

# JCSA Meeting 2020 - Winter Telecon

17 Jan 2020

## Preliminary Schedule: (times are approximate)

13:00-13:10	Welcome from JCSA and the CSA
13:10-13:30	LiteBIRD Update
13:30-13:40	SPICA Update
13:40-13:50	CASTOR Update
13:50-14:00	NEOSSat AOs Summary
14:00-14:10	Co-I AO Grants
14:10-14:20	Astrosat Grants
14:20-14:45	JWST Updates
14:45-15:00	--- Break ---
15:00-15:30	SA Vision Doc (by Sarah)
15:30-16:00	Draft SA mission roadmap (Martin)
16:00-16:10	JCSA membership and co-Chair
16:10-16:20	CASCA 2020, SPIE
16:20-17:00	Action Items / Discussion Points

## Action Items

### **1) JWST-GO Grant Program [Deadline: ASAP]**

- a) solicit volunteers. Daryl has already stepped up. I'd like suggestions for others (JSTAC, Canadian JWST team) and other volunteers from JCSA.
- b) Three initial questions: grant eligibility (PI/Co-I/Collaborator), grant amount, grant timeline.

D. Haggard has volunteered.

J. Hutchings has volunteered.

C. Willott has volunteered.

J.R. will send email to start process. [done - Jan 21/2020]

Meeting scheduled for Tuesday, Jan 28, 2020 11-12 EST.

Meeting notes document:

[https://docs.google.com/document/d/1fl5KeA1cWaP25mEFKvEmkCfFiXcix\\_ua7KYDNhAkTyl/e/dit?usp=sharing](https://docs.google.com/document/d/1fl5KeA1cWaP25mEFKvEmkCfFiXcix_ua7KYDNhAkTyl/e/dit?usp=sharing)

### **2) JCSA feedback on SA Vision Doc [Deadline: End of Month]**

- a) I will set up a Google Doc this morning to enable feedback.
- b) Timeline is end of Month for feedback.

### **3) Review Meeting Notes. [Deadline: 2 Weeks]**

- a) Please review meeting notes
  - JCSA : add additional notes/comments/questions
  - CSA : please note and content that should not be shared outside of the JCSA

### **4) Identify community members to work with CSA to improve contracts.**

- a) To help with hiring of students to work on studies
- b) Reduce problems with IP

### **5) JCSA needs to weigh in on Co-I program**

- a) size and number of grants.

### **6) Community feedback towards WFIRST contribution**

- a) Is it worth the risk of asking a third time?
- b) Draft JCSA recommendation.

### **7) Confirm that SPICA is a community priority.**

- a) Draft JCSA recommendation.

**8) Confirm that ARIEL is a community priority.**

- a) We also need additional details. Will this be an open call?
- b) Draft JCSA recommendation.

**9) Guidance on Colibri mission**

- a) This may be a bit early, and should probably wait until after the Colibri team completes their Concept Study.

**10) Potential for Canadian funded XRISM GO program.**

- a) Draft JCSA recommendation.

**11) Discussion of FAST-AO**

- a) should FAST be more limited in scope? This could greatly benefit the Balloon community.

**12) Feedback to BRITE to contact CSA for contract updates.**

**13) JCSA membership.**

- a) Rotation of J.R.

## Discussion Points

- 1) Request for ARIEL contribution
  - a) possibility of contributing a modest (<5M) work package to the ARIEL mission: most likely a software pipeline work package or the cryo harness
- 2) Staying involved/informed about NASA Large missions LUVOIR/Origins/HabEx/LYNX
- 3) XRISM Guest Scientist program - potentially Canadian Scientist funding
- 4) SPICA Status
  - a) Delays in SPICA funding for UL
  - b) By the end of 2020/early 2021 a letter from the CSA to ESA will be required stating in effect that if ESA selects SPICA, Canada will commit to the mission.
- 5) POEP Costing Study to attempt co-funding with CFI 2022 bid.
- 6) Respond to EPPE regarding potential costing/management balance.
- 7) Respond to CADC regarding visibility of Canadian studies/projects.
- 8) Euclid request for science funding
- 9) BRITE status
  - a) it is imperative that funding support negotiations between CSA and UTIAS-SFL for continued operation of BRITE-Toronto until early 2021 be completed
- 10) Balloon Science
  - a) Regular FAST calls for technology development and HQP training, periodic larger competitions for funding astrophysically-compelling balloon experiments at the >\$1 million CAD level.
- 11) COSPAR update

- a) Canadian membership/representative (S. Gallagher).
- 12) NSERC participation.
  - a) Getting NSERC back to the table -- especially for science funding or alternative sources of operation funds for Canadian missions.
- 13) Potential questions for the CSA funding questionnaire: {from last meeting}
  - a) Have you submitted a grant to the CSA (how many? How many successful? Co-I vs P-I status?)
  - b) Do you intend to submit to the next call? [DH: Add "If yes, to which solicitation?"]
  - c) Do you understand the procedure?
  - d) Do you understand the difference between SMS/STDP/FAST etc.?
  - e) Would you attend a virtual session on applying to the CSA?
  - f) Would you find a template useful?
  - g) Do you know how to submit a grant? Do you understand the challenges (e.g. research office) [DH: Is this targeting early career folks? Seems like an odd question.]
  - h) Check with CASCA about diversity numbers (what can we ask?)
  - i) Check with CSA about diversity targets re: institution, gender, etc - and think of questions to ask that will inform those goals too
  - j) Poll for membership in missions JCSA is not aware of.
- 14) <https://asc-csa.gc.ca/eng/funding-programs/funding-opportunities/ao/2020-leap-capability-demonstration-notice.asp> understanding LEAP and SA connection

