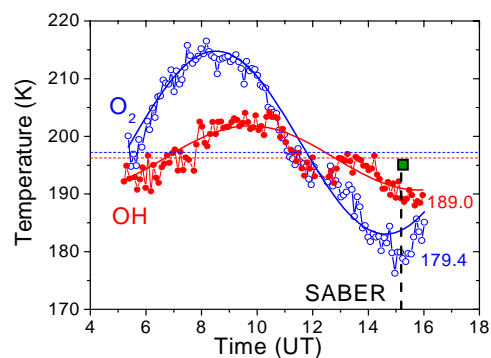
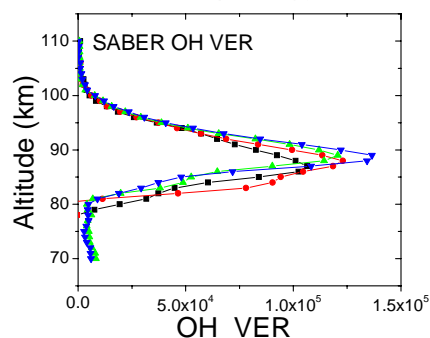
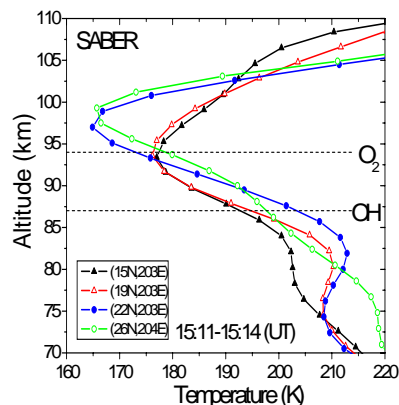


CEDAR-TIMED Coordinated Measurements of Mesospheric Temperature at Low-Latitudes

An important goal of the NASA TIMED satellite mission is to map the temperature field of the earth's upper atmosphere (core region ~60-180 km) on a global scale. The TIMED/SABER instrument uses limb measurements of the CO₂ emission at 15 μm and 4.3 μm to retrieve height profiles of atmospheric temperature (altitude ~40-135 km) with a vertical resolution of ~2 km. In the upper mesosphere (~85 km), non-LTE temperature retrievals are used with an accuracy of 5-8 K. As part of the CEDAR-TIMED collaborative program, we have compared ground-based measurements using the CEDAR Mesospheric Temperature Mapper (MTM) located at Maui, Hawaii (20.8°N, 156°W) with SABER measurements obtained within ~500 km of the Hawaiian Islands. The MTM utilizes the near infrared OH (6, 2) band and O₂ (0, 1) Atmospheric band nightglow emissions to infer atmospheric temperature at two mean altitudes ~87 and 94 km (averaged over the layer widths) within the SABER temperature profile. These independent measurement techniques provide a powerful and complementary method for investigating temporal and spatial-induced variability. In an initial study, data from February and July/August 2002 have been used to investigate winter-summer differences in the nocturnal variability under the influence of strong tidal forcing.

UT Date (2002)	SABER (87 km)	MTM	ΔT (MTM-SABER) (87 km)	ΔT (OH VER) (87 km)
02/07	195.7	193.6	-2.1	--
02/11	205.4	205.6	0.2	-0.4
02/16	195.9	199.9	4.0	2.7
02/17	195.6	189.0	-6.6	-0.6
Feb. Average	197.4	196.6	-1.1	0.6
7/10	181.8	187.6	5.8	3.9
7/13	188.0	190.6	2.6	0.0
7/14	186.3	186.0	-0.1	-1.4
July Average	185.4	188.1	2.7	0.8
8/3	190.8	189.6	-0.8	-5.2
8/9	188.0	189.8	1.8	-0.4
8/12	184.1	186.2	2.1	0.8
8/19	178.3	186.7	8.4	5.5
August Average	185.3	188.1	2.8	0.2



The table shows very good quantitative agreement especially when SABER OH emission layer altitude and width were used for the height weighted temperature determinations. The mean temperature differences were 1.5 K (assuming a fixed altitude of 87-km) and 0.5 K (using the SABER OH volume emission rate profile).

A similar study has recently been performed using the SCIAMACHY spectrometer onboard the European ENVISAT.