

Remote sensing for the observation of senescence in Conference pear trees



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Summary



1 Why to observe senescence?



2 What time & colour patterns?



3 Can we see senescence from satellite?





Why to observe senescence?



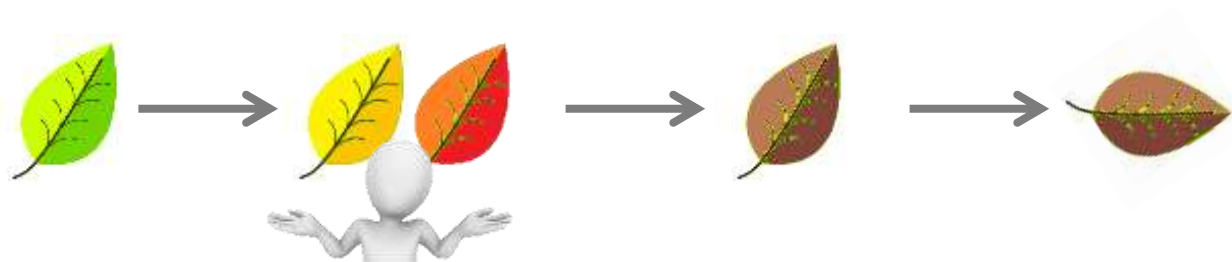
Pear decline (*Candidatus Phytoplasma pyri*)