## JCSA Membership:

Denis Laurin (CSA/Co-Chair), Jason Rowe (UBishop's/Co-Chair), Jean Dupuis (CSA), Daryl Haggard (McGill), Jeremy Heyl (UBC), Renée Hložek (UofT), John Hutchings (NRC), Locke Spencer (ULeth), Chris Willott (NRC)

## Meeting Attendance:

At CSA: J. Rowe, J. Doherty, D. Laurin, M. Bergeron, J. Dupuis

Online/Remote: J. Hutchings, L. Spencer, R. Thacker, J. Heyl, C. Willott, P. Barmby & B. Gaensler [for LRP, partial], D. Haggard [partial], R. Hložek [partial], S. Gallagher [partial]

## Meeting Notes:

NEOSSat:

- AO Cycle 1 Sept 2019 - March 2020
- How many proposals? - 9 proposals, 8 accepted
- Providing observations for all proposals
- Allocation is done within the CSA

- Maybe need an external TAC for science prioritization
- Cycle 1 was 4-5x oversubscribed.
- May people willing to continue obs into cycle 2
- All data is open, no priority period. Data available on CADC
- No CSA funding for the PI
- Lots of obs of Borisov
- PI feedback is mostly positive
- CSA is planning cycle-2, waiting on mission extension / mission review
  - Needs to be approved by DRDC and CSA
  - Mission extensions need to be renewed on a yearly basis
- No technical problems in the last few months, originally there were ACS problems.
  - Recently problem with data corruption, but minor which has been solved
- Significant contributions from D. Balam to NEOSSat science (MPC)

#### BRITE:

- 1 sat is currently in safe mode due to reaction wheel problems
- JCSA feedback to Canadian PI to contact CSA (D. Laurin) to ensure no gaps in funding.
- Operations into 2021 is cleared for funding

#### XRISM

- Opportunity for GO for Canadians
- CSA to investigate if science could be funded.

#### LITEBIRD

- New STDP that is about to start - readout electronics
- Phase-0 (10 months) has started
- **More details with upcoming roadmap**

#### SPICA

- Currently supported by STDP
- 1.7M over a few years.
- 2015 phase 0, but scope has changed. Phase-0 will need an update
- To avoid funding problems, teams need to be planning **more** than 1 year in advance. At requests on shorter timescales have a low prob of occurring on time

#### CASTOR

- There are significant international partnerships / interests

#### Studies: LITEBIRD/POEP/EPPE/Colibri

- Needs to be a downselect option for these studies to move to next stages
- Colibri - high-energy -- new opportunities for Canada. Study is nearing completion

#### CSA support SA

- ROI on SA (ROI = return on investment). Being completed by HAL
- ROI report due end of March, 2020
- Potential for report to be shared with JCSA and LRP

#### Co-Investigator support

- Support for non-CSA missions
- Plan to be a recurring AO. yearly
- Two new grants each year
  - Enable quick reaction to opportunities
- Funding for 3rd year is confirmed (150K/year).
  - Support 3 grants
  - Add a new entrant each year
  - Grants are for 2 years with an option for a 3rd year
- JCSA Q: Is this better than 1 call every 3 years
- Do current holders have a 3rd year option?
  - No commitment yet. Will be determined by pressure on grants
  - Could be easier option as grant agreements are already signed
- Comment: Better for 2 grants at \$75K/year rather than 3 at \$50K
  - With \$50K other grants are necessary if you want to support something like a postdoc
- CSA wants the JCSA to make a formal statement on this (size of grants, cadence of grants)
  - Note: it will be \$150K/year for the program

#### FAST-AO

- Currently under review
- Issued every 2 years
- FAST could be strategically limited in scope (if we want to)
- Be more selective to airborne opportunities
- Funding levels for current call was lower. Envelope will change in the future

#### STDP

- Calls are not general. Will be tailored to specific needs

#### Contracts

- Potential Issues with Universities. For example, IP and issues with students and publications
- CSA could work with community members (in the summer) to address these problems
  - JCSA should identify a member from the community
- Overhead has been reported as a problem for some university/contractors

#### Euclid

- Unsolicited bid
- Upfront communication about the needs, made at least a year in advance

#### JWST

- GTO grants have been issued
  - St. Marys/UdeM

- Teams have been asked to extend funds over longer period
- Delayed postdoc hiring because of JWST launch delay
- GO Grants
  - Announcement from CSA will happen before May 1.
  - Need approval from CSA internal for release.
    - No current schedule for release
  - PI/Co-PI/Co-I questions needs to be addressed (eligibility)
  - Amount of funding (grant amount)
  - When will grants start -- needs to be answered
    - Includes ERS program
  - Can JCSA see the announcement ahead of time
  - JWST workshops are starting - UBC in 2 weeks
- JCSA will solicit volunteers to solve GO programs - contact J. Dupuis / M. Bergeron
  - Kick off a week of Jan 27. Members to be selected next week.

