Biodiversity changes as a consequence of Climate Change in Flanders

Luc De Bruyn, Dirk Maes, Geert De Knijf, Beatrijs Van der Aa

Research Institute for Nature and Forest (INBO)
luc.debruyn@inbo.be

inbo
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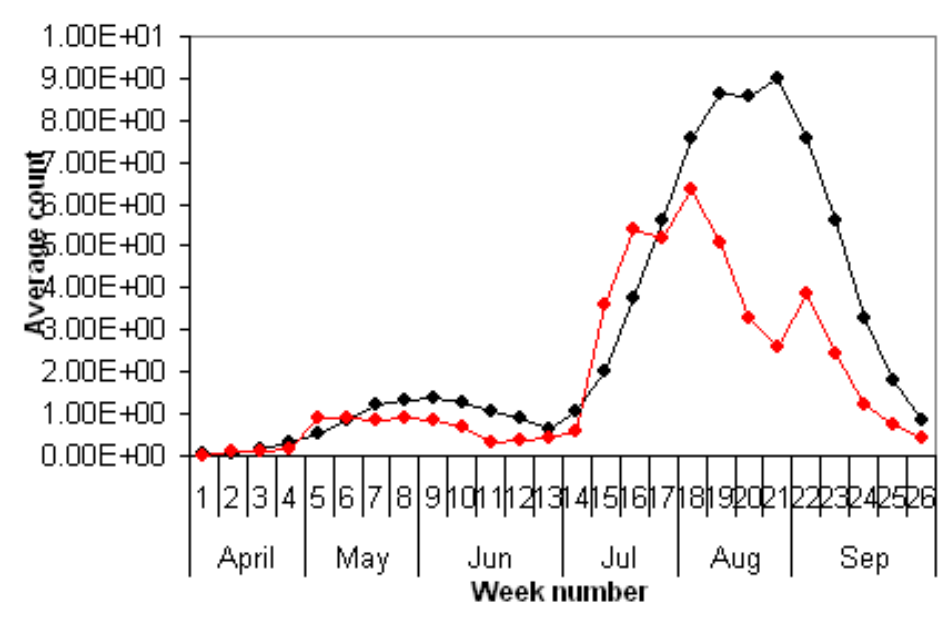
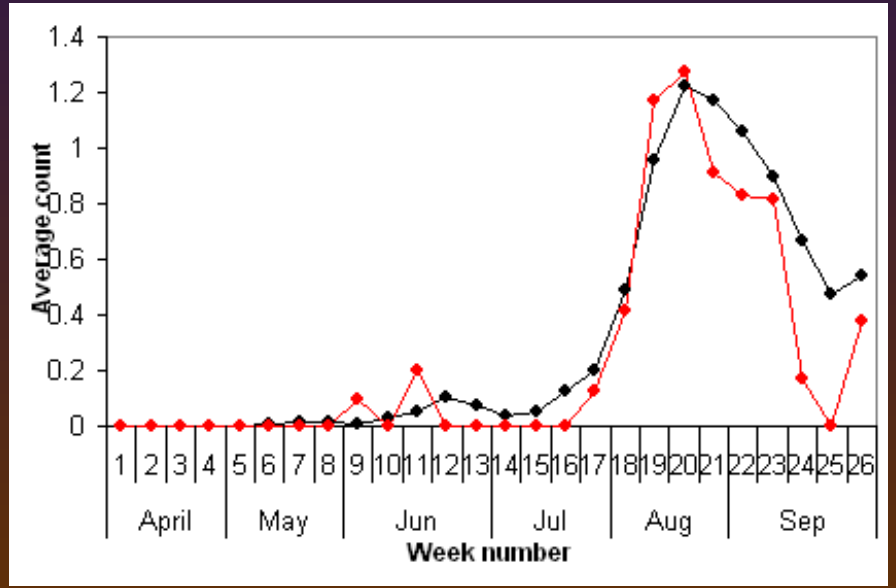
Effects of climate on biodiversity ?

