Using Trajectories as an Air Transport Database for Studies of Atmospheric Monitoring

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At the Center for Global Environmental Research (CGER), National Institute for Environmental Studies (NIES), Japan, we developed a trajectory calculation program, called Meteorological Data Explorer (METEX) for personal computers to archive and analyze airflow patterns for monitoring stations of CGER/NIES. The program can use meteorological datasets from the National Centers for Environmental Prediction (NCEP), the European Centre for Medium-Range Weather Forecasts (ECMWF), and the Japan Meteorological Agency (Figure 1). Because of the open policy and the easy accessibility of NCEP data set, the program is also being used by several universities and local organizations in Japan for studies related to air transport. While air trajectories provide useful information for the sources of greenhouse gases (Figure 2), evaluating initial conditions for trajectory calculation is important for applications. This presentation introduces results of our studies on the subject and our ongoing effort to construct a database of air transport for online access by researchers of NIES. METEX is free and can be downloaded from http://www-cger.nies.go.jp/ publication/M014/metex-home/metex/.
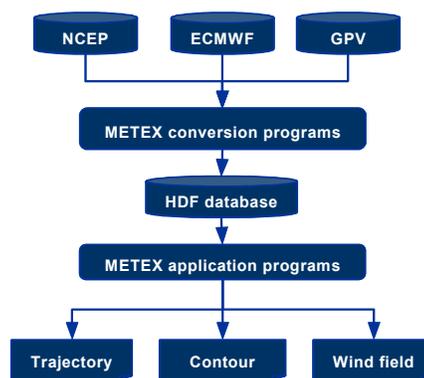
Figure 1. METEX converts meteorological data in various formats to the Hierarchical Data Format (HDF) of the National Center for Supercomputing Applications for trajectory calculation and for the visualization of meteorological parameters.
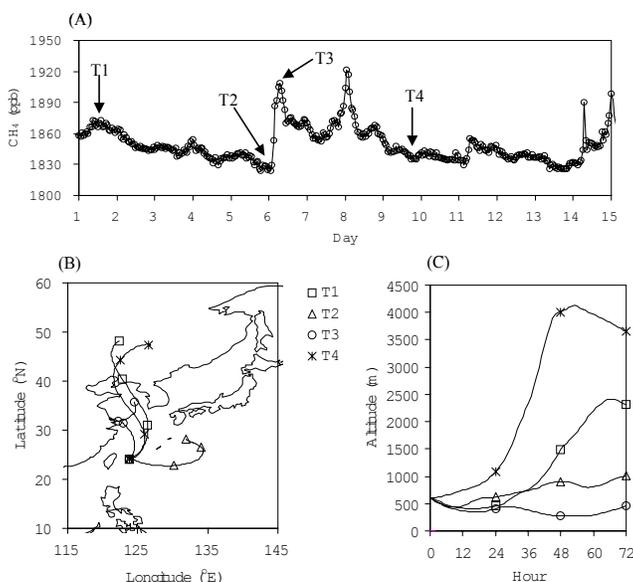
Figure 2. Time series change of methane and trajectory. (A) Hourly variation of methane from February 1 to 15, 2000. (B) 3-day backward trajectories corresponding to marked observations at T1 to T4; (C) Change of trajectory altitude with time [Zeng et al., *Atmos.Env., 37*, 1911-1919, 2003].