



## SPARC Workshop SHARP2016

### **Have stratospheric temperature trends changed in the last decade?**

Beatriz Funatsu<sup>1</sup>, Chantal Claud<sup>2</sup>, Philippe Keckhut<sup>3</sup>, Prof. Alain Hauchecorne<sup>3</sup>, Thierry Leblanc<sup>4</sup>

<sup>1</sup> CNRS

<sup>2</sup> Laboratoire de Météorologie Dynamique, CNRS / IPSL, Paris, France

<sup>3</sup> LATMOS/CNRS

<sup>4</sup> Caltech Institute of Technology

bmf.amit@gmail.com

Stratospheric temperature trends are fingerprints of climate change, reacting to radiative, chemical and dynamical forcing. A large range of observations and climate model simulations for the period until the mid-2000's indicate that the stratosphere cooled in most of the layer up to 50 km in altitude due to both the decrease in stratospheric ozone concentration and the increase in tropospheric greenhouse gases, with a mean cooling of 0.5-1.5 K/dec over much of the globe for the period 1979-2007. However, since the implementation of the Montreal Protocol in the late 1980's, the levels of ODS have decreased in the stratosphere and ozone concentrations have started to climb. Have substantial changes in temperature trends been already observed in response to these changes in the radiative and chemical balances?

In order to examine this, we used the calibrated IMICA/NOAA version of AMSU stratospheric measurements for the recent decade (2002-2014). In this period the stratosphere continued cooling over most of the globe, however, less strongly than in the previous decade. The rate of cooling is latitudinally and seasonally variable, with large uncertainty in the polar regions. Seasonally, trends are small and close to neutrality in summer for all latitudes, and very variable in the NH polar regions for the other seasons. Satellite based trends estimates were supported by lidar measurements in three distinct latitude bands with good agreement.