Southern species

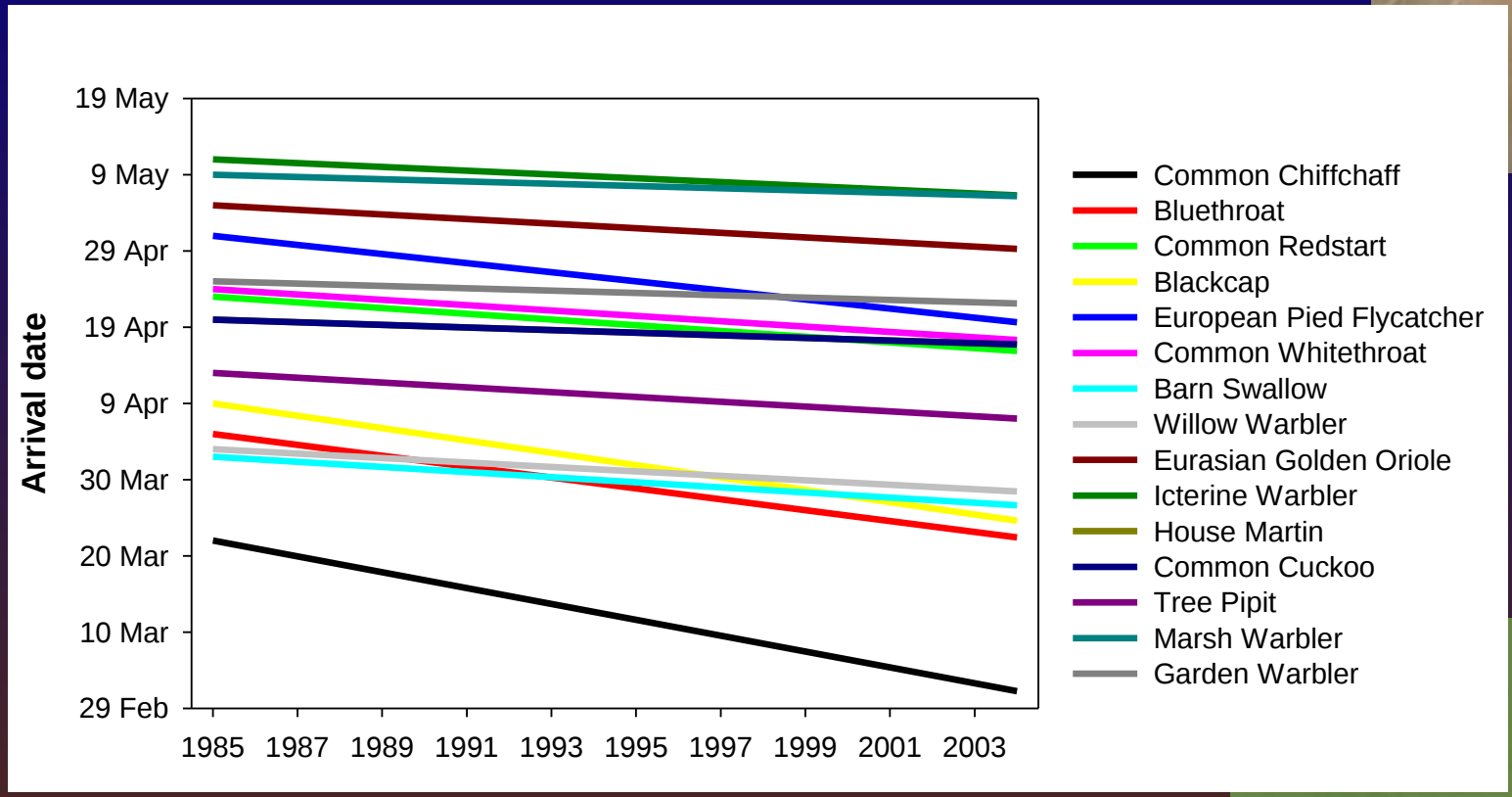
Phenological activities





Migratory birds, fist arrival date

- 15 species

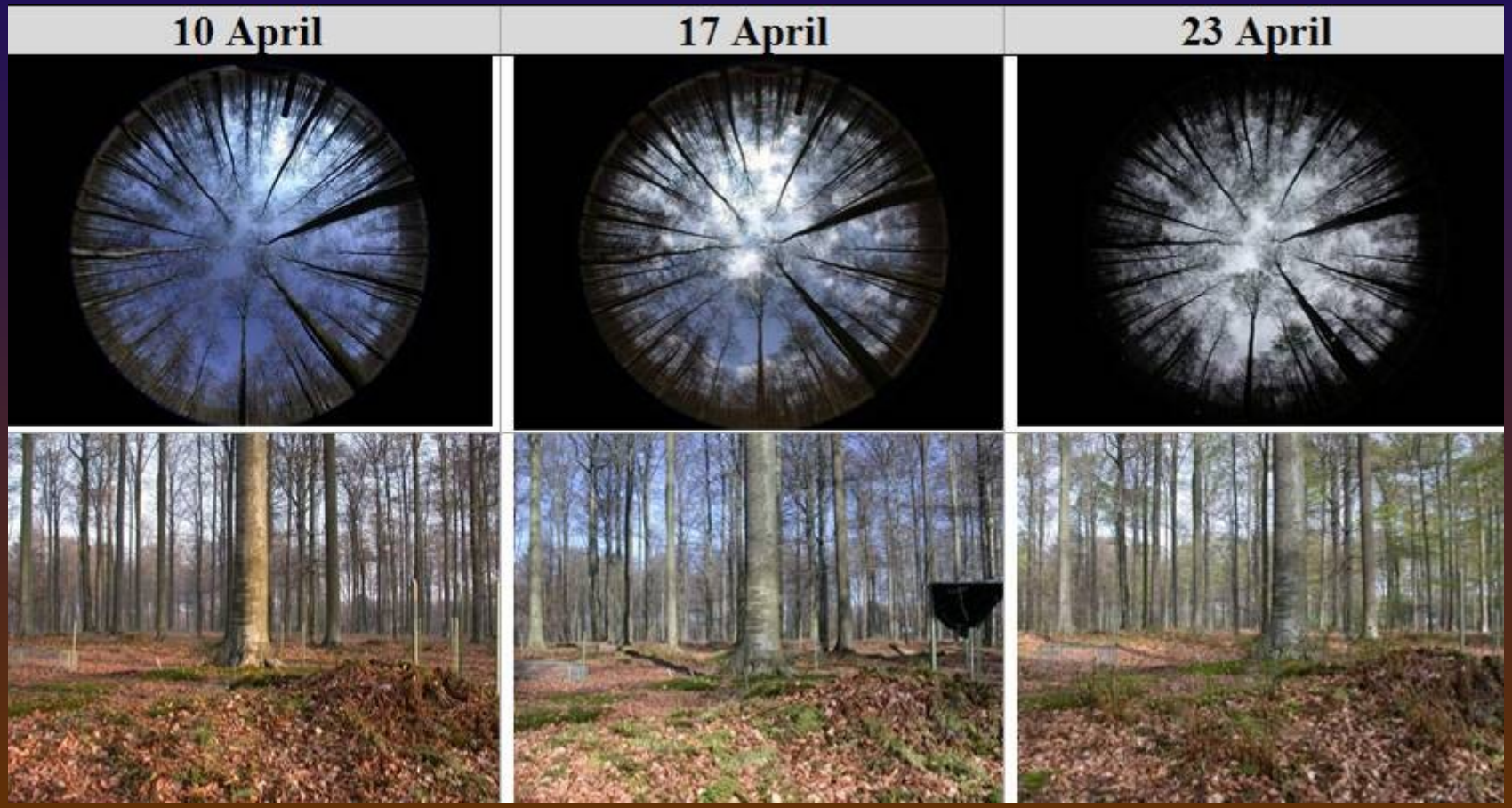


- overall : 7.63 days (0.45 days / jaar)
- Common Tjiftjaf : 20 days (1.16 days / jaar)
- Marsh Warbler : 3 days (0.17 days / jaar)

