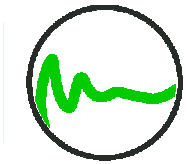

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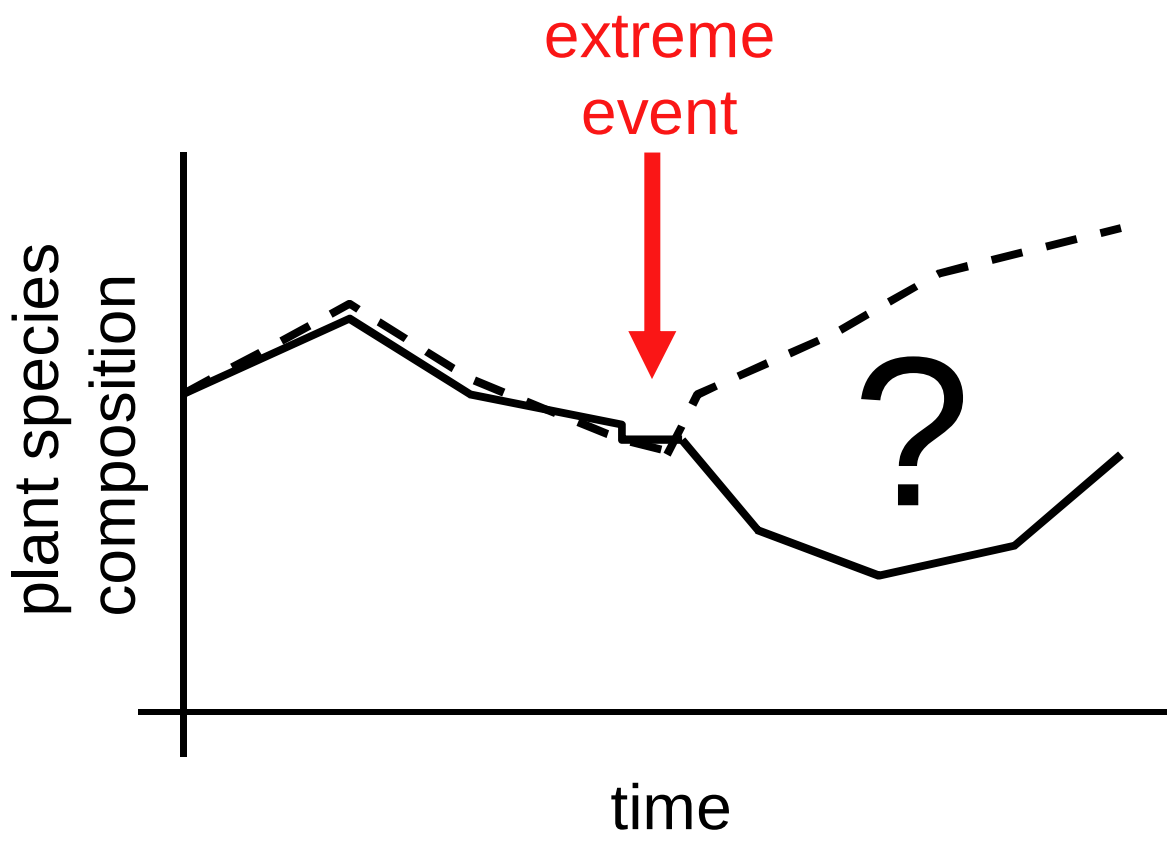
Stochastic trajectories of succession initiated by extreme climatic events