Graft incompatibility

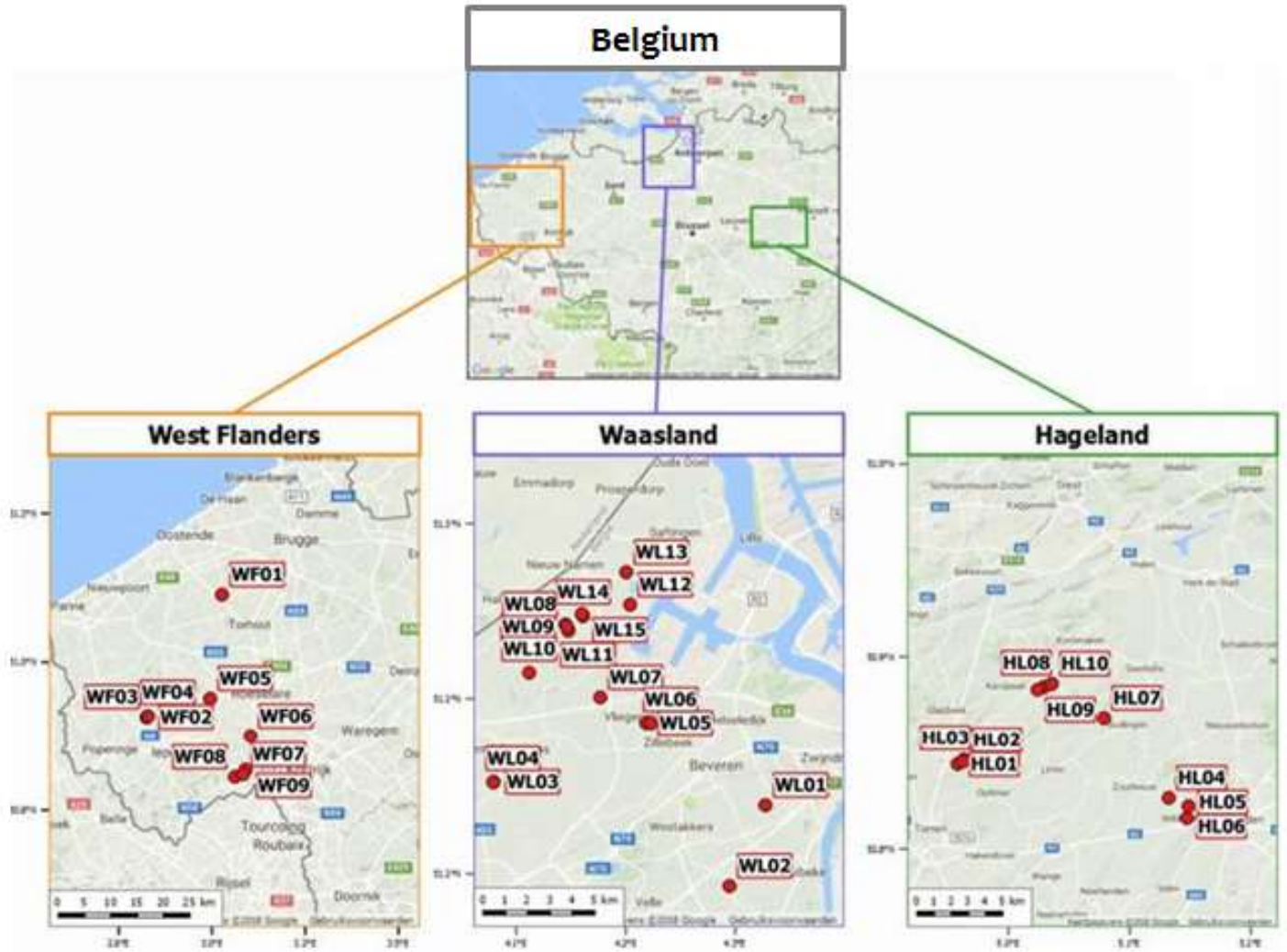


Fireblight





What time & colour patterns?





What time & colour patterns?





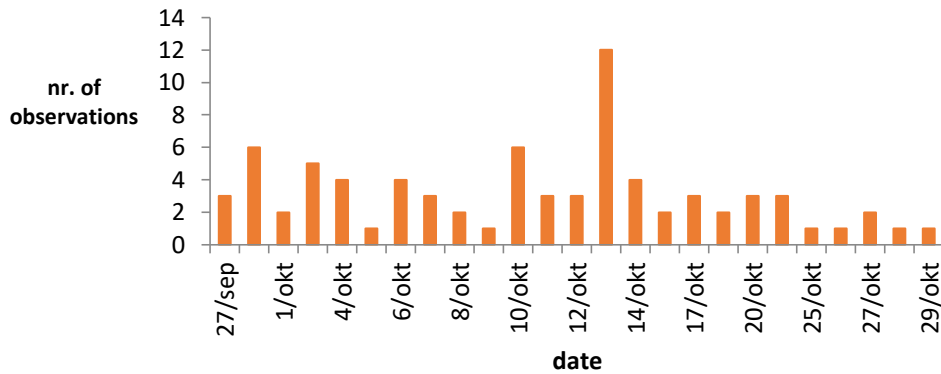
What time & colour patterns?



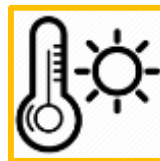
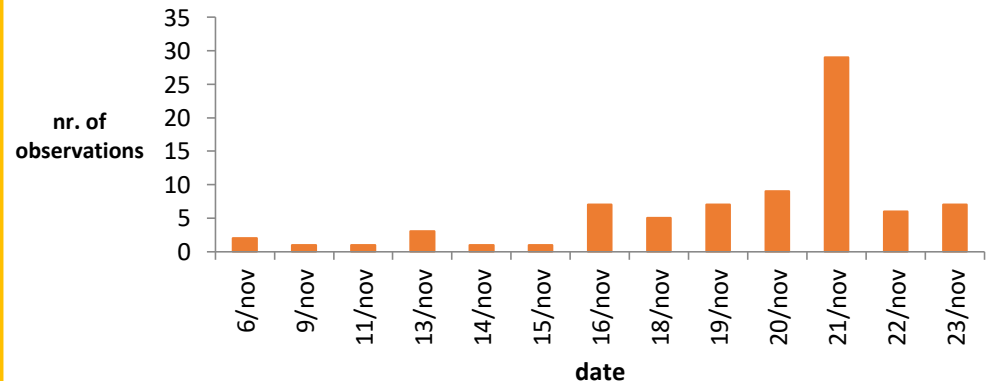


What time & colour patterns?

Frequency distribution of the beginning of senescence



Frequency distribution of the end of senescence





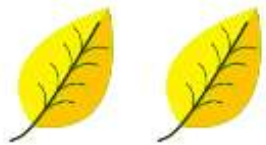
What time & colour patterns?

DEOS (days)

