

IOPW Steering Committee Meeting Minutes, October 9, 2013 in Denver, CO

Glenn Orton (Chair), Ricardo Hueso, Paul Steffes, Bob West, Kunio Sayanagi, Heidi Hammel, Julie Rathbun, Imke de Pater, Mark Hofstadter

Written updates by other members are attached at the end of this note.

Minutes:

Welcome new member: Julie.

Julie:

With EXCEED launch, we can look at Io in UV. When was the last Io workshop? Please do some observation of the volcanoes from the ground. It will look at Jupiter for awhile, will switch to Venus after a while. Status of the mission – they haven't removed the instrument cover. Jupiter until April (6-mo Jov op), then Venus, nominal mission is for a year, will then go back to Jupiter.

Heidi's strategic question:

Can we prepare for EXCEED's return to Jupiter – what can we do to get us prepared?

Julie:

The EXCEED mission support is quite extensive (whole big list – Julie will send Kunio). We will need to start scheduling Jupiter observation for when EXCEED goes back to Jupiter observation. The Japanese are going gung-ho about putting together a ground based support observation.

Mark on Uranus/Neptune:

Uranus/Neptune workshop – observation and theory activities. At today's Uranus/Neptune workshop, I'll give more updates. Aurora observations Two interesting observations on the zonal wind – zonal wind on Uranus can only be shallow. Ocean-dynamo circulation might couple to the cloud-top flow. It might preferentially put internal heat more on the equator.

Bob: it doesn't surprise me that it's the case for Uranus because Voyager 2 Neptune showed that dynamo should be shallow – doesn't surprise me that it's the case for Uranus.

Mark: Observational side: ALMA – we have high hopes to look for phosphine + hydrogen sulfide lines. ALMA thinks their band-width stability might not be good enough to make that observation. They will not try it – proposal rejected twice. Observing Uranus would be a good way to constrain the stability! They don't know the bandwidth stability, and it is unclear what they are willing to do in the future. It seems like an excuse to just do easier non-solar system stuff. So, what planetary observations *have* been done at ALMA?

Heidi – we might request proposers to let us (IOPW) have a look at their proposals to see if they are worth getting submitted before flooding ALMA with solar system proposals.

Question – do we feel that there are proportionally appropriate time allotted to solar system targets at all the big telescopes?

Heidi: No – the quality of the proposals is a separate issue, but we need to get ourselves represented.

Heidi: if we can list scientific questions and state how they can be addressed and go through OPAG, then that can be a rallying point. “Enabling observations for future missions” is a good thing to say.

Kunio: Hasn't ALMA been looking at KBOs?

Heidi: Their observations are more astronomy-like and not solar-system like, so the observation/values are easier to understand for people (astronomers) on the TACs.

Speaking of astronomy-like observations, Exoplanets – we have found all the intermediate cases between Earth and Neptune. Not super Earth but more like mini-Icy-giants.

Ricardo:

We continue to get good observation from amateurs of Jupiter and Saturn. With newer cameras and observation techniques, we expect better images of Jupiter this season. We are starting to get many images from people we didn't know about before. We need to reach out to these new observers, not just the traditional contributors (Chris Go, Anthony Wesley...). Can we merge the ALPO Japan database and PVOL database? Hmmmm, who speaks Japanese among the IOPW members ... Kunio will help.

It's a lot of work to convince amateurs to contribute to do scientifically useful Chris Go and Celestron President are good friends. Maybe there is something to work out there.

CanariCam – the atmospheric water column at the site is large, so make sure you propose things that are not affected by atmospheric water.

Last Year – There's an instrument using tunable spectrometer, to detect lightning flashes. Antonio Garcia.

Paul – Satellites -- big interest seems to be surface chemistry, chemical deposition, interaction with plasma around the planets ... Outer Planets roots have grown at GAtech. Yay Britney, Carol and ... 3 other recent hires.

Heidi: Neptune – amateur discovery of bright feature on Neptune, have been followed up by DD proposal has gone in.

Ricardo – The Neptune feature may have already disappeared – amateurs have not been able to detect it in the past couple of weeks.

Julie – Io Workshop in Boulder, organized by Con Tsang and Andrew Steffl.

Another thing – push the Art Walk tomorrow (Thursday).

Rotating Members Kunio and Makenzie have been voted in to stay for another year (thanks!).

