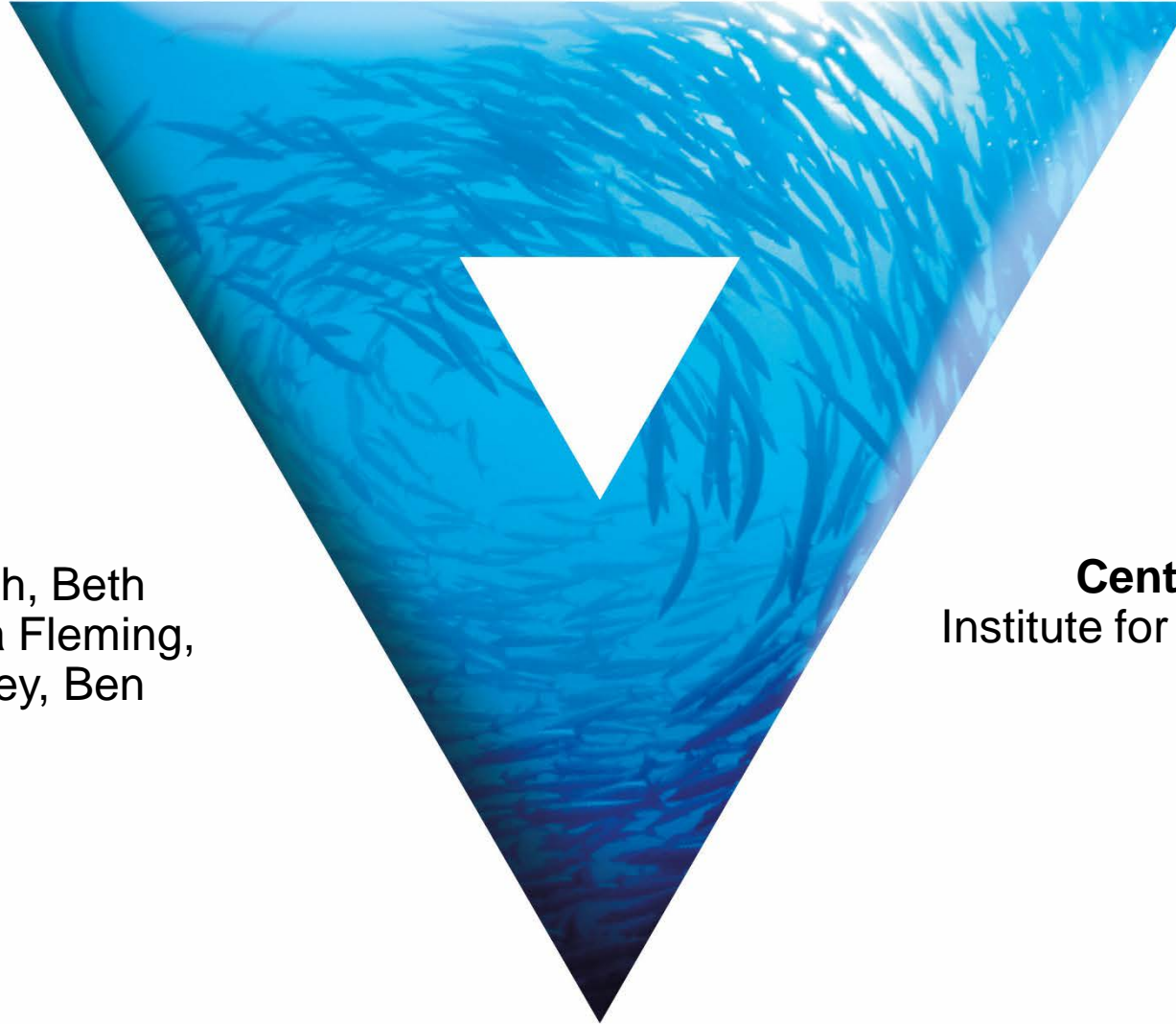


Shocks to terrestrial and aquatic food production:

