



	Experiment title: Density and structure of a S-rich magma in the P-T range of its formation and ascent.	Experiment number: HS4221
Beamline: ID27	Date of experiment: from: November.25 2010 to: December 1 2010	Date of report: 25/02/2011 <i>Received at ESRF:</i>
Shifts: 15	Local contact(s): M. Mezouar	

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Report:

Water and carbon dioxide comprise the most abundant volatiles in magmas, and their fraction in volcanic gases often exceeds 95%. Sulphur is also frequently found in volcanic gases in concentrations up to several mole percent. Although the concentration of this minor volatile appears to be very small, it nevertheless determines the onset of degassing of magmas during depressurization when approaching Earth's surface. Sulphur species are also thought to be important in metal transport and subsequent ore genesis. That raises fundamental questions: how S is incorporated in the melt structure at depth, what are the consequences of its incorporation on melt properties and how that controls in turn the mass transfer of S between Earth's reservoirs (mantle, crust, atmosphere)?

During this run, high P-T conditions up to 5 GPa-2000 K, have been generated by the Paris-Edinburgh press. We have recorded absorption scans and x-ray diffraction patterns on three compositions : basalt, basalt+3%S and hydrated basalt+3%S, and at two pressure steps (3 GPa and 5 GPa). Data are being processed by C. Crépisson during her master (Feb-Aug. 2011), in order to extract the sample density from the absorption scans^{1,2} and the melt structure from the x-ray diffraction signal^{3,4}. Examples are given in the figure below. Samples have been recovered for ex situ chemical analyses (scheduled in march).

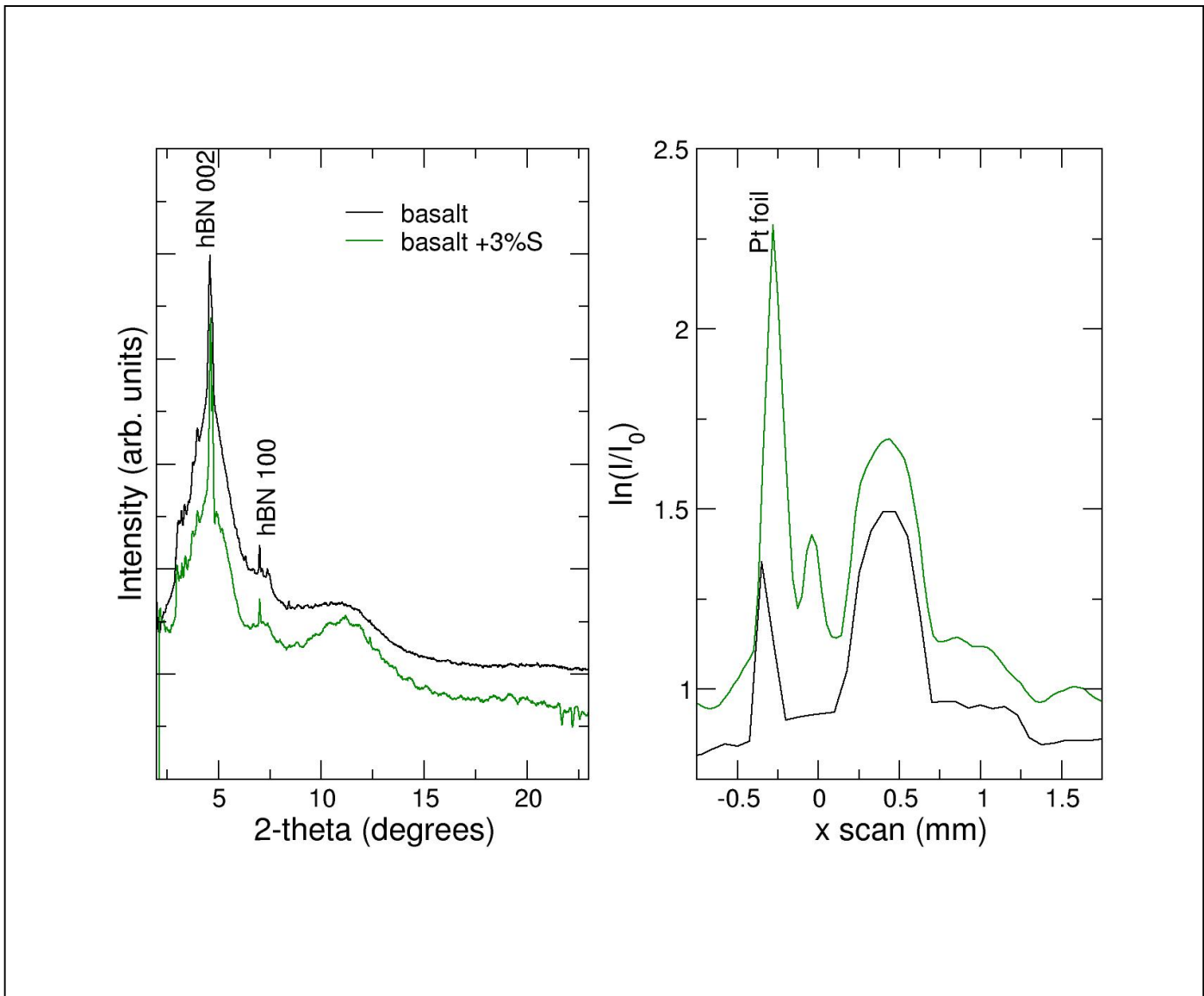


Figure : X-ray diffraction (left) and absorption scans (right) recorded at 3 GPa and 2000 K ; samples is located at the center of the scans. Pt and hBN were used for P-T calibration.

References:

- 1- Katamaya, High Press. Res. 14, 383 (1996).
- 2- Sanloup et al., GRL 27, 811 (2000), Sanloup et al., GRL 31, L07604 (2004)
- 3- Sanloup et al., Eur. Lett. 52, 151 (2000)
- 4- Morard et al., Rev. Sci. Instrum. **82**, 023904 (2011)