Other notes:

Henry Roe's Titan Update:

In the 2012-2013 apparition our extended group has continued multi-telescope observations of Titan's methane weather. We had programs at IRTF to use SPeX in a service mode to grab a quick spectrum on as many nights as possible and a ToO program at Gemini (both North and South) to obtain snapshot resolved imaging on numerous nights. We also continue our small telescope photometric monitoring sites for filling in the temporal gaps and helping to trigger large telescope ToO's.

John Clarke: IOPW Aurora and Magnetosphere sub-Discipline

Update Oct 2013

The concentration of effort in the past year has been at Saturn, in no small part owing to the continuing Cassini mission.

The status of the discipline was reported at the July 2013 Magnetospheres of the Outer Planets conference, held in Athens Greece (<http://space.academyofathens.gr/mop2013/>). There have been few observations of the plasma torus in the past year, and only scattered observations of Jupiter's aurora, mainly using HST and ground-based IR telescopes. Nonetheless the trove of HST images including the 2007/2008 large campaign program continue to lead to new publications (see below).

One recent highlight has been the launch of the Japanese mission Sprint-A / EXCEED, or Hisaki. This small EUV telescope will orbit the Earth and obtain time series data on the EUV emissions from the Io plasma torus, as well as a number of other targets. Launch was in August 2013, and the instrument is in its check-put phase now. (<http://www.space.com/22806-japan-launches-epsilon-rocket.html>)

A new HST program has been awarded in the present cycle to follow

up on earlier successful observations of aurora on Uranus (L. Lamy is the PI). Observations have been made, and the data are undergoing analysis.

At Saturn, further coordinated HST and Cassini UVIS and VIMS observations are scheduled, and these programs have been very successful to date. In the first years of Cassini at Saturn, there were few UV/IR observations of the aurora, but the number has been increasing over the years, and is now a common mode for Cassini:

(<http://www.astronomynow.com/news/n0911/25cassini/>)

The lead people are Jon Nichols for the HST, Wayne Pryor for UVIS, and Tom Stallard for VIMS. The detection of auroral emission from the magnetic footprint of Enceladus at Saturn was a big event a couple of years ago.

A Few Publications:

“Auroral Processes on Jupiter and Saturn”, J. T. Clarke, chapter in AGU Geophysical Monograph Series 197, pp. 113-121 doi: 10.1029/2011GM001199 (2012).

“Remote sensing of the energy of auroral electrons in Saturn’s atmosphere: Hubble and Cassini spectral observations“, J.-C. Gérard, J. Gustin, W.R. Pryor, D. Grodent, B. Bonfond, A. Radioti, G.R. Gladstone, J.T. Clarke, and J.D. Nichols, *Icarus*, 223, doi:10.1016/j.icarus. 2012.11.033 (2013).

“Effects of methane on giant planet's UV emissions and implications for the auroral characteristics”, J. Gustin, J.-C. Gérard, D. Grodent, G.R. Gladstone, J.T. Clarke, W. Pryor V. Dols, B. Bonfond, A. Radioti, L., Lamy, and J. Ajello, *J. Molecular Spectr.*, vol, pgs, <http://dx.doi.org/10.1016/j.jms.2013.03.010> (2013).

“Longitudinal Modulation of the Brightness of Io’s Auroral Footprint Emission: Comparison with Models“, S. Wannawichian, J.T. Clarke, F. Bagenal, W. Smyth, C. Peterson, and J. Nichols, *J. Geophys. Res.*, 118, doi:10.1002/jgra.50346 (2013).

"Hubble Observations of Jupiter's North-South Conjugate Ultraviolet Aurora", J.-C. Gérard, D. Grodent, A. Radioti, B. Bonfond, and J.T. Clarke, *Icarus*, 226, 1559-1567, <http://dx.doi.org/10.1016/j.icarus.2013.08.017> (2013).

“The Multiple Spots of the Ganymede Auroral Footprint”, B. Bonfond, S. Hess, F. Bagenal, J.-C. Gérard, D. Grodent, A. Radioti, J. Gustin, and J.T. Clarke, *GRL*, 40, 1-5, doi:10.1002/grl.50989 (2013).

"Multispectral simultaneous diagnosis of Saturn's aurorae throughout a planetary rotation"

L., Lamy et al., *JGR*, 118, doi:10.1002/jgra50404 (2013).

"Saturn's auroral/polar H3+ infrared emission: The effect of solar wind compression".
JGR, 117, doi:10.1029/2012/JA018201 (2012).