trends, drivers and implications for food security under climate change



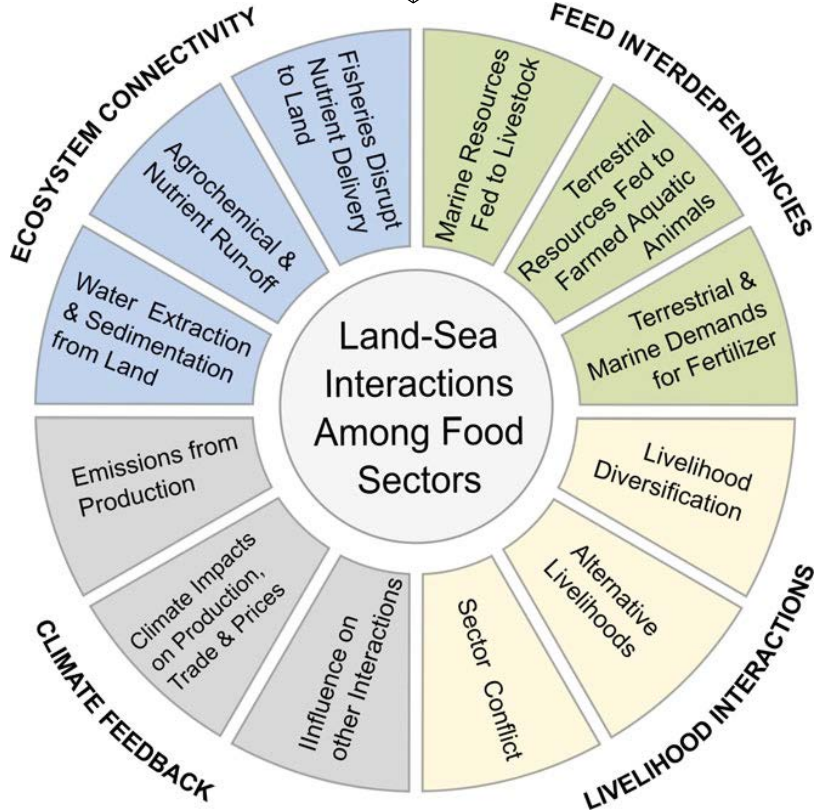
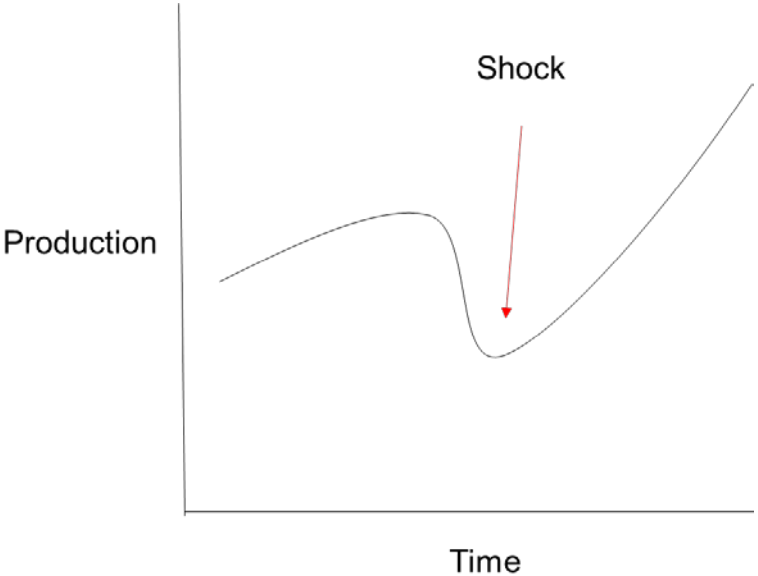
Richard Cottrell

Julia Blanchard, Kirsty Nash, Beth Fulton, Reg Watson, Aysha Fleming, Tom Remenyi, Stuart Corney, Ben Halpern

Centre for Marine Socioecology
Institute for Marine and Antarctic Studies
University of Tasmania

