Local cohomology supported in determinantal varieties

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Let K be a field of characteristic zero. Consider the polynomial ring $S = K[X_{i,j}]_{1\leq i\leq m, 1\leq j\leq n}$ on the entries of a generic $m\times n$ matrix $X = (X_{i,j})$. Let I_p be the ideal in S generated by $p \times p$ minors of X. I explain how to calculate completely the local cohomology modules $H^i_{I_p}(S)$. I will also explain why the problem is interesting. It turns put the result allows to classify the maximal Cohen-Macaulay modules of covariants for the action of $SL(n)$ on the set of m n-vectors. It also allows to describe the equivariant simple D-modules, where D is the Weyl algebra of differential operators on the space of $m \times n$ matrices. This is a joint work with Claudiu Raicu and Emily Witt. The relevant references are arXiv 1305.1719 and arXiv 1309.0617.