Digging into the Geologic Record of Environmentally Driven Changes in Coral Reef Development

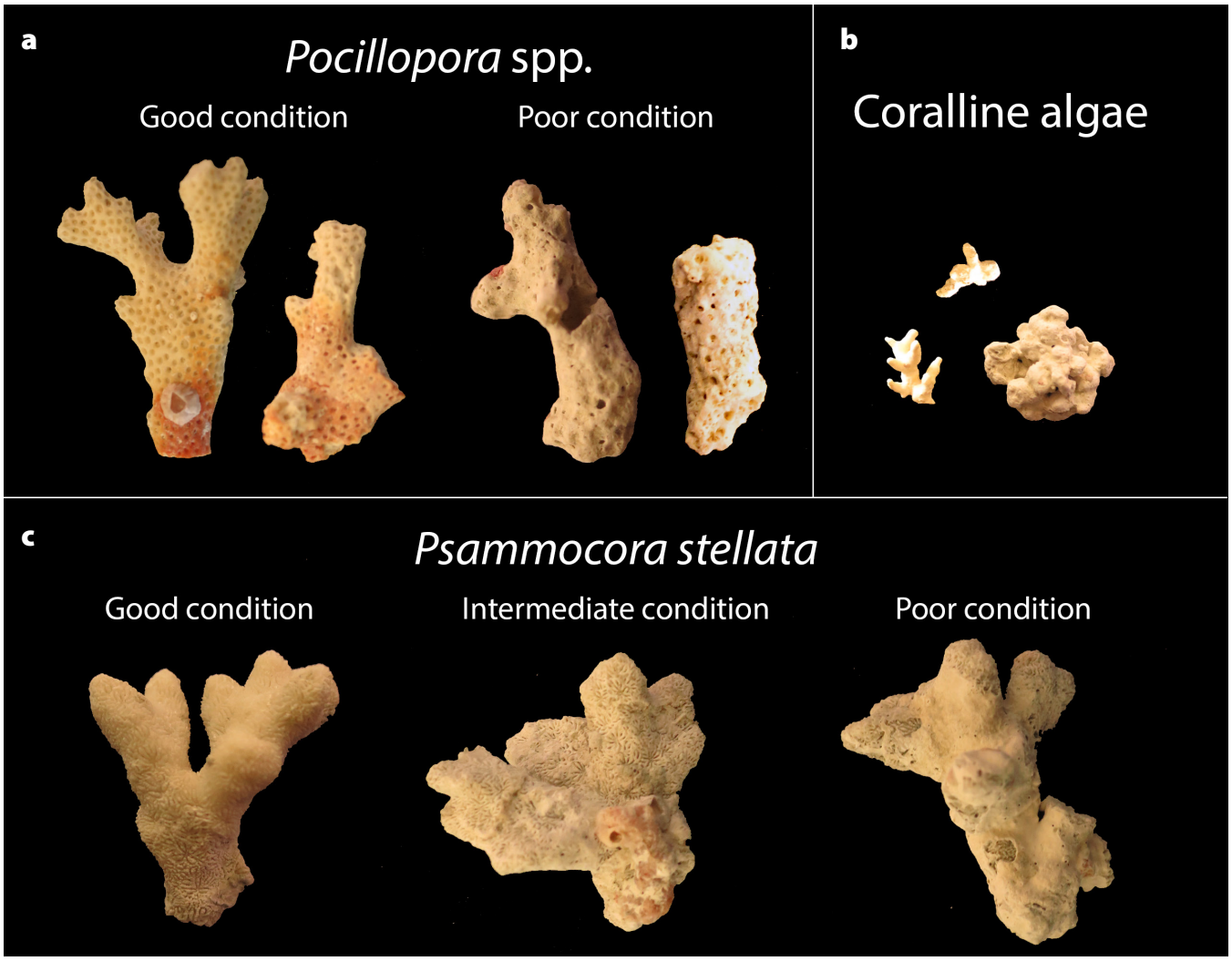
HANDOUT S1

This handout contains the following:

- A core material key for identifying the composition and condition of corals and coralline algae in a core.
- Digital images representing the three cores. Each set of images represent coral-reef conditions at 1,500–1,000 yr BP, 4,000–2,000 yr BP, and 5,000–4,000 yr BP. The photographs are labeled to identify the individual cores, and the time periods within the cores are shown.
- A core analysis grid.
- Glossary of terms.
- List of internet resources.