#### AstroSat

- Update from Hutchings
- Operations are doing well
- Publications seem to be lagging
- Joe is doing a great job with data analysis
- Will be new GO call in a couple of months
- AO-5 / AO-6 grants are a work in progress
  - Timescale of weeks
  - PIs have been contacted
- ISRO, archival program with grants
  - Might be a good idea to add to Canada program
- CSA has funding for 1 more cycle of grants
  - Need to start process of extension

#### Balloons

- Lack of info regarding funding opportunities
- Could direct FAST towards suborbital opportunities
- JCSA needs to be more involved with this community

#### CADC

- Visibility at AAS

#### DUET (short comments from Daryl, please do not share outside of JCSA!)

- DUET = Dynamic Ultraviolet Explorer Telescope
- NASA SMEX proposal led out of JPL; Fiona Harrison/CalTech is PI (DH/McGill is Co-I)
  - Two co-aligned wide-field telescopes (FoV: 7.45deg x 7.45deg)
  - CMOS detectors targeting two bands (183-214 nm and 259-301 nm)
  - PSF (FWHM) ~14 arcsec (field-averaged)
- Targeting UV transients

#### SA Vision Doc

- General audience : CASCA, CSA, VPRs,

- Synthesize info from prioritization exercises
- Does it go to government or space advisory?
  - Yes
    - Could go to Minister, but not the audience
    - Space advisory might be an audience
- Potentially an important document. Connecting with executives.
- Make a Google Doc, then adding comments, keep in one place
- Timeline: comments by the end of the month
  - Post doc for comments ASAP
  - Confirm with LRP for timeline
- There will be documents for the other space-science groups
  - Planetary astronomy
  - Space and health science
  - Space utilization
    - Space weather
    - Space physics
    - Earth system (everything else)
  - Space astronomy (furthest ahead)
- Do other communities do LRPs?
  - Only atomic physics
  - This is why the exercise is starting with space astronomy
  - Others have mechanisms for group consensus

### Space Astronomy Roadmap

- Presentation of draft roadmap
  - This is not official. This is a work plan to identify key activities and resources
    - This is an early version
  - Bringing clarity to the community about intent
  - Trying to provide a pathway
    - May not be endorsed by exec
    - At least making the case (pros/cons) and making a level playing field
- 6 science disciplines
  - SA is one of them
  - Using SA as a pathfinder
- Challenging to produce a roadmap
- LRP is a big driver to producing roadmap
- This will remain a draft until guidance/feedback from LRP
- There is pressure from JWST
  - Pressure on next investment
- Goal to present document at CASCA
  - funding/request base will not be shared
- 3-5 year horizon
- Includes preparatory activities, risk mitigation, science support, mission candidates and schedule
- Planning capacity, key for approval process
- Important to stress this inclusion of \*candidate\* missions
- Mission planning broken into 6 phases : planning, preparatory, risk retirement, mission delivery, operations, data exploitation

- Most activity is in preparatory (typically 1M/year for this activity)
- Risk retirement - STDP/FAST
- Roadmap summary
  - Looking for balance from small to larger
  - Variety of funding profiles 1M, 10M, 100M+ (small, medium, large)
  - Long term - Colibri further out, new concepts from LRP
  - Roughly \$7M/year for SA (based on success of STDP/FAST)
- LITEBIRD
  - Phase 0 + STDP is in place
  - Pushing for Phase-A - trying to arrive at a mission start
  - One of few short term priorities
- ARIEL
  - SMS (100K) Sept 2020 - Oct 2021
  - JCSA + LRP needs to confirm that this mission is priority
- Euclid
  - Specific funds (not Co-I), science support grants
- WFIRST
  - Contract to NUVU (JPL) to provide detectors for coronagraph
  - Important, that there is some return on early investment from CSA
    - Funded balloon mission was important
  - At least twice have asked for science authority and was declined
    - Is it worth risk to ask a third time
    - **JCSA and LRP needs to weigh in on this**
      - Worry about asking a third time
- SPICA
  - Good news - funds for a delta Phase-0
    - Not a mission commitment
    - Need reaffirmation from JCSA that SPICA is important
- CASTOR
  - Expensive mission
  - Good news of ISRO interest.
    - Can do risk retirement
  - Potential for a Phase-0
- Exoplanets
  - Two proposals
  - Not good to carry on two missions
  - Looking for a candidate for the small mission class
  - Suggestions
    - compete
    - Or join forces
    - Phase 0 - Apr 2021
  - STDP could operate as a downselect
  - FAST For airborne demonstration
- Colibri
  - Large cost option.
  - Will not carry multiple large cost options
  - Could support SMS activities -- have funds, but looking for guidance
- Co-I

- Funding for another year or so. Looking to increase from community pressure
- JCSA feedback is needed. (as discussed earlier)
- Post-LRP
  - \$25K x 4 teams (topical teams)
  - For the first two years and potentially continuing if useful
  - Mapping of topical teams and key science questions from vision document
- **This document/info is not for distribution**
- Time scale of 2 weeks
- \$30M is small - includes operations, full lifecycle (topend ~ 50M)

#### CSA/NSERC

- CSA met with NSERC, to have Space-Astronomy joint funding
  - Modalities of current program
  - mid-December
  - There has been success with space-weather but not space astronomy

#### COSPAR

- Sarah is Canadian rep
- Feb-14 abstract deadline
  - Funds for student travel

#### CASTOR

- No expectation that Canada would go alone
- Significant contribution from ISRO
- Major collaboration from JPL
- ISRO needs Canada to provide specific items
  - Fast steering
  - detector
- Partnership will significantly reduce cost

## Mission Updates (Community Contributions)

### ARIEL/HabEx/LUVOIR

Contributed by Nick Cowan:

1. Any ARIEL/HabEX/LUVOIR updates you would like the CSA/JCSA to be aware of?

LUVOIR and HabEx final reports are public:

[https://ui.adsabs.harvard.edu/link\\_gateway/2019arXiv191206219T/EPRINT\\_PDF](https://ui.adsabs.harvard.edu/link_gateway/2019arXiv191206219T/EPRINT_PDF)

<https://www.jpl.nasa.gov/habex/pdf/HabEx-Final-Report-Public-Release-LINKED-0924.pdf>

ARIEL Red Book is currently being assembled. I was a major contributor to the Phase Curves chapter, submitted last week. CSA (specifically Martin Bergeron) is currently studying the possibility of contributing a modest (<5M) work package to the ARIEL mission: most likely a software pipeline work package or the cryo harness.