41

41

34



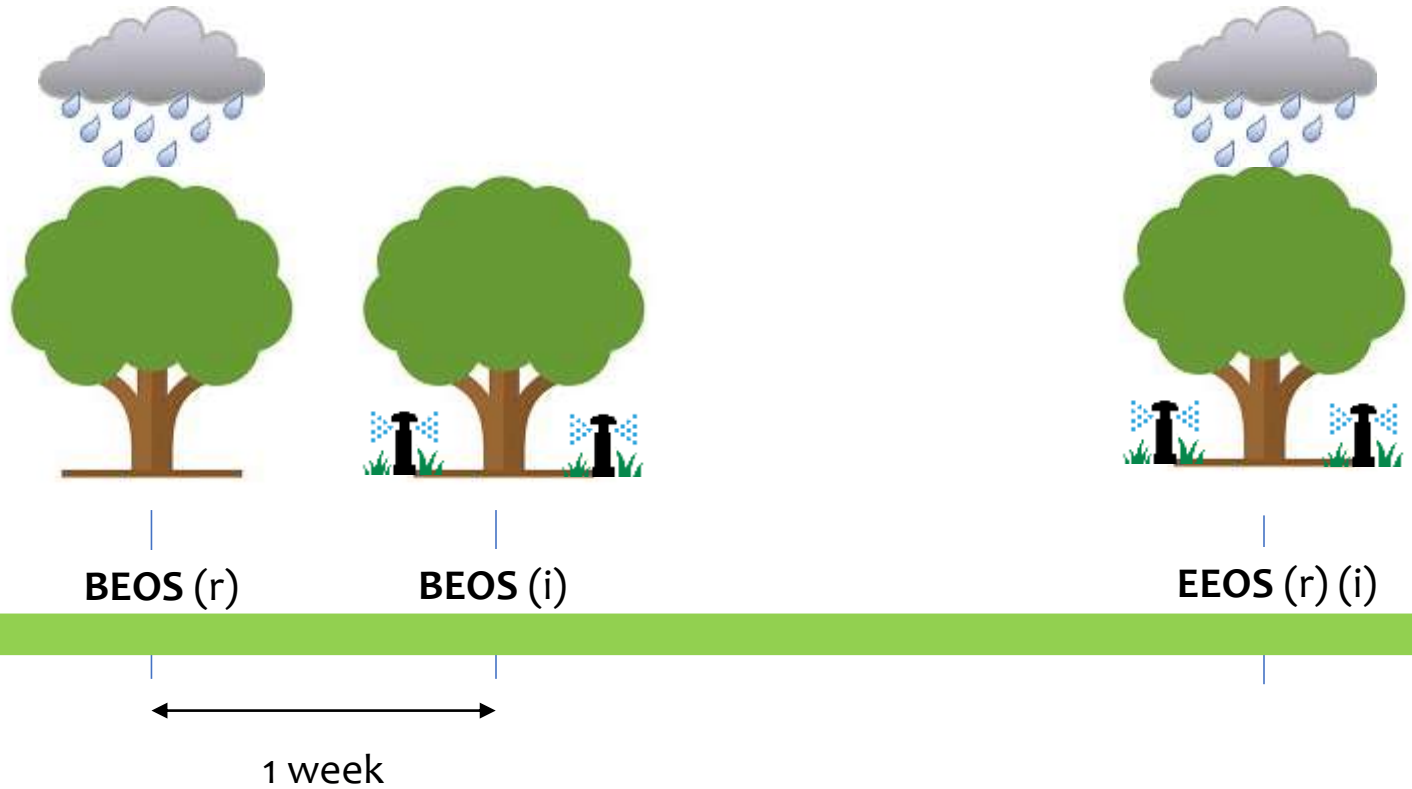
62%

10%

27%



What time & colour patterns?





What time & colour patterns?