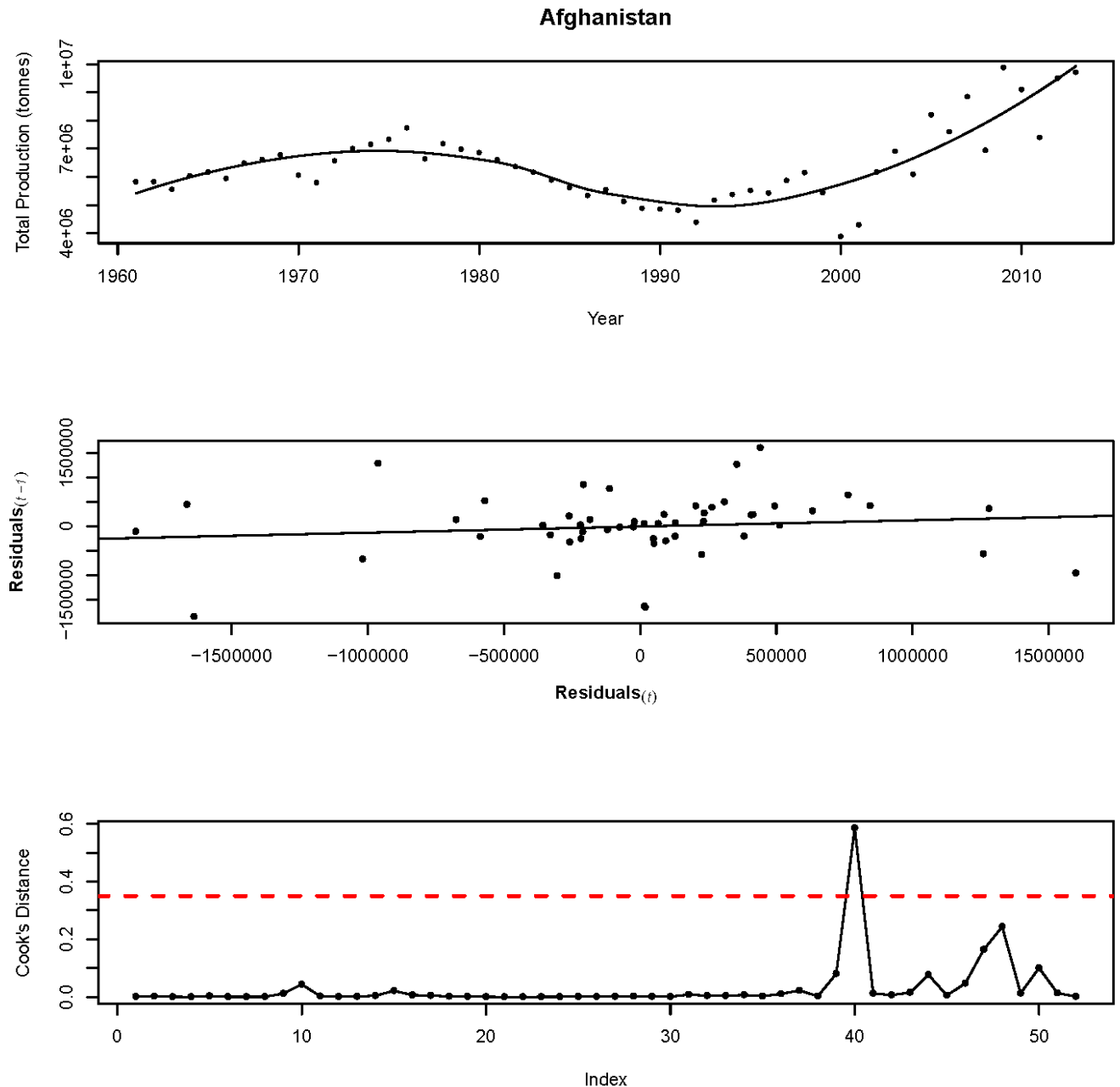
13 October 2017

Linking production shocks to the SDGs



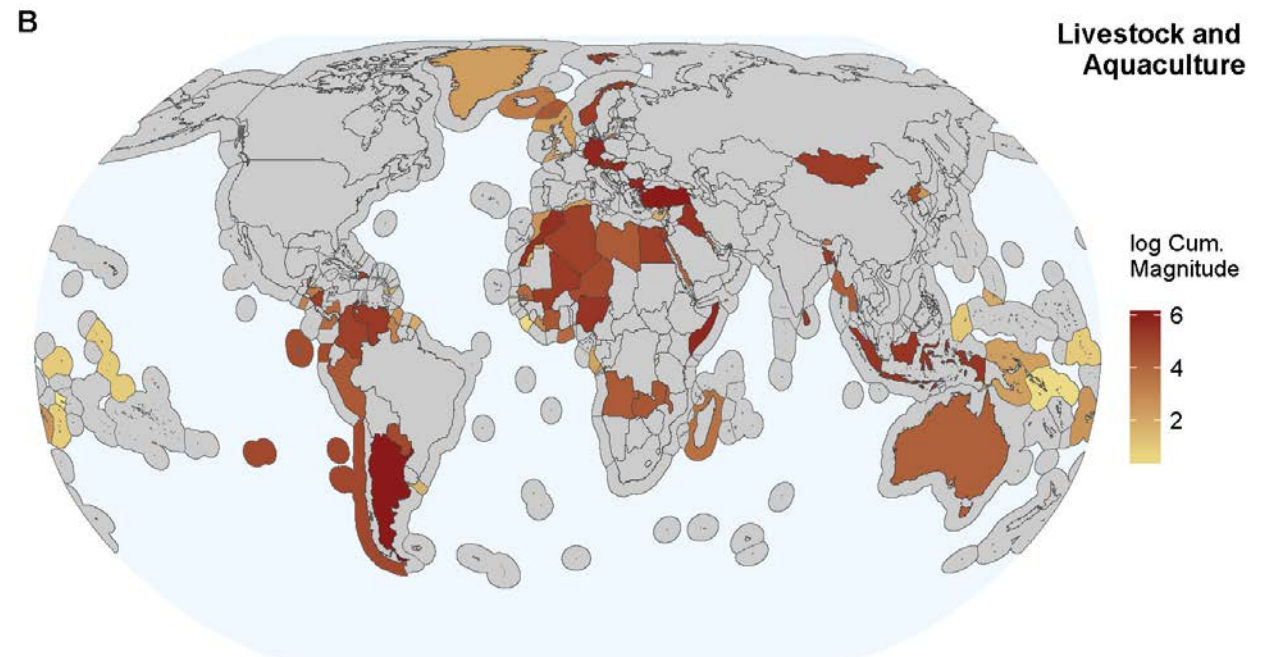
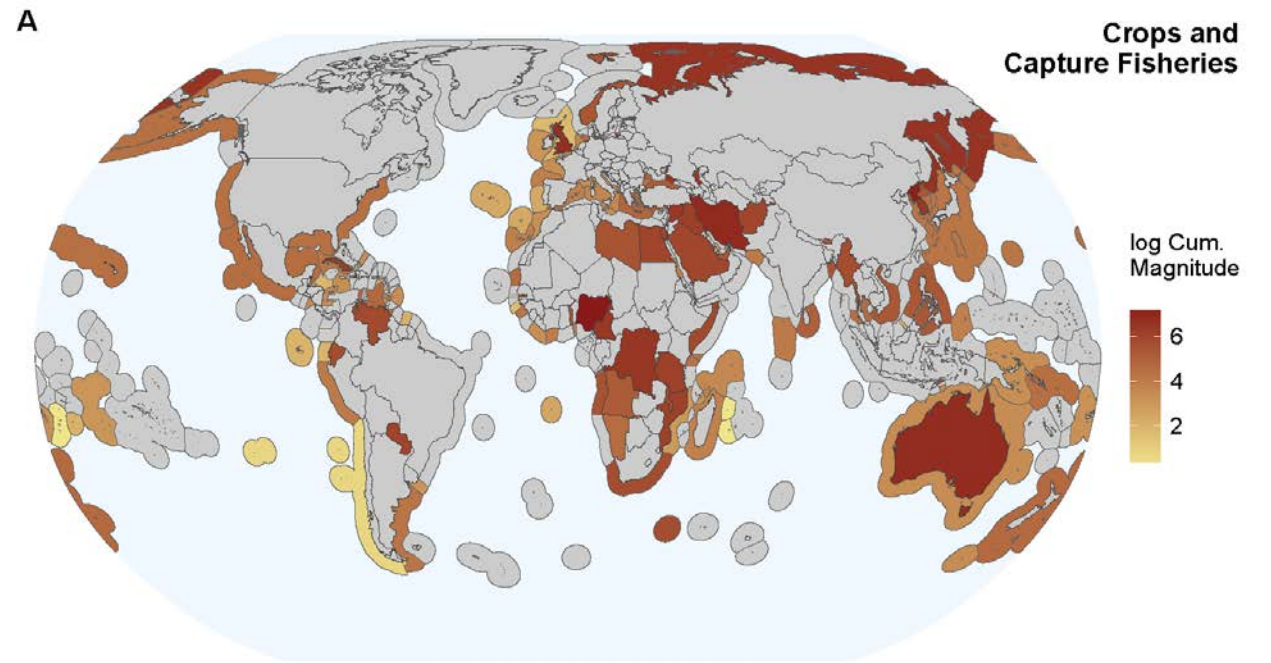
Detecting food production shocks

- Shock detection method extended from Gephart et al. 2017
- Production aggregated across total crop, terrestrial livestock, inland and marine capture fisheries and aquaculture sectors
- Production over 4 sectors for **180+ countries** between **1961-2013**
- LOESS model fitted to production time series
- Residuals regressed against $t-1$ residuals and outlier detected using cooks distance
- Found to be more sensitive when compared with Auto-regressive, Integrated, Moving Average (ARIMA) approach



