Geoscientific
Model Development

Supplement of

Image-processing-based atmospheric river tracking method version 1 (IPART-1)

Guangzhi Xu et al.

Correspondence to: Guangzhi Xu (xugzhi1987@gmail.com)

Supplementary materials to Image Processing Based Atmospheric River Tracking Method Version 1 (IPART-1)

August 4, 2020

1 Evolution sequences of some selected AR tracks
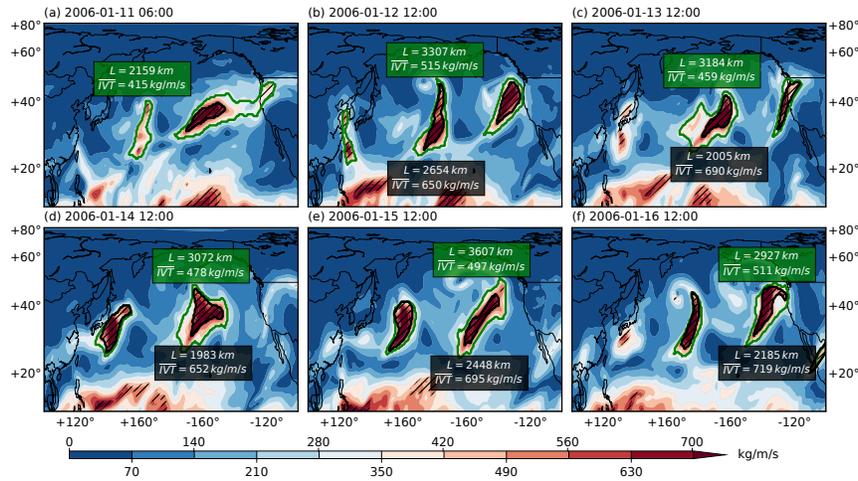
Figure 1: IVT distribution snapshots following an selected AR track from 2006-01-11 06 UTC in (a) to 2006-01-16 12 UTC in (f). ARs found by the THR-t4-s6 method are drawn in green contours, and those by IVT250ano method in black contours. Hatching indicates areas where the IVT anomalies are above the $250\,kg/m/s$ threshold. Length (in km) and averaged IVT (in $kg/m/s$) of the selected AR are labelled in a green box for the THR method, and a black box for the IVT250ano method.
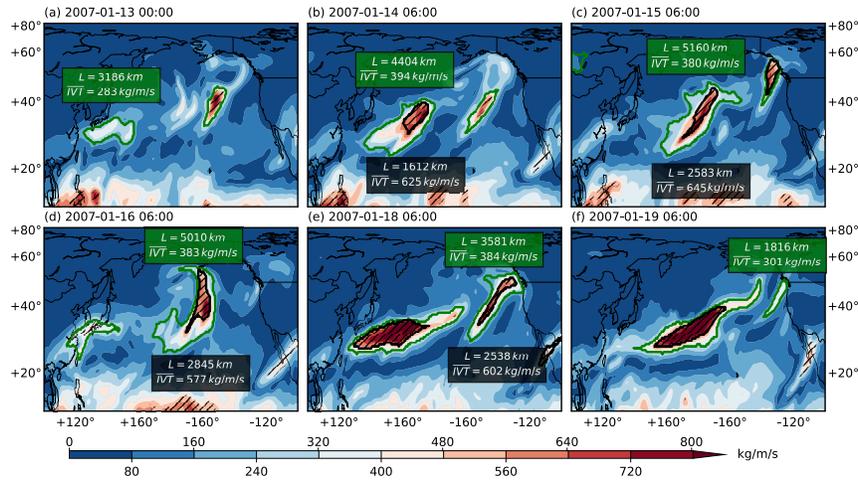
Figure 2: Similar as Fig.1 but for an AR track during 2007-Jan.
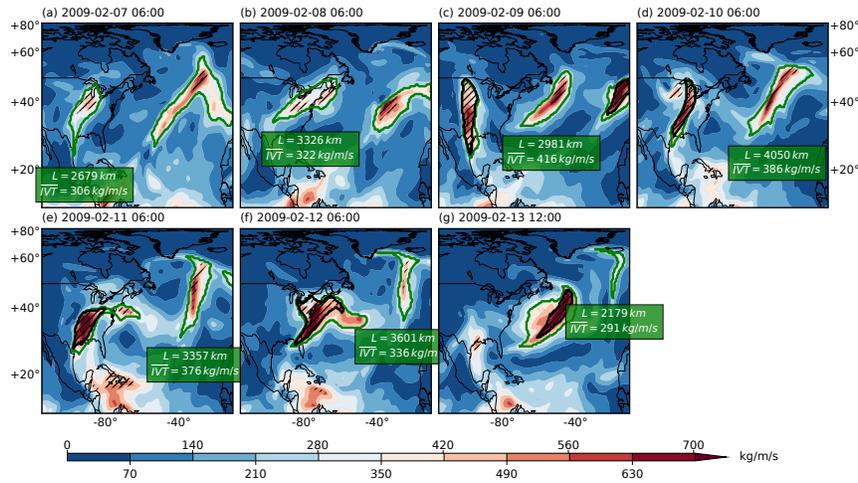
Figure 3: Similar as Fig.1 but for an AR track during 2009-Feb over North Atlantic.

