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Decadal climate variability and forced change in the South Europe - Mediterranean Region

Annarita Mariotti (1), Yutong Pan (2), Ning Zeng (2), and Andrea Alessandri (3)

(1) NOAA, Climate Program Office, Silver Spring, United States (annarita.mariotti@noaa.gov), (2) University of Maryland, College Park, United States., (3) ENEA, Rome, Italy.

Decadal climate variability in the Mediterranean/South Europe region since 1860 and projected 21st century change are investigated based on observational data and the newly available Coupled Model Intercomparison Project - Phase 5 (CMIP5) experiments. Our results suggest that decadal changes in surface air temperature and related water cycle changes (e.g. evaporation) observed in the region during the period since 1860 have been significantly affected by forcings, be of natural or anthropic origin. Warming has accelerated during the latter half of the 20th century and is projected to further increase due to growing greenhouse gas concentrations. Due to the significant trend, Mediterranean temperature for the coming decade is very likely to be warmer than 1980-2005 and outside the range of variability, with a mean warming of 2 K projected by 2060. Sea-surface evaporation (fresh water deficit) has increased during past decades and future forced increases are expected to exceed variability by 2020-2040 (in the coming decade). By 2071-2100, temperature (sea-surface evaporation and fresh water deficit) mean forced changes are estimated to be 4 (2) times larger than decade-to-decade anomalies due to internal variability. 20th century precipitation variability in the Mediterranean has been largely of internal origin. 20th century simulations and future projections show an increasing impact of external forcings in the form of long-term negative trends over most of the Mediterranean in the midst of internal variability. In JJA, forced precipitation change is projected to exceed internal variability by 2040. More generally, projections indicate that in the 21st century decade-to-decade conditions may still occasionally be wetter than what we have seen during 1980-2005 but there is an overall progressive shift in the odds for conditions to be drier.