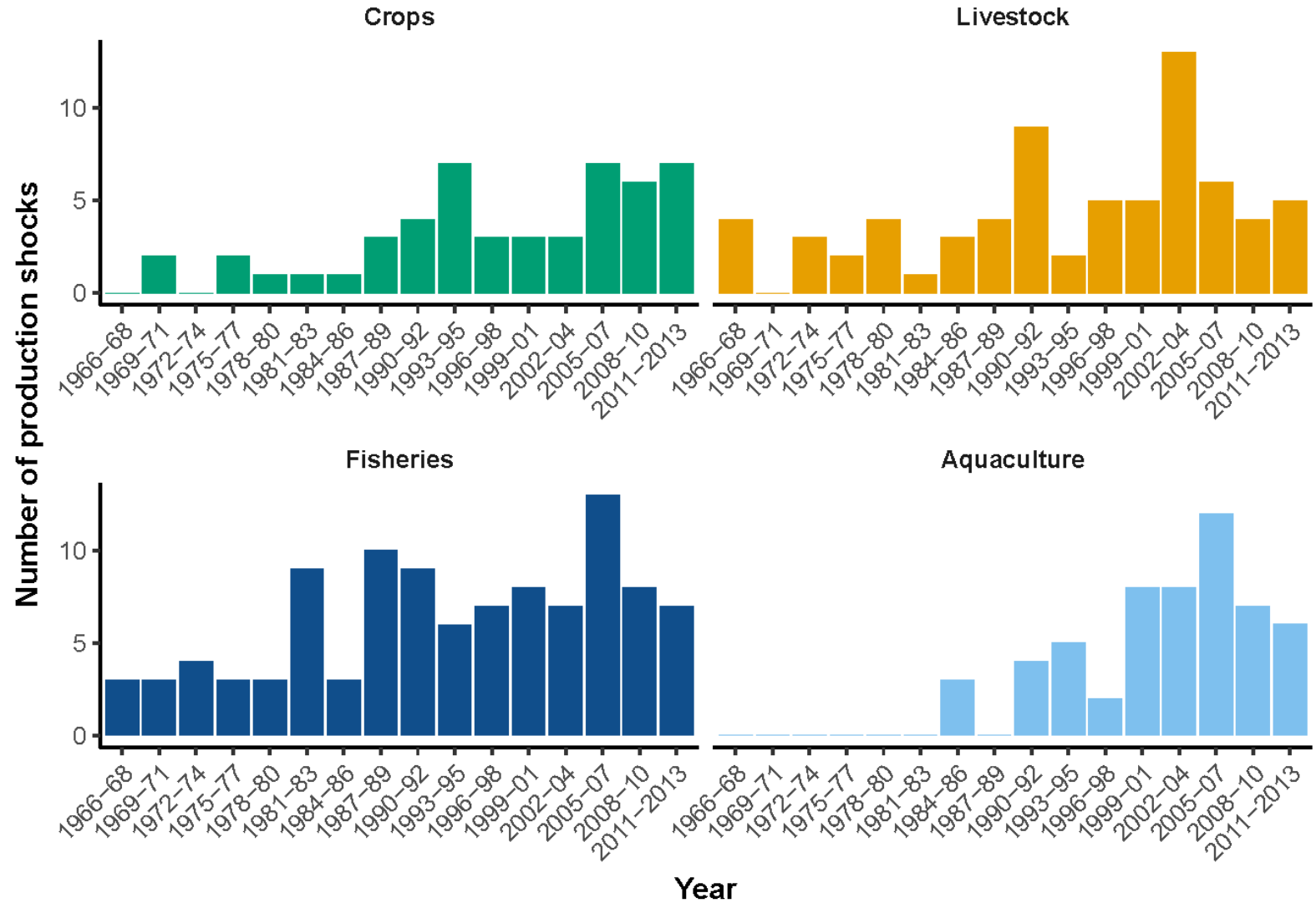
Trends in shocks over space and sector

- Crop production shocks largely in Africa, Middle East, South America
- Fisheries and livestock shocks more widely spread
- Aquaculture shocks less frequent than fisheries – occurs for both large and small-scale producers
- **Shock hotspots** – some countries experiencing multiple shocks in one sector 1961 – 2013
- **OR** Shocks over multiple sectors e.g. Angola (3), Australia (3), DPRK (4)