2 Axis-finding examples
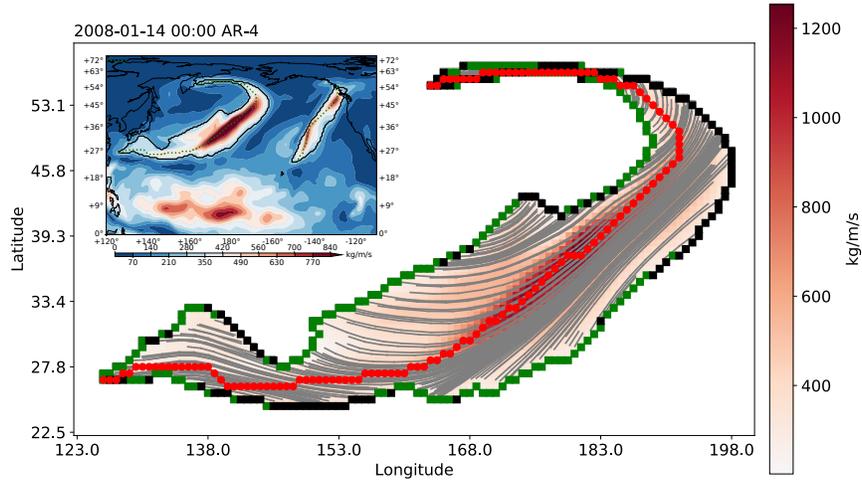
Figure 4: Application of the axis finding algorithm on the AR in the North Pacific, 2008-Jan-14 00 UTC. IVT within the AR is shown as colors, in $kg/m/s$. The IVT streamlines inside the region of the AR are drawn as grey curves. A square marker is drawn at each boundary node, and is filled with green if the boundary node has net input moisture fluxes ($n_i \in L_{k,in}$), and black if it has net output moisture fluxes ($n_i \in L_{k,out}$). The found axis is highlighted