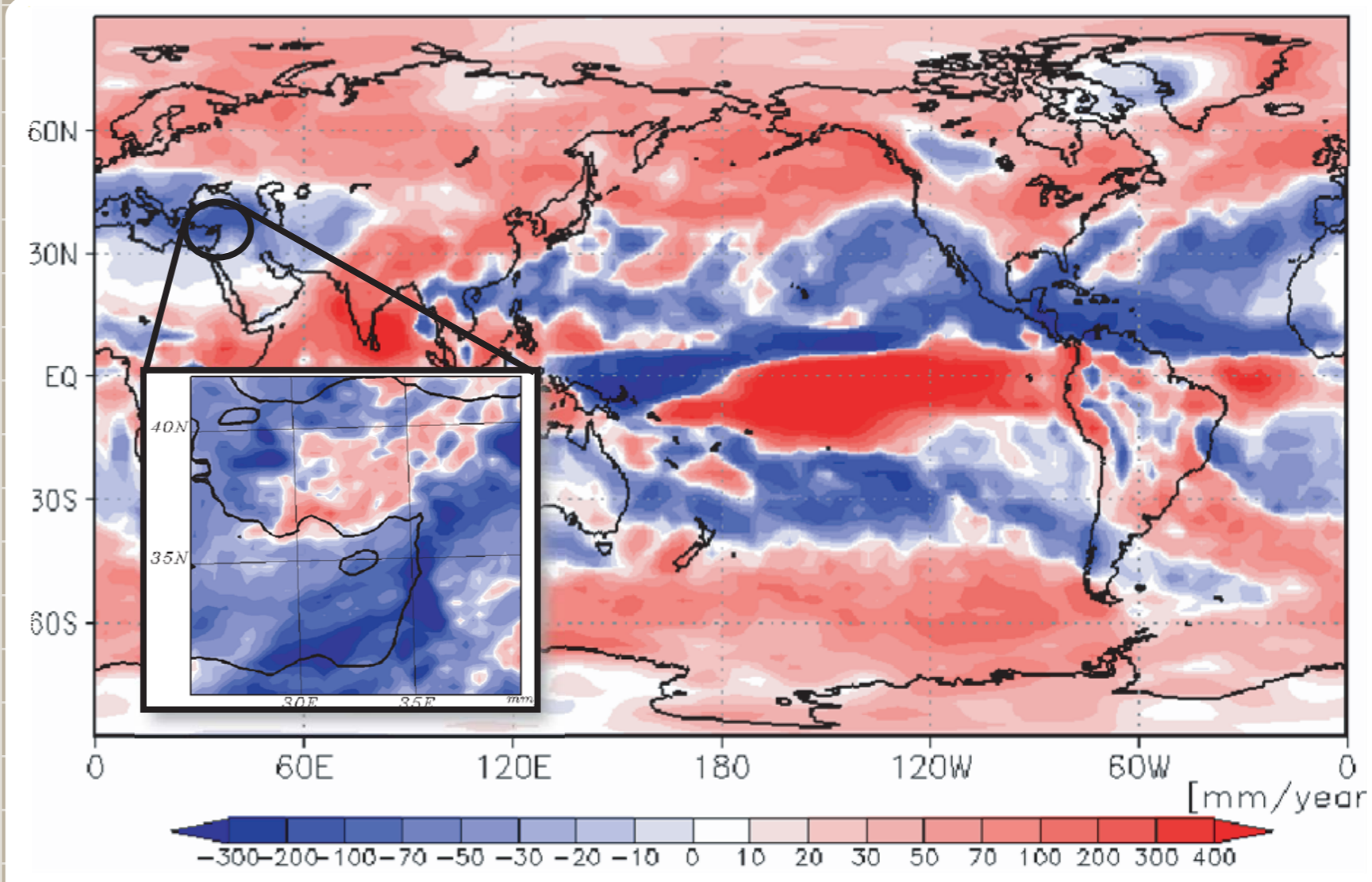




Division of Global Environment and Biological Sciences

Prediction of Global Change

Reliable predictions are provided for global warming caused by the increasing anthropogenic greenhouse gases. More precise regional climate prediction is demanded, however, for the mitigation of human impact. Numerous technical problems then arise, and computation becomes enormous when the model resolution is increased for regional climate prediction. In our group, the prediction of global change is performed by a combination of the regional climate model nested in the global climate model. The figures illustrate the precipitation change (blue for decrease) between 1990s and 2070s predicted by the general circulation model at the Meteorological Research Institute (lower) and over the east Mediterranean where severe drought is anticipated, predicted by the regional climate model by our group (upper).