<https://docs.google.com/document/d/1MJzRgIRUZLkQ6qgbZT2A0ZWYhMUAacmPCSzHwg5-kv4/edit?pli=1>

Notes from Julie on Jupiter Observing Campaigns.

More on:

http://bulldog2.redlands.edu/FacultyFolder/julie_rathbun/iopw/

JUPITER OBSERVING CAMPAIGNS 2014

Below is a brief outline of Jupiter system observing proposals that have been or will be submitted, coordinated with the Sprint-A/EXCEED mission observations. This list is being maintained to facilitate collaboration on the proposals and future coordinated datasets. Please correct and update the listings as appropriate. Please share the link with other colleagues if necessary. PI contact emails are at the bottom of this document.

Updated 28 June 2013 (s.badman@ion.le.ac.uk).

1. Sprint-A/EXCEED (Sprint-A: the mission name, EXCEED: the spectroscope instrument) -- Io torus and jovian aurora EUV spectroscopy.

Long-term (~October 2013 - March 2014) observations. 50 min observation per 100 min orbit.

(March 2014: Venus may also be observed but coordinated Jupiter observations will be prioritised. April 2014: Primary target is Venus but Jupiter observations may be made in the last week of April if strongly desired.)

to be Launched on 14 September 2013.

[PI: Yoshikawa]

I. JUPITER AURORA

I-1. HST/STIS: Jupiter northern FUV auroral imaging and spectroscopy.

1-14 Jan 2014: 14 HST orbits, 1 orbit per day for 14 days. 1 orbit = 45 min of observation. ('on hold' until successful launch of EXCEED. Cycle 20 tail.)

Requested times are optimised for simultaneous NOAO/GEMINI observations, i.e. Hawaii night time. Scheduling will not be finalised until ~2-3 weeks before.

[PI: Badman]

I-2. NOAO Gemini: Jupiter H3+ (4 micron) aurora.

1-14 Jan 2014: 2 h observation per night for 14 nights
(scheduling not confirmed. Semester 2013B.)

[PI: Melin]

I-3. IRTF CSHELL

- Jupiter H3+ (4 micron) ion winds in auroral region (spectroscopy).

1-14 Jan 2014: 14 partial nights of observations.

(Scheduling not confirmed. Semester 2013B.)

[PI: Stallard]

- Jupiter H3+ (4 micron) temperature measurement for the upper atmospheric disturbances in the mid-low latitude region, but part time can be shared for polar.

Jan 2 18:30-23:00 (4.5h) Jan 4 22:30-01:30 (3.0h) Jan 7 18:30-22:30 (4.0h)

Jan 9 22:00-00:30 (2.5h) Jan 12 18:30-22:00 (3.5h)

[PI: Kita (Tohoku Univ.) --- Actual observation will be done by Y Kasaba & T Sakanoi]

I-4. Chandra & XMM newton - Jupiter IPT, X-ray aurora, and satellites.

Apr 15-20th Requested 2x40 ks for for CXO/XMM coordination.

Other 4x40 ks exposures will be assigned around 15-20th soon.

Precise date & time is under negotiation (Cycle 15)

[PI: Kraft]

I-5. Subaru:

- Jupiter H2 / H3+ (K-band) spectroscopy + H3 L-band image with AO

3 (min: 1) nights of observations on Feb 13 (best), 25, and/or 20 (or 10-28 Feb.)

Semester 2014A.

[PI: Kasaba]

- Jupiter H2 / H3+ (K-band) spectroscopy + H3 L-band image with AO --- with X-RAY

1 night of observations on April 17(best), 19, or 14, adjusting to X-RAY observation core time on 15-20 Apr. (Hawaiian day is sometimes 1-day before the UT definition.

Please take care.)

Semester 2014A.

[PI: Tao]

I-6. IRTF CSHELL

- Jupiter H3+ (4 micron) ion winds in auroral region (spectroscopy).

Feb (with SUBARU) and/or Apr (with X-RAY): several partial nights of observations.

[PI: Stallard]

- Jupiter H3+ (4 micron) temperature measurement for the upper atmospheric disturbances in the mid-low latitude region, but part time can be shared for polar.

Feb (with SUBARU) and/or Apr (with X-RAY): several partial nights of observations.

[PI: Kita (Tohoku Univ.) --- Actual observation will be done by Y Kasaba & T Sakanoi]

I-7. HST/STIS

Jupiter FUV auroral spectra

3 orbits. Cycle 21.