Leysen & Herreman (2004) Natuur.Oriolus 70: 33-42

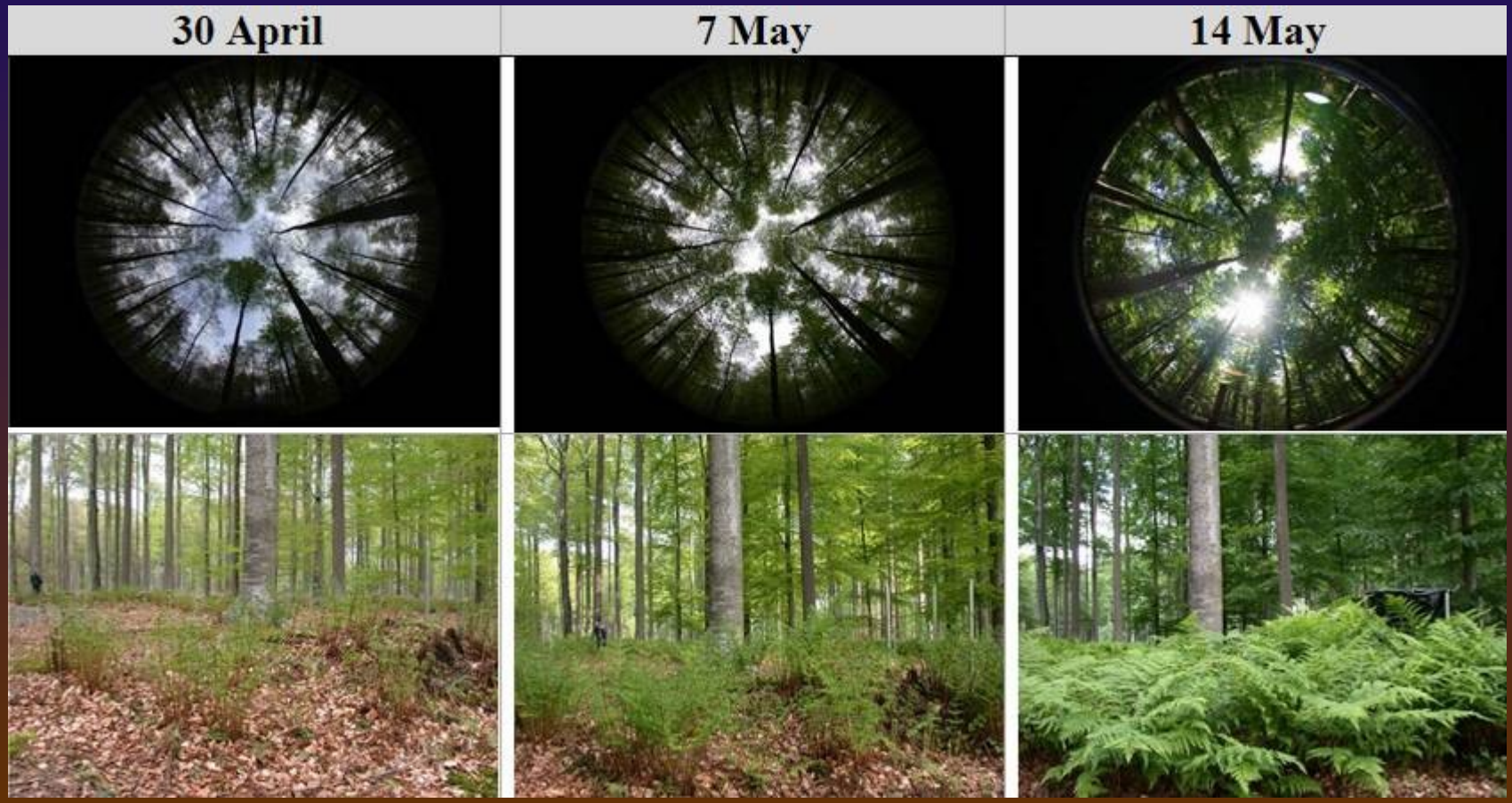
Tree phenology: budbirst

- Oak and Beech
- Weekly intervals
- The same selected trees

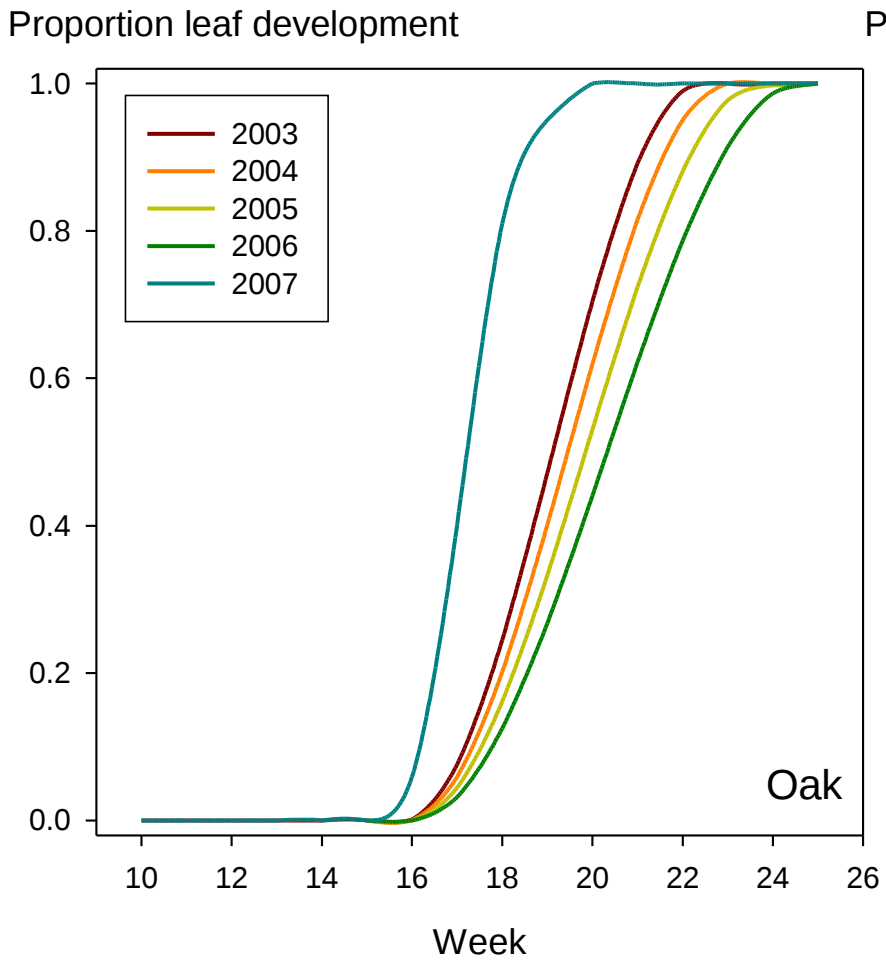


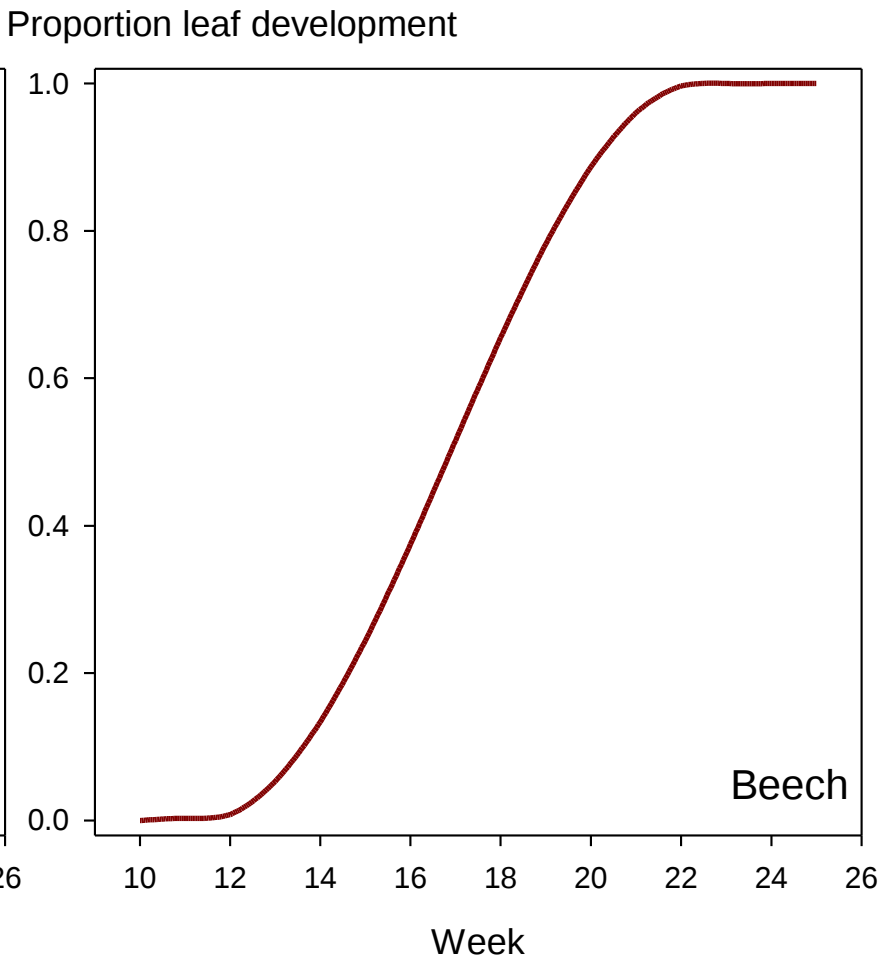
Tree phenology: budbirst

- 1 – nothing present
- 2 – not abundant, small parts of the crown
- 3 – between 2 and 4
- 4 – abundant, spread all over the crown
- 5 - complete



