[JJ] Evening Poster | P (Space and Planetary Sciences) | P-CG Complex & General

[P-CG22]New Developments of Planetary Sciences with ALMA

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The Atacama Large Millimeter/Submillimeter Array (ALMA) starated its science operation in 2011, and long-baseline observations have become available since 2014. ALMA, with its high sensitivity and resolution, has provided us with qualitatively new information on star and planet formation and small bodies in our Solar System. For example, the discovery of narrow gap structures in the protoplanetary disks around young stars HL Tan and TW Hya enabled us to actually compare the long-standing theoretical models of planet formation with real observations. In our solar system, 60km pixel-scale non-uniform brightness distribution and the rotation of the asteroid Juno are detected. Spatially-resolved thermal mapping of Europa icy surface enables us to search for thermal anomaly in possible plume source regions. As of Cycle 4, Solar observations are available, enabling us, for example, to determine the physical parameters of plasmoid quantitatively. In this session, we overview the latest results of ALMA observations in the field of planetary sciences. We also accept any theoretical and experimental works that are closely related to the observations and discuss the impact on the planetary science community.

[PCG22-P02]The development of new solar observing modes of ALMA

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The solar observations with ALMA have been offered by ALMA observatory since the open-use period in 2016-2017 (Cycle 4), and the scientific solar observing was started in December 2016. The Sun is the nearest star and its radio emission received at the earth is incomparably stronger than that from the celestial objects like star-forming regions and high-z galaxies. Hence, the various measures are needed to observe the Sun with ALMA that was constructed for observing such celestial objects (Shimojo et al. 2017, White et al. 2017). Due to the measures, the observing modes for solar observations that were offered for Cycle 4 is limited as follows; The observing frequencies are fixed at 100 GHz (Band3) or 239 GHz (Band6), only the compact antenna configurations are available, and the mode of the correlator is continuum mode only. The solar observing modes are used for not only Cycle 4 but also Cycle 5 (2017-2018) and Cycle 6 (2018-2019).

To utilize most observing functions of ALMA for solar observing, the international development team of ALMA solar observations works on the development of new solar observing mode. However, the machine time for commissioning is decreasing because the development of most observing modes had been finished and ALMA project shifted normal operating state. To develop solar observing modes effectively in such situation, we prioritized the observing modes based on the demands from the solar community. The current priority is following; 1) Higher observing frequencies (Band7 and Band9) that show temperature minimum and might realize higher spatial resolution, 2) Full-Stokes polarimetry to obtain the signal of the magnetic fields in the chromosphere (Band3), and 3) High-cadence scans of a small field of view with a single-dish observation. We are considering other modes, for instance, the flexibility of observing frequencies, and sub-seconds cadence. In the paper, we summarize the candidates of new solar-observing modes, and report the status of the development.