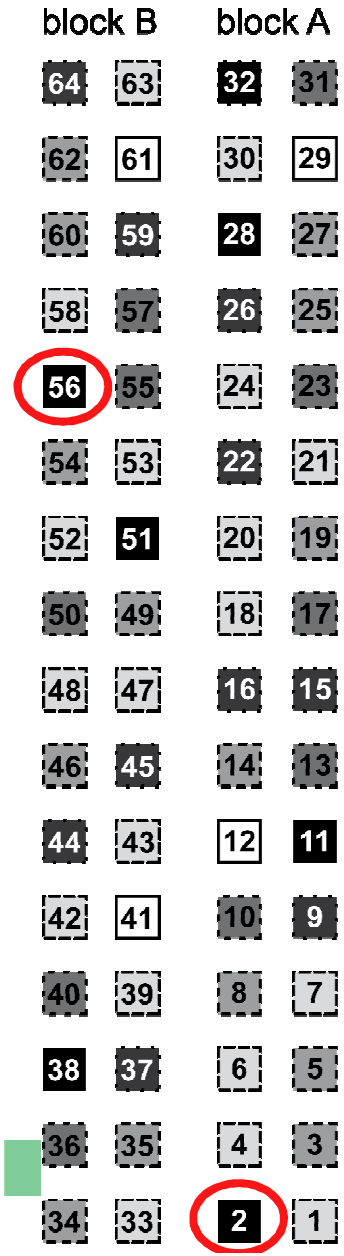
Jürgen Kreyling, Anke Jentsch, Carl Beierkuhnlein

Succession and Extreme Events



rule-based (deterministic) development after extremes?

