V140b Imaging demonstration of stellar masers with KVN+VERA

Hiroshi Imai, Miyako Oyadomari (Kagoshima Univ.), Se-Hyung Cho, Young-Joo Yun (KASI), Kozue Kusuno, Yoshiharu Asaki (JAXA/ISAS), Naoko Matsunoto (NAOJ), and KVN+VERA Evolved Stars sub-Working Group

Joint VLBI operation with Korean VLBI Network (KVN) and Japanese VLBI Exploration of Radio Astrometry (VERA) is expected to provide radio image cubes of stellar H_2O and SiO ($J = 1 \rightarrow 0$) maser sources with quality higher than those yielded by KVN or VERA alone. Such operation also enables us to conduct systematic and more flexible monitoring observations of the stellar masers. In order to trace propagation of stellar pulsation-driven shock waves through and temporal variation of the physical condition in circumstellar envelopes, simultaneous and intensive monitoring observations of the H_2O and SiO masers in a long term (a few stellar pulsation cycles) are crucial. In order to realize such observations within realistic and available machine time of the KVN+VERA operation, capability of high quality and snap-shot imaging with KVN+VERA should be tested and target stellar maser sources should be carefully selected. Here we report the results of imaging demonstration observations of stellar H_2O and SiO masers conducted during 2012 March–2013 May. The preliminary results show that the H_2O and SiO maser image cubes are dominated by artificial side lobes that have a similar property to thermal noise for integration time longer than 15 min and 30 min, respectively. In other words, the maser images are well focused and snap-shot imaging is possible in such integration time as long as the integration time is split into three or more scans that well cover (u, v)-planes.