2. What action is required by the CSA for ARIEL/HabEx/LUVOIR?

[examples include: grant support, studies, policy, ...]

For ARIEL the action is happening in the coming weeks: as part of the CSA roadmap they are trying to slot in a contribution of some kind to the mission.

For LUVEx, it would be useful to stay engaged not just in the science (which I have managed to do in my role of CSA representative on the STDT) but also to have informal conversations with folks about what hardware Canada could contribute (I have not done this for LUVOIR, I don't know about Christian Marois and HabEx). Then we need some funded CSA concept studies to further explore these options so that we can hit the ground running if one of these missions is adopted by the Astro2020 decadal.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

For LUVEx it is the Astro2020 decadal survey. I expect that will become public in late 2020 or early 2021.

ARIEL is already an approved mission but the Red Book will be finalized winter/spring 2020 and the mission will be officially adopted in fall 2020. So for a Canadian contribution to be baselined, we need the funding approved in the coming months.

4. Other comments, does not need to be specific to missions above.

Applications for funding science and hardware through the CSA should be streamlined. The pots of money are often very small yet the application is more onerous than a CFI or Discovery Grant. There are many of us doing space astronomy who would be happy to be funded by the CSA at the tune of a few grand a year to help participate in missions. This would help burnish the CSA's reputation as an agency that does science.

My understanding is that the CSA doesn't know its budget ahead of time. Nonetheless, they could have regular calls for proposals in a few different cost bins, which they could then refer to when money needs to be committed in a month's time. Concrete improvements would be to

(1) issue yearly calls, even when there may not be funding to allocate. Proposers would understand that these are risky proposals because a top-ranked proposal might still go unfunded if the CSA budget doesn't allow it, and  
(2) those proposals should be peer-reviewed by a combination of CSA employees and topical experts. That way, when our international colleagues approach us about contributing to a mission we can say "sure thing, I will apply to this year's competition for contributions of opportunity" and when money does happen to flow and the CSA does make a contribution to a mission, the Canadian community can be confident that it was the best use of money at that time.

## XRISM/ Athena/ Arcus

Contributed by L. Gallo

1. Any XRISM/Athena/Arcus updates you would like the CSA/JCSA to be aware of? [status. ]

XRISM: XRISM is proceeding well. The calorimeter was shipped to Japan and the integration was happening over Christmas. Mirror segments were heading to the beamline in Goddard and shipping to Japan in October.

Over the past six months, the SWG prepared proposals for potential targets. In the next few months, the team will evaluate the proposals to create a target list. Finalising the target list will probably be the main agenda item of the next face-to-face meeting, which will be in the US in May.

Of interest for Canada! The project wishes to make the observatory available to members of the astronomical (not just X-ray) community as soon as possible. They will announce a Guest Scientist program as soon as the target list is ready. The idea is that this will be a competitive program where scientists will apply to be part of a target team. They will need to bring something unique to the target team (e.g. expertise, data,...).

Canadians will apply under the NASA call, but will not be eligible for NASA funding. The CSA should be prepared to support Canadian scientists that are successful for this program. I don't know the level of support that NASA is providing.

Athena: Athena is progressing well. They recently passed the Mission Formulation Review and are now in Phase B1. They are still on track for formal mission adoption in 2021. As I have mentioned in the past, if we are to take part in Athena, we should be getting involved prior to mission adoption.

Arcus: Arcus was a MIDEX grating mission that was not accepted by NASA last call. It ranked extremely high, such that NASA considered accepting it as an additional mission. It will be proposed again in the next MIDEX call (2022).

The Arcus team was extremely interested in having a metrology system from Canada like that used on Hitomi (CAMS). For the 2022 proposal, they are considering a simplified LED-camera approach for the metrology. This would be a much cheaper alternative than the CAMS. They would still like to have Canadian contribution in the form of the camera and its calibration.

2. What action is required by the CSA for XRISM or Athena or Arcus? [funding, MOUs, grants, policy, etc.. ]

XRISM: We are still set for timely launch in FY2021. CSA should be prepared to invest in post-launch science activities of the Canadian SWG and community.

There will be a call for Guest Scientists from NASA that Canadians can apply to. CSA should be prepared to support these scientists. Discussions between CSA and NASA to determine time lines and funding levels would be encouraged.

Athena: To my knowledge, my previous recommendations that CSA contact ESA to discuss potential contributions have not been considered. I continue to encourage the CSA to engage in discussions with ESA about potential collaborations.

Arcus: The timeline for the NASA MIDEX mission is more rapid. The Arcus team would like Canada to be involved in the MIDEX proposal. I would encourage CSA to engage in talks with the Arcus team to determine the level of support and time lines that are required. This seems like an inexpensive opportunity to participate in an important mission.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

As stated above, action may be required on all three missions in the next 6 months.

4. Other comments, does not need to be specific to XRISM/Athena/Arcus. [To be shared with the CSA unless I'm told otherwise]

None.

## SPICA-SAFARI

Contributed by D. Naylor

Since the last JCSA meeting there has been one SPICA collaboration meeting held in Saclay, France from 28-30 October 2019, attended by myself with, for the first time representation from the CSA, Denis Laurin and Stéphane Gendron, and the ABB technical lead Alain Cournoyer.

The participation by the CSA was particularly welcomed by the consortium. To put this into perspective, on only one occasion during the entire Herschel mission did the CSA send one of its staff to attend a SPIRE consortium meeting. Dr Laurin participated in the Heads-of-Nations meeting where he learned first hand the status of the project in the various partner countries; Dr Gendron participated in the technical sessions to better understand the challenges of this mission. Mr Cournoyer participated in a detailed progress meeting to present the latest results and design concepts for the Fourier transform spectrometer that is proposed to be provided by Canada.

