During the 2010 eruption of the Icelandic Eyjafjöll volcano an intense effort has been made worldwide to track volcanic ash clouds and to quantify airborne concentration. Space-based retrievals and transport models confirmed to be key tools to monitor and forecast the volcanic clouds evolution. We examine here the FALL3D transport and dispersal and the SEVIRI data results related to the 2010 Eyjafjöll eruption. FALL3D is a 3-D time-dependent Eulerian model for the transport and deposition of volcanic particles that outputs, among other variables, cloud column mass and AOD. SEVIRI instrument, aboard the geostationary MSG platform, is a multispectral imager operating in the VIS-TIR spectral range with a 3 km nominal spatial resolution. The SEVIRI channels centered around 11 and 12 micron have been used for the ash retrievals through the Brightness Temperature Difference algorithm and MODTRAN simulations. A closer integration of space-based observations and transport models could greatly improve the accuracy and reliability of ash cloud evolution forecasting as well as our general understanding of eruption events. In this work we compare independent FALL3D model results with retrievals based on SEVIRI data of the Eyjafjöll eruption, and we describe new results obtained by using the space-based quantitative retrievals to constraint the inputs of the FALL3D model.