Tree phenology: budbirst



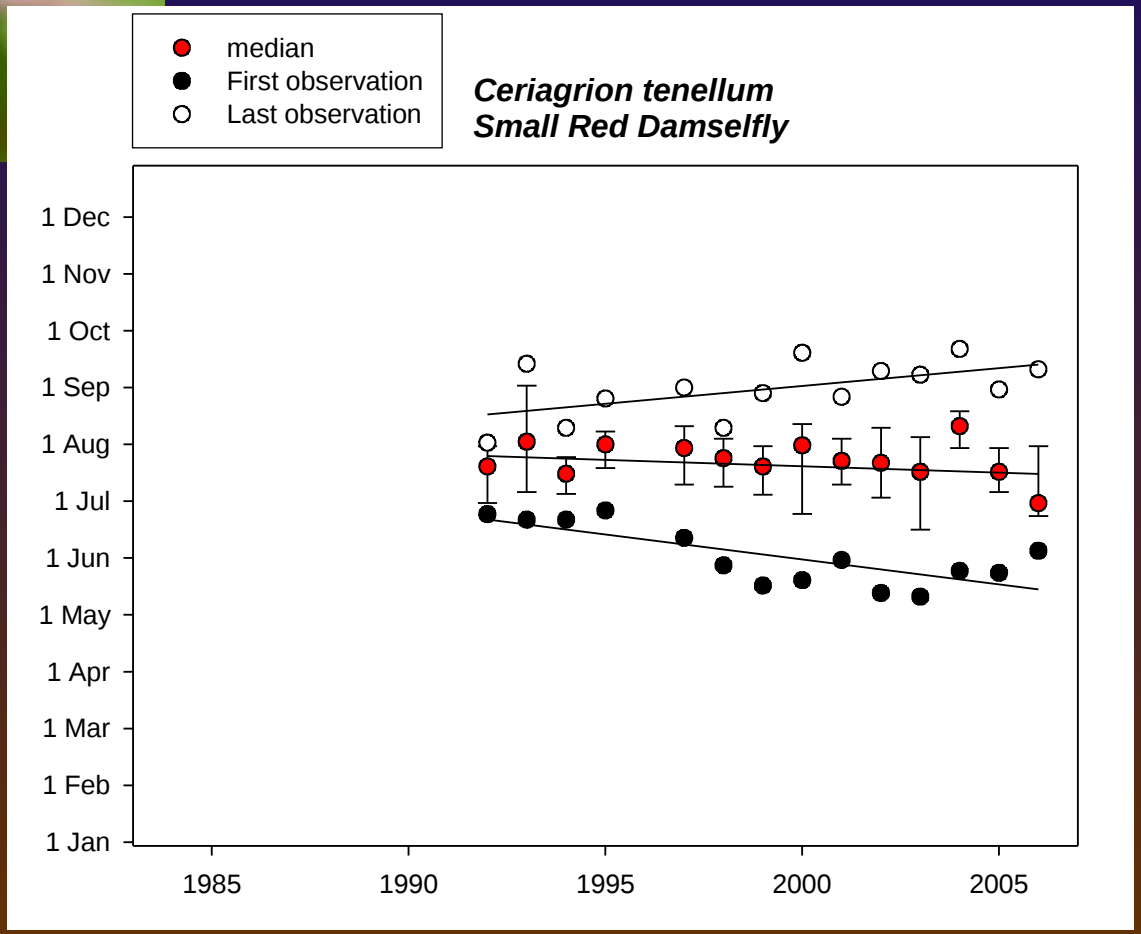


Flight period Odonata

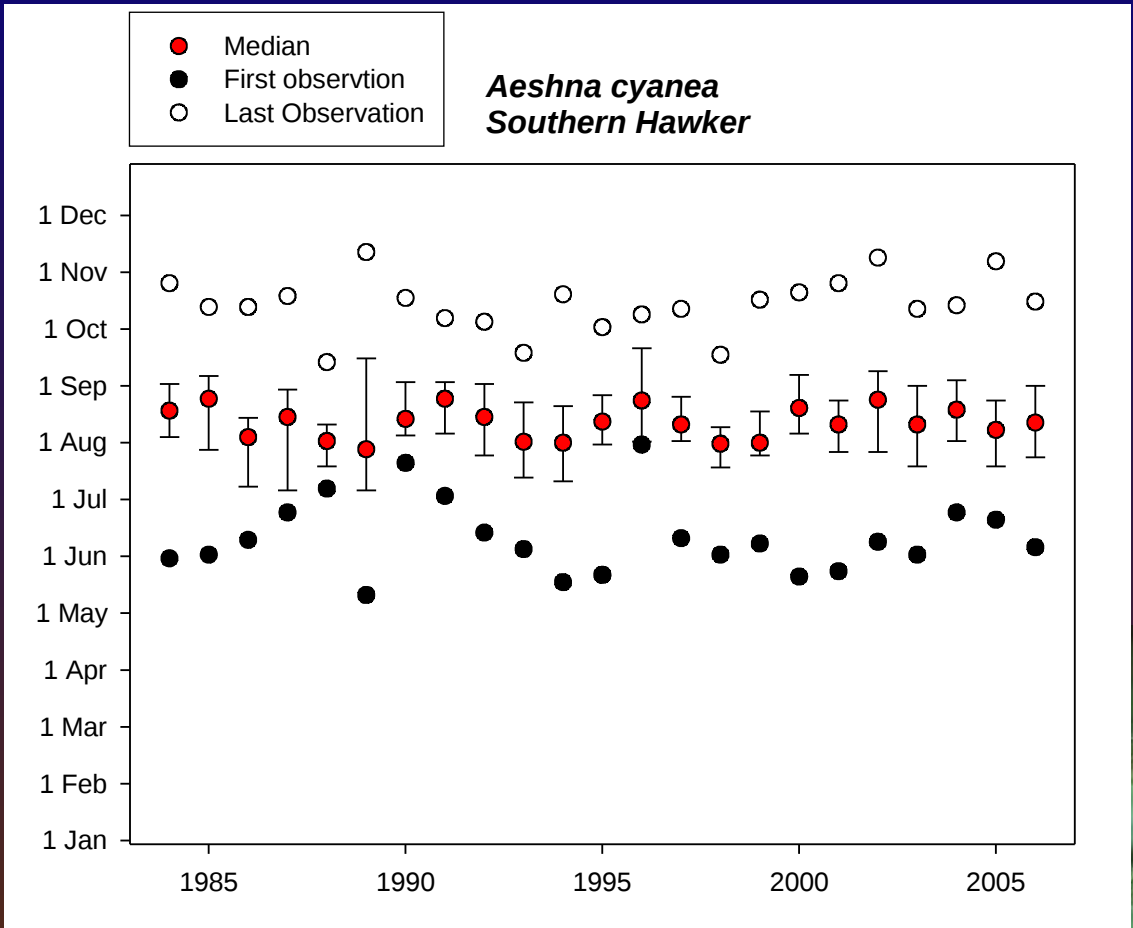
- 1984-2006
- 26 species

Flight period Odonata

- Spring 2.72 days / year
- Autumn 1.94 days / year



Flight period Odonata



Flight period Odonata

Changes in phenology between 1984 and 2006
for 26 Odonate species

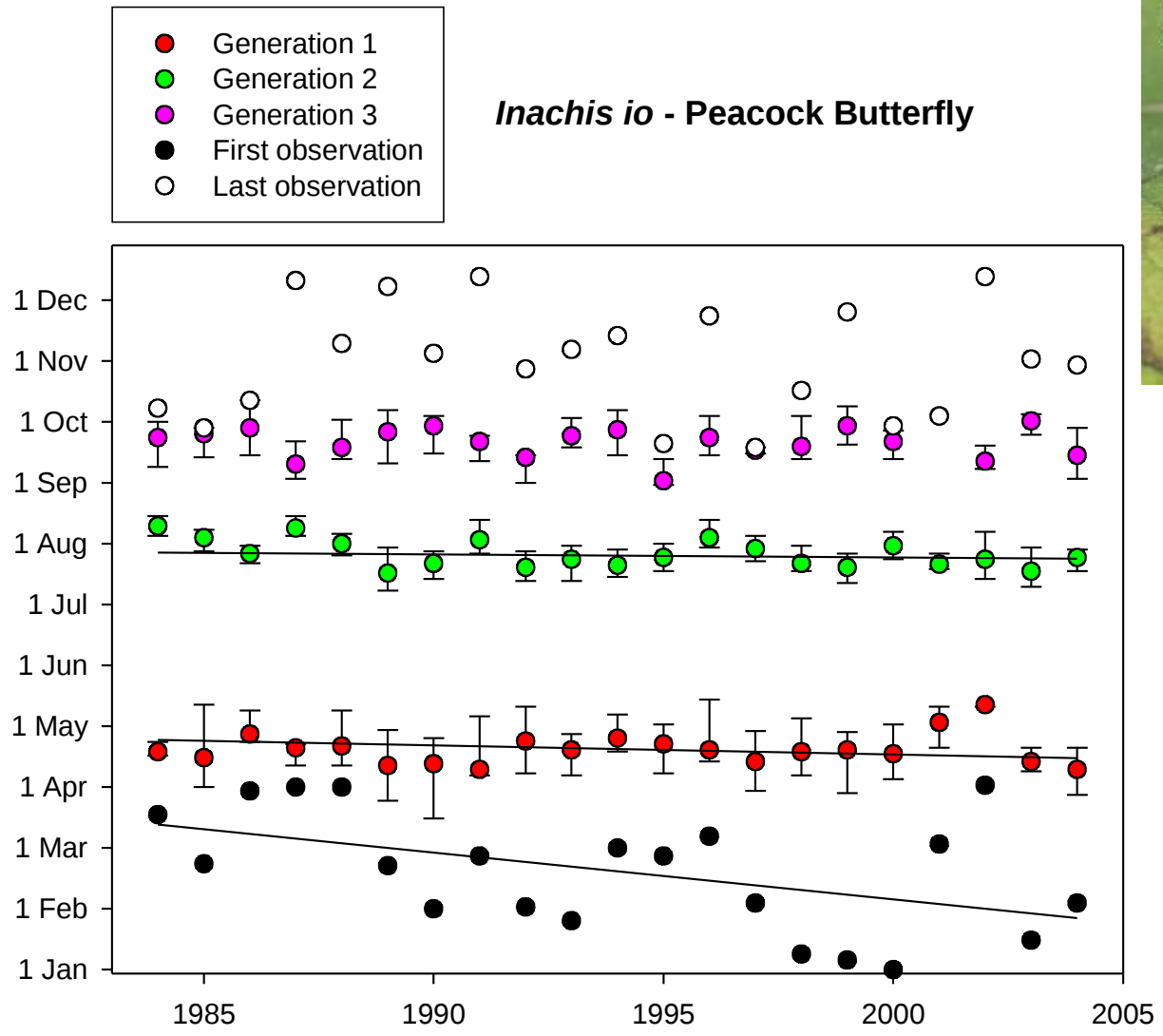
	Flight period		
	Earlier	Later	No change
First observation	8		18
Mean	11	2	13
Last observation		5	21