Field Experiment



x 0 species

x 1 species

x 2 species

x 4 species

x 8 species

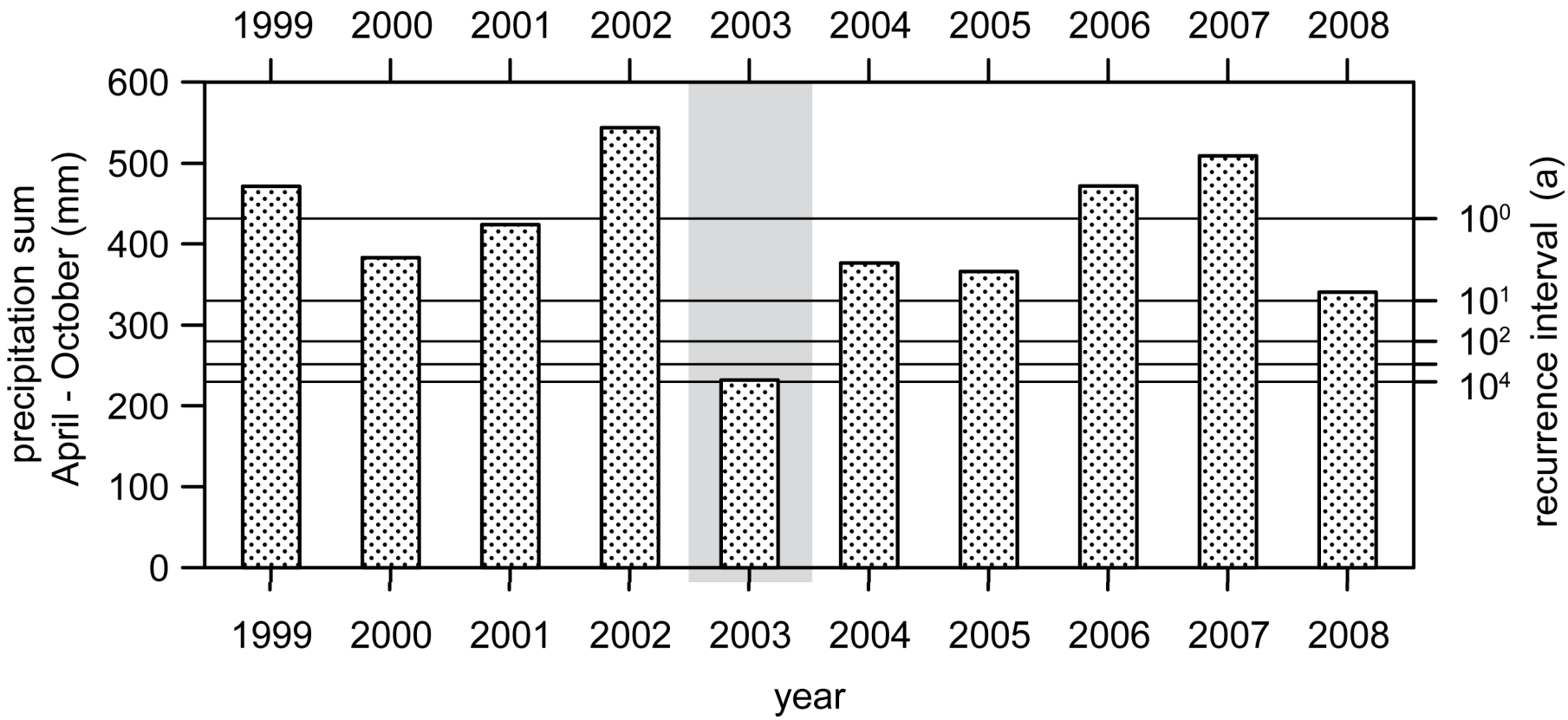
x 16 species

Stochasticity of succession measured as similarity in