The overall aim of NitroAustria was to identify drivers for N2O emissions taking into account different soil types, climate conditions and agricultural management. Thirty-four sites in six agricultural production regions of Austria were selected, and site and region specific N2O emissions from managed arable and grassland soils were calculated by the model LandscapeDNDC for the period 2005 to 2014. The cumulative N2O emissions from the six regions over the ten-year period ranged from 3 to 35 kg N2O-N ha−1 and were higher from intensively managed grasslands compared to arable fields. The N2O emissions showed high inter-annual variations due to climate for many regions except for those regions emitting most. In these two arable and one grassland regions, the N2O emissions were evenly distributed over the years, which insinuates that N2O emissions were mainly a result of management measures. In the hot spot regions, extreme peak emissions made up for 50 to 80% of annual N2O emissions. Peak emissions correlated positively with available nitrogen and soil temperature and took place mainly in the vegetation period from April to September.