Requested dates near opposition (possible to coordinate with IRTF or Chandra?)

PI: Gérard

II. IO TORUS / NEUTRALS

II-1. NOAO Kitt Peak 4m Mayall : Io torus visible wavelength spectroscopy.

3-9 Jan 2014: 7 half nights. .

[PI: Badman]

II-2. Suzaku: Jovian inner magnetosphere diffuse X-ray.

April tbd 2014, adjusiting to Chandra & XMM. 160 ksec.

[PI: Ezoe]

II-3. Haleakala 40cm: Sodium Mendillosphere.

Automatic / regular observations in DEC 2013 - APR 2014

[PI: Kagitani / Yoneda]

II-4. McMath-Pierce solar telescope west aux: Coronagraphic observations of torus in [SII] 6731A

Nov 23 -- Dec 3

[PI: Morgenthaler (PSI)]

II-5. U. Padova: Io torus sulphur (and possibly sodium) lines using high resolution spectroscopy.

Apply for regular observations during Dec 2013 - March 2014.

To be requested.

[PI: Schneider]

II-6. Apache Point: Io torus sulphur lines spectroscopy.

Apply for regular observations during Dec 2013 - March 2014.

To be requested.

[PI: Schneider (U. Colorado)]

III. JUPITER

III-1. SOFIA: Jupiter.

? hours in Dec 2013.

[PI: de Pater]

III-2. HST/WFPC: Jupiter vortical and zonal winds at ~680 nm.

To be submitted (deadline 1 March 2013). Cycle 21.

[PI: de Pater / Wong]

III-3. EVLA: Jupiter deep atmosphere.

Schedule?

To be submitted.

[PI: de Pater]

IV. IO

IV-1. Keck : Io volcanic activity in near-IR.

Semesters 2013B and 2014A: 1 h / night for several nights

[PI: de Pater (UC), Co-Is: Davies, de Kleer, Veeder]

IV-2. McMath-Pierce solar telescope stellar spectrograph: Io atmosphere at 630 nm.

Nov 23 -- Dec 3

[PI: Morgenthaler]

IV-3. IRTF/SpEX/NSFCAM2: imaging of Io volcanoes - Julie Rathbun **mid-September 2013 and end January 2014.**

All broadband imaging: Requested 15 90-minute observations to map 1-5 micron volcanic emission from Io's Jupiter-facing hemisphere during Jupiter eclipse, and 15 30-minute sunlit observations of 3-5 micron emission at random longitudes

[PI: Julie Rathbun, Co-I: John Spencer]

IV-4. HST / STIS: FUV auroral imaging of Io. 10 orbits.

Will be scheduled between Nov 2013 and Feb 2014 (Cycle 21); Updates here:

<http://www.stsci.edu/cgi-bin/get-proposal-info?id=13336&observatory=HST>

[PI: Lorenz Roth]

IV-5. GEMINI : Io volcanic activity in near-IR -- Frequent L-band monitoring

Submitted for semester 2013B

[PIs: de Kleer (UC), Co-Is: de Pater, Davies]

IV-6. IRTF/SPEX: Io 3-5 micron spectroscopy monitoring campaign.

Request 1/2 h / night over Oct 2013 - Jan 2014

[PI: de Kleer, Co-I: de Pater, Davies]

IV-7. ALMA: Spatial distribution of SO₂ gas around Io.

Schedule?

To be submitted.

[PI: de Pater]

IV-8. U. California (facility name?): Spatial distribution of SO₂ gas around Io.

Schedule?

To be submitted.

[PI: de Pater]

IV-9. U. Tokyo facility in Chile: Io volcanic activities in MIR

Request regular observations during Apr 2014 ---> To be requested.

[PI: Kagitani / Yoneda]

IV-10. McDonald Observatory: Wide-field coronagraph: Mendillosphere, Image-slicing spectrograph: Fast-sodium & Io torus

Schedule to be determined, facility is available.

[PI: Michael Mendillo, Co-I: Jeff Baumgardner, Carl Schmidt]

IV-11. IRTF/TEXES: TEXES Spectral Imaging of Io's Mid-IR Sulfur Aurora.

Requested 3 half-nights during 2014A TEXES Campaign

[PI: Kurt Retherford, Co-Is: Greathouse, Grava, Steffl, Roth, Spencer, Tsang]

V. MISC

V-1. Lick Observatory - Nick / Imke

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