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JIRAM for Juno mission: retrieval capabilities for ammonia and water vapour in the hot spots

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Jupiter's atmosphere presents limited regions of relatively thin cloud coverage (so-called 'hot spots'), that allow thermal radiation by warmer, deeper atmospheric layers to be transmitted directly to space. Hot spots therefore represent a means for probing physical conditions (namely chemical composition) below the main aerosol deck. The JIRAM instrument is an IR spectro-imager included in the payload of forthcoming Juno mission to the Jovian system. Its coverage of 5 μm CH_4 transparency window makes it particularly suitable for the study of hot-spots. Corresponding retrieval capability for mixing ratios of minor gases are quantitatively assessed on the basis of Bayesian theory. Data will provide effective constraints on the mixing ratios of water vapor between 40 and 70 km below the reference 1 bar pressure level (between 3.5 and 7 bars). Assuming an a priori correlation length equal to half the scale height, we achieve a minimum retrieval uncertainty of 0.17 once the mixing ratio is given in terms of $\log_{10}(\alpha)$, being α the mixing ratio (vs. altitude) relative to a given reference profile. The JIRAM-Juno dataset will further allow determination of the ammonia mixing ratio, with a minimum relative retrieval uncertainty of 0.32 in the same altitude range, and of the phosphine mixing ratio, with comparable uncertainty up to the reference altitude.