Data Assimilation for Meteorological Observations

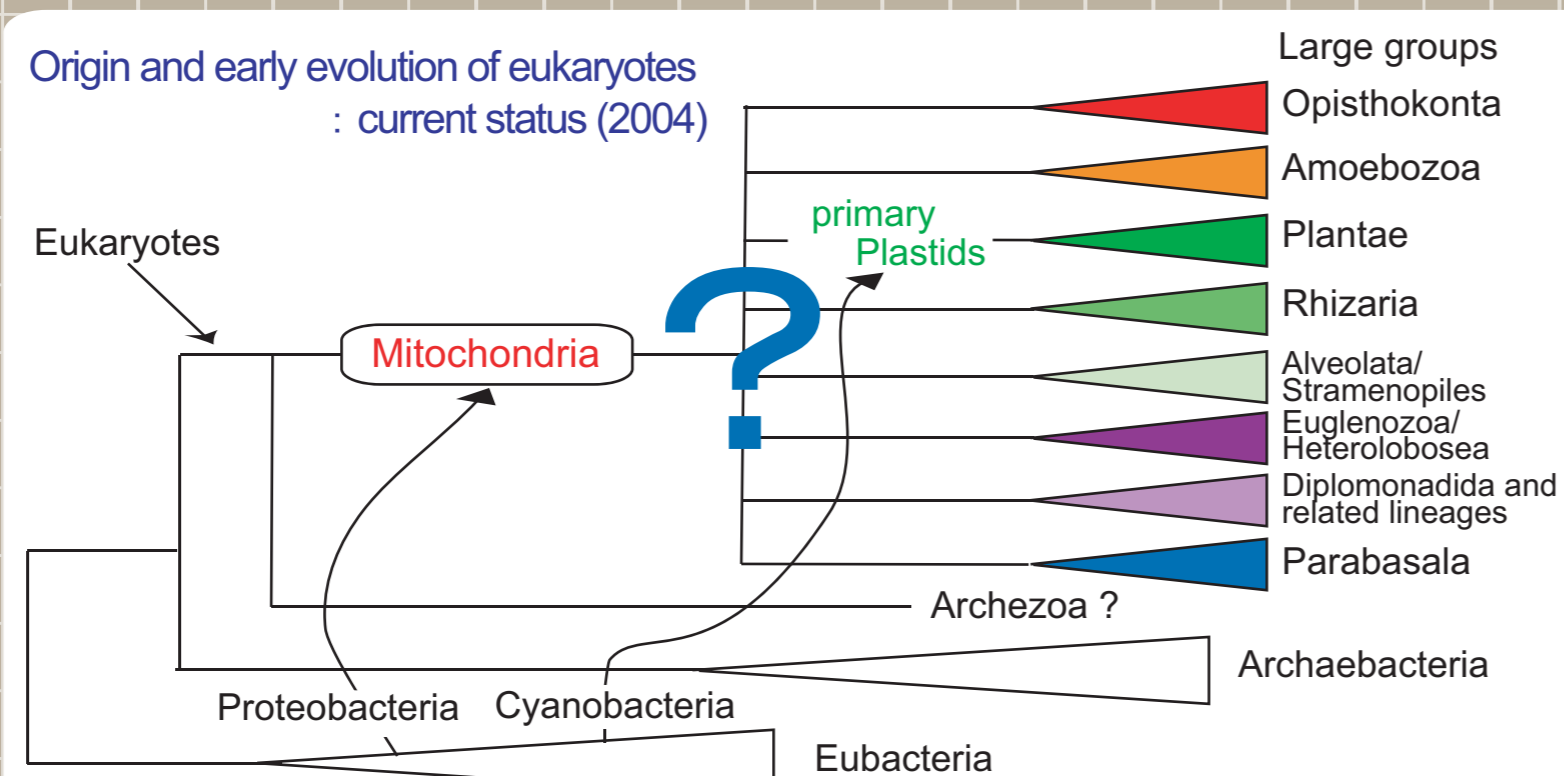
Model atmosphere would approach to the real atmosphere and eventually become identical if observed data are assimilated into the model atmosphere for infinite time interval. The technique is called 4 dimensional data assimilation. By this technique, we can infer the global feature of the atmosphere even if the meteorological observations are available sparsely only on the land. In our group, comparative experiments are conducted for the products of 4 dimensional data assimilation by many operational meteorological centers over the world. A new assimilation technique is developed by the application of Kalman Filter in the ensemble forecasts