The outstanding issues from the last JCSA report were:

- To release funding to develop the technology required for the cryogenic Fourier transform spectrometer mechanism (now assigned the project acronym FTSM).
- To find a solution to extend the UL cryogenic test facilities a necessary step to validate the FTSM.

In May we learned that CSA STDP funding for a sole source contract for the development of the FTSM was released by public works. While this was most welcomed news, because part of the funding provided essential support for UL activities, the reality was that the paperwork associated with the ABB- UL contract meant that it did not take effect until 1 Sept 2019! The project is indebted to Dr Okine UL VPR who backstopped the UL SPICA effort for the five months from April through to August. Since the CSA contract did not start until September these funds could not be reimbursed. The lesson here is that although the CSA may have felt the situation had been resolved in May, there are other hurdles that impact funding reaching the end user and without the support of my VPR I would have lost key staff.

Since the implementation of the STDP contract, ABB has been optimizing the design of the FTSM and working closely with the UL to develop cryogenic test protocols. The progress was reported at the Saclay meeting and it is fair to say that the Consortium remains impressed with the calibre of the contributions of the Canadian team. Dr Laurin and Gendron can speak directly to this.

From 2008 to 2021 the CSA will have spent: ~\$1.5M at the UL to establish a beachhead in the mission ~\$4M through several STDP contracts to ABB to raise the TRL of the FTS. In addition the University of Lethbridge has spent ~\$2M in support of the SPICA project through the acquisition of critical infrastructure. As a result of this investment Canada is positioned to build the mission critical, high resolution spectrometer of the leading infrared space observatory of the coming decades. Furthermore, as a founding member of the SAFARI consortium, Canada's return on investment will be at least twice that of the highly successful Herschel space observatory. As we enter 2020 the ~\$4M SPICA SAFARI STDP contracts have been wisely spent and have served to reduce the risk of the SAFARI FTS. The vast majority of STDP funding does not result in space deployment; this is the nature of the beast. However, these

specific STDP contracts have not only served to mitigate risks, but also resulted in a new and improved instrument concept which has a high probability of being deployed in space, not only on SPICA, but other missions employing cryogenic mechanisms.

Recommendations from JCSA:

As reported previously, the biggest challenge I see for SPICA is that all of the work to date has been funded through the CSA's STDP program and while this creative solution has allowed us to maintain Canada's leading role, as founding members in this exciting mission and keep moving the project forward, we are fast approaching to the final decision deadline. By the end of 2020/early 2021 a letter from the CSA to ESA will be required stating in effect that if ESA selects SPICA, Canada will commit to the mission. It has been my experience over the last decade that establishing and maintaining a beachhead in SPICA takes a huge amount of effort and that the timescales for acquiring the necessary approvals are much longer than one might think. Canadian scientists, with support from the CSA, have a long and illustrious history in infrared space astronomy. Starting with modest contributions to ISO and AKARI, increasing through Herschel and Planck, Canada is seen as a partner of choice and is now positioned to fully exploit the SPICA mission. SPICA affords a unique opportunity for Canadian astronomy and it is imperative that the CSA starts preparing for ESA's required letter of support for the final submission.

## Exoplanet Small Sat (POEP)

DH: Contributed by Jason Rowe??

(yes)

1. Work on POEP has been minor since the conclusion of the Science Maturation Study. Potential prime contractor has been identified (SFL-UTIAS) with a potential bus and spacecraft. The POEP team is attempting to fund the mission through a co-funding model through a CFI bid with the CSA as an in-kind contributor.

2022 CFI funding envelop from Bishop's University has been strategically planned. Decision will await a potential Phase-0 study to firm costing.

2. A Phase-0 exercise (or equivalent) was recommended from the outcome of the SMS and requested by the POEP-Team. A full costing exercise is necessary to obtain a best-effort mission costing and to secure CFI partners.

We are asking for the ability to compete for funds to complete a Phase-0 study.

3. A costing exercise must be completed prior to 2021 to ensure a strong CFI bid and to enable close work and collaboration with the CSA as potential partners.

4. We will be changing the name of the mission!

## EPPÉ

Contributed by S. Metchev

1. Any EPPÉ updates you would like the CSA/JCSA to be aware of?

We passed our Final Review with the CSA on Nov 25. Projected Phase 0-E cost is \$40-\$50M, excluding launch.

2. What action is required by the CSA for EPPÉ? [examples include: grant support, studies, policy, ...]

I would re-iterate the recommendations from the LRP2020 white paper:

- a Science Maturation Study to flush out a science plan for the mission given the parameters that we settled upon in the Concept Study
- Science and Technology Development Program funding to advance payload development.

The above would advance the mission to Phase 0 readiness level.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

No specific ones. However, as a dedicated polarimetric mission, ÉPPÉ would be an excellent asset alongside any future UVOIR mission, in particular ones with exoplanet focus (JWST, WFIRST, ARIEL, CASTOR).

Perhaps Nick can chime in with more.

4. Other comments, does not need to be specific to EPPÉ. [To be shared with the CSA unless I'm told otherwise]

ÉPPÉ is truly unique and innovative. We should paint the Canadian flag on it.

Separately, it would be beneficial to modify the proposal format for SMS calls. They are currently very heavy on the management and organizational section, whereas what really matters for an SMS is the science plan. I believe Nick expressed dismay during the LRP2020 town hall at the CSA about the very heavy management-oriented burden for SMS proposals. Effectively, one needs a 50% FTE to handle project management (even for writing new proposals). Yet, if that kind of money is included in the budget, what is left is effectively only undergrad student-level funding.

