ERRATA, McIntyre and Roulstone preprint:

A few typographical errors have come to our attention, and one substantial mistake. On pages 8 and 34 we claim that the balanced model having canonical coordinates $\mathbf{X}$ of the simple form (6) with $\gamma = i\sqrt{3}$ gives one further formal order of accuracy in Rossby number Ro, as compared with semigeostrophy and L_1 dynamics. This is wrong. The new model is still likely to be, in a numerical sense, substantially more accurate than the other two; but it fails to reach the next order in Ro except when vortex interaction timescales are long, of order Ro^{-1}, that is, in near-steady conditions. A model fully consistent to two orders in Ro now appears unlikely to have simple canonical coordinates $\mathbf{X}$, and certainly cannot have near-local ones.

We are indebted to John Allen, John Norbury and Tom Warn for pointing this out.

p. 11, equations (11)ff: The left hand sides should more logically have superscript C.

p. 13, 3rd last line of 2nd last paragraph: Delete ", the force on the i^{th} particle,"

p. 26, equation (86): The strange mark two-thirds of the way along is meant to be $\mathbf{x}$ ($\mathrm{d}\mathbf{x} \leftarrow \mathrm{d}m$ in the middle member of the equation).

p. 27, line below (90): "replaces (85)" $\rightarrow$ "replaces (87)"

Next paragraph, first line: "(88)–(90)" $\rightarrow$ "(85) and (87)"

p. 38, line 5 of last big paragraph: Tangent vectors in phase space are of course displacement *fields* in the physical domain $\mathcal{D}$. Also, in some versions, 'ring' of particles is more aptly replaced by 'disk or ring'. We have not been able to find this argument in the literature; if it has been published, any clues where to look would be appreciated.

p. 39, 2nd last line of section 11: "..., replacing the small ring of particles by a finite circuit, and using a single $\delta^{\mathrm{L}}\mathbf{x}(\mathbf{a})$ consisting of a field of small displacements around that circuit. A closed loop in phase space is a sequence of states generated by repeatedly applying such a displacement field until each particle ends up where it started on the physical-domain circuit; thus the relative integral-invariant is a corresponding sum of contributions each of which is proportional to (135). Therefore (135) itself is constant. An equivalent argument is to be published...."

Thanks also to Nancy Nichols, Rick Salmon and Jürgen Theiss. The above is being posted on the Internet, together with the preprint itself, at the sites

`http://www.atmos-dynamics.damtp.cam.ac.uk` and
`ftp://ftp.damtp.cam.ac.uk/pub/papers/mem/hamilton-balance*`

MEM, IR
27 Sept. 1996