Simulation of Forest Fire Smoke Transport

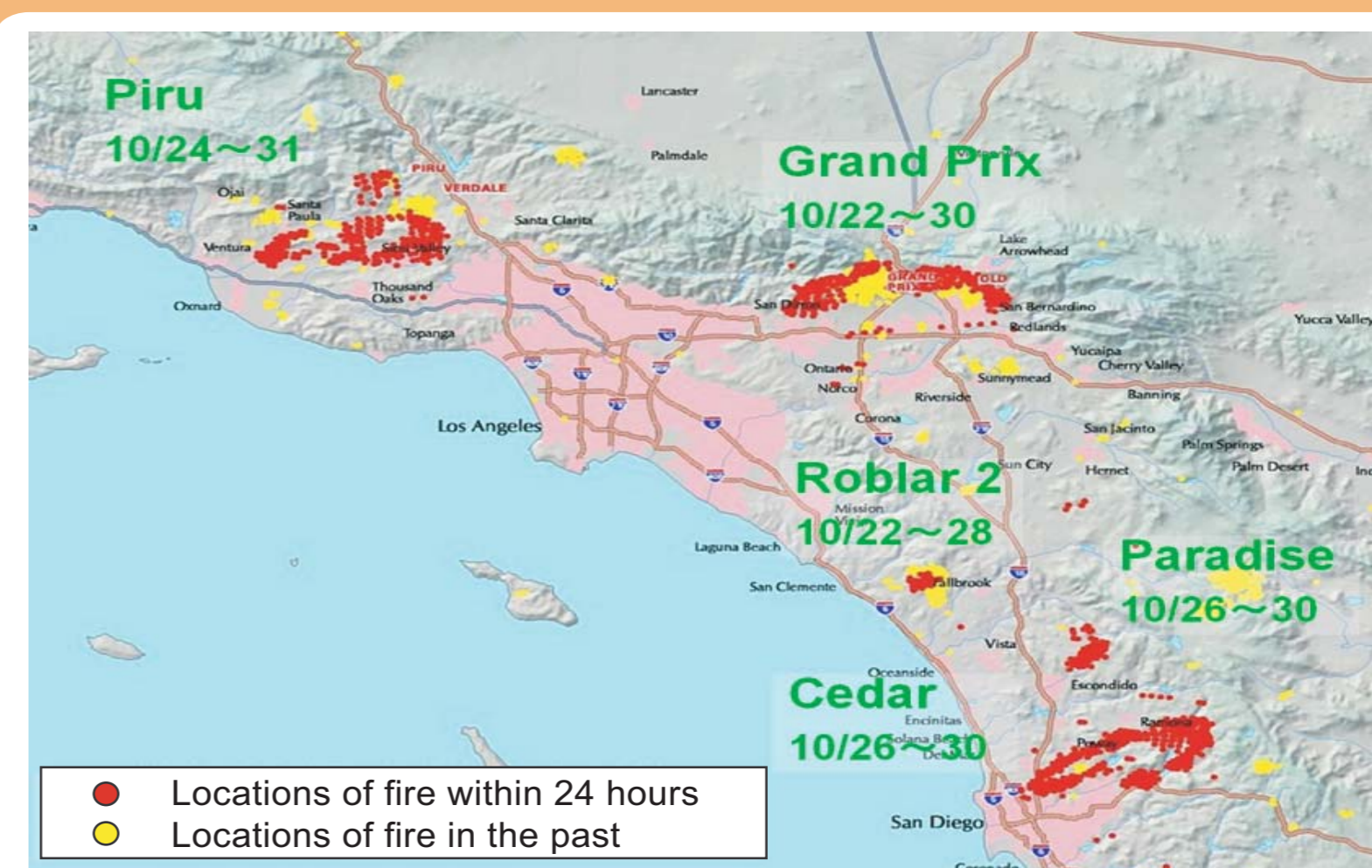
Real time meteorological data are useful for monitoring and predicting material transport. Illustrated is an example of the California Forest Fire in 2003 compared with satellite observations.