# CASTOR

Contributed by P. Cote

1. What is the Status of CASTOR relative to June 2019? Include anything you think the JCSA/CSA should be aware of.

CASTOR work has stopped while we await the outcome of the LRP2020 process and, hopefully, the next round of CSA studies. Some notable recent developments include:

On December 3, Hutchings and Cote had a one-hour telecon with Keith Grogan from the JPL Mission Formulation Division. We gave Keith a far-ranging update on CASTOR, including a status report on the LRP process in Canada, a summary of our discussions with India over a possible collaboration, and an update on expected support from the CSA in 2020. He, in turn, gave us an update on JPL's mission selection process and the relevant timelines and decision points. We noted our interest in reviving a NRC-JPL collaboration focused on detector testing that would benefit CASTOR during JPL's portfolio review in late 2020 (and hopefully a MO proposal in 2021). He was very supportive and said that he would follow up on options for moving ahead with this work. The good news here is that JPL remains highly supportive of CASTOR, and is expecting to put the mission forward during their internal portfolio review in September 2020.

In India, the INSIST/CASTOR mission concept is now being proposed as a joint mission between CSA and ISRO, with their pre-mission study for INSIST expected to conclude in March 2020. In anticipation of IIA's lead role in the development of the UV spectrograph, they are undertaking significant design and testing work on digital micromirror devices (DMDs). Indeed, NRC and IIA recently combined forces --- with the help of a group based at the Rochester Institute of Technology (world leaders in the use of DMDs for astronomy) --- to propose a cubesat mission to ISRO. This cubesat mission aims to fly a DMD for 3-6 months in space (a co-launch on an ISRO PSLV). The proposal was submitted on December 31, 2019, and a decision is expected in 2-3 months.

2. What action is required by the CSA for CASTOR?

It's my understanding that CSA hopes to move ahead with CASTOR Phase 0 and STDP studies in 2020. This is absolutely essential to maintain momentum in the project, and keep our international partners engaged in the mission. Assuming a favourable outcome for CASTOR in LRP2020 (hopefully by late spring of 2020), then CSA should be prepared to move expeditiously with a request to Government in the fall of 2020. This timescale aligns well with those of our most important international partners, JPL and India (see below).

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

In terms of international partners, the key decision points will come in late summer of 2020:

In March 2020, India will conclude its pre-mission study for INSIST, which is now being proposed as a combined CSA-ISRO mission. A high-level ISRO representative who attended the INSIST-CASTOR team meeting in Bangalore in September 2019 said that, allowing several months for ISRO to review the report, ISRO should be in a position to move forward around September 2020. By that point, ISRO no doubt expects that CSA will be able to identify CASTOR as a top priority.

Similarly, JPL, in anticipation of the 2021 Mission of Opportunity (MO) call from NASA, will hold an internal portfolio review around September-October 2020. This is effectively a “down select” to choose the mission or missions that JPL will propose in 2021. JPL expects to propose a partnership in CASTOR, but this will require CSA identifying the mission as a top priority by then. It will also be important for NRC to continue its collaboration with JPL to increase the technical readiness of CASTOR’s CMOS detectors. Based on our discussions with JPL in December, we believe there is a very good chance this work will proceed in 2020.

4. Other comments, does not be specific to CASTOR. [To be shared with the CSA unless I’m told otherwise]

None.

I hope this is useful information. Please let me know if you have any other questions, or would like to see anything else from me.

## Euclid

Contributed by M. Hudson

As background, more details are in the LRP White Paper on Euclid here [https://drive.google.com/drive/folders/1bAveBsTNSme\\_L2ZS9sxpIz8Lb\\_brAy8E](https://drive.google.com/drive/folders/1bAveBsTNSme_L2ZS9sxpIz8Lb_brAy8E)

I have attached the letter that I wrote to Martin Bergeron regarding the financial support we were looking for participation in Euclid Science Working Groups. The important point is that Key Projects are being defined now so if we can get in with some serious effort we can make important contributions to Euclid Science. Euclid tracks FTE-years of effort contributed towards the project and those with more FTEs get more/better paper-writing “rights”. While the total number of people “in Euclid” is large (~1200), many of these are engineers: the number actively working on science is much less: for example, on the Weak Lensing Science working group that I participate in, there are typically ~15+-5 people on the telecons. So Canadians can have a strong impact. We already have a few Canadians in leadership positions (primarily Will Percival, also myself and Douglas Scott) but the community could do a lot more with more support.

Other updates not covered in those two documents plus answers to the questions below:

What is the Status of Euclid relative to June 2019? Include anything you think the JCSA/CSA should be aware of.

Answer: Euclid still on track for launch in 2022. No major issues at the moment. Instruments are due to be delivered in a month or 2.

What action is required by the CSA for Euclid? [Postdoc funding + travel support.. ]

Answer: yes to both, plus a bit of money for the board member travel (which is me, at the moment). More details in the attached letter.

Are there any major decision points/deadlines the JCSA/CSA should be aware of?

Answer: I don't think so. The mission is in the final stages now. But as noted above, the sooner we can make a science investment, the more science return we can reap.

Other comments, does not be specific to Euclid. [To be shared with the CSA unless I'm told otherwise]

## JWST

Contributed by R. Doyon

1. What is the Status of JWST relative to June 2019? Include anything you think the JCSA/CSA should be aware of.

The launch date is stable to March 31 2021 but the schedule contingency is eroding rapidly, about two months now. There are rumors of a launch delay but nothing is official yet. We should hear about in a few months.

