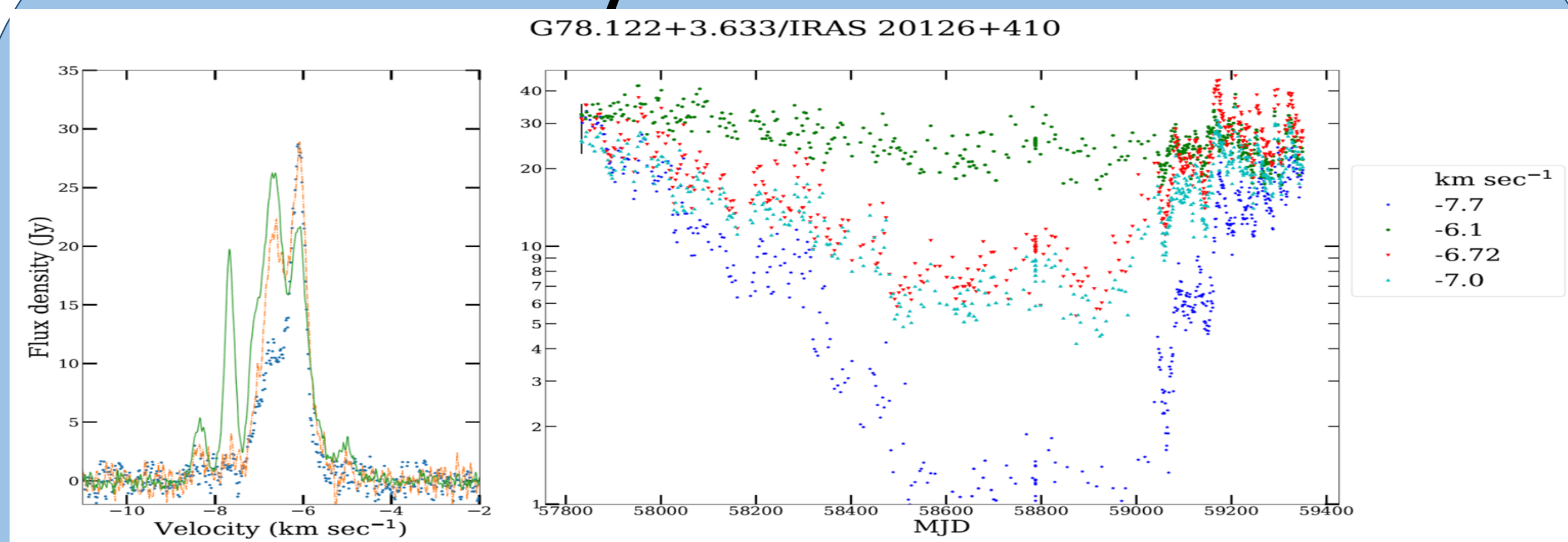


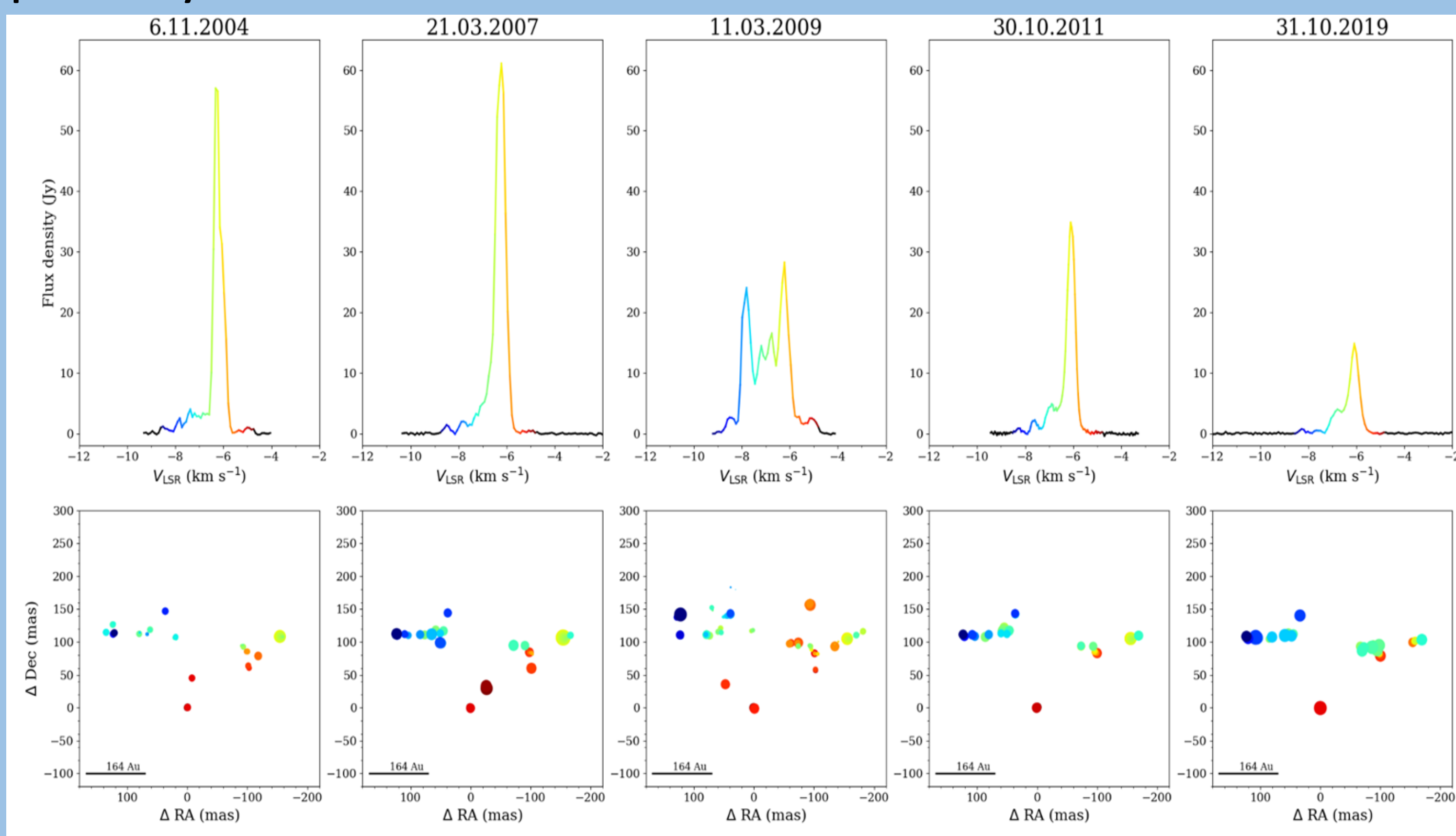
A detailed look at the maser cloudlet evolution in HMSFR IRAS 20126+4104

We present results of the milliarcsecond resolution study of the 6.7 GHz methanol masers evolution in high-mass star-forming region IRAS 20126+4104 (also known as G78.122+3.633) that lies at a distance of 1.64 kpc (Moscadelli et al. 2011). Using the EVN Archive and data from our EVN project carried out in 2019, we have analyzed the 15-year evolution of single maser cloudlets. The target has been variable, as noted in the single-dish monitoring using the Irbene RT-32 and RT-16 radio telescopes. The VLBI imaging shows that the overall maser structure has stayed almost unchanged over 15 years. However, detailed analysis indicates that the maser cloudlets may be either stable or change significantly.