Phylogenetic Inference on the Universal Tree of Life

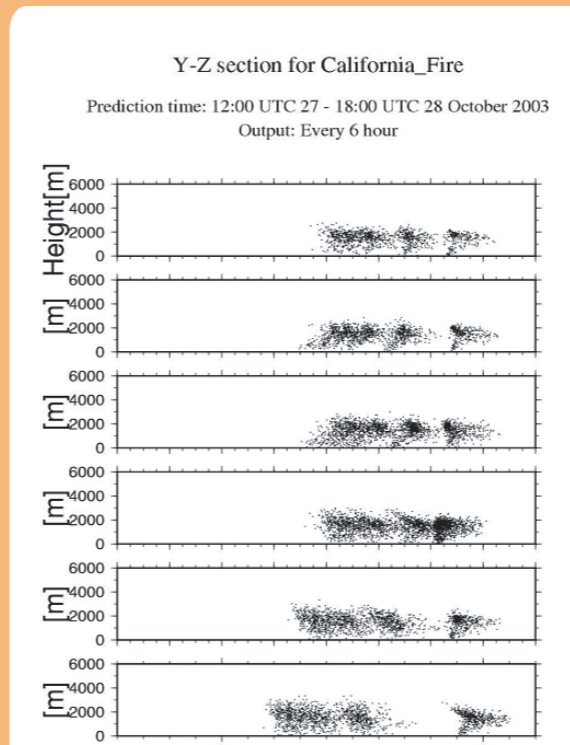
The central focus of our research is to gain insight into origin and early evolution of eukaryotes, the most important open problem in evolutionary biology. One of the goal of this research is to reconstruct the Universal Tree of Life including diverse organisms on the earth, based on molecular phylogenetic approach. Since a reliable phylogenetic inference simultaneously requires numerous genes and species, a large scale data analysis using high performance computers plays a key role in our study.