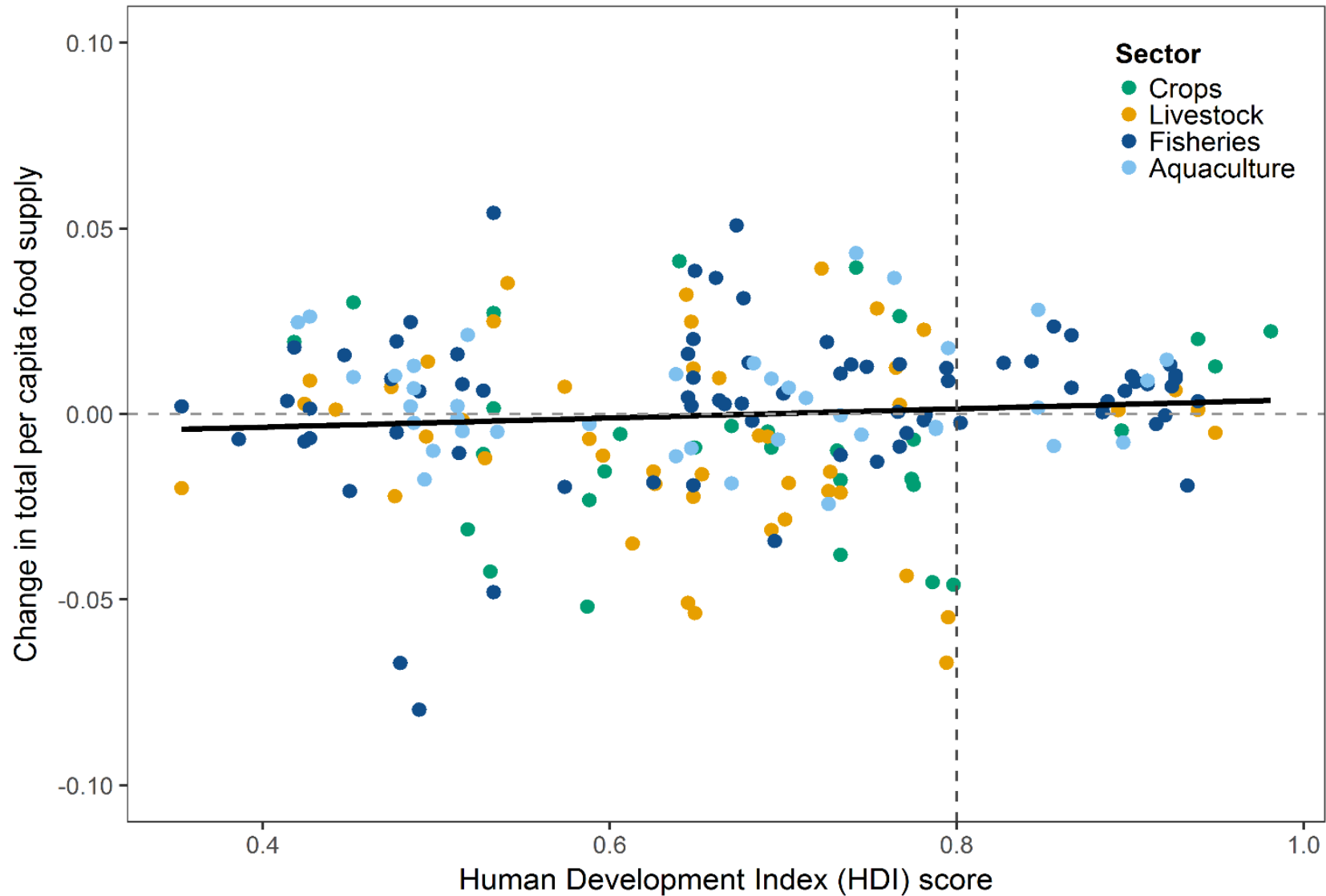


Trends in shocks over time and sector

- Shocks increasing over time, across all sectors
- Fisheries responsible for the most shocks, crops the fewest
- Aquaculture fewer than all but crops – although much newer industry



