A Cartographic Ode to Chapman: A Revised Regional Depiction of Postglacial Landscape Evolution in the Champlain Valley
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BACKGROUND
In the years following Donald Chapman’s seminal 1937 publication on the postglacial history of the Champlain Valley, numerous authors have developed improved age constraints and described new techniques for estimating the spatial extent of Glacial Lake Vermont and the Champlain Sea. However, Chapman’s maps simply represent the most comprehensive and regionally detailed postglacial lake maps throughout the Champlain Valley. Existing maps lack the necessary detail to provide useful correlations of the relationship between postglacial landscape evolution and modern land use activities in the Champlain Valley.

Inspired by work depicting the extent of Pleistocene lakes in the Western Great Basin, we offer a post-Chapman cartographic synthesis of ~100 years of research within the Champlain Valley. Our compilation suggests further refinement is needed within smaller arms of each lake level depicted extending into modern stream valleys and tributaries that now drain into Lake Champlain. A combination of shoreline features identified by earlier workers, new lidar products and up-valley interpolation of fluvial-deltaic sandplains may provide additional information.

Inspired by work depicting the extent of Pleistocene lakes in the Western Great Basin, we offer a post-Chapman cartographic synthesis of ~100 years of research within the Champlain Valley. These data include:
1. Stratigraphic features constraining the extent of lake margins extracted from existing historical literature, surficial mapping efforts, and interpretations of recent LIDAR products (Prest and Allego, 1969; Chapman, 1937; Connally and Sirkin, 1971; Prest, 1970; Berry, 1972; Morgan, 1972; Lanyon, 1967; Danesi, 1980; Franzi et al., 2002; Larson et al., 2010; Chickering et al., 2010; Rayburn, 2004; De Simoni, 2008; Franz, 2007; Leverington, 2007; Wright, 2011; Springston et al., 2015 and others).
2. The spatial extent of the Champlain and Fort Anne Stages of Lake Vermont and the extent of the later Champlain Sea was reconstructed using these stratigraphic features to interpolate a trend surface covering the entire region of interest. These surfaces were then subtracted from an ~5 meter DEM representing modern topography and the difference between the two was digitized to great extent. The resulting layer represents the inferred extent of each former lake level and follows a similar approach as Leverington et al. (2002), Bellido et al. (2004), Dake et al. (2008), and Breedlove (2010).
3. Verne sampling sites and marine fossil biotopes were obtained from Artemis, 1960; Rayburn, 2011; and Denny (1967, 1970).
4. Reconstructions based on marine and terrestrial data. Conventional lake-level data were obtained from Rebuffel and Lynch, 2007; Franzi et al., 2007; Rayburn et al., 2011; Frenzes et al., 2014; and Franzi et al., 2015.
5. Glacial ice margins were reconstructed based on surficial mapping and interpretation of aerial photography and LIDAR derivatives using Denny, 1970; Franzi, 1992, and Kranitz et al., 2014.
6. The extent of inferred exuvipale lake levels was reconstructed by Kolditz et al. (2014) using a trend surface - controlled by key data points.

FUTURE WORK
Although Chapman’s work was incredibly detailed and accurate given component to modern mapping techniques, there remains a lot of work left in producing an accurate representation of the spatial extent of glacial and post-glacial lakes in the Champlain Valley. This synthesis highlights the need to: (1) improve our understanding of glacial margins extending across Vermont; (2) further refine the extent of each lake levels within adjacent valleys to account for post glacial basin down cutting; (3) produce equivalent data plan in west Adirondacks along lake margins within Vermont; (4) develop an equivalent database for marine fossils within Vermont; (5) further discriminate between dates associated with specific lake levels, and (5) continue to add additional features to the existing databases as new data products become available in both New York and Vermont.

REFERENCES
Cronin (1977)
Cronin et al. (2008)
Ridge et al. (1999)
Peet (1904)
Chadwick (1928)
Merwin (1908)
Richard and Occhietti (2005)
Peet (1904)
Rayburn (2004)
Richard and Occhietti (2005)
Cronin (1977)

METHODOLOGY
This map integrates information from a variety of primary and secondary data sources related to the postglacial landscape of the Champlain Valley with specific emphasis on the spatial extent of Lake Vermont and the Champlain Sea. These data include:
1. Stratigraphic features constraining the extent of lake margins extracted from existing historical literature, surficial mapping efforts, and interpretations of recent LIDAR products. These data were then combined with aerial photography and LIDAR derivatives using Denny, 1970; Franzi, 1992, and Kranitz et al., 2014.

Figure 4: Time-slices of cartographic representations of Lake Vermont and Champlain Sea, including maps from Chapman’s seminal 1937 publication: Late-glacial and postglacial history of the Champlain Valley.