$$H^*(\Omega^2 S^{2n+1}; Z_{(p)}) = \mathrm{Tor}_{\Gamma[x]}(Z_{(p)}, Z_{(p)})$$

$$\Gamma[x] = H^*(\Omega S^{2n+1}; Z_{(p)}) =$$

$$\langle 1, x = \gamma_1(x), \gamma_2(x), \dots \rangle, \quad \gamma_i(x) = \frac{x^i}{i!},$$

$$\gamma_i(x)\,\gamma_j(x) = \frac{(i+j)!}{i!\,j!}\,\gamma_{i+j}(x).$$

<u>free</u> <u>$\Gamma(x)$</u> <u>resolution</u> $= R$:

dimen	0	$2n-1$	$2n$	$4n-1$	$4n$	... $2pn-2$	$2pn-1$	$2pn$
basis	1	y	x	yx	x^2	w	yx^{p-1}	γ_p
							z	

differentials: $d1 = 0$, $dy = x$, $dz = \gamma_p$, $dx = 0$, $dyx^k = x^{k+1}$,
$dw = p!\,z - y\,x^{p-1}$

$R \otimes_{\Gamma[x]} Z_{(p)}$:

basis $1, y, w, z$

differentials: $d1 = 0$, $dy = 0$, $dw = p!\,z$

$$\therefore \; H^{2pn-1}(\Omega^2 S^{2n+1}; Z_{(p)}) = Z/p!$$

$$\therefore \; H_{2pn-2}(\Omega^2 S^{2n+1}; Z_{(p)}) = Z/p!$$

$= (\text{loc at } p)\ Z/p.$