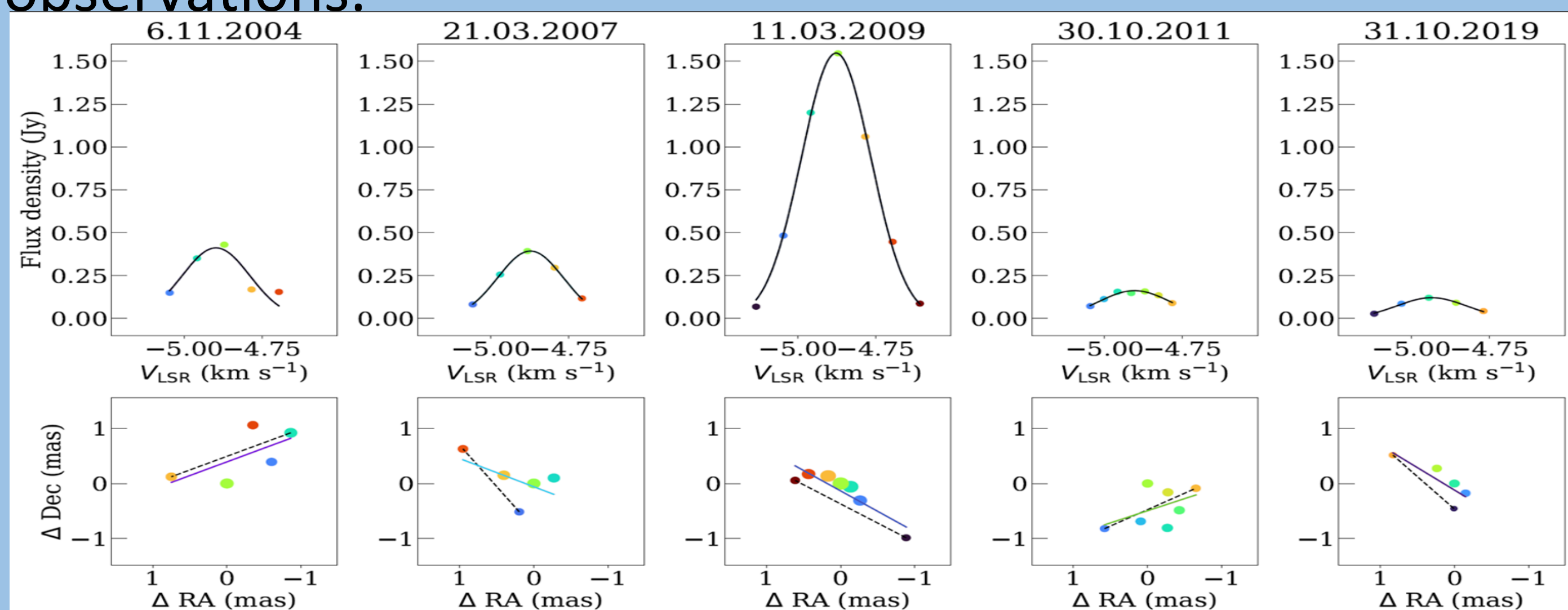
Variability



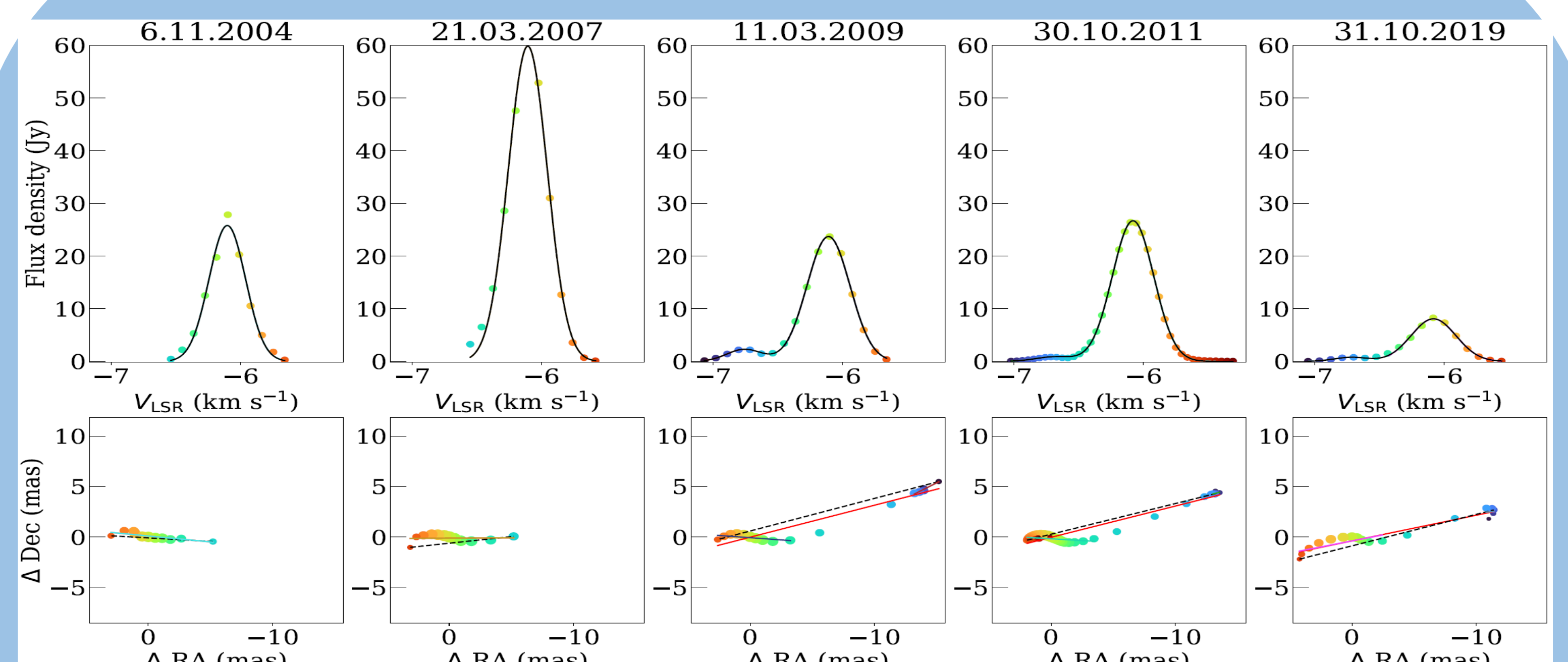
Irbene monitoring shows the high and low flux phases primary for blue-shifted emission.



