

### Supplemental Movie 1. SEOR1 in Root Tip

Movement of AtSEORI-eYFP protein bodies (green) is apparent in the root tip and vascular tissue in the elongation zone of a growing root. The root is stained with Synaptored (EMD Chem., San Diego) to highlight the cell membranes. Images were taken at 10 s interval. Total running time is 16:40 minutes.

### Supplemental Movie 2. Real time imaging of phloem flow

After loading the phloem of a plant with carboxyfluorescein diacetate, the entire sieve tube system is fluorescent (not shown). Photo-bleaching a sieve tube by high laser power produces a distinct front of fluorescent label, and yellow Carboxyfluoresceindiacetate refills a sieve element towards the root tip. The first 10 frames are the final seconds of photobleaching before reducing the laser intensity to observe refilling. Images were taken at 0.355 s interval.

### Supplemental Movie 3. SEOR1 movement in injured sieve tubes

A sieve tube of a transgenic Arabidopsis line carrying SEOR1-eYFP fusion proteins. The tube is initially slightly out of focus. The location of the sieve plate is indicated by an arrow. After cutting the root tip, large yellow AtSEORI-eYFP protein agglomerates pass through a sieve plate towards the severed edge of the injured root. New agglomerates appear in the field of view from upstream sieve elements. Images were taken at 10 s interval.