species composition (Bray-Curtis Distance on aboveground biomass) of twins

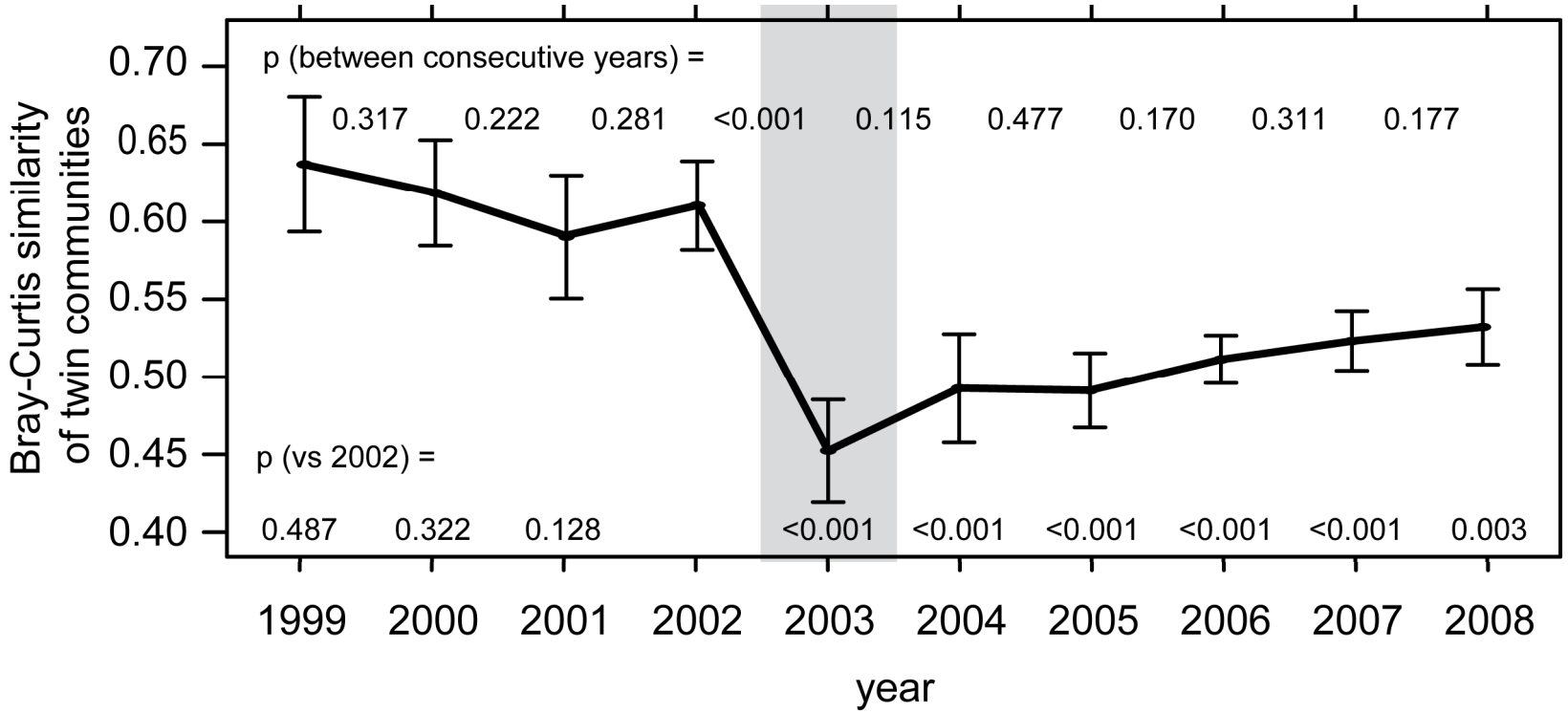
plots 2x2 m², installed on homogenized substrate 1996, succession since 1999

