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Controls from a widespread surface ocean organic micro layer on atmospheric oxidative capacity

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Organic carbon and iodine are important in the atmosphere, because they influence the reactive chemistry and lifetime of climate active gases (e.g., methane, ozone, dimethyl sulfide), and are relevant to the formation, composition and climate impact of aerosols. Current assessments of oxidative capacity in the marine boundary layer consider ocean sources for organic carbon primarily in context of reduced hydrocarbons, and primary organic aerosols, and comparatively minor amounts of organic halogen species. However, recent our observations of atmospheric glyoxal over the remote open ocean challenge this view. Further, the sources for iodine radicals are poorly understood, and thought linked primarily to biological sources. Recent studies suggest that additional iodine sources are needed in order to explain atmospheric iodine abundances, but the biological identify and atmospheric flux of iodine radicals is currently not quantified. It is further unclear whether organic carbon in the ocean has overall an accelerating, or inhibiting effect on oceanic iodine sources. This presentation summarizes results from four cruises that combined span an area of 37.3 x106 km2 over the world's largest eastern boundary upwelling system, the tropical Eastern Pacific Ocean (-22S to 22N latitude, 70W to 158W longitude; 135 days at sea). We measured marine hydrocarbons, and map the horizontal concentration gradients of atmospheric OVOCs (glyoxal, formaldehyde), and halogen oxide radicals (bromine oxide, iodine oxide) from the coastal-, to the mesotrophic and oligotrophic ocean. These measurements identify the source for atmospheric glyoxal is linked to the widespread presence of a surface organic micro layer, which is found a major source for oxygenated hydrocarbons (OVOC). The OVOC flux is compared to that of primary organic aerosol. The relevance of this organic carbon source from the ocean to atmospheric oxidative capacity is assessed in terms of hydroxyl, bromine, chlorine and iodine radical sensitivities.