Gravinese et al., 2020, https://doi.org/10.5670/oceanog.2020.113

Core Material Key



Key for identifying the composition and condition of corals and coralline algae in a core. (a) Two examples of *Pocillopora* in good and poor taphonomic condition. Intervals in cores during which *Pocillopora* skeletons dominate and are in good condition represent times of good coral growth and active reef development. Example of (b) coralline algae and (c) core constituents from an interval representing good, intermediate, and poor taphonomic conditions of *Psammocora stellata* skeletons.

Gravinese et al., 2020, https://doi.org/10.5670/oceanog.2020.113

Core #1

Gravinese et al., 2020, https://doi.org/10.5670/oceanog.2020.113

Core #2

Gravinese et al., 2020, https://doi.org/10.5670/oceanog.2020.113

Core #3

Gravinese et al., 2020, https://doi.org/10.5670/oceanog.2020.113

Core Analysis Grid

1,500–1,000 yr BP

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

4,000–2,000 yr BP

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

5,000–4,000 yr BP

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Gravinese et al., 2020, https://doi.org/10.5670/oceanog.2020.113

GLOSSARY OF TERMS

Calcification. The process of deposition of calcium carbonate ($CaCO_3$).
Cohen and Holcomb (2009) and http://www.aroundtheamericas.org/log/wp-content/uploads/2010/02/Teachers_GuideLess-1-CoralCO2Calcification.pdf

El Niño–Southern Oscillation (ENSO). A naturally occurring oceanic–atmospheric cycle of trade-wind circulation that results in the cyclical warming and cooling of the sea in the eastern Pacific Ocean.
Garrison (2013) and https://www.esrl.noaa.gov/psd/enso/education/

Geochemistry. The study of the chemical composition of and chemical changes in the solid matter of the Earth or a celestial body; the related chemical and geological properties of a substance.
https://www.merriam-webster.com

Paleoclimatology. The study of past climate.
https://www.merriam-webster.com

Taphonomy. The study of the biological, chemical, and physical processes that occur after the death of an organism as they become fossilized
https://www.merriam-webster.com

INTERNET RESOURCES

Florida Tech — Marine Paleoecology Laboratory
Website summarizing research in the eastern tropical Pacific being conducted by investigators at the Florida Institute of Technology.
http://research.fit.edu/marine-paleolab/

NASA — Global Seawater Oxygen-18 Database
US government database containing over 26,000 seawater oxygen-18 values since 1950 (Schmidt et al., 1999).
https://data.giss.nasa.gov/o18data/

NOAA Climate.gov — El Niño & La Niña (El Niño-Southern Oscillation)
US government website describing the climatic changes that occur during El Niño events.
https://www.climate.gov/enso

NOAA — El Niño
US government website providing educational materials about ENSO.
https://www.noaa.gov/education/resource-collections/weather-atmosphere-education-resources/el-nino

NOAA National Centers for Environmental Information — Paleoclimatology Data
US government website describing paleoclimatology data from tree rings, ice cores, corals and ocean and lake sediments. Other educational resources are also available.
https://www.ncdc.noaa.gov/data-access/paleoclimatology-data

NOAA National Ocean Service — What is Coral Bleaching?
US government website explaining coral bleaching.
https://oceanservice.noaa.gov/facts/coral_bleach.html

University of Exeter — Reef Budget
Provides additional resources and descriptions of methods used to calculate carbonate production in coral reefs.
http://geography.exeter.ac.uk/reefbudget/