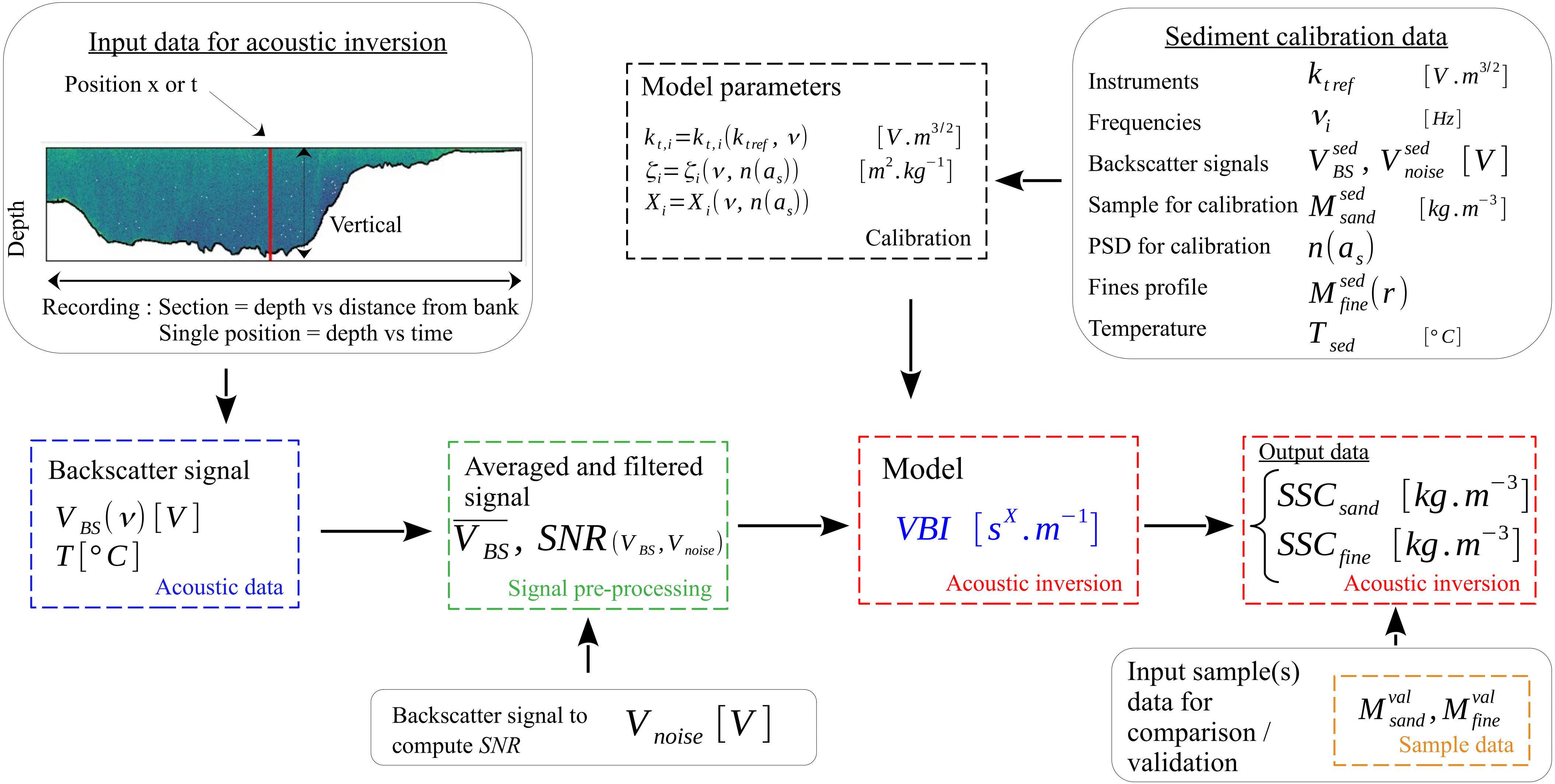
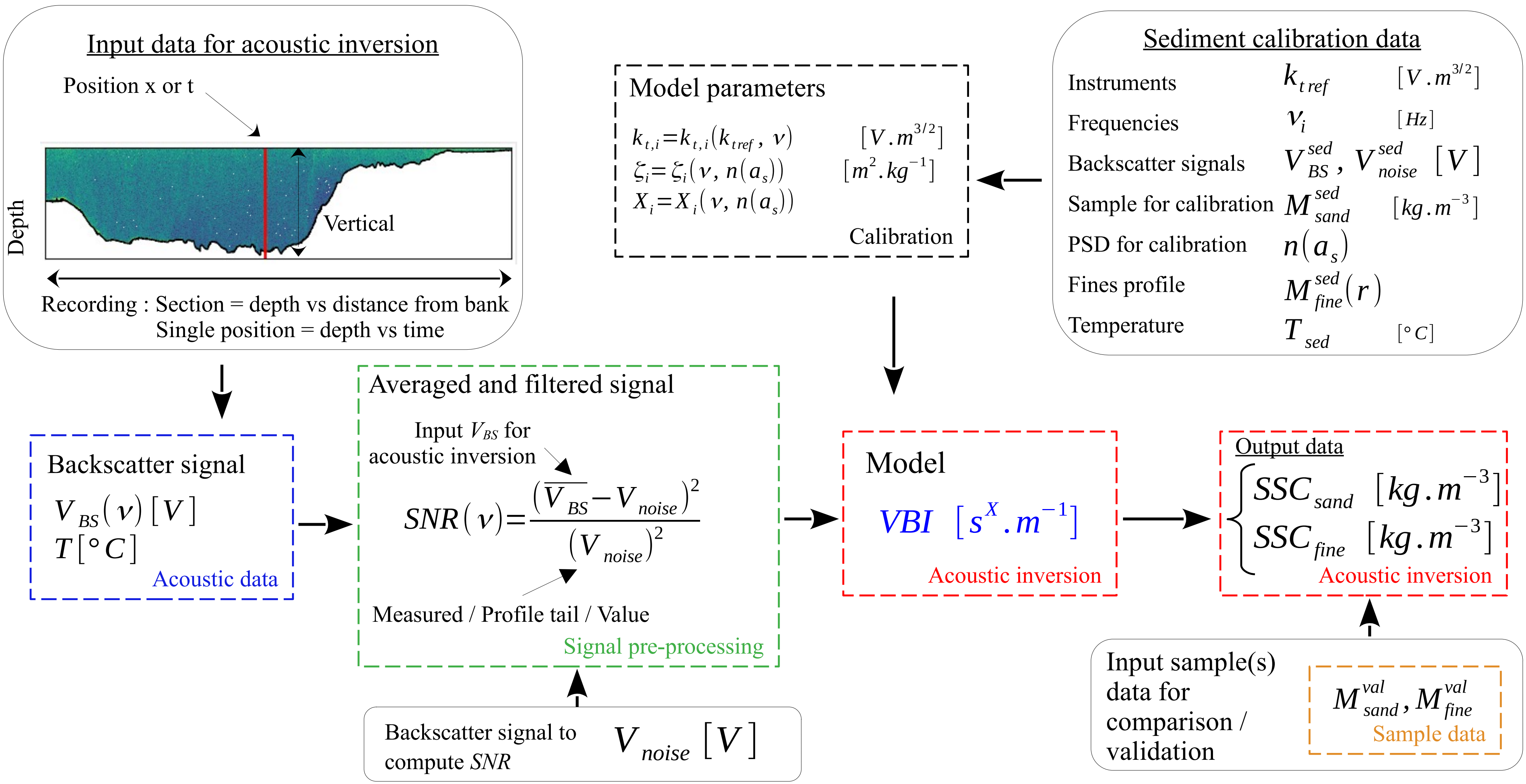
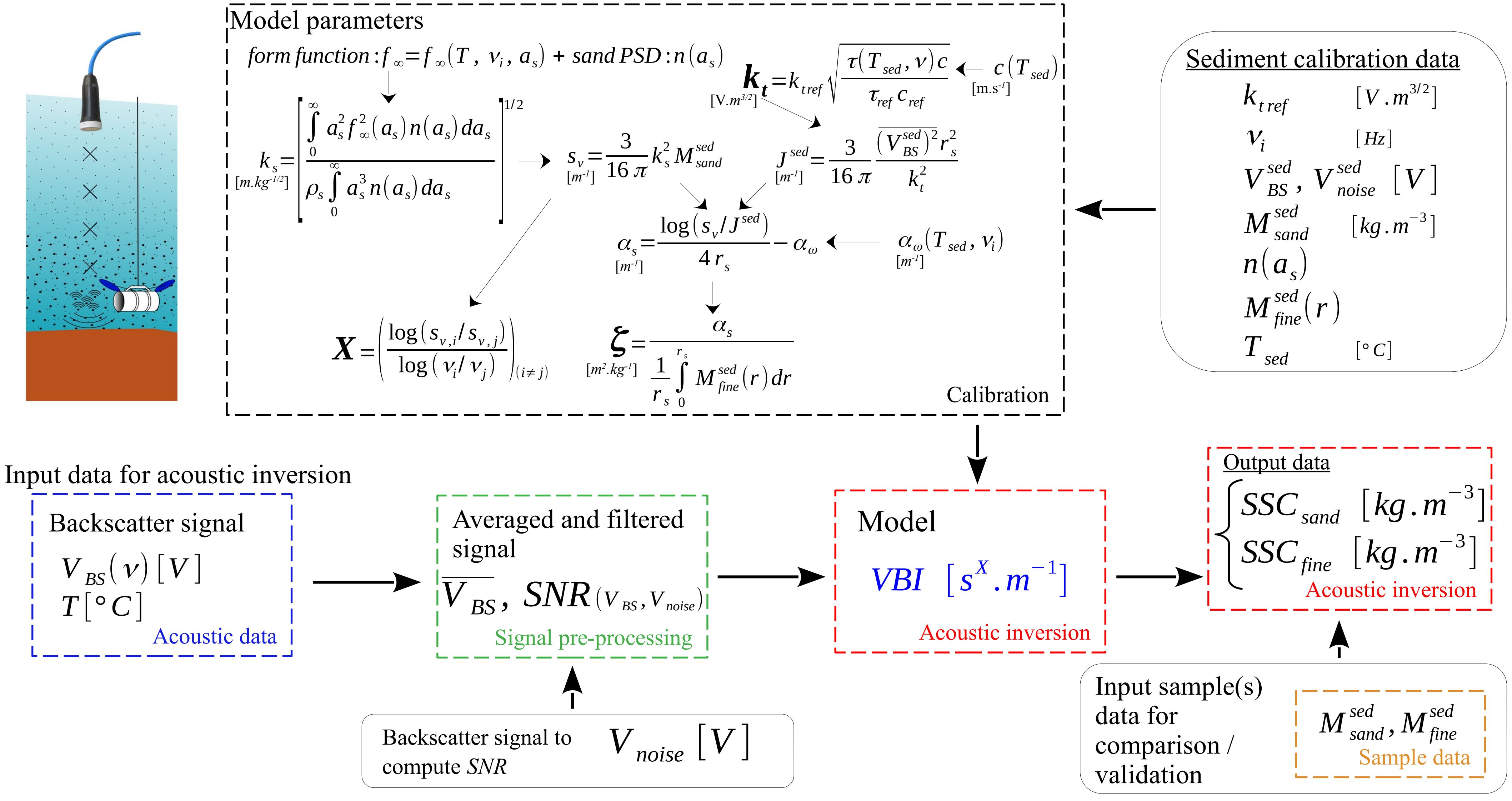
AcouSed general layout with physical dependencies of inversion method for high concentration



