Long term post-fire regeneration dynamics in Pinus sylvestris forests affected by high-severity wildfires in the Aosta Valley (Italy)

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Large crown fires in the Aosta Valley mostly occur in south-facing slopes where xeric conditions favour the presence of highly flammable conifer stands dominated by Pinus sylvestris. North-facing slopes are less affected by the occurrence of wildfires but the availability of large fuel amounts and prolonged drought periods can raise the fire risk also in these areas. Although stand-replacing wildfires affected about 20% of the total burned forest area from 1989 to 2017, the scarce fire adaptations of Pinus sylvestris pose serious problems for the regeneration of this species and a suitable post-fire management strategy is thus required to enhance this process. Long and mid-term forest regeneration dynamics of Pinus sylvestris were explored using both field surveys and remote sensing techniques in 12 stand-replacing wildfires occurred between 1989 and 2006 in the Aosta Valley. Tree regeneration at different development stages was sampled during 2017 and its fractional cover was also assessed. Time series of Landsat derived spectral vegetation indices were employed to track forest regeneration over time and temporal trajectories were modelled using robust regression methods to assess the magnitude and the direction of spectral changes throughout the years.