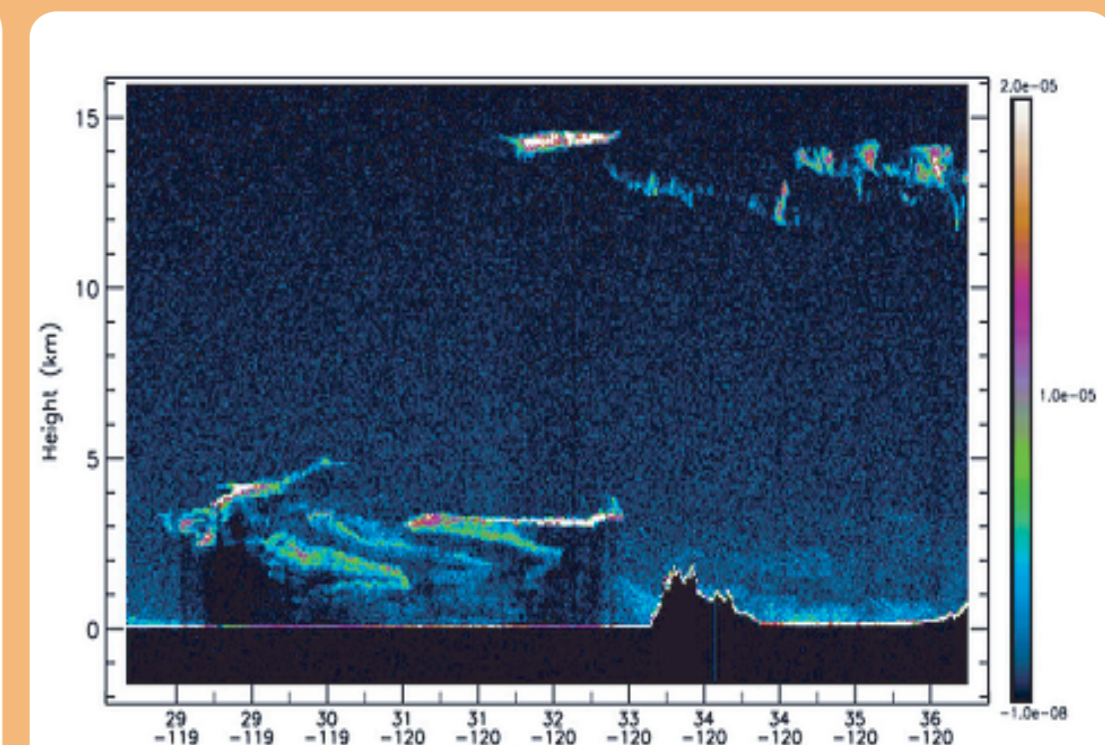
California Forest Fire



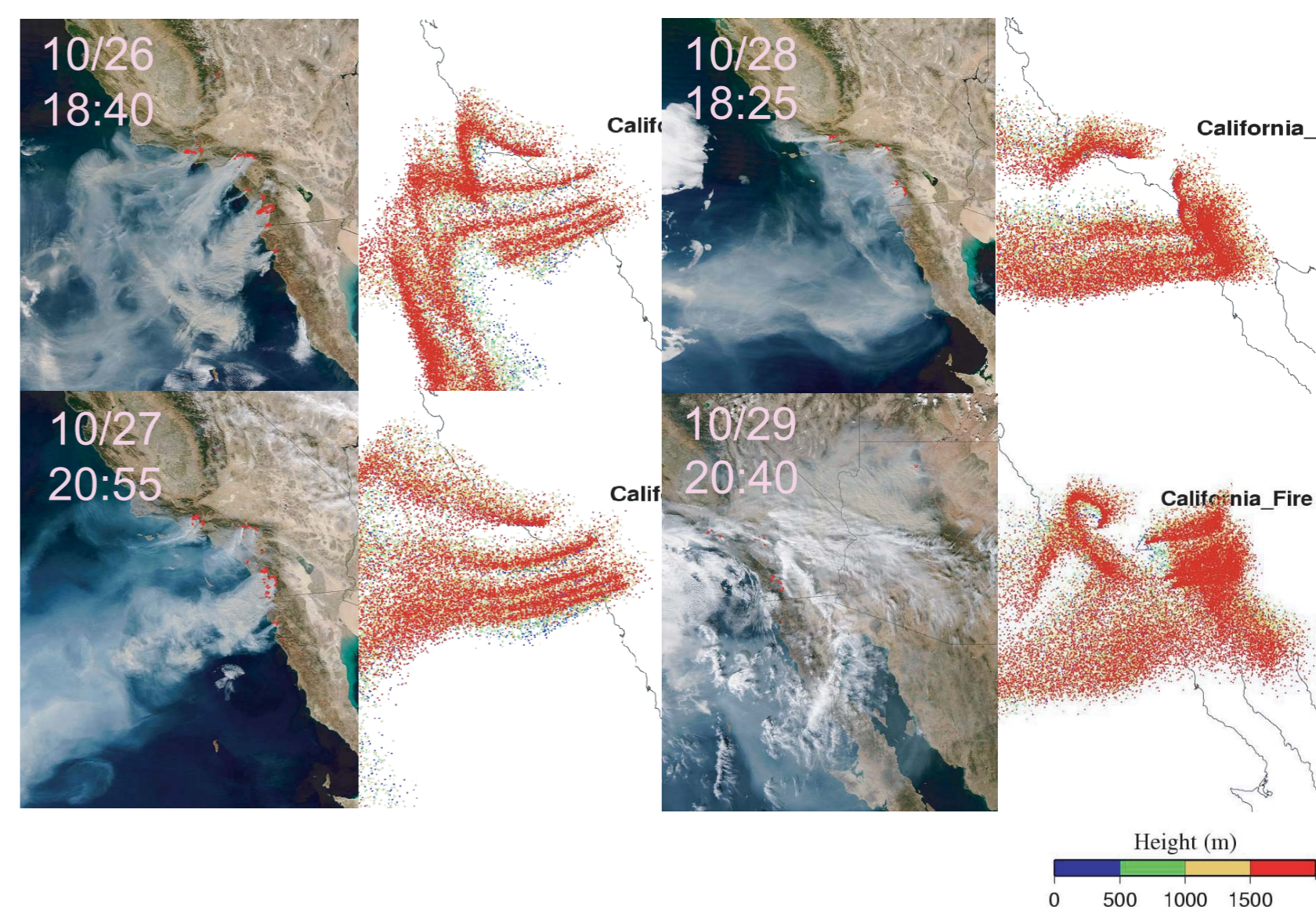
Distribution of forest fire in California October 2003.



Vertical distribution of the simulated ash.



Vertical image of the ash by lidar. (10/28 4:00)



Satellite images and simulated ash distributions from the forest fire.