



Observing the Anthropocene from Space: Selected Megacities

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From the beginning of the Neolithic revolution around 10000 BC and 1800 A.D., the earth's human population is estimated to have risen from several million nomadic hunter gathers to 1 Billion rural settlement and city dwellers. This population increase and its related raising of the standard of living increase and life expectancy were fuelled by energy from the exploitation of biofuel and some use of coal. This rapid development is dwarfed by the impact of the industrial revolution over the past two centuries. There are no over 7 Billion people on earth with over half living in cities and urban areas, e.g. there are ~ 3 billion more citizens than when the author was born and 2 million more than when the project SCIAMACHY (SCanning Imaging and Absorption spectroMeter for Atmospheric ChartographY) was proposed!

This industrialisation and urbanisation has been fuelled by the use of cheap energy from fossil fuel combustion. It has resulted in large scale changes in land use, air pollution, and the destruction of stratospheric ozone, the anthropogenic modification of biogeochemical cycling, the destruction of species, ecosystems and ecosystem services. In order to test our knowledge and understanding of the Earth system, accurate long term global measurements of atmospheric constituents and surface parameters are essential. The remote sounding of the atmosphere from instrumentation on satellite platforms provides a unique opportunity to retrieve regional and global observations of key trace atmospheric constituents (gases, aerosol and clouds) and surface parameters (ocean colour, ice extent, flora etc.). This talk describes results from the SCIAMACHY project and its spin offs, GOME (originally SCIA-mini - Global Ozone Monitoring Experiment), GOME-2, and their successors ESA Sentinel 4 (originally GeoSCIA), Sentinel 5, CarbonSat and SCIA-ISS.

The interpretation of the data from these instruments has provided a paradigm shift in our understanding of global atmospheric composition. In addition they deliver unique evidence for the development and verification of international environmental policy.