Cohomology and characteristic classes in Lie theory

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The classical Van Est theory relates the smooth cohomology of Lie groups with the cohomology of the associated Lie algebra, or its relative versions. Some aspects of this theory generalize to Lie groupoids and their Lie algebroids. I will revisit the van Est theory using the Perturbation Lemma from homological algebra to obtain precise results for the van Est differentiation and integrations maps at the level of cochains. I will also explain how this theory applies when looking at characteristic classes of geometric structures that are codified by Lie groupoids. This talk is partially based on joint work with Eckhard Meinrenken.