Food supply response to production shocks



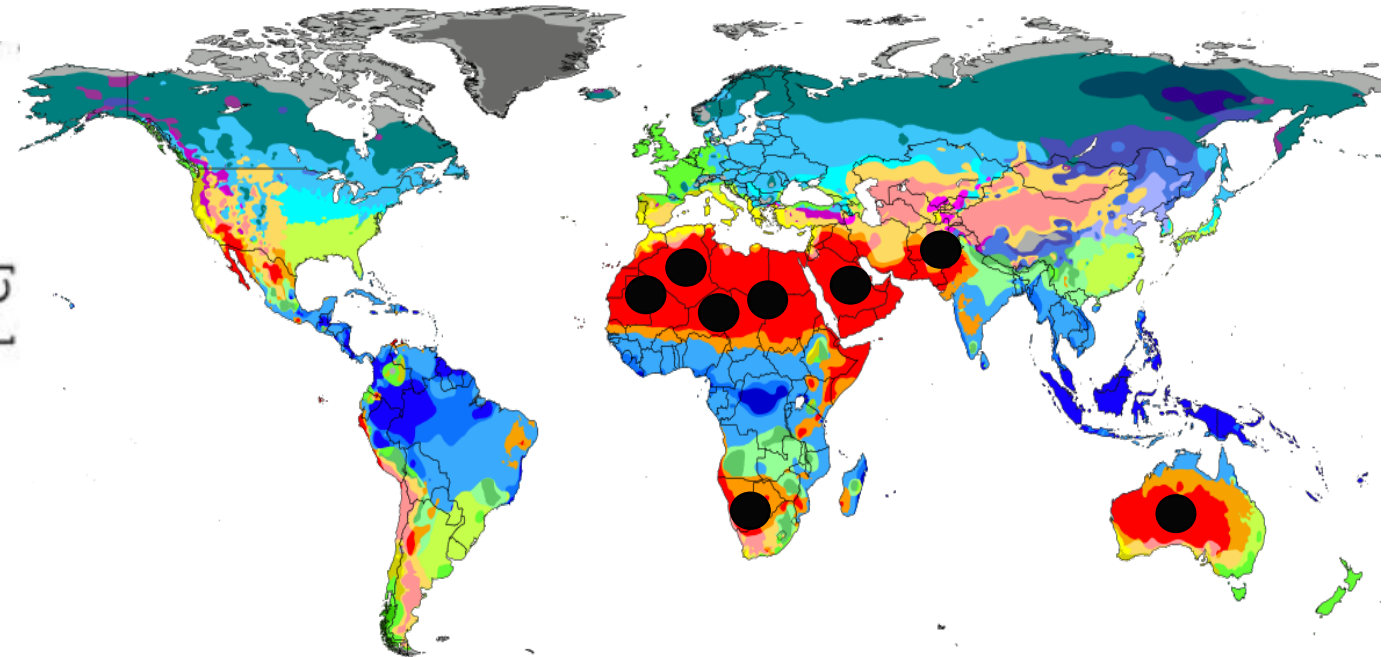
Associating shocks with extreme events

Table - Political instability/ independence changing country level production/ reporting

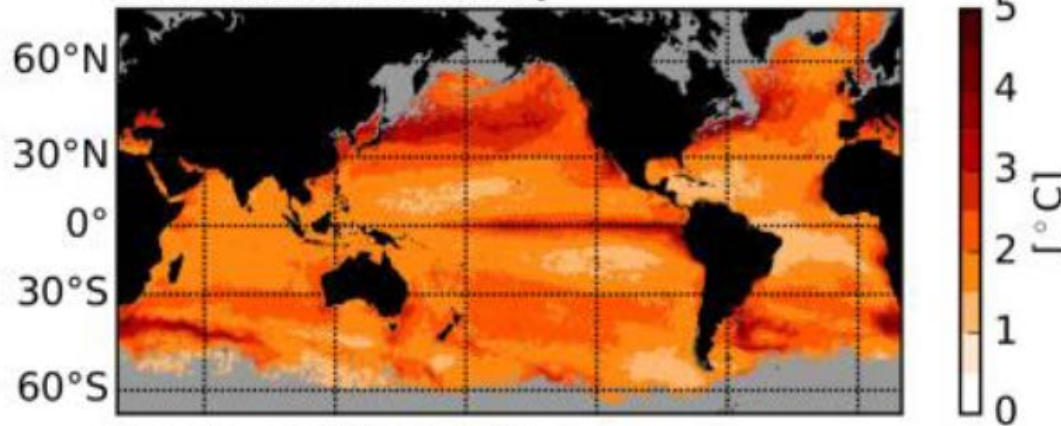
Sector	Political division	Year	No. of points > D threshold	Direction	Current political state (if -ve)/ Former political state (if +ve)
Crops	Armenia	1993	1	+	USSR – independence 1991
	Azerbaijan	1993	1	+	USSR – independence 1991
	Belarus	1993	2	+	USSR – independence 1991
	Belgium	2000	1	+	Belgium-Luxembourg
	Belgium-Luxembourg	2000	1	-	B-L Split? Belgium, Luxembourg
	Bosnia-Herzegovina	1992,93,94	3	+	Yugoslavia – independence in 1992
	Croatia	2002	1	+	Yugoslavia – independence in 1991
	Czechia	1993	1	+	Czechoslovakia dissolution in 1993
	Czechoslovakia	1993	1	-	Czechia, Slovakia
	Djibouti	1980	1	+	Independence from France – 1977
	Estonia	1992, 93	2	+	Return to independence from USSR – 1991
	Ethiopia	1993, 94	2	+	Independence from PDR of Ethiopia – fall after USSR backing
	PDR Ethiopia	1993	1	-	Became Ethiopia
	Georgia	1992	1	+	Independence from USSR in 1991
	Kazakhstan	1992,3	2	+	Independence in 1991
Kyrgyzstan	1992,93	2	+	Independence from USSR in 1991	
Latvia	1992,93	2	+	Independence from USSR	