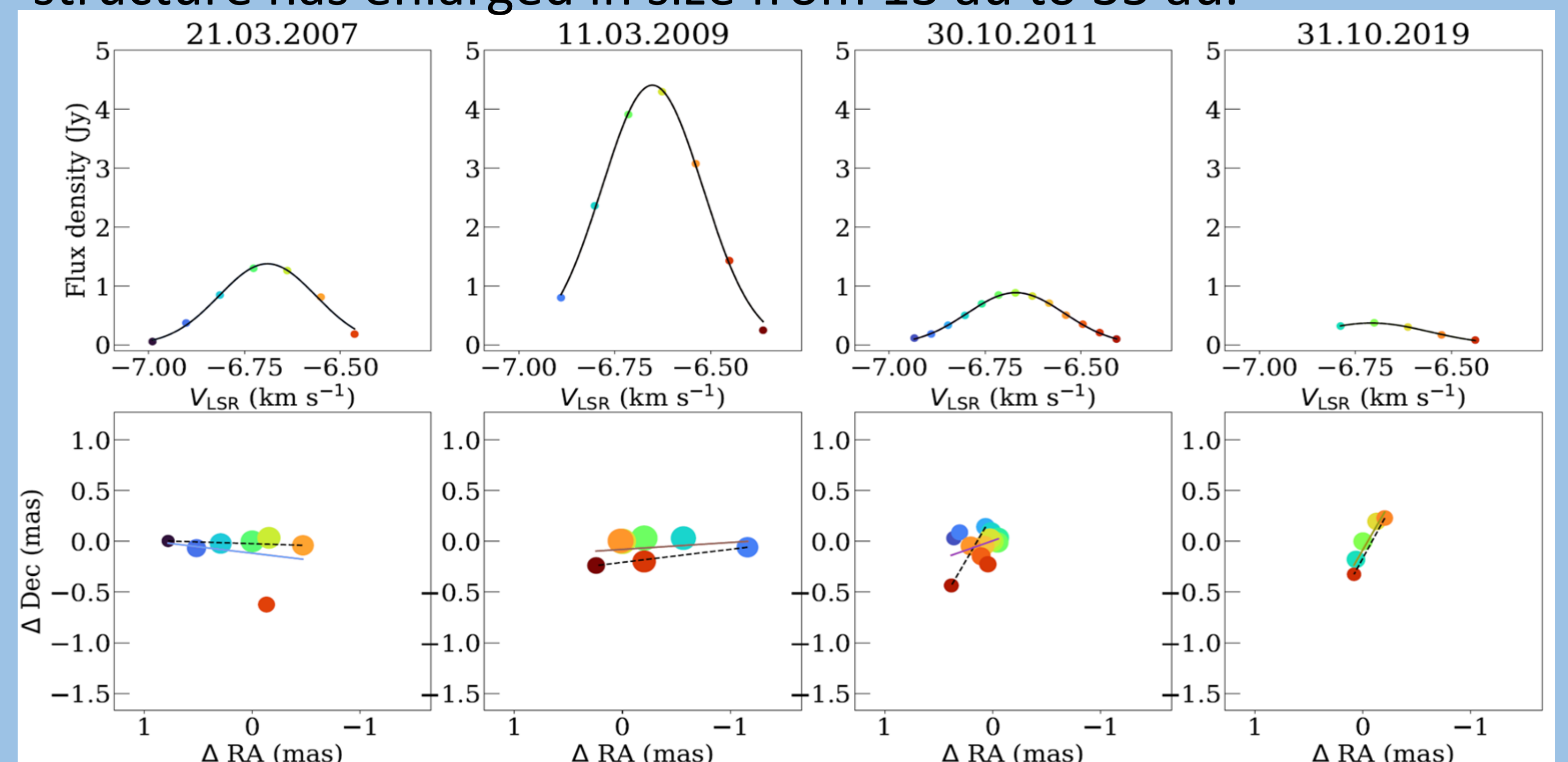
Five epochs of observations, data from 2004-11 are extracted from the EVN Archive (PIs: H.van Langevelde, G.Surcis). The 2019 data presents results from our EA063 project. We identified seven cloudlets in all epochs of observations.



