



Global atmospheric sounding using GPS radio occultation: Recent results from CHAMP, GRACE and COSMIC/FORMOSAT-3

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In 2006 a multi-satellite constellation for precise global atmospheric sounding using the innovative GPS radio occultation (RO) technique became reality. In addition to the German CHAMP (CHALLENGING Minisatellite Payload) satellite, which provides almost continuous data since 2001, additional LEO (Low Earth Orbiting) satellites started to operationally provide GPS RO data. The six satellites of the U.S.-Taiwan COSMIC/Formosat-3 mission (Constellation Observing System for Meteorology, Ionosphere and Climate) were successfully launched on April 14 and the European METOP satellite on October 19, 2006. In addition the U.S.-German GRACE-A satellite (Gravity Recovery And Climate Experiment) provides continuously data since May 22 of the same year. Altogether these satellites are expected to provide about 3,500 occultation measurements per day in near-real time. The constellation, consisting of 9 satellites, multiplies the potential of the GPS RO technique for several applications in atmospheric research, weather forecast and climate change related studies.

We review status and recent results of the occultation missions and of the corresponding data analysis for the neutral atmosphere. The unique long term data set from CHAMP, e.g., covers already more than 5 years. This allows for climatological investigations, e.g., of gravity wave parameters and tropopause characteristics on a global

scale. The occultation data are also used from numerous weather prediction centers to improve global as well as regional weather forecasts. Since 2006 Bending angle and refractivity data are operationally used by ECMWF and the Met Office to improve global weather forecasts.