World map of Köppen-Geiger climate classification

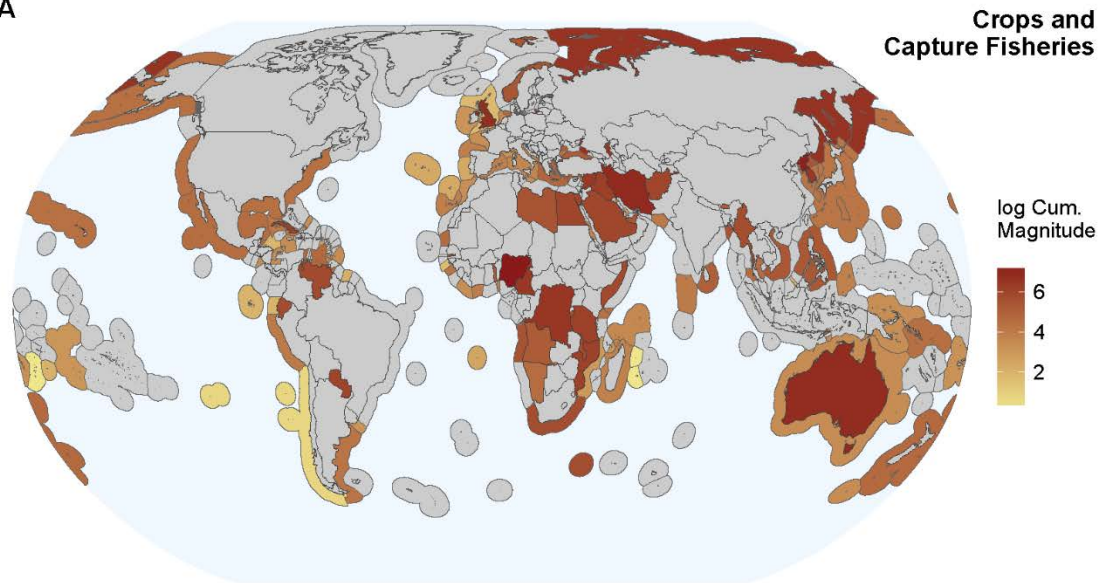


(D) Mean MHW Intensity

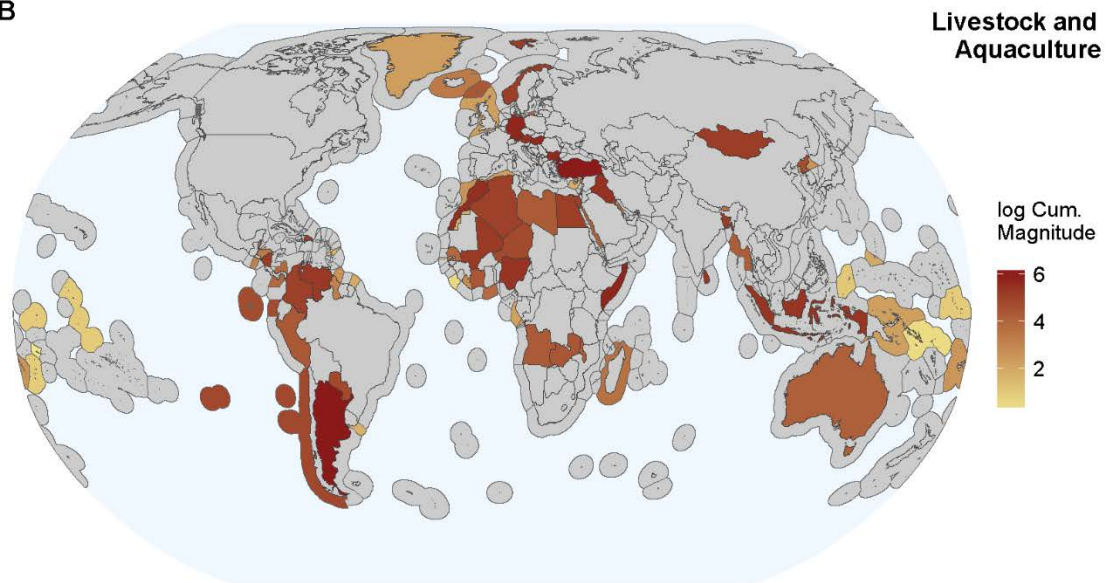


Oliver, Hobday *et al* (2017)

A



B



Thank you for listening