BEOS

- First half of October

EEOS

- 21st of November \pm 2 days

DEOS

- 35 to 44 days

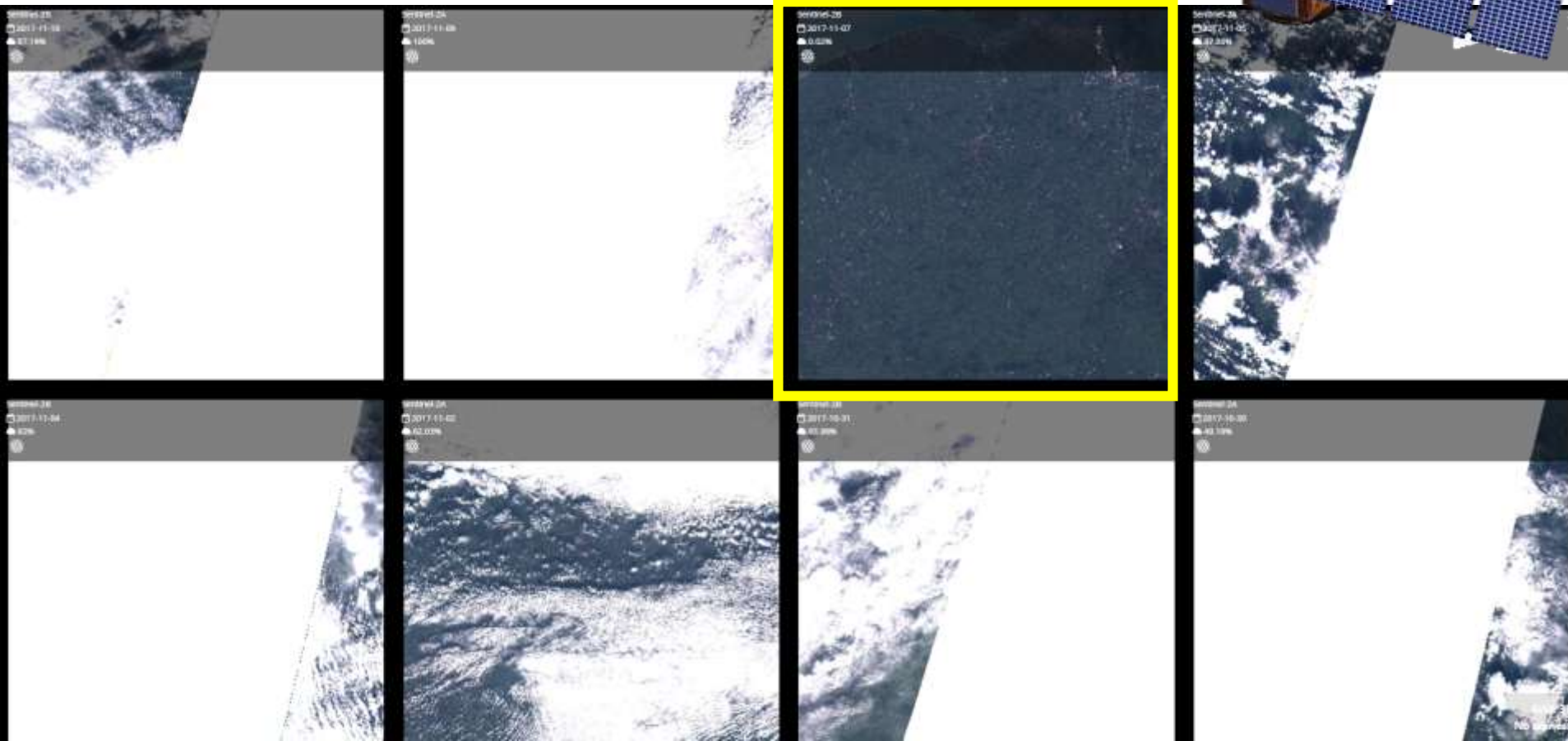
Colour

- Yellow foliage – sometimes red



What potential for Sentinel-2?

7th November 2017





What potential for Sentinel-2?



Late sen.
High VI



Medium sen.
Medium VI



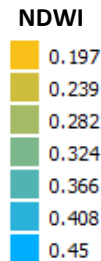
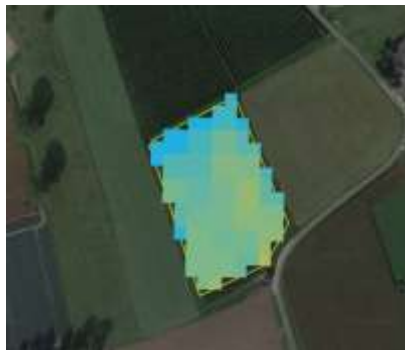
Early sen.
Low VI

Which VI to use?

Vegetation Index	Formula
CIG	$R_{780}/R_{550} - 1$
→ CIRE	$R_{780}/R_{705} - 1$
EVI	$2.5 * (NIR - Red) / (NIR + 2.4 * Red + 1)$
NDVI	$(NIR - Red_r) / (NIR + Red_r)$
→ NDWI	$(NIR - SWIR) / (NIR + SWIR)$
GRVI	$(Green - Red) / (Green + Red)$
YI	Green/Blue
NDYI	$(Green - Blue) / (Green + Blue)$

