The study of the source of major earthquakes is of great interest for the scientific community because the parameters derived from have a major importance for the rapid estimation of associated effects (destruction or tsunami). In the framework of these studies, we have identified the array processing as a modern tool that can provide vital information on the geometry and the kinematics of the rupture. Thanks to the various technologies implemented in the CTBT, we have brought these studies in the field of seismology, infrasound and hydroacoustic. These different approaches have resulted in either a direct visualization of the rupture thanks to the analysis of variations of azimuth with time of direct waves from the source or indirectly by obtaining the scope of radiation pattern of surface waves. This type of image is very innovative because it allows provide information on geographic areas which are not instrumented. We show multiple images of treatment PMCC (Progressive Multi Channel Correlation) associated with different major earthquakes as Sumatra Mw=9.3, Nias Mw=6.7, Kokoxol Mw=7.8 and how we can constrain the rupture of these events. These studies show the interest of the CTBT network and more precisely the dense arrays of sensors. These arrays offer the unique opportunity for a multi-technological approach of the seismic source and, perhaps, ultimately, the improvement of early warning systems to strong earthquakes and their consequences.

**Mw=9.3 Sumatra Earthquake: Hydro/Seismic coupling**

The rupture of the Sumatra earthquake (Mw=9.3) is complex and quite difficult to estimate using classical source inversion methods due to the exceptional rupture duration. To fix the problem of the rupture of the Sumatra earthquake (Mw=9.3) is complex and quite difficult to estimate using classical source inversion methods due to the exceptional rupture duration. To fix the problem of the Sumatra earthquake, this approach is based on the use of the CMAR-seismic array and the Diego Garcia hydroacoustic array (H08S) installed by the international Monitoring System and are respectively 1200 km and 2400 km far from the epicenter. We need to analyze the variations of azimuth and velocity of homogeneous wave from across the arrays gives us the opportunity to understand how the rupture propagates. The smooth and regular variations of azimuth fit a rupture extension of 1200 km and a duration of 500 s. This study proves that the combination of array analysis using the different technologies installed for the CTBT is an interesting way for research for a rapid estimation of teleseismic earthquake.

**Mw=7.9 Denali earthquake: Seismic**

The November 3, 2002, magnitude (M) 7.9 Denali Fault earthquake was the strongest ever recorded in the interior of Alaska. Like most earthquakes of its size, it was complex, consisting of several subevents. It started with thrust upward motion on a previously unknown fault, now called the Susitna Glacier Fault. This rupture continued on the Denali Fault, which shows a prominent right-lateral movement. Studies of the Denali Fault and the 1992 earthquake until provide information vital in reducing losses in future earthquakes. The direct visualization of seismic waves by the array processing allows the separation of waves. This image can then be projected on the fault to get the direct kinematic of the rupture. As the Sumatra earthquake, this approach is direct without any other assumption.

**Mw=7.8 Kokoxili earthquake: Infrasound**

On the 11/4/2001, a strong earthquake occurred in the Qinghai Province (China). The small array of infrasonic sensors installed by the CEA in Mongolia has clearly recorded a coherent infrasonic Rayleigh waves and earthquake, which has been identified by two clear variations in the azimuth. The inversion of the coherent infrasonic detections shows that the epicenter of the event is located in an area previously hypothesized excited by the ground velocity of the Rayleigh waves.

**HYDROACOUSTIC COUPLING**

The 26th December 2004 Sumatra earthquake is one of the five biggest microtremor earthshakes ever recorded. Because of the tsunami and its tragic consequences we focus our attention on a rapid estimation of the rupture extension using records from both CTBT hydroacoustic and seismic small arrays. The array analysis allows to estimate the azimuth time evolution and to follow the rupture front. This property was already observed [Le Pichon et al., 2003; Vallee et al., 2004] but in the preseismic velocity to regional Pn velocity. From the Sumatra Meriy earthquake we can take advantage of the complementary hydroacoustic and seismology technologies. The quality of CTBT array makes this present analysis unique. The combination of these two observations allows us to evaluate a 1200 km of rupture extension and a 500 s duration.