Flight period Butterflies

- 1984 - 2004
- 26 species

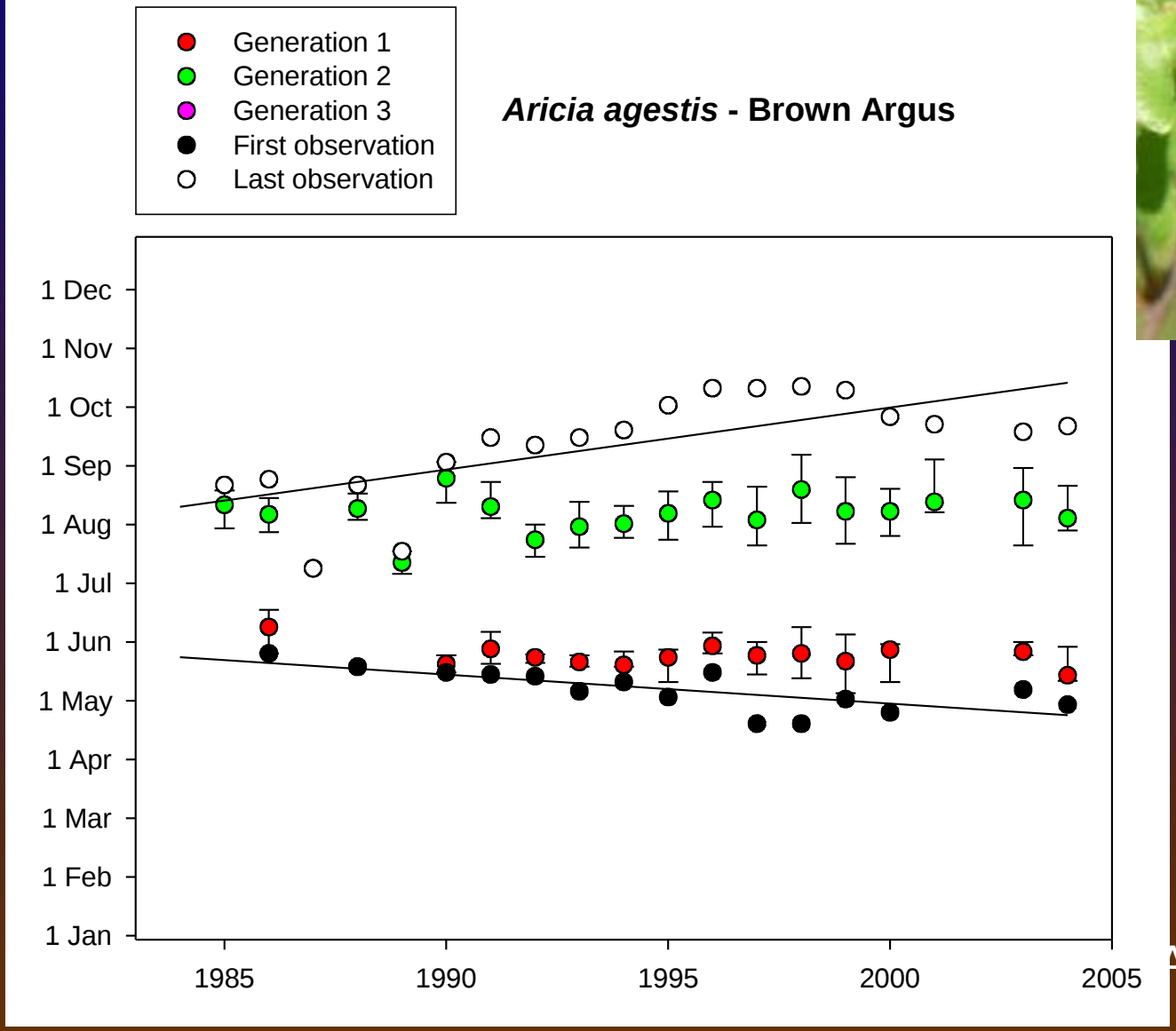
Vlinderwerkgroep

Flight period Butterflies



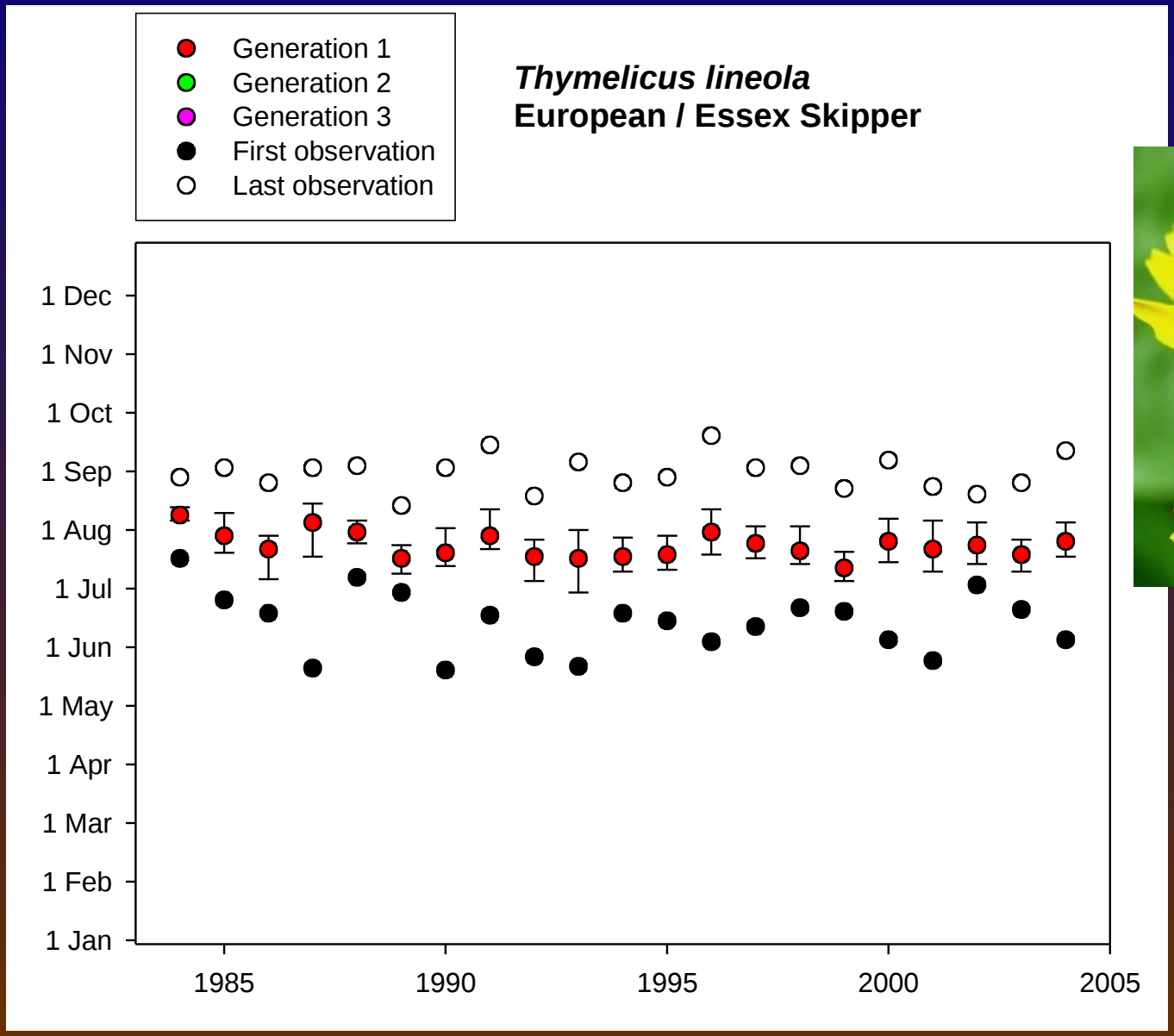
Spring 2.39 days / year

Flight period Butterflies



Autumn 3.27 days / year

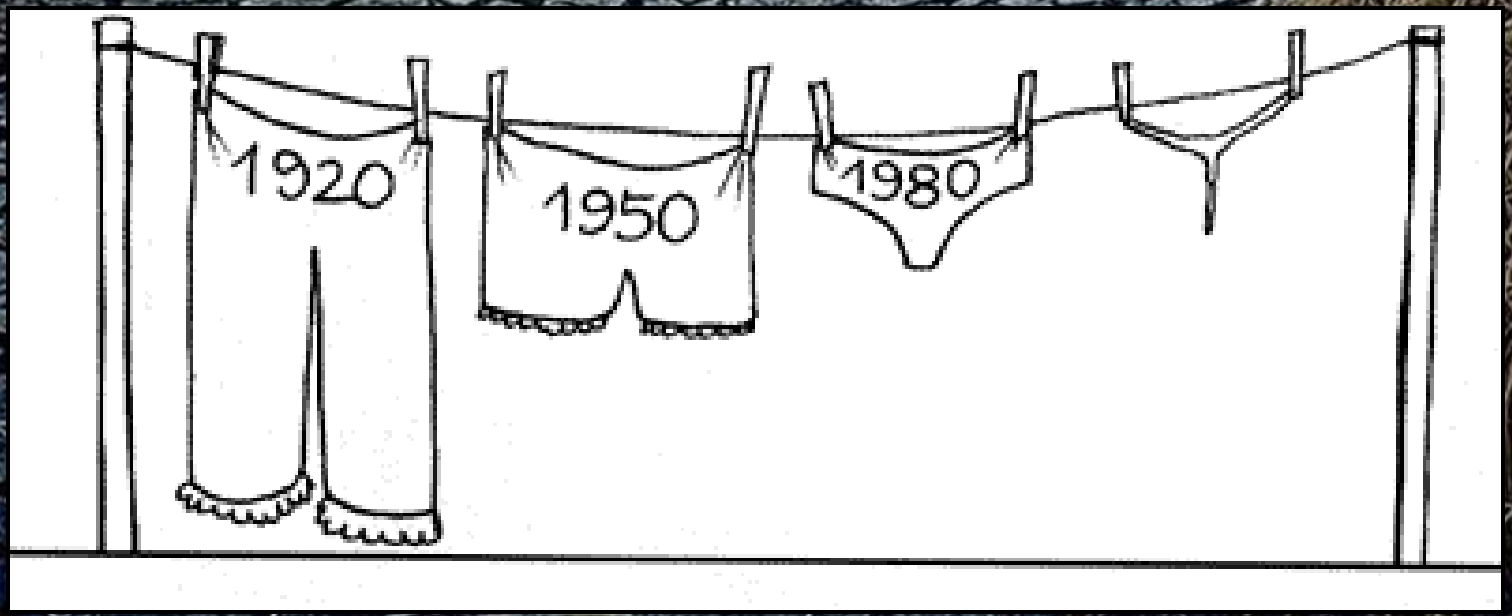
Flight period Butterflies



Flight period Butterflies

Species with		Flight period: Earlier	Later	No change
One generation		8		2
Two generations	gen 1	5	2	4
	Gen 2	3	6	2
	gen 1	3		2
Three generations	gen 2	3	1	1
	gen 3	1		4

Are the changes related to climate change ?



