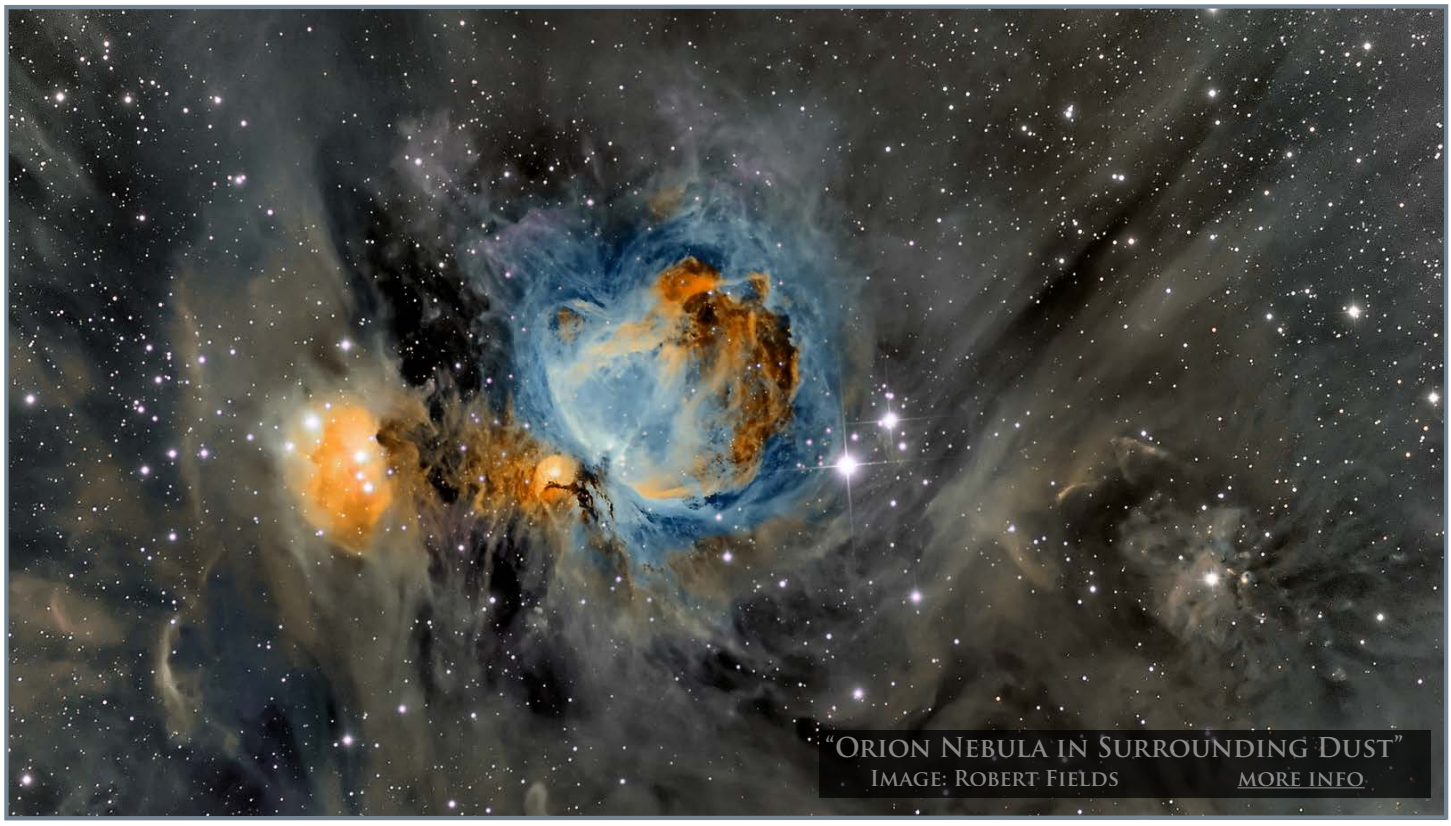
Kern Astronomical Society on FaceBook
facebook.com/groups/syzygy/

The Kern Astronomical Society

April 2014

Sun	Mon	Tue	Wed	Thur	Fri	Sat
23 moon ↑ 1:22 am moon ↓11:51 am sun ↓ 7:10	24	1	2	3	4 ○ KAS Meeting 6:30p	5
6 moon ↑ 7:04 am moon ↓ 7:49 pm sun ↓ 7:22	◑ 1:31 am 7 	8	9	10	11	12 ○ KAS Astronomy Day
13 moon ↑ 6:12 pm moon ↓ 5:24 am sun ↓ 5:52	14	● 12:43 am 15 	16	17	18	19
20 moon ↑ 12:13 am moon ↓ 10:47 am sun ↓ 7:04	21	◑ 12:52 am 22 	23	24	25	26 ○ KAS at Lockwood
27 moon ↑ 5:09 am moon ↓ 6:21 pm sun ↓ 7:04	○ 11:15 pm 28 	29	30	1	2	3 ○ KAS at Lockwood

Star Party Coordinator **Darren Bly** dcbly@bak.rr.com



"Orion Nebula in Surrounding Dust"
Image: Robert Fields more info

Old Tool, New Use: GPS and the Terrestrial Reference Frame

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To create a terrestrial reference frame, you need to know the distance between as many points as possible. Two methods help achieve that goal. Very-long baseline interferometry uses multiple radio antennas to monitor the signal from something very far away in space, like a quasar. The distance between the antennas can be calculated based on tiny changes in the time it takes the signal to reach them. Satellite laser ranging, the second method, bounces lasers off of satellites and measures the two-way travel time to calculate distance between ground stations.

Weiss and his colleagues would like to add a third method into the mix—GPS. At the moment, GPS measurements are used only to tie together the points created by very long baseline interferometry and satellite laser ranging together, not to directly calculate a terrestrial reference frame.

"There hasn't been a whole lot of serious effort to include GPS directly," says Weiss. His goal is to show that GPS can be used to create a terrestrial reference frame on its own. "The thing about GPS that's different from very-long baseline interferometry and satellite laser ranging is that you don't need complex and expensive infrastructure and can deploy many stations all around the world."

Feeding GPS data directly into the calculation of a terrestrial reference frame could lead to an even more accurate and cost effective way to reference points geospatially. This could be good news for missions like Jason 2. Slight errors in the terrestrial reference frame can create significant errors where precise measurements are required. GPS stations could prove to be a vital and untapped resource in the quest to create the most accurate terrestrial reference frame possible. "The thing about GPS," says Weiss, "is that you are just so data rich when compared to these other techniques."

You can learn more about NASA's efforts to create an accurate terrestrial reference frame here:
http://space-geodesy.nasa.gov/

Kids can learn all about GPS by visiting:
http://spaceplace.nasa.gov/gps

and watching a fun animation about finding pizza here:
http://spaceplace.nasa.gov/gps-pizza