in red. The inset image shows the IVT distribution over North Pacific with the detected ARs highlighted in black contour.
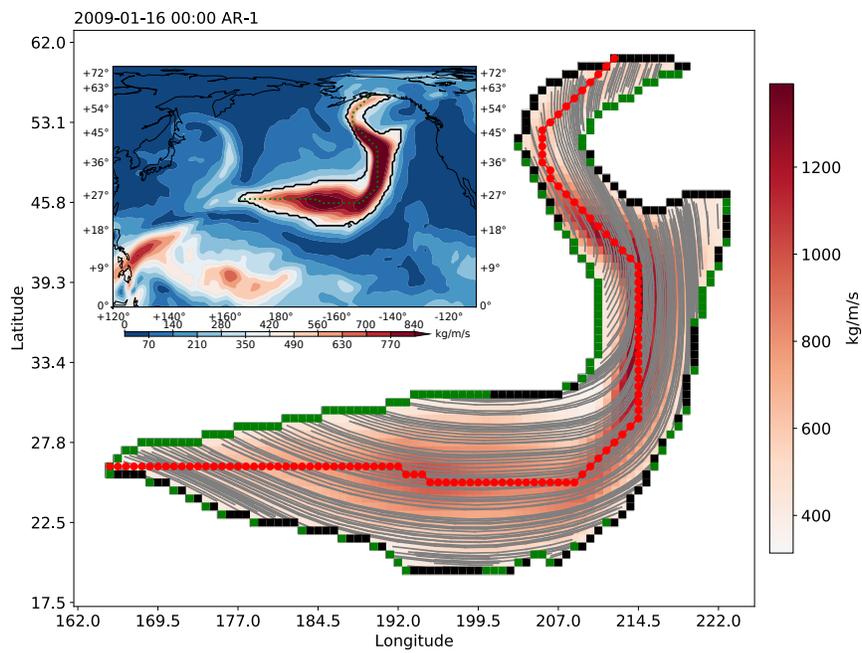
Figure 5: As in Fig. 4 but for an AR at 2009-01-16 00 UTC.
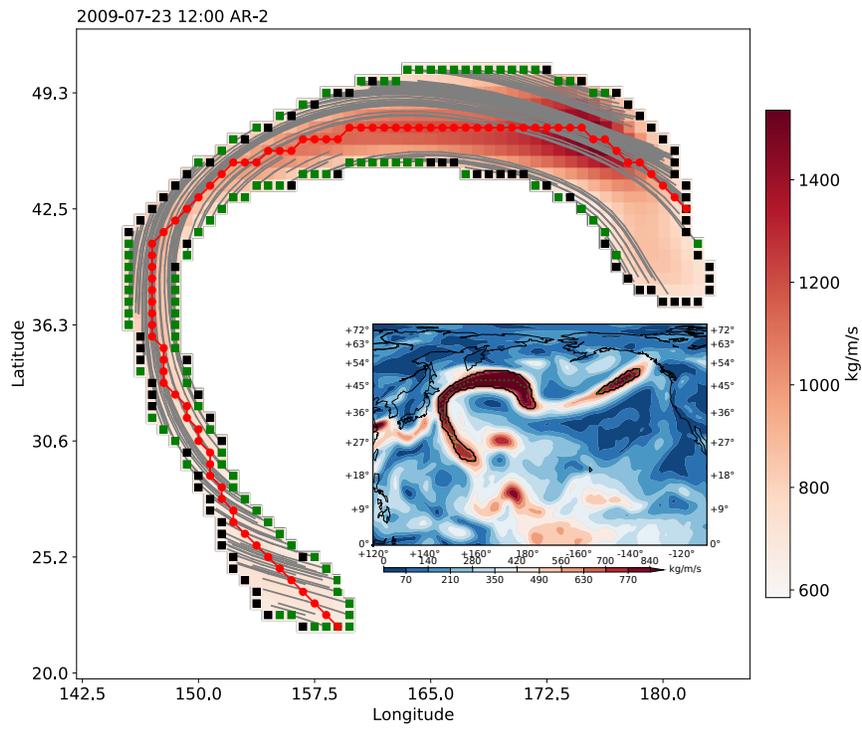
Figure 6: As in Fig. 4 but for an AR at 2009-07-23 12 UTC.

In all these three examples, the identified axes follow the general flow direction inside the ARs as represented by the streamlines. The directed path design makes sure that it never goes out of the AR boundary.