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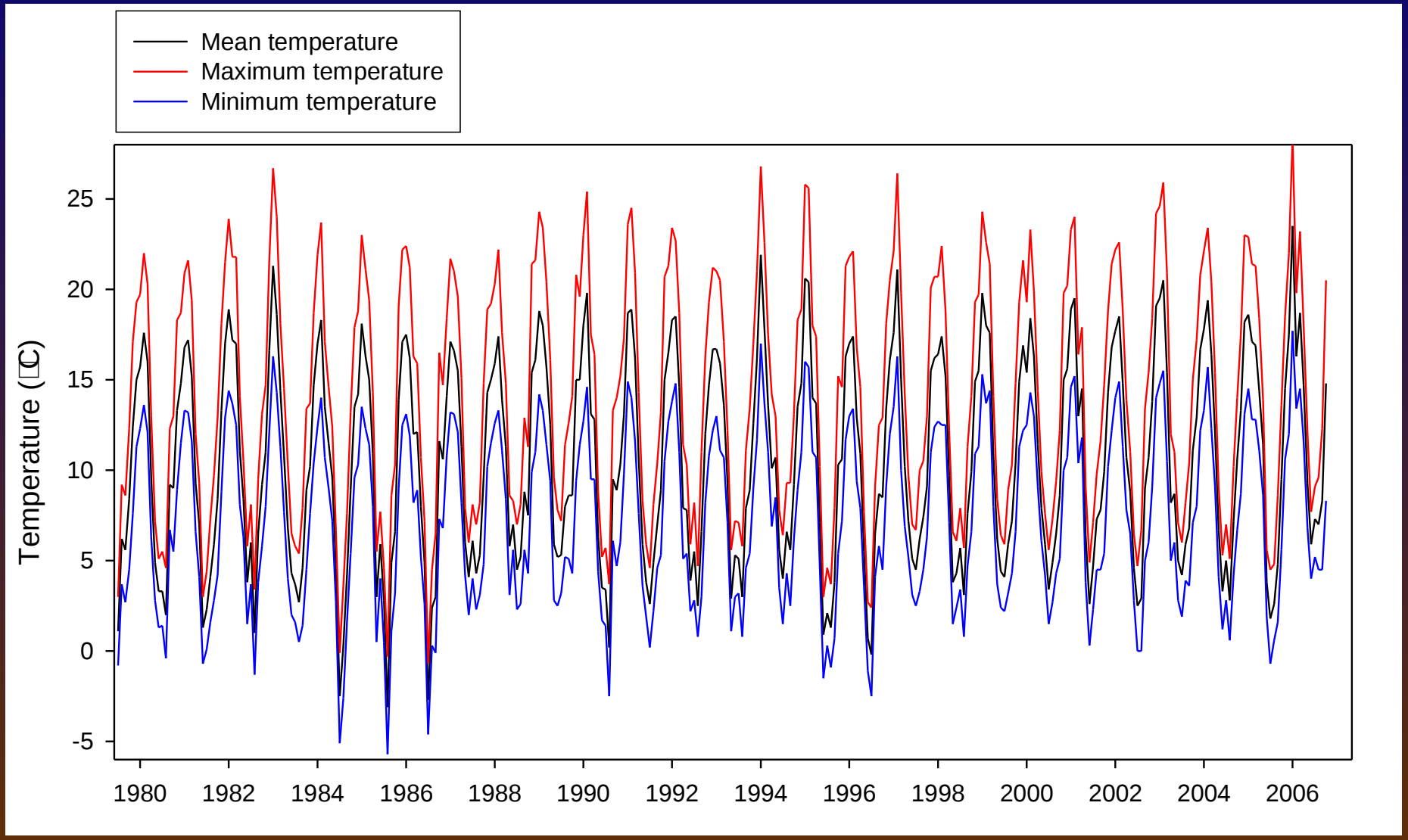

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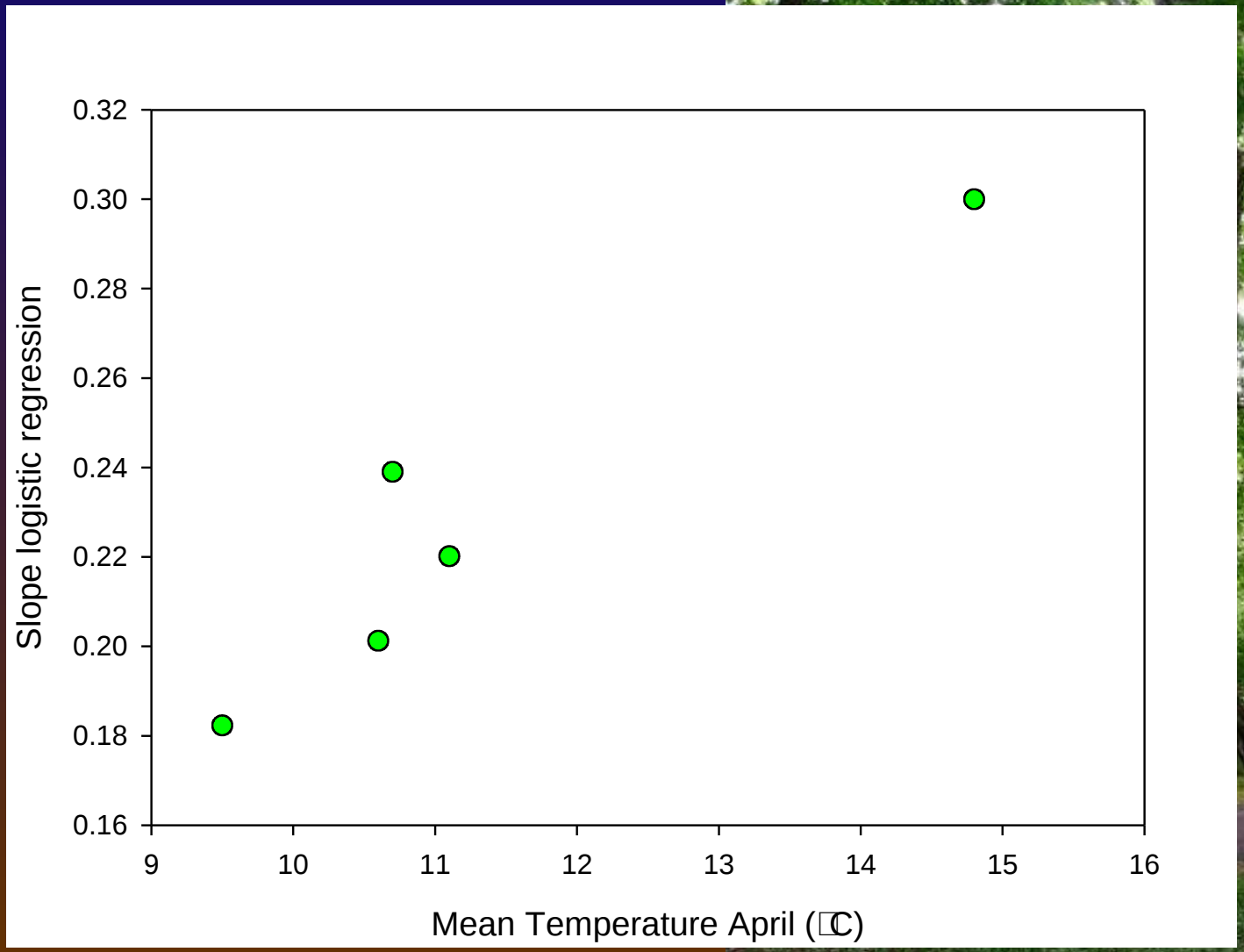