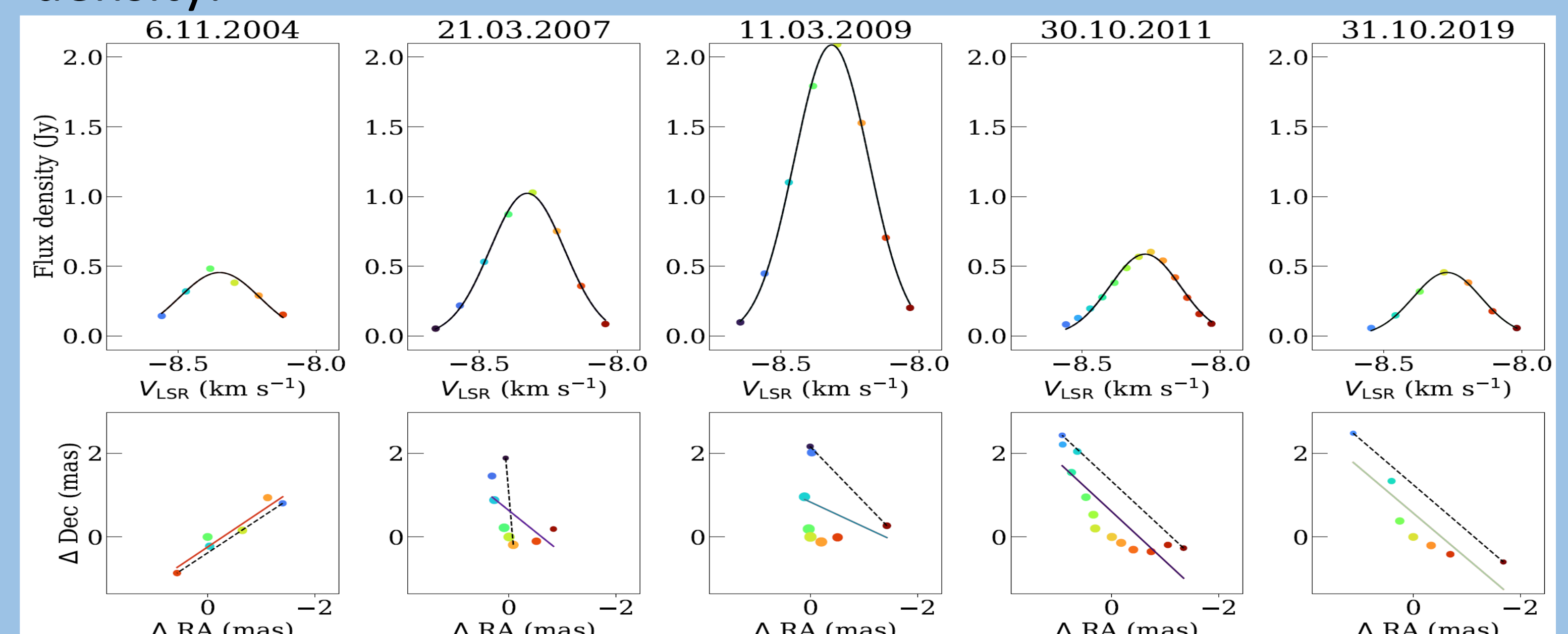
Cloudlet no. 1 shows significant changes in the amplitudes. However, the structure is stable over 15 years.



Cloudlet no. 5 includes the brightest spot in the target. Its flux density changes by a factor of six during from 2007 to 2019. The structure has enlarged in size from 13 au to 35 au.



Cloudlet no. 7 varies significantly in its structure and flux density.



Cloudlet no. 4 shows morphology evolution that may indicate the shock front evolution.

Conclusions

The 6.7 GHz methanol maser emission is variable in IRAS 20126+4104, but the overall structure as seen on the EVN images is almost unchanged. Seven cloudlets can be identified in all five epochs spanned by 15 years. They show significant variability in the internal structure, like a rotation of the whole maser cloudlet. The majority of cloudlets are elongated with the typical size of 5 mas (i.e. 8.5 au) with velocity gradients of $0.13 \text{ km s}^{-1} \text{ au}^{-1}$.