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TITLE: The ASAI View on our Chemical Origins

ABSTRACT BODY:

Abstract Body: The Large Program ASAI carried out at the IRAM 30m telescope joins the efforts of several groups in Astrochemistry, in Spain and France, to address the question of our “chemical origins”. Its goal is to obtain a complete census of the gas chemical composition, its evolution along the main stages of the star formation process, from prestellar cores and protostars to protoplanetary disks, in order to understand the processes which govern the emergence of molecular complexity, and the formation of pre-biotic molecules. This is achieved through highly sensitive and systematic spectral line surveys of a sample of sources illustrative of the various stages of protostellar evolution. The resulting data set is aimed to serve as a reference database for the astrochemical community: astronomers, chemists, and theoreticians

Formamide (NH₂CHO) is a crucial molecule in this respect as it is one of the simplest molecules of pre-biotic interest. Recently, it has been proposed as a precursor of both metabolic and genetic material, suggesting a common chemical origin for the two mechanisms, and could have played an important role in the emergence of life (Saladino et al 2012; Ferus et al. 2014). We have conducted with ASAI the first comprehensive study of formamide towards solar-type environments, revealing new discoveries of NH₂CHO (Kahane et al. 2013; Lopez-Sepulcre et al. 2015), including its detection, for the first time, in outflow shock spots (Mendoza et al. 2014). The presence of formamide in such a variety of star-forming environments, as well as on a Solar System comet, suggests that it could have been exogenously delivered onto a young Earth in the past.

We will present the results of this study of formamide and will discuss their implication for the formation route of this molecule and other related pre-biotic species in solar-type protostellar environments.

References:

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Mendoza E. et al. 2014, MNRAS, 445, 151

Saladino R. et al. 2012, Physics of Life Reviews, 9, 121

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