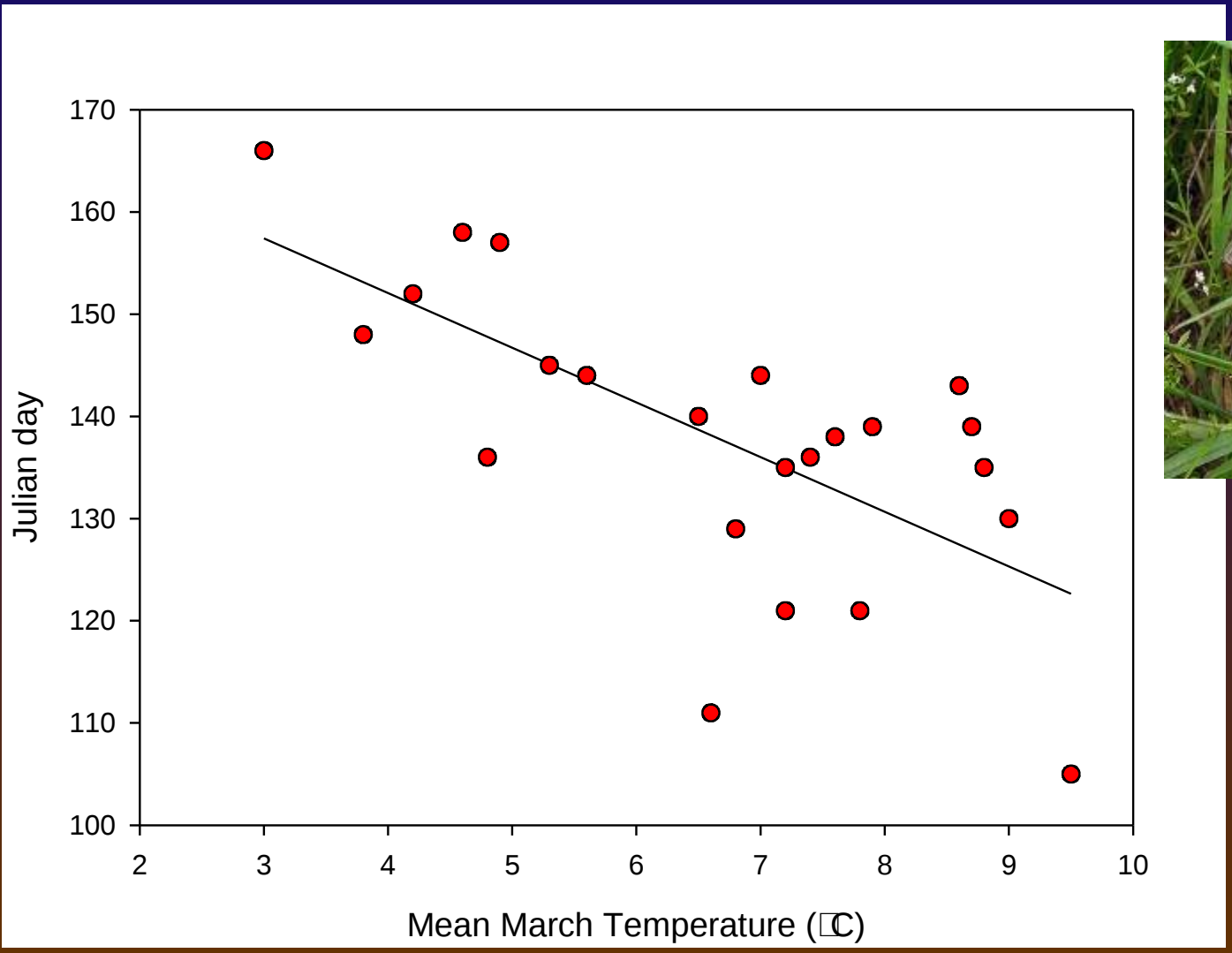
Are the changes related to climate change ?

Odonata

Species	Jan	Feb	Mar	Apr	May	Jun
Aeshna cyanea					*	
Aeshna grandis	*				*	
Anax imperator			***	**		
Aeshna mixta						
Cordulia aenea				*	***	*
Coenagrion puella		*				
Calopteryx splendens				***	**	
Enallagma cyathigerum			*			
Erythromma najas				**	***	*
Erythromma viridulum						
Ischnura elegans			*			
Libellula depressa			*	***	**	
Libellula quadrimaculata			*			
Lestes sponsa		*	*			
Lestes viridis						**
Orthetrum cancellatum			***			
Pyrrhosoma nymphula			*			
Platycnemis pennipes						**
Sympetrum danae						
Sympetrum sanguineum						
Sympetrum striolatum		*	***			**
Sympetrum vulgatum				*		*

Are the changes related to climate change ?

Anax imperator



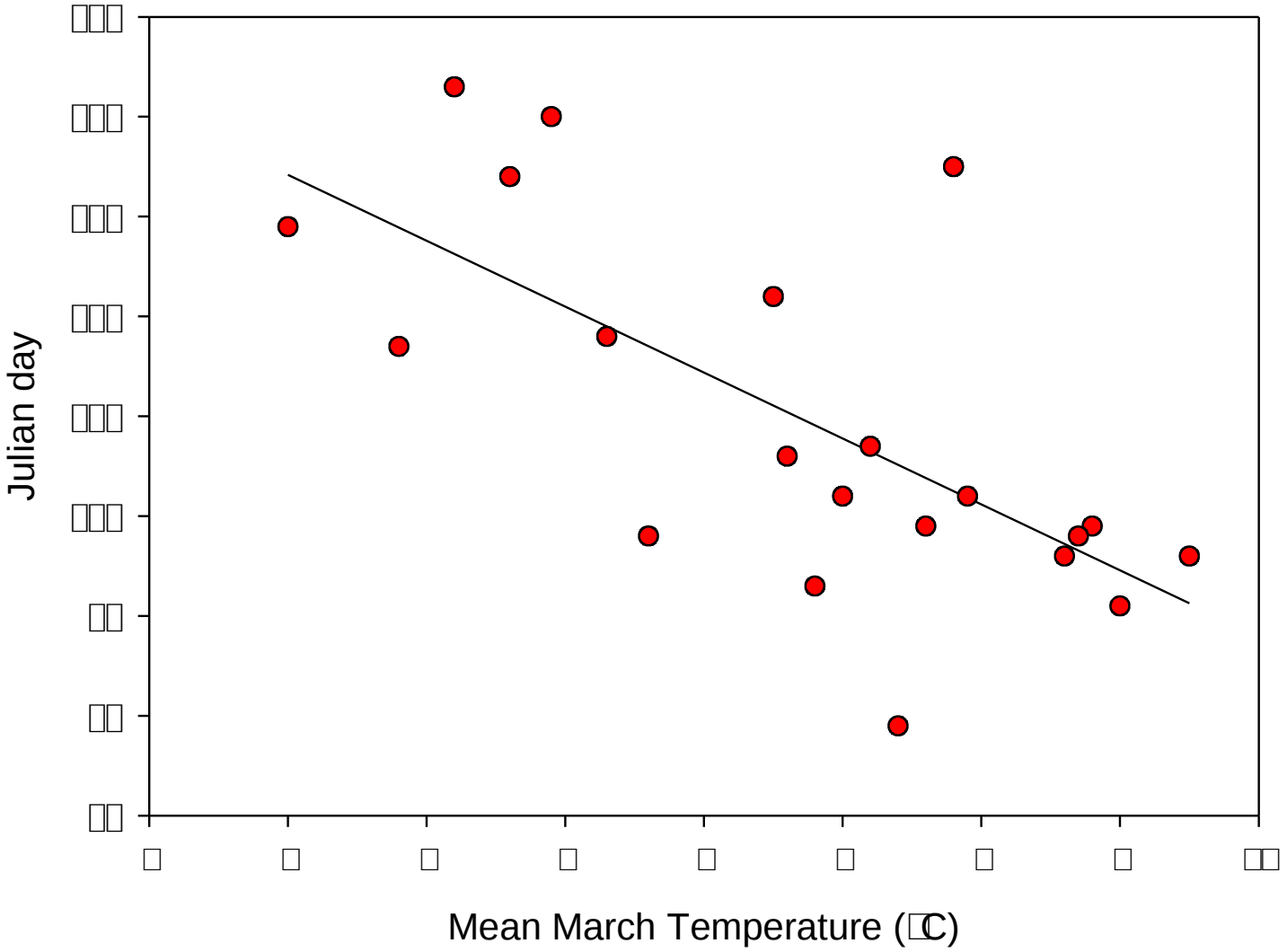
Are the changes related to climate change ?