Biodepth: Hector, Schmid, Beierkuhnlein et al. 1999 Science

Precipitation

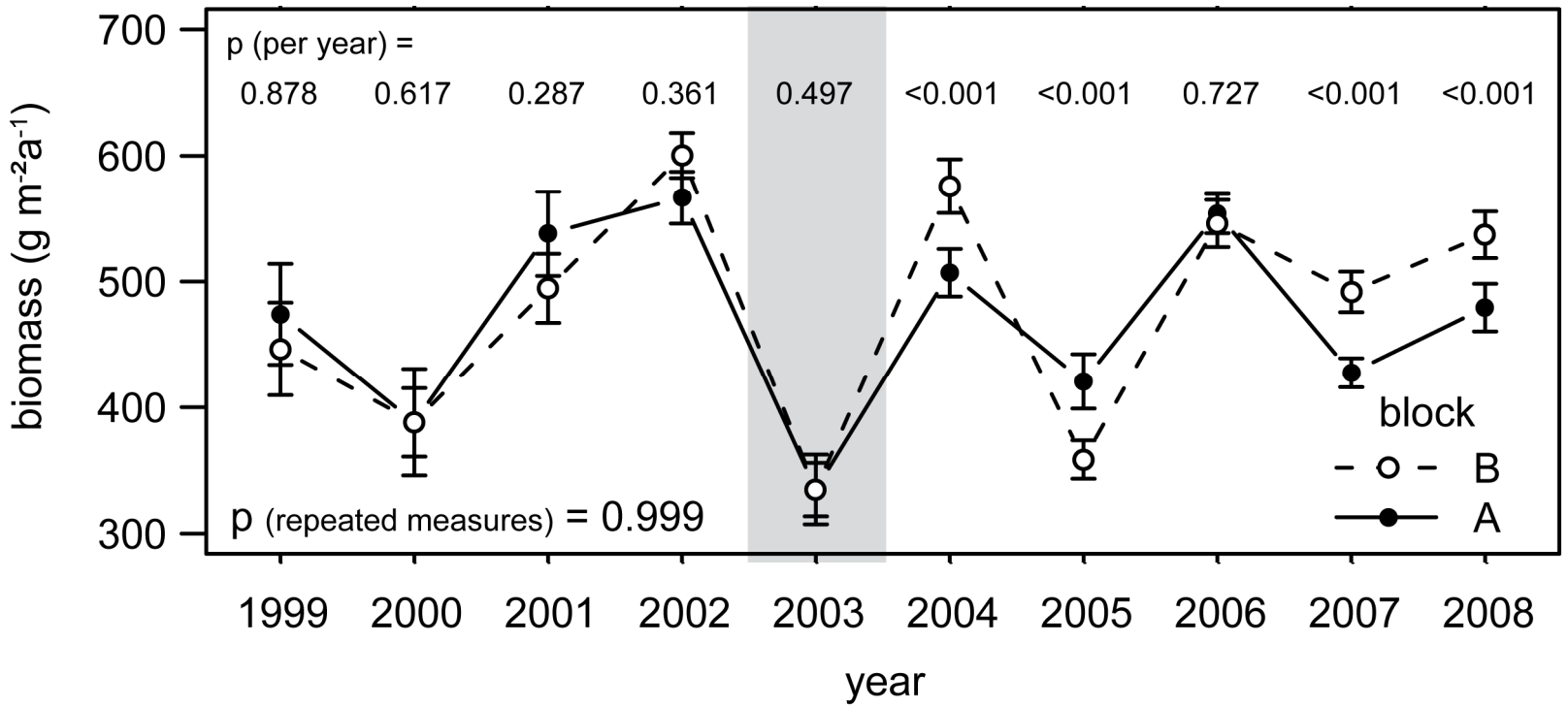


