	Experiment title: W and Fe oxidation states in silicate melts at depth: the effect of pressure	**Experiment number**: ES250
Beamline: BM23	**Date of experiment**: from: 18/06/2015 to: 23/06/2015	**Date of report**: Feb. 11, 2016
Shifts: 15	**Local contact(s)**: Olivier Mathon	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Benjamin Cochain, ISTEP, Université Pierre and Marie Curie, Paris, France

Charlotte de Grouchy, University of Edinburgh, UK

Report:

The aim of this proposal was to assess the oxidation state of tungsten and iron in a hydrous basaltic melt at high temperature and pressure conditions through XANES experiments at the W L_3 edge and Fe K edge**.** Short-lived radiogenic isotopes such as ^{182}W record accretional processes and an array of planetary specific differentiation mechanisms. A basic understanding of how this element partition between minerals and magmas, or between liquid Fe and magmas is thus critical to interpret early planetary differentiation events. Element partitioning between two phases is governed by the local environment of a given element in each phase. Therefore, understanding the partitioning of W at depth requires first to elucidate its local environment at high pressure in silicate melts, i.e. magmas.

Our previous EXAFS experiment on BM23, ESRF at the W L_3 edge performed in-situ at high pressure using a Paris-Edinburgh Press with NPD capsules seems indeed to indicate that W changes oxidation state from 6+ to 4+ with increasing pressure (see report ES70). However, the results needed to be confirmed and the errors bars reduced before reaching a firm conclusion. The additional points obtained during this proposal did confirm our previous results and a paper is being written.

The results show an influence of the pressure on the position of the inflexion point of the XANES white line. This suggests that the oxidation state of W in silicate melt varies with the pressure from 6+ to 4+. The present results also show that W regains its 6+ valence during the quench to a glassy state while it was 4+ in the melt.