[구KVN-05] Planning Large Program of Stellar Maser Study with KaVA

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We present our activities linking to planning of possible forms of large program to study on circumstellar H2O and SiO maser sources with KaVA. A great advantage of KaVA for the stellar maser observations is the combination of the unique capability of the multi-frequency phase referencing technique of KVN and the dual-beam astrometry of VERA with the KaVA's relative dense antenna configuration. We have demonstrated this advantage through the test observations conducted by the KaVA Evolved Stars Sub-working Group since 2012 March. Snapshot KaVA imaging is confirmed to be possible in integration time of 0.5 hour at the 22 GHz band and 1.0 hour at the 43 GHz band in typical cases. This implies that large snapshot imaging surveys towards many H2O and SiO stellar masers are possible within a reasonable machine time (e.g., scans on ~100 maser sources within 200 hours). This possibility enables us to select the maser sources, which are suitable for future long-term (10 years) intensive (biweekly-monthly) monitoring observations, from 1000 potential target candidates selected from dual-frequency band (K/Q-bands) KVN single-dish observations. The output of the survey programs will be used for statistical analysis of the structures of individual stellar maser clumps and the spatio-kinematical structures of circumstellar envelopes with accelerating outflows. The combination of astrometry in milliarcsecond(mas) level and the multi-phase referencing technique yields not only trigonometric parallax distances to the masers but also precise position reference for registration of different maser lines. The accuracy of the map registration affects interpretation of the excitation mechanism of the SiO maser lines and the origin of the variety of the maser actions, which are expected to reflect periodic behaviors of the circumstellar envelope with stellar pulsation. Currently we are checking the technical feasibility of KaVA operations for this combination. After this feasibility test, the long-term monitoring campaign program will run as one of KaVA's legacy projects.