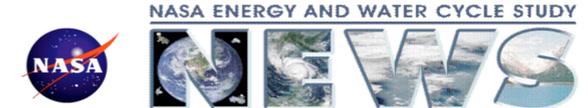
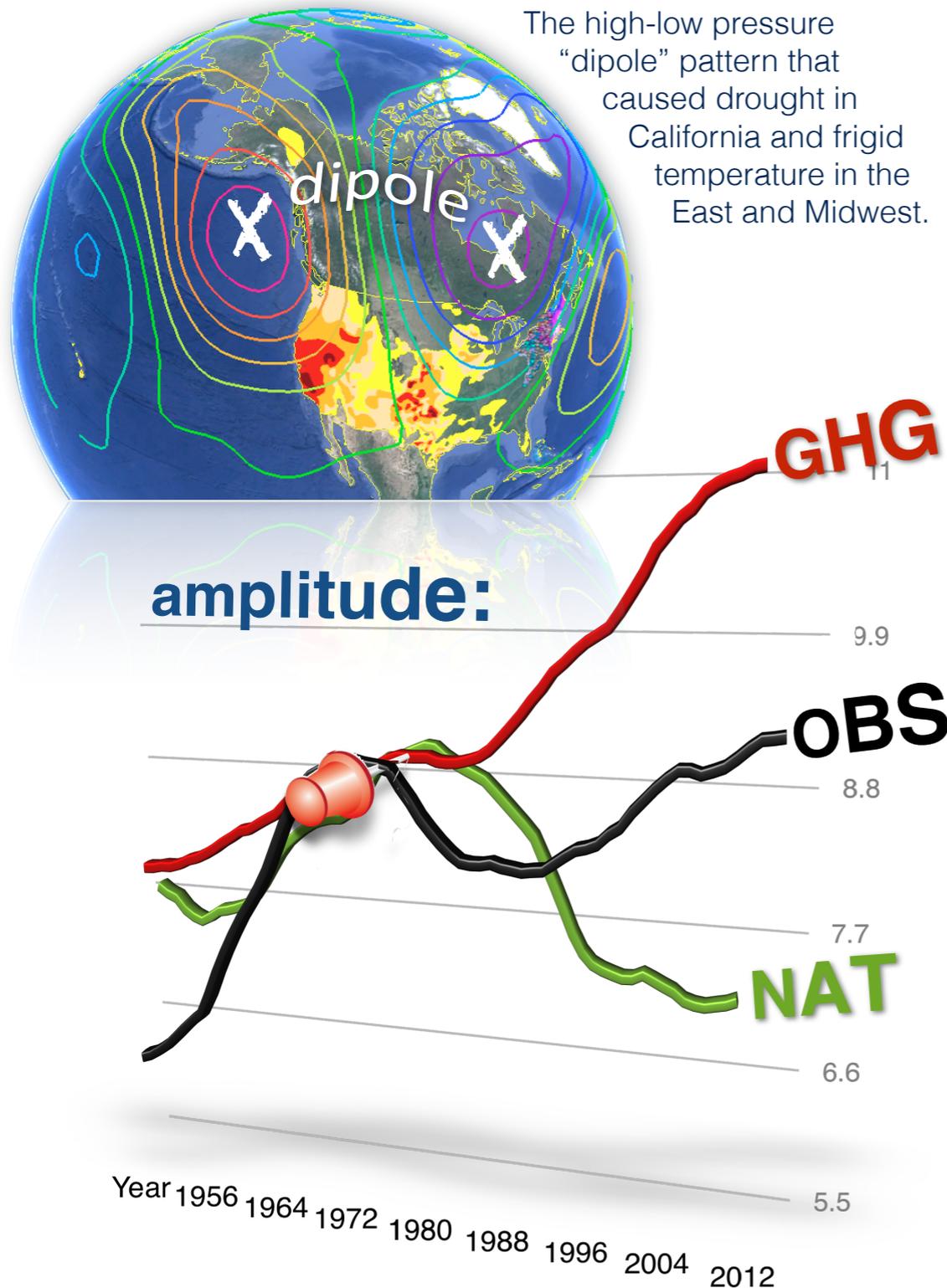


# Science Links California Drought to Human-caused Climate Change



The high-low pressure “dipole” pattern that caused drought in California and frigid temperature in the East and Midwest.



The news fever on the California drought and the frigid East may be fading, but the scientific debate on the role of climate change is just beginning. New research by Utah State University climate scientists has shown evidence connecting the amplified wind patterns, consisting of a strong high pressure in the West and a deep low pressure in the East, to global warming.

Referring to such high-low pressure patterns as a “dipole”, USU researchers, who are working for a NASA funded project, have uncovered evidence that can trace the amplification of the dipole to human influences. Specifically, they found that the dipole tends to form one year before El Nino – widespread tropical Pacific warming that cause worldwide climate anomalies. This research explains why the 2013-2014 drought in California occurred during neither a El Nino nor a La Nina year.

California is facing increasing pressure to resolve tensions involved in apportioning its water among municipal, agricultural, industrial users. Thus, it is important to note that the dipole is projected to intensify, which means more extreme future droughts for California. Historical data show that the dipole has been intensifying since the late 1970s. The intensified dipole can be accurately simulated using a new global climate model, which also simulates the level of greenhouse gases in the atmosphere. Simulations with only natural variability show a weakening dipole, which is opposite to what is currently being observed. Moreover, the occurrence of the dipole one year before an El Nino/ La Nina event is becoming more common, which can only be reproduced in model simulations when greenhouse gases are introduced into the system.

According to the study, the persistent dipole and subsequent drought in California is part of a natural variability related to the initiation of El Nino, rather than El Nino itself. But this relationship has strengthened in response to increased greenhouse gases in the atmosphere. Looking into the future, the dipole and its indication of impending El Nino may suggest wet conditions in California later this year, when El Nino is predicted to happen.

Variances of the dipole within 30 years derived from the observation (OBS) and simulated effects of greenhouse gases (GHG) and natural variability (NAT). The model is called Community Earth System Model.

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