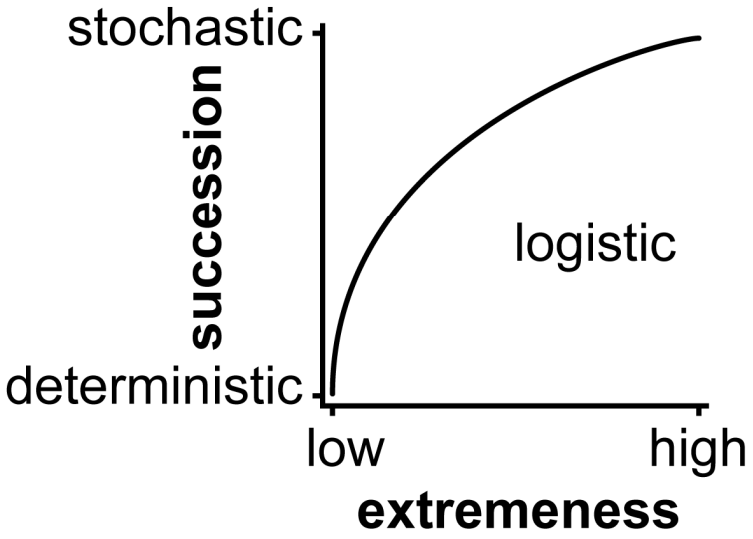
Stochasticity of Succession

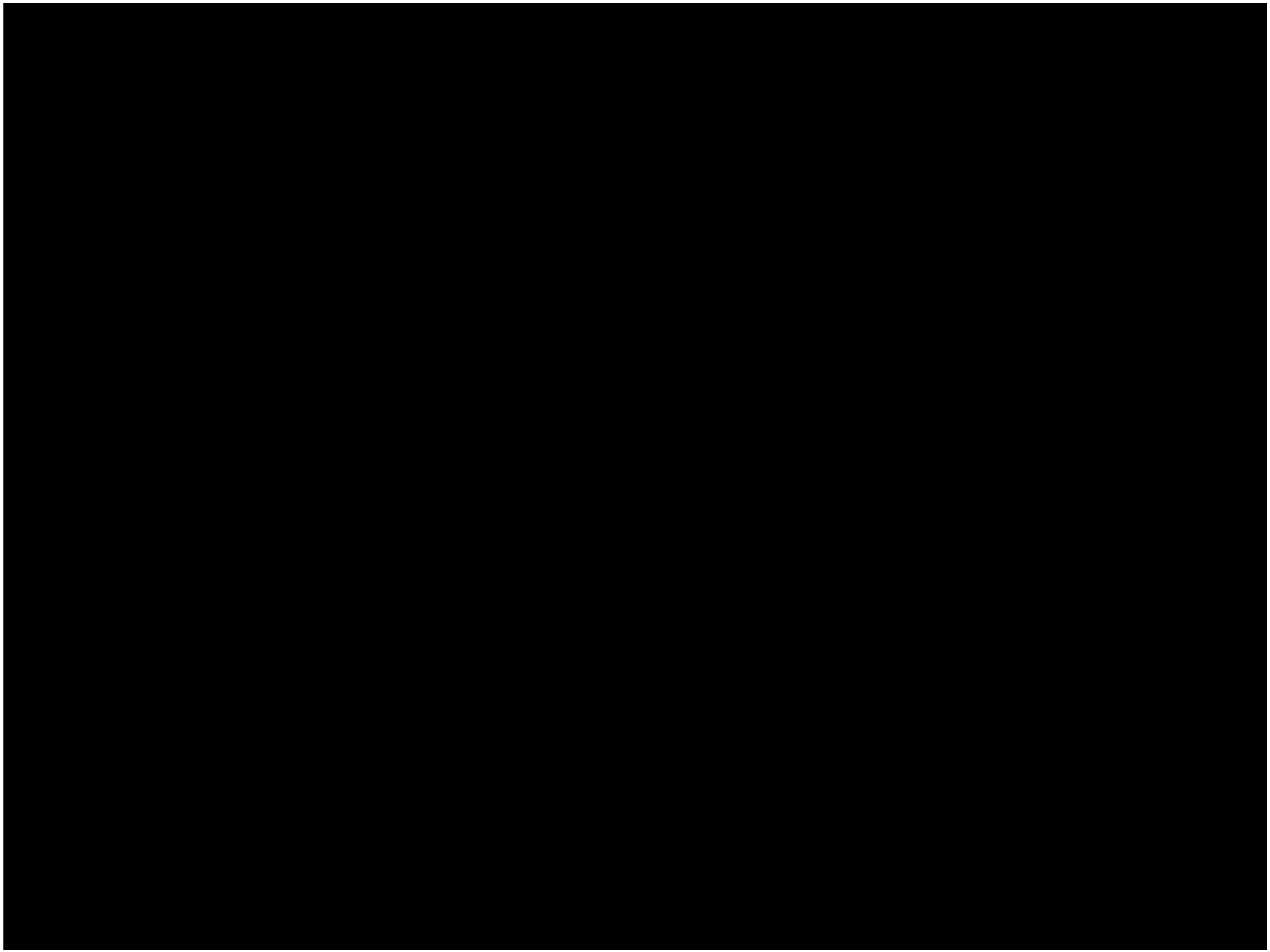


