



Quality Improvement of the French Permanent Broadband Stations with Shallow Posthole Installations

Jérôme Vergne (1), Hélène Pauchet (2), Mickaël Bonnin (3), and the RESIF-CLB Team

(1) Institut de Physique du Globe de Strasbourg, Université de Strasbourg/CNRS, Strasbourg, France (jerome.vergne@unistra.fr), (2) Institut de Recherche en Astrophysique et Planétologie, Université de Toulouse/CNRS, Toulouse, France (Helene.Pauchet@irap.omp.eu), (3) Laboratoire de Planétologie et Géodynamique, Universités de Nantes et d'Angers/CNRS, Nantes, France (mickael.bonnin@univ-nantes.fr)

In the framework of the RESIF (Réseau sismologique et géodésique français) research infrastructure, more than one hundred new permanent broadband stations are being deployed in metropolitan France. About 75 percent of them are located in open environments. To ensure a standardized installation method able to provide good noise level performance at a reasonable cost, it has been decided, following intensive tests on 3 prototype stations, to install most of the broadband sensors in shallow depth (3 to 20m) cased boreholes. Presently, 40 of these installations have already been completed using Trillium 120PH posthole sensors and spanning various types of environments in terms of geology, local noise sources and meteorological conditions.

We present an overview of the improvement brought by such type of installation. Power spectral density functions of seismic noise level and signal to noise ratio of seismic events are compared with those observed during the testing period of the sites or from other temporary collocated sensors installed in surface vault.

For most of the sites we observe a significant improvement both for high (>5Hz) and low (<0.05 Hz) frequency ranges and on all three components. The decrease in seismic noise level on the horizontal components at low frequencies, sometimes reaching more than 30dB, can be explained by a reduction of tilt noise induced by local pressure variations. However, the performances that can be achieved still clearly depends on the local geology and the close environment of the station. We also observe that the way to install the sensor has a strong influence on the quality of the data.