Given

$$\begin{tikzcd} \operatorname{Spec} R_1 \arrow[rr] \arrow[dr] & & \operatorname{Spec} R_2 \arrow[dl] \\ & \mathcal{M}_{Ell} & \end{tikzcd}$$

the obstruction theory will produce

$$\mathcal{O}^{top}(\operatorname{Spec} R_1) \longrightarrow \mathcal{O}^{top}(\operatorname{Spec} R_2),$$

but this map will not necessarily be unique. However, if we choose $\mathcal{O}^{top}(\mathcal{M}_{Ell})$, and require that the diagr.

$$\begin{tikzcd} \mathcal{O}^{top}(\operatorname{Spec} R_1) \arrow[rr] \arrow[dr] & & \mathcal{O}^{top}(\operatorname{Spec} R_2) \arrow[dl] \\ & \mathcal{O}^{top}(\mathcal{M}_{Ell}) & \end{tikzcd}$$

commutes, then, it turns out, the top map will be unique. This uses a rel. Frob. trick.

ex $p=3$.

$$y^2 = x^3 + b_2x^2 + b_4x$$

scaling: $y \mapsto \lambda^{-3}y$, $x \mapsto \lambda^{-2}x$,

$x \mapsto x+r$; $r^3 + b_2r^2 + b_4r = 0$

$$\begin{tikzcd}
\operatorname{Spec} A[\lambda^{\pm 1}][r]/(r^3+b_2r^2+b_4r) \arrow[r] \arrow[d] & \operatorname{Spec} \overbrace{\mathbb{Z}_{(3)}[b_2,b_4]}^{A} \arrow[d, "\text{flat}"] \\
\operatorname{Spec} A \arrow[r] & \mathcal{M}_{Ell}
\end{tikzcd}$$

cohomologically like $H^*(\mathbb{Z}/3\mathbb{Z}, \text{something})$.

Ordinary locus:

$$y^2 - (x^3 + b_2x^2 + b_4x + b_6) = F(x,y)$$

$$F(x,y)^{p-1} = \text{---} + v_1 (xy)^{p-1} + \text{---}$$

Hasse invariant $= b_2$

ordinary $\iff$ b_2 unit.