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Highlights

It provides a simple and reliable prediction method for the surface settlement prediction during the operation of underground storage cavern in salt rock.

It has been proved that Gaussian function has a good adaption in the aspect of fitting surface settlement above a single cavity in salt rock.

The proposed space prediction model of surface settlement can reflect directly the relationship between cavity shrinkage of storage cavern and surface deformation.

The predicting analytical formula of annual subsidence rate has high prediction accuracy when the salt rock is in the steady creep stage.

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