2. What action is required by the CSA for JWST? [GTO/GO proposal funds?].

Yes! GTO/GO/ERS finding is the post pressing item. FYI, information from Massimo Stiavelli (STScI), NASA is considering a funding scheme whereby \$ would be allocated through a proposal process i.e. not a « formula » (amount scaling directly with number of hours). NASA will likely adopt this model for a one or two cycles, after which they would likely adopt a formula scheme informed from past experience. Perhaps CSA could be inspired by this?

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

None, except for a new launch date that may be announced in the next couple of months. Please do not spread any rumors!

4. Other comments, does not be specific to JWST. [To be shared with the CSA unless I'm told otherwise]

Attached my most recent report to SWG about the Canadian science team activities.

## Astrosat

Contributed by J. Hutchings

Astrosat report for JCSA Jan 2020

Astrosat continues to operate, now into its 5th year in orbit. Most instruments are working and available, the principal exceptions being UVIT NUV channel, and one LAXPC channel. These have not been working for some time and are not expected to return to service. In the case of UVIT, the resets that are occasionally required to eliminate noise patterns carry the risk of failing to restart, as happened to the NUV detector. Last year the VIS detector developed noise features that made tracking impossible for many observations, and the reset was done - fortunately successfully. The FUV channel continues to function, with all filters, and remains a good workhorse for excellent science.

ISRO continues to hold annual calls for proposals, for cycles that begin in October. Time was allocated for large legacy proposals, and these are under way. All proposals for UVIT are subject to rigorous safety checks, to avoid damage from bright objects, which have maintained good sensitivity to date. While oversubscription levels for all proposal categories (Indian, International, and Canadian) are factors of 2 or 3, the safety checks led to rejection of otherwise scientifically interesting proposals in the Indian and International categories, and a mid-cycle extra call for proposals was held to fill the time. Canadian time was already filled for the year, so was not eligible for the extra call. The general call for year 6 proposals is expected in the next few months.

The legacy proposals have had considerable interest, with the allocated time oversubscribed by a factor close to 10. Legacy proposals must be submitted only by SWG members, but may include Co-Is from anywhere. I have submitted two successful legacy proposals on behalf of teams from Canada and other countries - on the Coma cluster, and the SMC. I have suggested expanding the legacy proposals in various ways but so far ISRO as not made such changes.

There is a special group who advise and trigger observations to follow up GW events. I have

requested that Canada have one such member (Safi-Harb) but still await more detail on how this is going.

The SWG meets once a month and I try to be present in India for a few, as real-time remote participation is very difficult. Otherwise I participate by email on issues as they arise, and other actions of the group. It is very useful to make visits to IIA and ISRO on a regular basis to keep properly informed and participate in developments. It also facilitates science collaborations, and includes ongoing joint developments with CASTOR, MSE, and TMT.

In other developments, Joe Postma continues to lead ongoing evolution of the UVIT pipeline and provides invaluable data processing services for Canadian and other observers. Examples are his workaround for tracking with the VIS channel artifacts, and improved astrometric corrections to WCS coordinates. He makes occasional visits to IIA and is well known and respected there. As part of this picture, the entire UVIT database is being reprocessed with improved software, and missing data are being included from past observations. Data delivery via the ISRO pipeline and archive remains somewhat problematic but is improving.

ISRO has initiated funding and support for proposals to use the Astrosat archive, as it is now considerable, and this is proceeding well. CSA continue to offer support for Canadians who have Astrosat data, but the uneven and unpredictable receipt of useful data seem to cause some ongoing uncertainty in the process. This might be worth review with CSA and discussion by JCSA. More generally, while many Canadians and other personal colleagues have had approved Astrosat observations, very few publications have resulted, to date. I occasionally remind colleagues of this, but what feedback I get suggests lack of complete data, insufficiently processed data, or maybe just lack of time and support, have led to few completed papers. For myself, I am not leading research papers, but participating as co-author as things emerge - so far mainly with Indian principal authors. The data are good and the topics compelling, so I do want to see more published results emerge.

Beyond Astrosat, JCSA should be discussing prospects for a viable space science program for CSA, the lack of stakeholder participation in the government's arbitrary decisions on a piecemeal basis, what (if anything) is happening with the LEAP, the leadership and ambitions of CSA, prospects for LiteBIRD, SPICA, and CASTOR, and inputs to LRP2020.

## BRITE

Contributed by G. Wade.

1. What is the Status of BRITE relative to June 2019? Include anything you think the JCSA/CSA should be aware of.

One of the 5 BRITE satellites - the Austrian satellite UniBRITE - is experiencing an issue with a reaction wheel. As a consequence, it has been held in safe mode for several months while the problem is investigated.

Apart from UniBRITE, the BRITE-Constellation continues in standard operations - the remaining 4 satellites are acquiring observations continuously. At this time, fields up to and including #47 have been completed. Fields up to #42 have been distributed to PIs, fields #43-45 are proceeding through processing and quality control, and fields 48 and 49 are currently being observed.

As TESS data has become available for many BRITE targets, the value of BRITE photometry has become more evident and BRITE data have become more in demand. This is due to the short timespan of typical TESS datasets (less than one month) as compared to the longer duration of typical BRITE datasets (6 months). As a consequence, BRITE data after provide better frequency resolution, notwithstanding the better flux precision of the TESS data.

2. What action is required by the CSA for BRITE?

At this time it is imperative that contractual negotiations between CSA and UTIAS-SFL for continued operation of BRITE-Toronto until early 2021 be completed (if they have not already been).

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

The international BRITE team is discussing potential BRITE Phase 2 mission concepts to begin in 2021, but no concrete plans currently exist.

4. Other comments, does not be specific to BRITE. [To be shared with the CSA unless I'm told otherwise]

None at this time.

## Balloons

Contributed by L. Fissel

1. Are there any updates on any research programs with the CSA that the JCSA should be aware of? [e.g., status of concepts]

The Super BIT balloon imaging telescope had a very successful flight from Timmins, Ontario in September 2019.