AcouSed general layout with Signal/Noise Ratio (SNR) details



AcouSed general layout with sediments calibration details



AcouSed general layout with inversion calibration details

Input data for acoustic inversion

Backscatter signal

$V_{BS}(\nu)\,[V]$

$T\,[^\circ C]$

Acoustic data

Backscatter signal to compute *SNR*

$V_{BS}^{noise}\,[V]$

Averaged and filtered signal

$\overline{V}_{BS},\ SNR(V_{BS}, V_{BS}^{noise})$

Signal pre-processing

Model parameters

$k_{t,1}\ ,\ k_{t,2}$

$\zeta_1\ ,\ \zeta_2$

X

Calibration

Input data for method calibration

Backscatter signal	$V_{BS}^{sed}\ [V]$
Sample for calibration	$M_{sand}^{sed}\ [kg.m^{-3}]$
PSD for calibration	$n(a_s)$
Fines profile	$M_{fine}^{sed}(r)$
Frequencies	$\nu_i\ [Hz]$

Model

$$\begin{cases} \log(VBI) = \dfrac{\zeta_2 \log\left(J_1 e^{(4r\alpha_{\omega,1})}/\nu_1^X\right) - \zeta_1 \log\left(J_2 e^{(4r\alpha_{\omega,2})}/\nu_2^X\right)}{\zeta_2 - \zeta_1} \\ (\nu_1,\ \nu_2),\ \ (J_1, J_2),\ \ (\alpha_{\omega_1},\ \alpha_{\omega_2}) \end{cases}$$

Acoustic inversion

Input sample(s) data for comparison / validation

$M_{sand}^{val}, M_{fine}^{val}$

Sample data

Output data

$$\begin{cases} SSC_{sand} = \dfrac{16\pi \times VBI \times \nu_2^X}{3k_s^2} \\ SSC_{fine} = \dfrac{1}{\zeta_2}\left[\dfrac{1}{4r}\log\left(\dfrac{VBI \times \nu_2^X}{J_2}\right) - \alpha_\omega\right] \end{cases}$$

Acoustic inversion