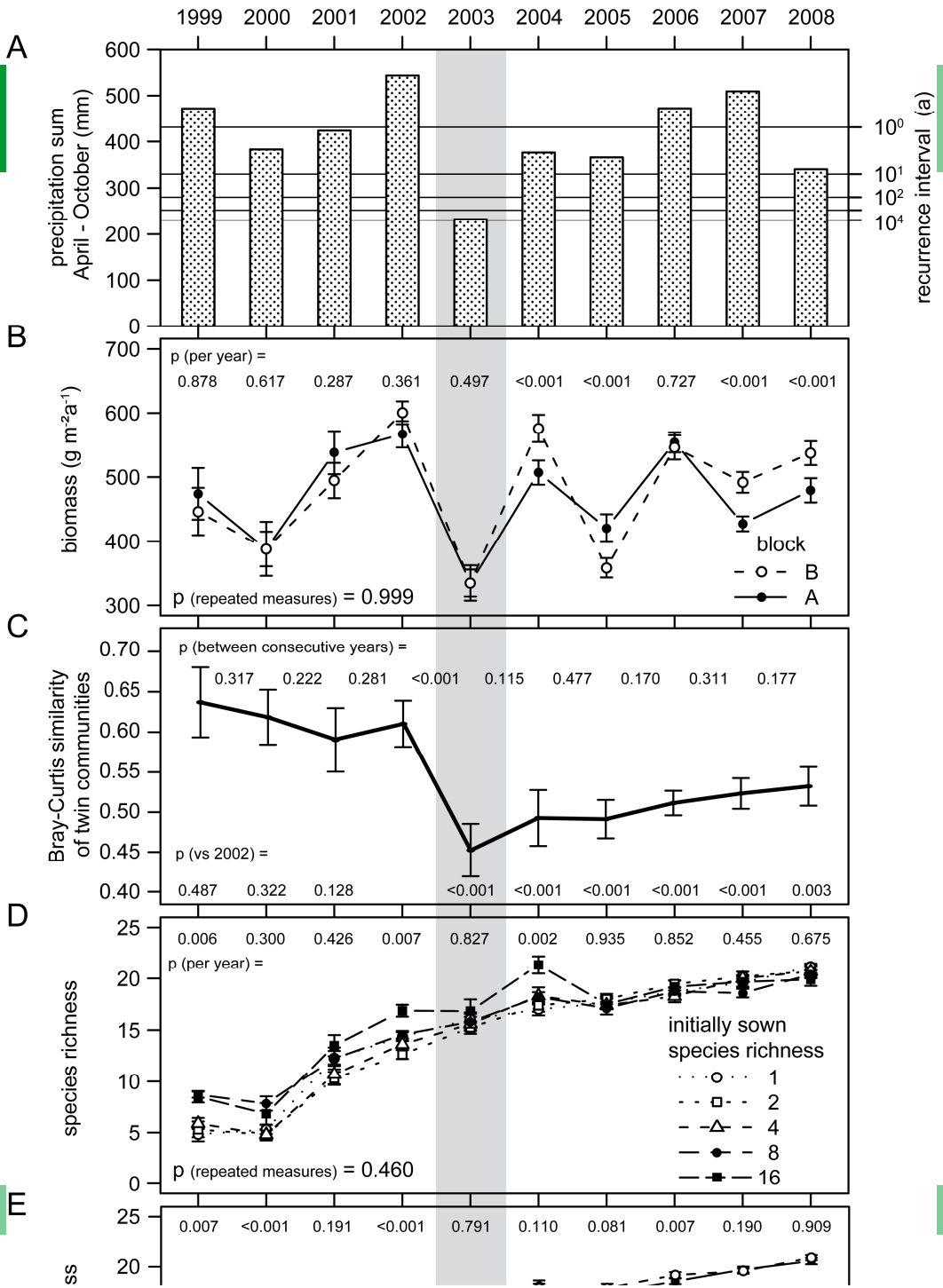
no significant effect of initial species richness or functional composition (mixed models)