The BLAST-TNG sub-mm balloon telescope had a first flight from Antarctica in January 2020.

2. What action is required by the CSA for your planned research programs/projects to be successful? [examples could be concepts studies, FAST calls, grants..]

Regular FAST calls for technology development and HQP training, periodic larger competitions for funding astrophysically-compelling balloon experiments at the >1million CAD level.

I spoke with some CSA employees at the CSA LRP2020 town hall meeting in October, who said these kind of larger funding envelope opportunities do exist already within the CSA portfolio. However it is very difficult to figure out from the information available on the CSA's website how to get started on such a proposal. It might be a good idea to have an information session or some sort documentation for potential PIs on how these other programs work and where to go for more information.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

I can't think of anything right now.

## LITEBIRD

Contributed by M. Dobbs

1. Any LITEBIRD updates you would like the CSA/JCSA to be aware of? [Phase 0, STDP..? ]

Phase-0 was awarded to McGill in October 2019. clarifications about the STDP proposal (2 rounds) have been received by McGill and answered to PWGSC. CSA says its a high priority to move forward with that. We think we have given CSA all they need and we're waiting for final word from CSA. If we can get contract in place by mid-feb, it won't affect mission timeline, and I think we're on target for that.

No need for JCSA to follow up on these two items with CSA other than to pat them on the back for making things happen.

Super exciting news is that CNES, representing the European consortia, has signed on for Phase A as of December 2019. We now have all partners (JAXA, NASA, CNES) on board through phase A. This takes us very roughly to Q3 2021, when CNES and NASA have a gatepost before proceeding past phase A.

2. What action is required by the CSA for LITEBIRD? [Phase A?, MOU?]

It's time for CSA to get in sync with international partners. they need to talk more to JAXA and ESA. I'm told by JAXA management that they have more contact with ESA and NASA than CSA, and they would like more.

They need to make it possible to transition from Phase 0 to Phase A/B in a timely manner, so that we don't slow down the international process, and so that we don't loose our key personnel due to a big gap. I recognize that this transition needs to be contingent on:

- a good outcome of Phase 0, as judged by CSA.
- if the new Canadian LRP is available, LiteBIRD would need to figure prominently.
- international partners need to remain on board.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of? [JAXA?]

see above.

4. Other comments, does not need to be specific to LITEBIRD. [To be shared with the CSA unless I'm told otherwise]

not at this time.

If you have questions for me during the JCSA meeting, we can set a time when I'm available to connect by phone. I'm in BC at DRAO, so pacific time.

## Colibri

Contributed by J. Heyl

1. Any Colibri updates you would like the CSA/JCSA to be aware of? [Status of Concept Study]

We will be finishing our concept study in the next two months. Both of the industry partners are nearly done with their reports on the spacecraft and payload and the science team is putting together the science case.

2. What action is required by the CSA for Colibri? [STDP? SMS?... ]

We would like a STDP for the TES X-ray sensors and readout. The group to UBC is anxious to try to build the sensors, the main obstacle is to have someone take charge of the production and testing of the devices. Our collaborator Josh Folk feels that this requires the skill level of an upper-level undergraduate possibly during a co-op. There is a bit of a learning curve to using the low T equipment, so having someone who could concentrate on this exclusively for six months or a year would be ideal. The readout is somewhat more involved so the two projects could probably fit in the envelope of a usual STDP.

Given the scope of the mission, we also feel that an SMS is necessary to develop further a baseline and threshold mission, the payload definition and spacecraft.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

No.

4. Other comments, does not need to be specific to Colibri.

No.

## NEOSSat

Updates provided at meeting.

## CADC

Provided by J.J.

1. Any CADC updates you would like the CSA/JCSA to be aware of?

Working in close coordination with the CSA, the CADC has established a NEOSSat science archive portal for the delivery of raw and pre-processed NEOSSat observations. This page has allowed the profile of NEOSSat data to be a bit higher, particularly interesting as NEOSSat is currently observing the Interstellar Comet regularly. CADC hopes that this project has helped CSA understand more clearly the services that are available through the CADC.

This fall the CADC presented to CSA our initial prototype for a JWST processing support system within CANFAR. Work, supported by CSA, to make this processing environment available to all Canadian JWST scientists is on-schedule (given the expected launch of JWST in March 2021).

CADC continues to work with MAST and ESA on archiving of HST observations. Recall that the HST effort is seen as path-finder effort for the JWST archive.

2. What action is required by the CSA for CADC?

At this time the CSA/CADC MOU is funded and we are pursuing the goals outlined in that MOU. CADC encourages CSA to reach out to the CADC if there are further data archiving and processing activities we can assist with.

3. Are there any major decision points/deadlines the JCSA/CSA should be aware of?

Not on the immediate horizon.

4. Other comments, does not need to be specific to CADC. [To be shared with the CSA unless I'm told otherwise]

There is a rich set of space astronomy missions being proposed by our traditional space astronomy collaborators. I think there may be so many that there is not strong awareness in the community of which opportunities are being monitored for Canadian participation and the scope that participation might have. The CSA could provide some clear updates to the community on these various mission opportunities, perhaps via updates posted to the CASCA exploder or within e-Cassiopeia.

## LRP2020 update

Contributed by P. Barmby

LRP2020 is mostly done with its information-gathering phase: white papers are submitted, town halls are complete. We have requested additional information on facility construction and operations costs from some white paper authors (exact details of requests should not be over-interpreted as messages about priorities!). The panel discussions on prioritization will be finished within the next few weeks as report-writing begins. Our goal is to have a draft report with recommendations completed by the end of March.