Butterflies

Species	Jan	Feb	Mar	Apr	May	Jun
Anthocharis cardamines			**	*		
Aphantopus hyperantus			**			
Araschnia levana			*	*		
Aglais urticae						
Celastrina argiolus			**	*		
Coenonympha pamphilus			*			
Gonepteryx rhamni	*					
Hipparchia semele			**			*
Inachis io			*			
Lasiommata megera			*			
Lycaena phlaeas			***			
Maniola jurtina			**			
Neozephyrus quercus				*	*	
Ochlodes venata					**	
Pararge aegeria			*			
Pieris brassicae			*			
Polygonia c-album			*			
Polyommatus icarus			*			
Papilio machaon						
Pieris napi			***	**		
Pieris rapae			*			
Pyronia tithonus			*			
Thymelicus lineola						

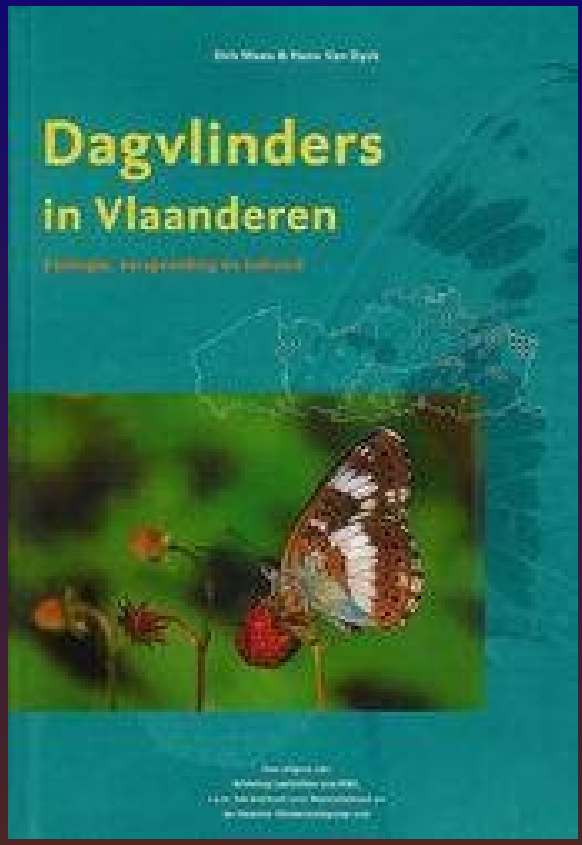
Are the changes related to climate change ?

Small copper



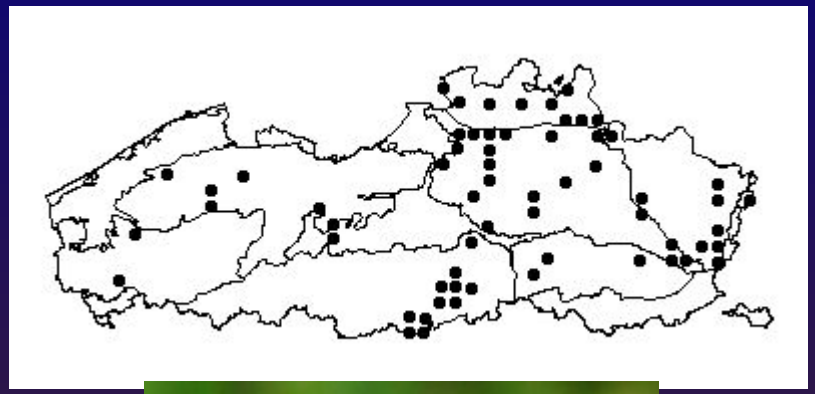
So what ?

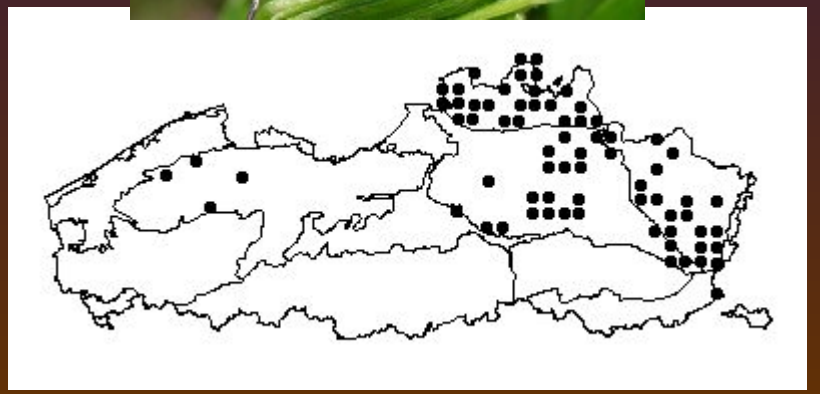
Phenology and distribution



Distribution maps
5x5 km UTM squares

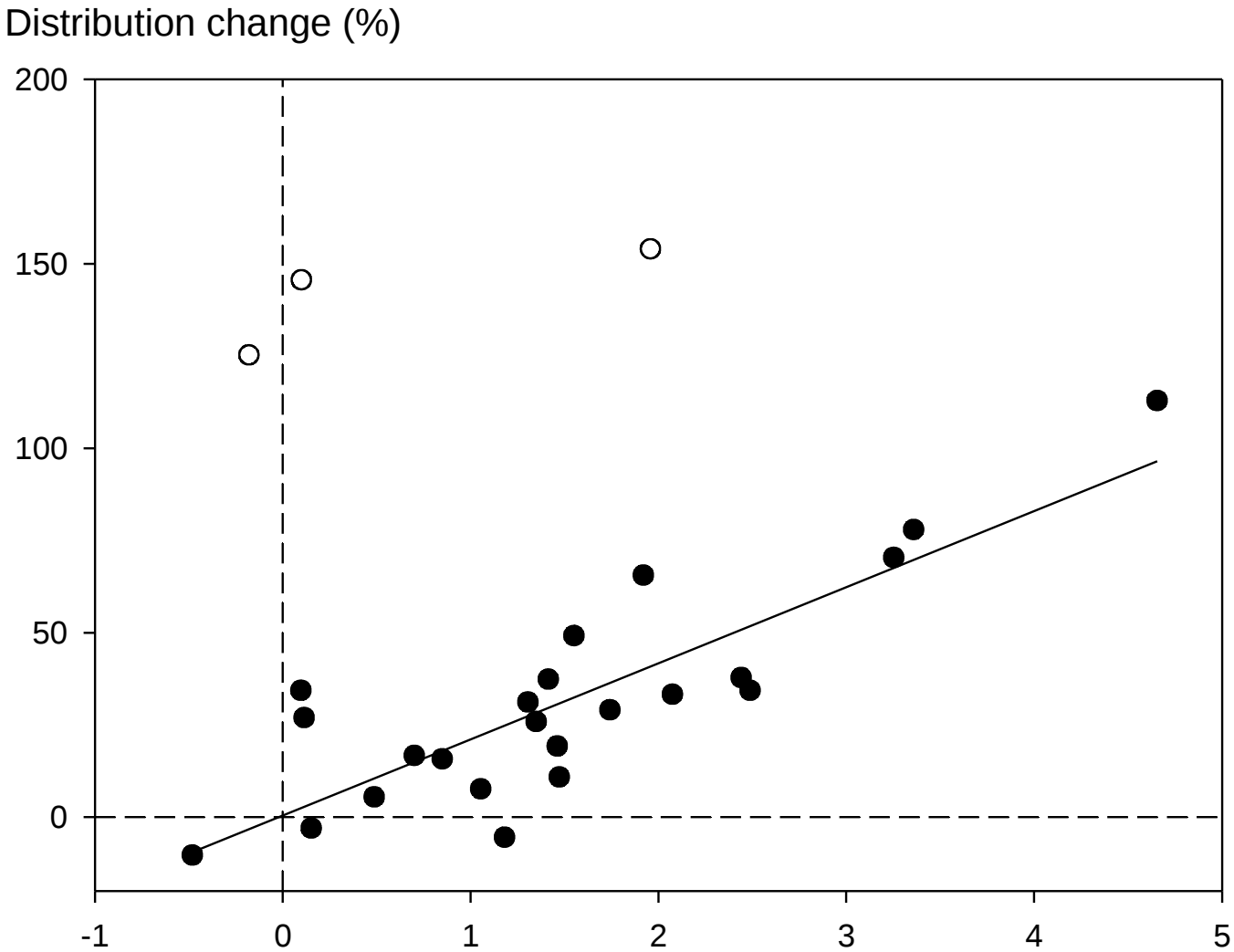
Phenology and distribution





Phenology and distribution

Odonata



Phenology and distribution

Butterflies