

# **Séminaire LGGE**

***Lundi 22 Juin 2015, 10h30***  
**salle L. LLiboutry, LGGE**

**Ingeborg Levin**

*Institut für Umweltphysik, Heidelberg University, Germany*

## **Radiocarbon in modern Carbon Cycle research**

Atmospheric nuclear weapon testing during the 1950s and 1960s was associated with more than  $6 \times 10^{28}$  atoms or about 0.6 tons of artificial  $^{14}\text{C}$  production in the atmosphere, which led to a doubling of the  $^{14}\text{C}/\text{C}$  ratio in tropospheric  $\text{CO}_2$  of the Northern Hemisphere. The thus generated prominent spike in 1963 has been used as transient tracer in all compartments of the global carbon cycle. Today, the transient bomb-radiocarbon signal has levelled-off in most carbon compartments and the anthropogenic input of radiocarbon-free fossil fuel  $\text{CO}_2$  into the atmosphere has taken over:  $\text{CO}_2$  from burning of fossil fuels, due to their age of several hundred million years, is free of  $^{14}\text{C}$ . Adding fossil fuel  $\text{CO}_2$  to the atmosphere, therefore, leads not only to an increase of its mole fraction, but also to a dilution of the  $^{14}\text{C}/\text{C}$  ratio in  $\text{CO}_2$ . This provides an important signal in the polluted atmosphere, which allows separating fossil fuel from biogenic  $\text{CO}_2$  source contributions and, together with regional transport modelling, verification of emission inventories. Some prominent examples and results will be presented and the perspective of applying radiocarbon as tracer for future environmental studies will be discussed.