1. A chronosequence is formed by debris flow deposits at the study site at Forest Falls, in the San Bernardino Mountains of southern California.

New geomorphic surfaces are formed at the site at an approximate 20 year frequency. The deposits are formed when debris flows, descending from an adjacent ridge, overflow from the channel into the surrounding ponderosa pine forest.

The age of the deposits can be determined from the age of uniform-aged stands of trees, which represent the stand established in the year after the surface formed.

2. Carbon accumulates at a lower rate at Forest Falls than at Mt. Shasta, in northern California.

Soil organic carbon accumulates most rapidly in the first 600 to 1000 years of soil development. The rates of carbon accumulation determined for the first 400 years of soil development at Forest Falls are $0.051 \text{ g kg}^{-1}$ in the upper 10 cm, $0.00056 \text{ kg m}^{-2}$ for the upper 70 cm. These rates are lower than those determined for a ponderosa pine forest in northern California at the Mt. Shasta chronosequence. The lower carbon accumulation rate at Forest Falls is most likely a factor of lower precipitation causing lower plant productivity.

3. The increasing carbon content is reflected in the soil color.

Soil color was measured in the L* - a* - b* color space using a chroma meter. In this color system, the L* value is a function of darkness and the a* value is a function of redness. Soil color in the upper 10 cm becomes darker and redder as soil age increases. Redness, though not typically associated with organic carbon, seems to be inherited from roots rather than mineralogical changes.


The decrease in bulk density is most likely due to the increasing content of low density organic matter and accumulation of biogenic pores. The bulk density decreases most rapidly at the soil surface, where organic matter and roots are most concentrated.

5. Large amounts of organic carbon are stored in buried soils.

Frequent deposition along the debris flow channel results in a common occurrence of buried soils. High carbon contents in the buried soils can originate from carbon present before burial, litter mixed into the soil during deposition, or stimulation of root growth by high nutrients and favorable physical properties of the buried A horizon.

6. Carbon incorporated into the buried soil persists at a relatively constant concentration over a time.

Comparison of soils that were buried at approximately 50 years of age indicates a slight increase of carbon concentration following burial, which is stable for at least 75 years.

<table>
<thead>
<tr>
<th>Time since burial (yr)</th>
<th>Weighted average organic carbon in the upper 10 cm (g kg$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>13.9</td>
</tr>
<tr>
<td>50</td>
<td>17.1</td>
</tr>
<tr>
<td>75</td>
<td>18.8</td>
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</table>

Acknowledgements
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