Productivity




stochastic
succession
deterministic
logistic
low
high
extremeness



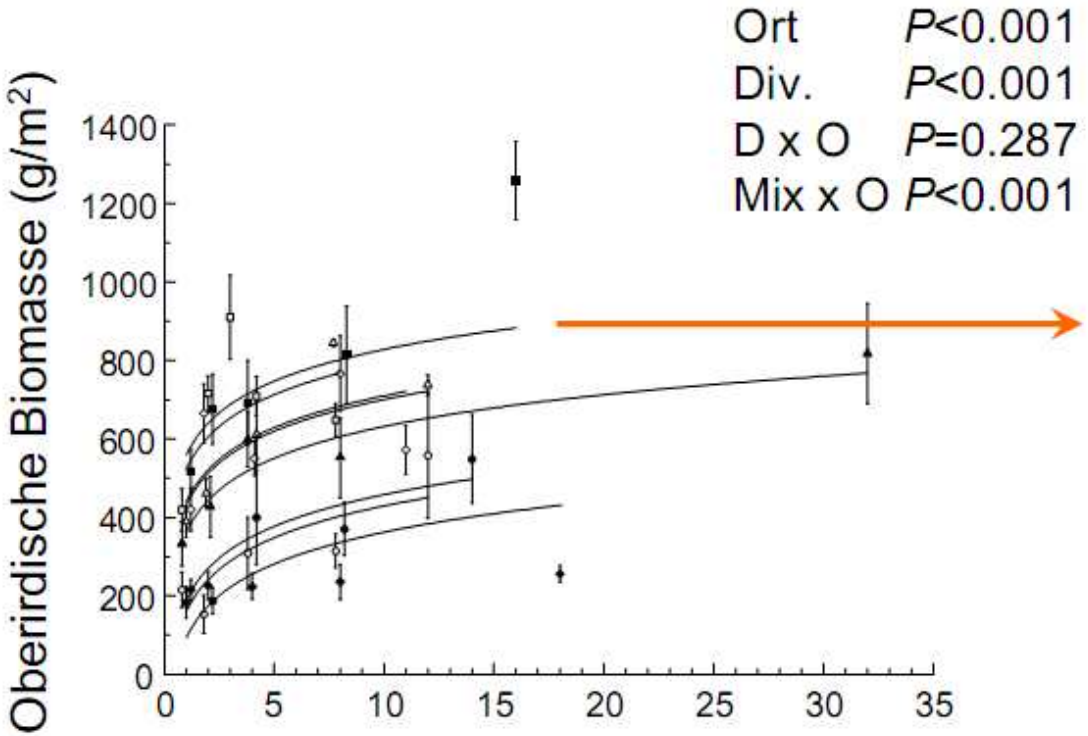


Bray-Curtis Similarity:

$$d[jk] = 1 - \frac{\sum |x[ij] - x[ik]|}{\sum x[ij] + x[ik]}$$

Biodepth 1996-1999

Diversität & Produktivität



Diversität steigert Produktivität

(non-transgressive) Overyielding:

Hector et al 1999 Science

Biodepth species

species	1 species	2 species	4 species	8 species	16 species
Achillea millefolium				22/44	2/56
Alopecurus pratensis	30/39	19/46	13/40; 31/57; 23/55	16/45; 22/44; 9/64	11/38; 28/51
Anthoxanthum odoratum				26/37	11/38; 2/56; 28/51
Arrhenatherum elatius	32/42	19/46;3/35	10/50; 31/57;23/55	16/45; 15/59; 22/44; 9/64	11/38; 2/56
Bromus hordeaceus					11/38; 2/56
Campanula patula					2/56
Centaurea jacea					11/38
Chrysanthemum leucanthemum					2/56
Crepis biennis				26/37	2/56
Cynosurus cristatus				26/37	2/56; 28/51
Dactylis glomerata	21/58	8/34	10/50; 13/40	16/45; 15/59; 22/44	2/56; 28/51
Festuca pratensis		14/62		16/45; 9/64; 26/37	28/51
Festuca rubra	7/52	27/54;25/60;5/49	31/57; 17/36	16/45; 15/59; 9/64	11/38; 28/51
Geranium pratense	6/47	3/35	13/40	22/44	28/51
Holcus lanatus	1/63	27/54	10/50; 13/40	16/45; 15/59; 22/44	11/38; 2/56
Knautia arvensis					11/38
Lathyrus pratensis				9/64	2/56; 28/51
Leontodon autumnalis					28/51
Lolium perenne			10/50; 17/36	16/45; 15/59; 22/44; 26/37	11/38; 2/56; 28/51
Lotus corniculatus			23/55	26/37	11/38; 2/56; 28/51
Lychnis flos-cuculi					28/51
Phleum pratense				16/45; 15/59	11/38; 2/56; 28/51
Pimpinella major					11/38
Plantago lanceolata	24/43	5/49	23/55	9/64	11/38
Ranunculus acris	20/53	14/62	17/36	22/44	28/51
Rumex rugosus				9/64	
Taraxacum officinalis				26/37	
Trifolium pratense		25/60	17/36	15/59; 9/64	11/38; 2/56
Trifolium repens	4/33	8/34	31/57	15/59	11/38; 28/51
Vicia cracca					11/38; 2/56; 28/51
Vicia sepium				26/37	