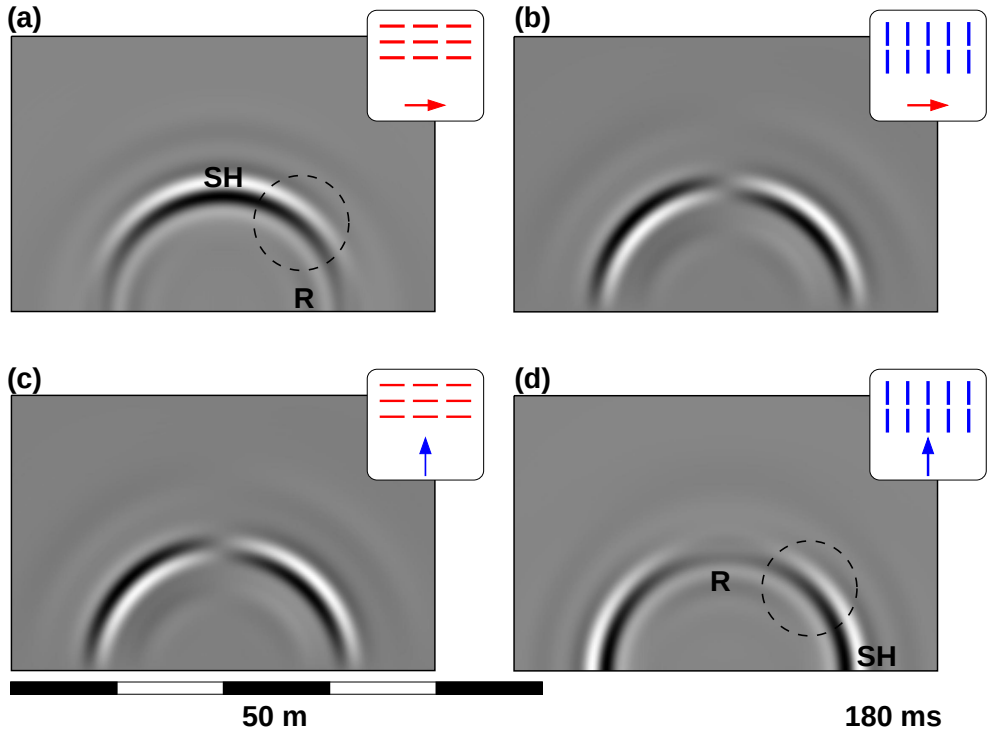

Figure 4.3: *Synthetic data of four single components with icons indicating the source and receiver orientations on the spread. Clearly seen are source radiation pattern and the intermixing wavefields of P, S, Rayleigh and Love wave due to receiver geometry.*

simulate any geophone orientation by elementary vector operations, such as vector addition and rotation of the coordinate system. Thus, the most obvious and easiest way to separate the individual seismic wavefields follows this geometrical concept. Assuming the wavefield traveling along a straight line between source and individual receiver location, we virtually rotate the individual receiver components to point parallel and perpendicular to this direction.

$$\begin{pmatrix} u_t^X \\ u_t^Y \end{pmatrix} = \begin{pmatrix} cos\alpha & sin\alpha & 0 & 0 \\ 0 & 0 & cos\alpha & sin\alpha \end{pmatrix} \begin{pmatrix} u_x^X \\ u_y^X \\ u_x^Y \\ u_y^Y \end{pmatrix} \tag{4.1}$$

Let $u_x^X(t)$, $u_x^Y(t)$ and $u_y^X(t)$, $u_y^Y(t)$ be the four time series recorded for each geophone location, where X and Y are the respective shot orientations, and x and y are the