

ISSI Planetary LIBS international Team Meeting

April 29 – May 3 2019

International Space Science Institute

Monday 29 April – Overview of current LIBS space instruments and related techniques.

Morning :

10:00 ISSI Welcome + Maurizio Falanga Welcome.

10:15 Introductions of each team member

10:30 Leader : Introduction to ISSI, and the meeting + goals of the meeting (J. Lasue; R. Wiens)

11:00 Brief history of planetary elemental composition measurements (R. Wiens, J. Lasue)

12:00 Lunch

Afternoon:

13:30 - ChemCam results at Mars (R. Wiens)

14:15 - The goals and status of Supercam (S. Maurice)

15:00 - The Chinese Space missions LIBS instruments (X. Ren)

15:45 - The Indian LIBS instrument for Chandrayaan 2 (J. Lasue)

16:00 - Pause

16:15 - The use of LIBS on airless bodies – opportunities for lunar exploration (J. Lasue)

16:40 - The use of LIBS and Raman on Venus (S. Clegg)

17:00: Icebreaker Cocktail offered by ISSI.

18:30: adjourn

Tuesday 30 April – Survey of LIBS laboratory setups on the ground for planetary applications

Morning :

9:00 – LIBS setups in the US and applications to Earth geology (P. Sobron)

9:30 – The Toulouse LIBS setup for Mars applications (A. Cousin, S. Maurice)

10:00 – The LIBS facilities at DLR, Germany (S. Schröder)

10:30 - Pause

10:45 – General discussion on future opportunities for LIBS space exploration. Overview of future calls by space agencies and such opportunities.

12:00 - Lunch

13:30 – The LIBS facilities at LaserLab Malaga, Spain (J. Laserna)

14:00 – The LIBS facilities at Shandong University (Z. Ling)

14:30 – Any other presentations for ground facilities - discussion

15:00 - Pause

15:15 – General discussion on future opportunities for LIBS on the ground and in space. Possible applications, exchanges of standards (how to improve the technique? miniaturization, opportunities etc.).

18:00 - adjourn

Wednesday 1 May – Survey of LIBS calibration procedures

Morning :

- 9:00 – ChemCam calibration for quantification (S. Clegg)
- 9:30 – ChemCam calibration for quantification of minors (A. Cousin)
- 10:00 – ChemCam data, where to find it, how to use it (S. Schroeder)

10:30 - Pause

- 10:45 – The ChemCam and SuperCam Calibration targets (A. Cousin)
- 11:15 – Calibration of LIBS payload of Chinese HX-1 exploration project (X. Wan)
- 11:45 – Discussion – any information on the calibration of Indian LIBS for Chandrayaan 2?

12:00 - Lunch

- 13:30 – The acoustic signal from LIBS (J. Laserna, S. Maurice)
- 14:00 – Calibration of LIBS spectra from first principles (N. Melikechi)
- 14:30 – LIBS facilities in Japan and instrument development for airless bodies applications (S. Kameda)

15:00 - Pause

15:15 – General discussion on calibration – Other calibration techniques? Discussion on the possible exchange of standards between the laboratories to cross-calibrate the instruments.

18:00 - adjourn

Thursday 2 May – Survey of LIBS databases and software

Morning :

- 9:00 – Databases of LIBS lines information (NIST, C-quest, OSCAR etc.) (A. Cousin, N. Melikechi)
- 9:45 – The software developed for LIBS analysis on Mars (IDL pipeline, multivariate data analysis, etc. R. Wiens)

10:30 - Pause

- 10:45 – General discussion on databases and software:
 - application of multivariate techniques (PYSAT?)
 - calibration-free LIBS? (OPSIAL)
 - first principles LIBS analysis?

12:00 - Lunch

Afternoon – Excursion around Bern + Team dinner

Friday 3 May – Conclusion and future team work

Morning : Sundry topics to finalize the workshop and define the next actions

- 9:00 – discussion on how to use the laboratory setups, and also cross-calibrate them: exchange of standard samples, and prepare a calendar to do so.
- Describe techniques to evaluate the applicability of different software and compare them quantitatively, or discuss how to develop new software.

10:30 - Pause

10:45 – generate a calendar of actions: presentation at conferences, exchange of results, teleconference, visits, writing of reports and papers, etc.

Targeted outputs of the workshop include:

- => A review on the space LIBS instruments and their calibration.
- => A review on the ground laboratory for LIBS and their comparisons and calibration.
- => A traceability matrix of the various LIBS instruments being built or having been proposed in preparation of future opportunities.
- => Final discussion about the next meeting and actions to be done before then.

12:15 - Lunch

Afternoon – adjourn the meeting