$$R^2 (NDWI-BEOS) = 0.69$$

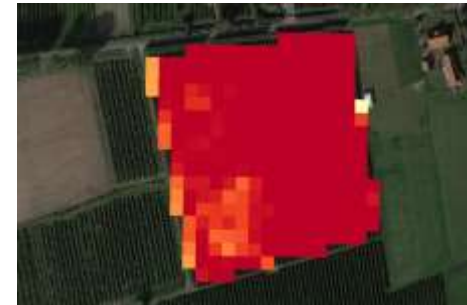
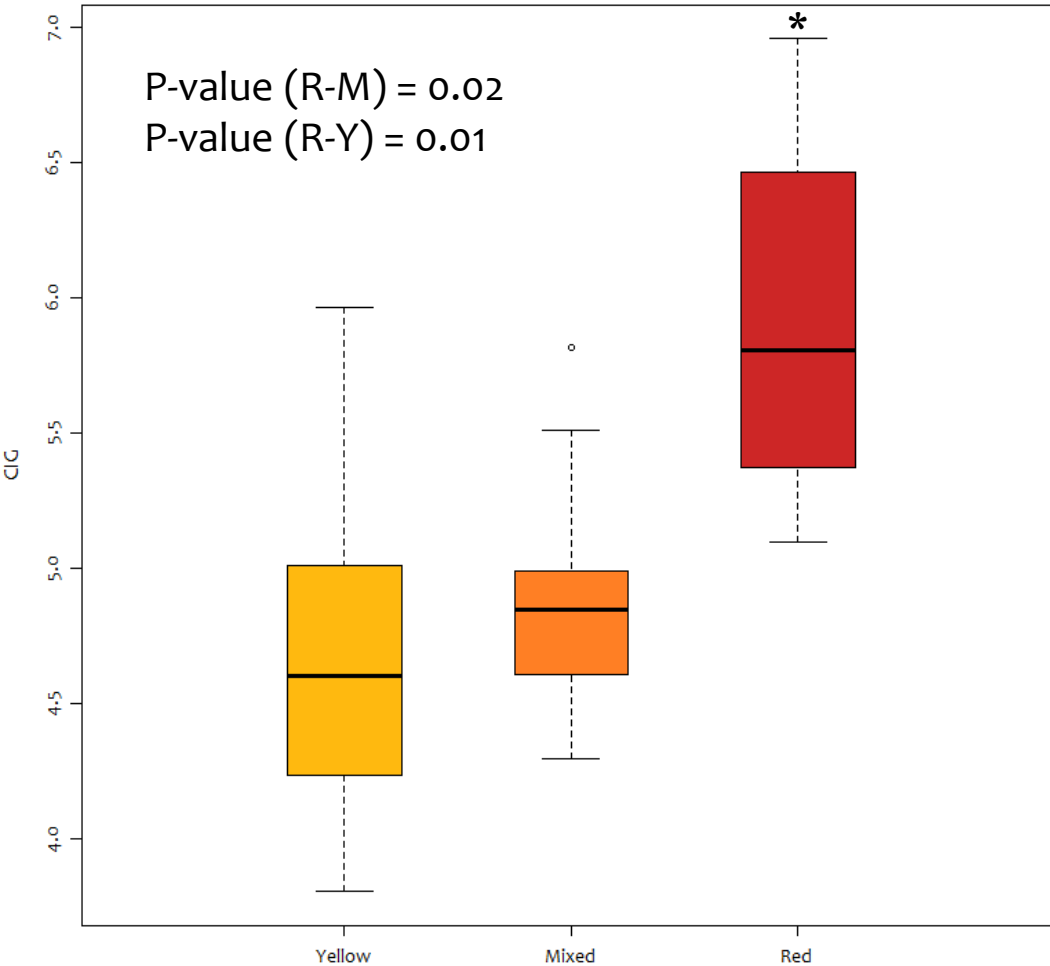
Waasland orchard nr. 1
Beginning of senescence:
29th September



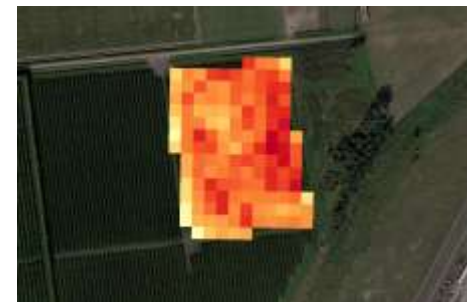
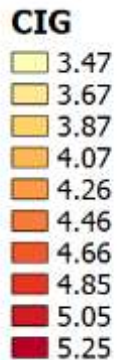
West Flanders orchard nr. 6
Beginning of senescence:
15th October



What potential for Sentinel-2?



Waasland orchard nr. 3
Colour class: Red



Waasland orchard nr. 12
Colour class: Yellow



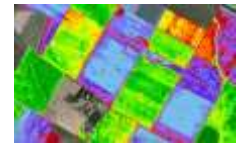
Conclusions



Observation of senescence can open new perspectives on **stress detection**



There are clear **patterns** in the temporal and colour dynamics of senescence



Satellite data can provide information about the stage of senescence and the colour of the foliage – potential to be explored in time series analyses



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Thank you for your attention



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